

63951

# Saracen Archery

AN ENGLISH VERSION AND EXPOSITION OF A  
MAMELUKE WORK ON ARCHERY

(ca. A.D. 1368)

*With Introduction, Glossary, and Illustrations*

BY

J. D. LATHAM, M.A., D.Phil. (Oxon.)

AND

LT. CDR. W. F. PATERSON, R.N.

IX  
908  
9



THE HOLLAND PRESS  
LONDON

First published in Great Britain  
by The Holland Press Limited  
112 Whitfield Street, London, W.1

© 1970 J. D. Latham and W. F. Paterson

# ERRATA

- P. xiv, line 6, for *-āt* read *-at*.  
P. xxxvi, line 25, for "origina" read "origin".  
PLATE SEVEN B, last line far left, for "one" read "Bone".  
P. 155, line 27, for *ustādh* read *ustād(h)*; for *munta(h)* read *muntah*.  
P. 161, last line, for *usfur* read *usfür*.  
P. 166, line 11, before "the third" insert "lies below".  
P. 181, line 23, after "Pers." insert "*dast -āl* (cf. *changāl*, *danbāl*, &c.) 'arm', or".  
P. 200, 9 lines from bottom, for "5539" read "5538".  
P. 205, lines 11 & 12 from bottom, for "Raffā" read "Raffā'".

Printed in Great Britain  
by Ebenezer Baylis & Son Ltd  
The Trinity Press, Worcester, and London  
and bound by Mansell Ltd, London

# CONTENTS

ACKNOWLEDGEMENTS	Page ix
PREFACE	xi
NOTE ON THE transliteration AND PRONUNCIATION OF ARABIC WORDS	xiii
DATES	xv
BIBLIOGRAPHY	xvii
INTRODUCTION	xxiii
NOTES TO INTRODUCTION	xl
THE DOXOLOGY	i
Chapter	
1 THE AUTHOR'S INTRODUCTION	3
2 THE PILLARS OF ARCHERY	5
3 ON BOWS	6
4 ON BOWSTRINGS	20
5 ON ARROWS	24
6 ON THUMB-GUARDS	34
7 ON THE FUNDAMENTALS OF ARCHERY	37
8 ON GRASPING THE BOW	42
9 ON NOCKING	47
10 ON LOCKING AND COUNTING	51
11 ON DRAWING THE BOW	56
12 ON SIGHTING	58
13 ON THE LOOSE	64
14 ON THE FOLLOW-THROUGH	68
15 ON SHOOTING FROM HORSEBACK	71



## CONTENTS

16	ON SHOOTING THE STIRRUP CROSSBOW FROM HORSEBACK	85
17	ON BRACING THE BOW	90
18	ON STANDING BEFORE THE TARGET	101
19	ON FLIGHT SHOOTING	104
20	THE LIST OF THIRTY-FOUR POINTS	111
21	ON FAULTS AND INJURIES TO WHICH ARCHERS ARE EXPOSED	115
22	ON ADJUSTMENTS REQUIRED BY DIFFERENT PHYSIQUES	122
23	THE SYSTEMS OF THE GREAT MASTERS OF ARCHERY	130
24	ON THE ARCHER'S NEED TO RECOGNIZE HIS FAULTS AND KNOW THE CORRECT USE OF HIS ARMS	136
25	MISCELLANEOUS TECHNIQUES AND DEVICES	137
26	ON SHOOTING WITH AN ARROW-GUIDE	145
27	ON THE PROCEDURES, CONDUCT, AND PRINCIPLES TO BE OBSERVED BY A NOVICE	152
28	ON THE DUTIES AND QUALITIES OF A MASTER AND TEACHER	157
APPENDIX 1 Weights and Measures		159
APPENDIX 2 The Bow: Terminology		161
APPENDIX 3 Arrows: Terminology		164
APPENDIX 4 Finger-reckoning		167
APPENDIX 5 The Reconstruction of Taybughā's Bow		170
APPENDIX 6 <i>Qabaq</i> and <i>Qighaj</i>		172
GUIDE TO ENGLISH TECHNICAL TERMINOLOGY		174
ARABIC-ENGLISH GLOSSARY		178
NOTES AND REFERENCES		195
INDEX OF SUBJECTS		209
OF PLACES AND PEOPLE		214
OF TECHNICAL TERMS		216

## ILLUSTRATIONS

## PLATES

<i>Frontispiece</i>	Bahrām Gūr hunting
<i>(Between pp. 136 and 137)</i>	
PLATE ONE	Ornamental bookplate
PLATE TWO	Turkish flight bows
PLATE THREE	Ambassador presenting bows to Akbar
PLATE FOUR	Portrait of Hulagu
PLATE FIVE	Bowstring loop-knots
PLATE SIX	Arrowheads
PLATE SEVEN	Thumb-rings
PLATE EIGHT	The draw of '69' and the grip of '30'
PLATE NINE	Gold finger-tips
PLATE TEN	The Sasanid Nūshīrvān displaying his prowess
PLATE ELEVEN	Mounted archers engaging defenders on a wall
PLATE TWELVE	Mounted archer
PLATE THIRTEEN	Sultan Murād II shooting at the <i>qabaq</i>
PLATE FOURTEEN	Mounted archers using the <i>jarmakī</i> technique
PLATE FIFTEEN	Georgians shooting at the mast
PLATE SIXTEEN	Archers attacking a fort
PLATE SEVENTEEN	Korean arrow-guide
PLATE EIGHTEEN	Reproduction of Mameluke bow

## FIGURES

Figure		Page
1	Thumb loose	xxv
2	Composite bows	xxvi
3	Crossbows	xxx
4	Crossbow nut	xxxii
5	Parts of a composite bow	7
6	Grip of an Indo-Persian bow	9
7	Wooden core of a composite bow	12
8	Methods of splicing	13
9	Wooden core with horn applied	14
10	<i>Siyah</i> of a Bashkir bow	15
11	Cord and pulley	18
12	Weighing a bow	21
13	Bowstring loop-knots	23

Figure		Page
14	Arrow shafts	24
15	Arrowheads and nocks	25
16	Parts of a feather	32
17	Thumb-guards	35
18	Parts of the hand	42
19	Grasps on the bow	43
20	The 'Falcon's Talons'	44
21	Nocking	47
22	Locking and counting	52
23	Sasanid lock	53
24	Aiming: 'inside' and 'outside'	59
25	Aiming: external	62
26	The follow-through	70
27	Shooting rearwards from horseback	74
28	Shooting from horseback	81
29	Drawing-strap	85
30	Crossbow with retaining-clip	87
31	Bracing: military method	91
32	Bracing: on horseback	92
33	Bracing: in squatting position	93
34	Bracing: with an assistant	93
35	Bracing-board	94
36	Bracing a stiff bow	95
37	Bracing with drawing-strap	95
38	Bracing: Assyrian archer	97
39	Bracing: Scythian archer	98
40	The <i>siper</i>	107
41	Twisting the thumb	120
42	Stance: oblique and square	123
43	Drawing: oblique and square	124
44	Grasps: square and oblique	128
45	Methods of the Masters	131
46	Shooting when wearing a helmet	133
47	Razor- and nockless arrows	139
48	Egg-and-pellet	140
49	<i>Shāh Mijrāt</i>	145
50	'Long-nosed' guide	146
51	Stirrup-guide	147
52	Arrow-guide	148
53	Slotted guide	150
54	The bow: terminology	162
55	Parts of an arrow	165
56	Finger-reckoning 1 to 9	168
57	Finger-reckoning (tens) 10 to 90	169

## ACKNOWLEDGEMENTS

It is a pleasant duty to acknowledge all those who have assisted us in any way in our preparation of this book. On the practical and technical side we must, first and foremost, mention Mr. M. T. Hallam for the special bow which he so kindly and skilfully constructed to enable us to apply the acid test of field trials to our Mameluke writer's instructions. Without this bow, which has sturdily stood up to deliberate misuse and violent treatment for more than four years, many technical problems may never have been solved. Hardly less great is our debt to Mr. E. McEwen whose knowledge of Oriental composite bow design he patiently combined with his experience as a craftsman to prove by a first-class reconstruction that Taybughā's specifications for the best Mameluke bow of his day were indeed realistic. For practical advice on mounted archery, cavalry techniques, and equestrian matters generally, we are indebted to Colonel G. S. Courtney, O.B.E., and Mrs. Barbara Low. Valuable comments and suggestions on the technical aspects of archery have been made by many others with whom we have discussed our subject and, although we hesitate to single out names, we feel that it would be an injustice not to express especial thanks to Messrs. J. Flinton, G. F. Glover, E. G. Heath, D. S. Skinner, J. R. Wiggins, and Dr. D. J. F. Hill.

On the Arabic and Islamic side our greatest debt is to Professor C. F. Beckingham, Head of the Department of the Near and Middle East, School of Oriental and African Studies, University of London, who has very generously devoted a good deal of his valuable time to reading our typescript and making corrections and constructive criticism. It goes without saying that none of our errors are his—or indeed anyone else's—responsibility. In matters of weights and measures we acknowledge with gratitude the advice and assistance of Professor W. Hinz of Göttingen University; for resolving certain palaeographical problems we are grateful to Dr. S. M. Stern of All Souls College, Oxford; for valuable suggestions and advice on points of detail we owe particular debts to Professors D. Ayalon, A. F. L. Beeston, J. A. Boyle, the late V. Minorsky, J. Robson, J. Schacht, and Drs. H. H. Al-Hamdani, A. A. Kafrawy, M. Mowafy.

For permitting us to utilize manuscript materials and providing us with photostats, microfilms, and reproductions we express sincere thanks firstly to the British Museum and members of its staff, notably Dr. M. Lings and Messrs. G. Meredith-Owens and R. H. Pinder-Wilson, who have rendered generous service in many different ways. We next express our gratitude to the Aya Sofya and Topkapı Sarayı libraries (Istanbul), the Bibliothèque Nationale (Paris), the Bibliothek der Rijksuniversiteit (Leiden), the Bodleian Library (Oxford), Cambridge University Library, the Chester Beatty Library (Dublin), Edinburgh University Library, and Manchester University Library. We must at the same time thank Mr. W. Brice, Dr. Susan Skilliter, and Professor Beckingham for the time and trouble they took in seeking out manuscripts and obtaining microfilms for us during their travels in Turkey and elsewhere.

To Mrs. E. Simon, President of the Society of Archer-Antiquaries, we express our gratitude for her kindness in granting us access to manuscript notes on composite bows made by her late husband, Mr. Ingo Simon. Last, but by no means least, we wish to say how grateful we are to Dr. A. L. S. M. Lutful-Huq and the University of London for allowing us to consult and utilize his unpublished edition of the *Nihāyat as-sūl*.



## PREFACE

Conceived as a contribution to the history of archery, this book is primarily intended for the toxophilite whose spirit of inquiry carries him beyond the sphere of archery as a modern sport into the world of the medieval warrior, for whom the bow was very much more than a pastime. The hard core of the book consists of the translation and exposition of a work in Arabic written less than a century after the Saracen recapture of Acre. Of major importance for a fuller understanding of the weapons, training, techniques, and skill of the fourteenth-century Mameluke bowman and, in particular, his remarkable dexterity as a horse archer, the work affords a deeper insight into some technically significant factors underlying the success of Central Asian military irruptions into the Middle East. Those interested in Islamic miniatures will welcome the light it sheds on a number of technical details frequently depicted in the hunting and battle scenes so dear to the Muslim illuminator, while lexicographers will perceive from our glossary that it has something to contribute to existing Arabic dictionaries. The subject matter of the work, then, is of more than marginal relevance to Arabic and Islamic studies, and, this being so, we have considered the needs of the orientalist as well as those of the archer. To please two groups of persons with such widely differing backgrounds and interests as those dividing the majority of our readers will not be easy, and we are only too well aware that we shall satisfy only some of the people some of the time. Our Arabic-English glossary, for instance, may seem to the archer to go somewhat beyond his requirements, and, elsewhere in the book, he may not appreciate the occasional discussion of some Arabic, Persian, or Turkish term. If so, we beg his indulgence and plead the inadequacy of the dictionaries for the understanding of Mameluke archery literature. For his part, the orientalist may wish that we had included, say, a study of Taybughā's sources or extended the scope and character of the glossary. If so, we plead the limitations of space which impose the need for priorities. Finally, if to either party we seem to make points that are elementary in the eyes of the one, it should be recognized that they are made for the sake of the other.

The complete absence of any edition of the Arabic text to serve as the basis of our work necessitated the investigation of a comparatively large number of manuscripts. For reasons which our introduction makes obvious, the problems they posed could not be passed over in silence, and they have therefore been the subject of a discussion which will perhaps be of little direct interest to the archer or more general reader. Again, the lack of a published Arabic text and the existence of a complexity of manuscripts have combined to impose the necessity of furnishing manuscript references. To remove the distraction which they might have inflicted if recorded in footnotes, they have been relegated to the back of the book together with such explanatory notes or supplementary materials as seemed to us, for one reason or another, to be out of place in the main body of our work.

## NOTE ON THE TRANSLITERATION AND PRONUNCIATION OF ARABIC WORDS

In conformity with modern scholarly practice Arabic words and phrases are transliterated according to a system which will be meaningful to all Arabists and familiar to most other serious students of Islamic civilization and culture in the Middle East. The complete layman will be grateful for the following hints:

### Short Vowels

*a* is pronounced as in *pat*.

*i* is pronounced as in *pit*.

*u* is pronounced as in *put*.

### Long Vowels

*ā* is pronounced as in *far*.

*ī* is pronounced as *ee* in *sheet*.

*ū* is pronounced as in *lunar*.

### Consonants

*ḍ*, *ḡ*, *ṣ*, *ṭ*, *ẓ* are difficult letters and are better pronounced as their nearest English equivalents, viz. *d*, *g*, *s*, *t*, *z*, than as the retching, spluttering, or choking sounds so often emitted even by tutored students of Arabic.

*dh* is pronounced as *th* in *the*.

*gh* represents a guttural *r* somewhat like the burred *r* of Northumbrian English and northern French.

*kh* is pronounced as *ch* in the Scottish *loch*.

*sh* is pronounced as in *shout* EXCEPT when the second letter is *h*, in which case the two letters are pronounced independently of one another, as, for instance, in the case of *Ishāq* (pron. *Iss-hāq*).\*

*th* is pronounced as in *thing*.

(<sup>ˈ</sup>) is the glottal stop, or a catch of the breath, such as that replacing the *r* in Cockney, Glaswegian, and Mancunian pronunciations of *water* (wa'er), *butter* (bu'er), etc. It is the sound we hear after *n* in *an ice cream* which, if pronounced without the glottal stop, gives us *a nice cream*.

(<sup>ʔ</sup>) is a strong guttural peculiar to Arabic and not unlike a forceful glottal stop (<sup>ˈ</sup>) articulated in the depths of the throat. It is *not* a vowel.

**Doubled Consonants.** These should be pronounced as such. Thus, *tt* must be pronounced not as in *better*, but as the two *ts* in *cat tails*, and *shsh* as in *dish shelf*.

\* The same applies to *dh*, *kh*, and *th*. On occasions *h* may also have to be pronounced independently, but this point need not concern us.

*The Arabic Article (al, l).* This is assimilated to a following *d, ḍ, dh, n, r, s, sh, ṣ, t, th, ḫ, z, ẓ*; Exx.: *adh-dhirā'* (not *al-dhirā'*), *ar-radīf* (not *al-radīf*). When a preceding word ends in a vowel, the 'l' form is used, the antecedent vowel replacing the *a* in *al*. Thus, *wa-l-bayt*, not *wa-al-bayt*.

*The Feminine Ending -ah.* When followed by a noun in the genitive, the feminine form ending *-ah* becomes *-āt*. Thus *'uqdat al-ibhām* (not *'uqdah al-ibhām*) 'the joint of the thumb'. The *h* is not pronounced and, in fact, many writers omit it altogether.

In Turkish there are two 'i's, one dotted the other not.

## DATES

Since there are some who may not know that Muslims have their own calendar, we draw attention to the fact that dates in Muslim Arab sources are normally given according to the lunar years of the Hegira (*hijrah*) era (indicated by the abbreviation A.H.) which is reckoned from 16 July, A.D. 622. Since it is rare for a Muslim year to fall wholly within a single Christian solar year, it is not possible, unless an author specifies the day and month, to indicate which of two possible Gregorian years is involved. It is for this reason that the reader will find, for instance, that the Muslim years 764-78 are expressed as A.H. 764-78/1362-3—1376-7. All dates without any indication to the contrary are to be taken as A.D., and, where an oblique stroke intervenes between any two dates, the first is that of the Muslim year.

# BIBLIOGRAPHY AND ABBREVIATIONS

(The key to periodical abbreviations will be found in section ii.)

i

- Acker, W. R. B., *Japanese Archery*, Rutland, Vt., and Tokyo, 1965. First published as *The Fundamentals of Japanese Archery*, Kyoto, 1937.
- Anderson, G. L., 'Turkish Archery', in *British Archer*, vol. 16, Dec.-Jan. 1964-5, pp. 150-51.
- Arab Archery* = Faris, N. A. and Elmer, R. P., *Arab Archery*, Princeton U.P., 1945. Translation of an Arabic work with notes, etc.
- Archery (Badminton)* = Longman, C. J., Waldron, H., and others, *Archery (The Badminton Library of Sports and Pastimes)*, London, 1894.
- Archery: the Technical Side* = Hickman, C. N., Klopsteg, P. E., and Nagler, F. (eds.), *Archery: the Technical Side*, N.F.A.A. (privately printed), Milwaukee, Wisconsin, 1947.
- Ascham, R., *English Works: Toxophilus*, etc., edited by W. A. Wright, Cambridge U.P., 1904. First published 1545.
- Ayalon, BSOAS = Ayalon, D., 'Studies on the Structure of the Mamluk Army', in BSOAS, vol. XV (Parts I and II), 1953, pp. 203-28, 448-76, and vol. XVI (Part III), 1954, pp. 57-90.
- Ayalon, *Gunpowder* = Idem, *Gunpowder and Firearms in the Mamluk Kingdom*, London, 1956.
- Ayalon, JAOS = Idem, 'The Circassians in the Mamluk Kingdom', in JAOS, vol. 69, 1949, pp. 135-47.
- Ayalon, Scripta = Idem, 'Notes on the Furūsiyya Exercises and Games in the Mamluk Sultanate', in *Studies in Islamic History and Civilization (Scripta Hierosolymitana, IX)*, Jerusalem, 1961, pp. 31-62.
- Ayalon, D., *L'esclavage du mamelouk (Oriental Notes and Studies, 1)*, Jerusalem, 1951.
- Baer, *Guilds* = Baer, G., *Egyptian Guilds in Modern Times (Oriental Notes and Studies, 8)*, Jerusalem, 1964.
- Balfour, JAI = Balfour, H., 'On the Structure and Affinities of the Composite Bow', in JAI, vol. XIX, 1890, pp. 220-50.
- Balfour, JRAI = Idem, 'The Archer's Bow in the Homeric Poems' (Huxley Memorial Lecture), in JRAI, vol. LI, 1921, pp. 289-309.
- Bertier, A. de, Cordier, V., and Guglielmini, A., *Le tir à l'arc*, Paris, 1900.
- Beveridge, H., 'Oriental Crossbows', in *Asiatic Quarterly Review*, vol. 32, 1911, pp. 344-48.
- Bilson, F., *Bowmanship*, London, 1965.
- Bishop, W. E., 'On Chinese Archers' Thumbings', in *Archery*, vol. 26, no. 11, Nov. 1954, pp. 10-14, 33-34.



*The Arabic Article (al, l).* This is assimilated to a following *d, dh, n, r, s, sh, t, th, z, ẓ*; Exx.: *adh-dhirā* (not *al-dhirā*), *ar-radif* (not *al-radif*). When a preceding word ends in a vowel, the 'l' form is used, the antecedent vowel replacing the *a* in *al*. Thus, *wa-l-bayt*, not *wa-al-bayt*.

*The Feminine Ending -ah.* When followed by a noun in the genitive, the feminine form ending *-ah* becomes *-āt*. Thus *'uqdat al-ibhām* (not *'uqdah al-ibhām*) 'the joint of the thumb'. The *h* is not pronounced and, in fact, many writers omit it altogether.

In Turkish there are two "i"s, one dotted the other not.

## DATES

Since there are some who may not know that Muslims have their own calendar, we draw attention to the fact that dates in Muslim Arab sources are normally given according to the lunar years of the Hegira (*hijrah*) era (indicated by the abbreviation A.H.) which is reckoned from 16 July, A.D. 622. Since it is rare for a Muslim year to fall wholly within a single Christian solar year, it is not possible, unless an author specifies the day and month, to indicate which of two possible Gregorian years is involved. It is for this reason that the reader will find, for instance, that the Muslim years 764-78 are expressed as A.H. 764-78/1362-3—1376-7. All dates without any indication to the contrary are to be taken as A.D., and, where an oblique stroke intervenes between any two dates, the first is that of the Muslim year.

- Blachère, *Dict.* = Blachère, R., Chouémi, M., and Denizeau, C., *Dictionnaire arabe-français-anglais*, Paris, 1964.
- Brockelmann, C., *Geschichte der arabischen Literatur*, and *Supplementbände*, 5 vols., Leiden, 1937-49.
- Browne, W. A., 'The Thumb Ring in Art', in *JSA*, vol. 2, 1959, pp. 34-37.
- Burke, E. H., *The History of Archery*, London, 1958.
- Busbecq. See Busbequius.
- Busbequius, *Embassy into Turkey* = Busbecq, A. G. de, *The Four Epistles of A. G. Busbequius* [Busbecq] concerning his Embassy into Turkey [Translated from Latin], London, 1694.
- Cahen, *BEO* = Cahen, C., 'Un traité d'armurerie composé pour Saladin', in *BEO*, XII, 1947-8 (1948), pp. 103-63. (See Introduction, p. xxxiv)
- Chardin, *Travels* = Chardin, Sir John, *Travels in Persia*, London, 1927. (Argonaut Press edn. Introduction by Sir Percy Sykes.)
- Clover, P. (ed.), *Bowman's Handbook*, 3rd edn., Portsmouth, 1955. (Includes as Pt. I 'Technical Notes on Archery' by W. F. Paterson.)
- Dozy, *Suppl.* = Dozy, R. P. A., *Supplément aux dictionnaires arabes*, 2 vols., Leiden, 1927.
- Edwards, C. B. and Heath, E. G., *In Pursuit of Archery*, London, 1962.
- BI* = *The Encyclopaedia of Islam*. Edited by M. T. Houtsma, T. W. Arnold, etc., 4 vols., Leiden, 1913-34.
- BI*<sup>2</sup> = *The Encyclopaedia of Islam. New Edition*. Edited by H. A. R. Gibb, J. H. Kramers, etc., Leiden-London, 1960- (A to I so far published.)
- Elmer, R. P., *Target Archery*, New York, 1946.
- Elott, M. E., 'Technique of the Oriental Release', in *Archery*, Dec. 1962, pp. 18-21, 43.
- Flinton, J., 'Musings on the Thumb Ring', in *JSA*, vol. 1, 1958, pp. 38-39.
- Gabrieli, F., *Muhammad and the Conquests of Islam*, London, 1968.
- Gaudefroy-Demombynes, M., *La Syrie à l'époque des Mamlouks*, Paris, 1923.
- Gibb, Sir Hamilton A. R., *Mohammedanism: an Historical Survey*, Oxford U.P., 1964. (Second edn. Reprint.)
- Giorgetti, G., *Le armi antiche dal 1000 d. C. al 1800 in tre volumi*, Milan, 1961. Vol. II—*L'arco, la balestra, e le macchine belliche* (1964).
- Grimley, G., *The Book of the Bow*, London, 1958.
- Guillaume, A., *Islam*, 1954. (Penguin book.)
- Hamlin, *Archery* = Hamlin, H. S., 'A Study of Composite Bows', in *Archery*, April-Sept. 1948 (in six monthly parts).
- Hansard = Hansard, G. A., *The Book of Archery*, London, 1840.
- Hein, *Isl.* = Hein, J., 'Bogenhandwerk und Bogensport bei den Osmanen nach dem Auszug der Abhandlungen der Bogenschützen (telhîs resâil er-rûmât) des Muṣṭafâ Kânî', in *Isl.*, XIV, (1925) pp. 289-360, and XV (1926), pp. 1-78, 234-94. (See Introduction, p. xxxiii.)
- Hodgkin, A. E., *The Archer's Craft*, London, 1951.
- Huuri, *Gesch.* = Huuri, K., *Zur Geschichte des mittelalterlichen Geschützwesens aus orientalischen Quellen*, Helsinki-Leipzig, 1941. (See Introduction, p. xxxiv.)
- Ibn al-Faqīh (wrote circa A.D. 903), *Kitāb al-buldān*, ed. M. J. de Goeje, Leiden, 1885.
- Ibn Iyās (d. 1524), *Histoire des Mamlouks circassiens, tome II* ([A.H.] 872-906), trad. G. Wiet, Cairo, 1945.
- Ibn Iyās, *Journal d'un bourgeois du Caire*. Translated and annotated by G. Wiet, 2 vols., Paris, 1955-60.
- Isles, F. W., 'Turkish Flight Arrows', in *JSA*, vol. 4, 1961, pp. 25-28.
- Jāhiz, *Manāqib* = al-Jāhiz (d. A.D. 869), *Manāqib at-Turk*, in *Tria Opuscula*, ed. G. van Vloten, Leiden, 1903.
- Kānî, Muṣṭafâ. See Hein.

- Kitāb al-makhsūn jāmi' al-funūn* (Anon.), MS Arabe 2,826, Bibliothèque Nationale, Paris.
- Klopsteg = Klopsteg, P. E., *Turkish Archery and the Composite Bow. Second Edition*, Evanston, Ill., 1947. Published by the author. (See Introduction.)
- Latham, J. D. and Paterson, W. F., 'An Analysis of Arrow-weights in an Islamic Military Manual', in *JSS*, vol. 10, 1965, pp. 253-61.
- Lewis, B., *The Arabs in History*, London, 1966. (Fourth edn.)
- Maqrizī, *Khiṭaṭ* = al-Maqrizī (1366-1442), *al-Mawā'iz wa-l-i'tibār fī dhikr al-khiṭaṭ wa-l-āthār*, 4 vols., Cairo, A.H. 1324-26.
- Mayer, L. A., *Mamluk Costume*, Geneva, 1952.
- Modi, J. J., 'Archery in Ancient Persia', in *JRAS* (Bombay Branch), vol. 25, 1917-21, pp. 175-86.
- Morse, *Additional Notes* = Morse, E. S., *Additional Notes on Arrow Release*, Salem, Mass., 1922.
- Morse, *Bull. Essex Inst.* = Idem, 'Ancient and Modern Methods of Arrow Release', in *Bull. Essex Inst.*, vol. XVII, 1885, pp. 3-56.
- Mukhaṣṣaṣ = Ibn Sidah (d. 1026-7), *Kitāb al-mukhaṣṣaṣ*, 17 vols., Bulaq, A.H. 1316-21. (The work is an encyclopaedic lexicon of technical terms classified according to subject.)
- Nihāyah = al-Aqsarā'i, Muḥammad ibn 'Isā (? d. 1348). *Nihāyat as-sul' wa-l-ummiyyah fī ta'līm al-māl al-furūsiyyah: a critical edition*... by A. L. S. M. Lutful-Huq. Ph.D. thesis, University of London, 1956. (SOAS Thesis 226.)
- Partington, J. R., *A History of Greek Fire and Gunpowder*, Cambridge, 1960.
- Paterson, W. F., 'The Archers of Islam', in *JESHO*, vol. IX, pp. 69-87.
- Paterson, W. F., 'Thumb Guards', in *JSA*, vol. 6, 1963, pp. 14-15.
- Payne-Gallwey, *Crossbow* = Payne-Gallwey, Sir Ralph, *The Crossbow*, London, 1958. The work includes (a) *The Crossbow*, published London, 1903; (b) *Appendix to the Crossbow*, published London, 1907, in which are contained *The Catapult and Balista* and *The Turkish Composite Bow*.
- Payne-Gallwey, *Turkish Composite*. See preceding.
- Pope, S. T., *Bows and Arrows*, California U.P. (Berkeley), 1962. (First edn., 1923.)
- Pope, S. T., *Hunting with the Bow and Arrow*, New York, 1947. (First edn., 1923.)
- Popper, W., *Egypt and Syria under the Circassian Sultans (1382-1468)*, California U.P., 1955.
- Rausing, G., *The Bow: Some Notes on its Origin and Development*, Lund, 1967.
- Redhouse, *Lexicon* = Redhouse, J. W., *A Turkish and English Lexicon*, Constantinople, 1921.
- Reinaud, *JA* = Reinaud, M., 'De l'art militaire chez les arabes au moyen âge', in *JA*, 1848, pp. 207-21.
- Ritter, *Isl.* = Ritter, H., 'La Parure des Cavaliers und die Literatur über die ritterlichen Künste', in *Isl.*, XVIII, 1929, pp. 116-54.
- Roberts, T., *The English Bowman*, London, 1801.
- Robinson, H. R., *Oriental Armour*, London, 1967.
- Scanlon, *Manual* = Scanlon, G. T., *A Muslim Manual of War*, being *Tafrīḥ al-kurūb fī tadbīr al-hurūb* by 'Umar ibn Ibrāhīm al-Awsī. Edited and translated, Cairo, 1961.
- Simon, H. Ingo, Manuscript materials.
- Smail, R. C., *Crusading Warfare 1097-1193*, Cambridge, 1956.
- Sobernheim, *Matériaux*, 2me partie = Sobernheim, M., *Matériaux pour un corpus inscriptionum arabicarum*, 2me partie: *Syrie du Nord*, Cairo, 1909.
- Stein, F. A. H., *Archers d'autrefois: archers d'aujourd'hui*, Paris, 1925.
- Steingass, F., *A Comprehensive Persian-English Dictionary*, London, 1930.
- Stone, *Glossary of Arms and Armor* = Stone, G. C., *A Glossary of the Construction, Decoration, and Use of Arms and Armor in All Countries and in All Times*, New York, 1961. (Reprint. First published 1934.)



- Tabṣīrah* = at-Ṭarsūsī, Marḍī ibn 'Alī (called Murḍā by Cahen, *BEO*, XII), *Tabṣīrat arbāb al-albāb fī kayfiyyat an-najāt fī l-hurūb*, etc., MS Huntington 264, Bodleian Library, Oxford. (See Introduction, p. xxxiv.) N.B.: our references are to the foliation in occidental numerals.
- Telḥiṣ*. See Hein.
- Wāḍih* = at-Ṭabarī, Aḥmad ibn 'Abd Allāh (d. 1295), *Kitāb al-wāḍih fī ma'rifat 'ilm ar-ramy*, MS Or. 9454, British Museum.
- Wāḍih*, Ist.: As above. Istanbul MS Veliyüddin Ef. 3175. (See Ritter, *Isl.*, XVIII, 1929, p. 136, item 'Welieddin 3175'.)
- Waley, A., *Chinese Poems*, London, 1946.
- Willcox, R., 'Something about the Thumb Ring', in *TAM*, Nov. 1962, pp. 16-17.
- Williams, E. C., *Across Persia*, London, 1907.
- Yadin, Y., *The Art of Warfare in Biblical Lands* (translated by M. Pearlman), London, 1963.
- Ya'qūbī, al-, Aḥmad ibn Abī Ya'qūb (d. after A.D. 891), *Kitāb al-buldān*, ed. M. J. de Goeje, Leiden, 1892.
- Zajaczkowski, A., *Mamelucko-turecka wersja arabskiego traktatu o lucznictwie z. XIV w.* in *Rocznik orientalistyczny*, XX (1956).

## PERIODICAL ABBREVIATIONS

- Archery*, Palm Desert, Calif., U.S.A. (Monthly.)
- Asiatic Quarterly Review*, London.
- BEO* = *Bulletin d'Études Orientales de l'Institut Français de Damas*, Beirut.
- Bow and Arrow*, Covina, Calif., U.S.A. (Bi-monthly.)
- British Archer*, The, Portsmouth. (Bi-monthly.)
- BSOAS* = *Bulletin of the School of Oriental and African Studies*, University of London.
- Bull. Essex Inst.* = *Bulletin of the Essex Institute*.
- Isl.* = *Der Islam*, Berlin.
- JA* = *Journal Asiatique*, Paris.
- JAI* = *Journal of the Anthropological Institute*, London. See also *JRAI*.
- JAOS* = *Journal of the American Oriental Society*, Yale U.P., New Haven, Connecticut, U.S.A.
- JESHO* = *Journal of the Economic and Social History of the Orient*, Leiden.
- JRAI* = *Journal of the Royal Anthropological Institute* (originally *JAI*), London.
- JRAS* = *Journal of the Royal Asiatic Society*, London.
- JSAA* = *Journal of the Society of Archer-Antiquaries*, London.
- JSS* = *Journal of Semitic Studies*, University of Manchester.
- Phoenix, The*: *Journal of the Classical Association of Canada*, Toronto.
- Rocznik orientalistyczny*, Warsaw.
- TAM* = *The Archer's Magazine*, Boyertown, Pa., U.S.A.

# INTRODUCTION

## I. HISTORICAL PERSPECTIVE

The rise of Islam and the rapid growth of the Arab Empire in the wake of conquests in Asia, Africa, and Europe need not detain us. The vital role of Persian and Turkish influences in the history of archery in the Middle East makes it more appropriate to begin with the overthrow, in A.D. 750, of the Umayyad Caliphate by the Abbasids and the transfer of the capital from Damascus to Baghdad where the latter first ruled (763-945) and then reigned as puppets until the fall of Baghdad in 1258.<sup>1</sup> With the advent of the Abbasids and the growth of Baghdad, whose position along the main trade routes to Central Asia favoured eastward expansion, new influences from the Iranian cultural orbit penetrated the fabric of the Empire. On the military side—our central interest—the Arab warrior class gradually lost its importance and Khorasanians (in the regional sense of the term) formed the core of the army until displaced, from the reign of al-Mu'taṣim (833-42) onwards, by Turkish slave troops.<sup>2</sup> The courage and martial prowess of these new elements evoked the admiration of contemporaries who have left impressive accounts of their skill as bowmen and horse-archers. From the renowned Arab writer, al-Jāḥiẓ (776-869) we glimpse something of the Khorasanians' military training in which, amongst other things, boys practised vaulting on to horses' backs and men played polo, after which came 'shooting at the sitting quarry, the hoop [*birjās*: below, p. 83] and the bird on the wing'.<sup>3</sup> Of the Turks, he writes that 'if a thousand of their horse join battle and let off a single bout of arrows, they can mow down a thousand [Arab] horse. No army can withstand this kind of assault. The Khārijites [Arabian religious extremists hostile to the Abbasids] and the Beduin have no skill worth mentioning in shooting from horseback, but the Turk can shoot at beasts, birds, hoops, men, sitting quarry, dummies, and birds on the wing, and do so at full gallop to fore or to rear, to left or to right, upwards or downwards, loosing ten arrows before the Khārijite can nock one.'<sup>4</sup> In flight, he adds, the Turk spelt certain death since he was as accurate in retreat as attack.<sup>5</sup> To Ibn al-Faḥr the Turks were skilled shots who could hit the pupil of an eye,<sup>6</sup> and in al-Ya'qūbī, who interestingly records that their arrows were made of bone, we can readily detect an implicit recognition of their skill.<sup>7</sup>

The advent of the Seljuqs and the creation of the Great Sultanate in 1055 finally established the power of the Turks. During the Great Sultanate, which lasted about a century, they were no longer a class of slave or freed troops, and the period is marked by the occurrence of a new and important phenomenon in Middle Eastern history, namely, the westward migration of whole clans of free Turkmens.<sup>8</sup>

The Mongol conquest of Baghdad by Hulagu (Hülegü) in 1258 brought the Caliphate in Iraq to an end. In Egypt and Syria events took a different turn. At the end of the twelfth century the two countries had been welded by Saladin, the Ayyūbid, into a powerful state based on military strength and capable of combating the Crusaders.<sup>9</sup> The régime founded by the Ayyūbids became the inheritance of the Mamelukes who rose to power through the military policy of aṣ-Ṣāliḥ Ayyūb (1240-49). Recruiting vast numbers of Turks from the Kipchak steppe and surrounding regions, he created from amongst them the *Bahriyyah* regiment, an élite guard of nearly



1,000 horsemen, whose formation led to the creation of the Mameluke sultanate which in 1261 established a nominal Abbasid Caliphate in Cairo.

During the first Mameluke period (1250–1382), commonly, but incorrectly, termed *Bahri* from the name of the regiment, the Kipchaks predominated.<sup>10</sup> It was they who, under the command of Baybars at 'Ayn Jālūt signally defeated the Mongols in pitched battle (1260) and checked their advance into Syria and Egypt.<sup>11</sup> It was during this first period, as Ayalon has shown,<sup>12</sup> that the *maydān*, or training-ground, so essential for systematic drill and intensive training in the arts of war, flourished as never before or after. At its peak under Baybars I (1260–77), Mameluke training slowly but surely began to deteriorate, though, we suspect, much more slowly in Syria than Egypt.<sup>13</sup> The role of the bow in all this was probably much greater than commonly appreciated by the orientalist, for in A.H. 733 (1332–3) the sultan an-Nāṣir Muḥammad ibn Qalāūn, probably fearing the strength of his amirs' troops, ordered the demolition of archery ranges built by the amirs outside Cairo, closed *bunduq*-makers' (meaning probably in this context crossbow-makers)<sup>14</sup> shops, and forbade the production of practice arrows. The prohibition extended to the whole Mameluke sultanate.<sup>15</sup> After this ruler's death rot set in, and the very first symptom of decay appeared when al-Ashraf Sha'bān (A.H. 764–78/1362–3–1376–7) tried to arrest the process by favouring and encouraging military experts such as our author, Ṭaybughā. His efforts were in vain. The Circassian sultanate<sup>16</sup> established by Barqūq (1382–99) accelerated the downward trend. Generally speaking, training became more perfunctory, discipline lax, and adult relatives of the Circassian Mamelukes imported from the Caucasus began to infiltrate the corps without passing through the military school.<sup>17</sup>

The skill of Mameluke archers in their heyday is legendary, and even after the advent of firearms the bow was not hastily cast aside; for not only was it quite some time before any kind of firearm was as effective as the bow but, as Ayalon so penetratingly observes, "To equip a soldier with an arquebus meant taking away his bow and, what was to the Mamluk more distasteful, depriving him of his horse, thereby reducing him to the humiliating status of a foot soldier, compelled either to march or to allow himself to be carried in an ox-cart."<sup>18</sup> In their eyes the importance of the bow was such that in the period of decline failure to pass tests in its use was used as the criterion for stopping the privileges of members of the non-Mameluke socio-military unit of the *Ḥalqah*<sup>19</sup> to which were attached the sons of amirs and Mamelukes debarred by the non-hereditary system of their society from making a career in the corps.<sup>20</sup>

One point remains to be made for the benefit of those unfamiliar with the history of the Middle East. The military servitude of the Mamelukes should not evoke a mental picture of illiteracy and degradation. After the completion of a primary education in religion and the rudiments of theology and Islamic law, the young adolescent underwent training in the use of arms and tactics.<sup>21</sup> His protracted period of highly disciplined training in the military school formed his character and outlook for life. Upon passing out and gaining his freedom, he qualified for the remuneration and privileges of a full-fledged Mameluke and might, if outstandingly able, rise to the higher amirates or even the sultanate. From the nature of his education it follows that in the Middle East of his epoch the bow was widely used by the literate. The fact that the contrary was the case in the West accounts for the late appearance of Roger Ascham's treatise *Toxophilus* in 1545. There would have been little point in writing for the illiterate, from whose ranks the average Bowman was drawn.

## 2. ARCHERY: TECHNICAL CONSIDERATIONS

The bow has played an important part in history. Not only did it prove vital to the survival of the human race in early times, but it also decided only too frequently the outcome of many great battles. Rarely do we hear of men trained to handle powerful bows being defeated by foes who were not archers. Even when Rome neared the height of her military power, Crassus and

his legions were ignominiously slaughtered in 53 B.C. when faced with the strong mounted bowmen of Parthia who could drive their arrows through the heavy shields and armour of their enemies.

Since a battle could not normally be won by archers alone, hand-to-hand combat being the decisive factor, the basic purpose of the bow was to render the enemy incapable of effective self-defence when further attacks were finally pressed home. In this connexion it is worth noting that the Muslim horse-archer was not merely a Bowman; his prowess also extended to the use of other weapons such as the sword, the lance, and the mace. Archers of his calibre were the product of long years of arduous training, and it cannot be too strongly emphasized that to handle a war bow entailed great physical effort. Regular practice from boyhood culminated in the archer's ability as a man to handle bows requiring a pull of 60, 80, or even 100 lb. to hold them at full draw. This quantity the archer calls the *weight* of the bow. Records of heavier bows exist, and rare men of exceptional physique have been known to shoot bows weighing up to 160 lb. Mastery of a strong bow necessarily implies that it be accurately shot, and accuracy can never be achieved without the muscular development needed for full control.

As the studies of E. S. Morse (see Bibliography) have shown, man has devised many methods of drawing the bowstring. History, however, suggests that the most effective for use with strong bows amount to two. By one of them the first three fingers are hooked around the string, the nock of the arrow lying between the index and middle fingers. The longbow of the Western world was drawn in this manner, and even today the Western archer adheres to this same method. By the second—employed throughout most of the Orient and of immediate concern to us—the thumb is hooked around the string and its grip reinforced by holding its tip with the index finger. (For further details, see Ch. 10.)

The right-handed Oriental archer, who holds the bow in his left hand, must set the arrow on the *right-hand* side of the bow. The moment the string is loosed, the thumb's pressure on the side of the string will deflect it slightly to the right, and the foreshaft of the arrow will react by pressing against the side of the bow as it begins to move forward. Should the arrow be placed on the left of the bow the head will be thrown to that side, and the direction in which the arrow will then leave the bow cannot be controlled. Since the converse is true in the case of the Western archer shooting with the finger loose, the arrow must be set to the left of the bow. The behaviour of the arrow when discharged is an interesting and important subject which may be studied further elsewhere.<sup>22</sup>

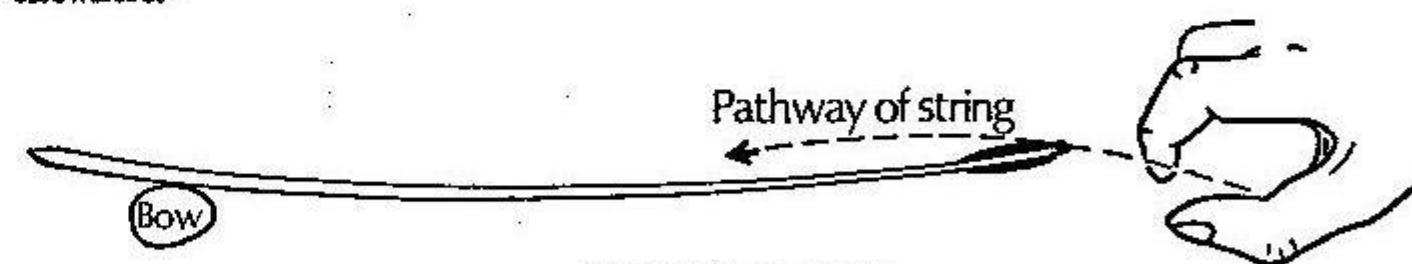


FIG. 1. THUMB LOOSE

Protection against the chafe of the string is needed for all but the toughest hands. In the West a glove was used, and in the East a ring or leather thumb-stall (Ch. 6).

The simplest form of bow is that made from a single piece of wood and tapered from the handle towards each tip. This is the *self bow*, for which few woods are suitable. In order to strengthen the bow by reducing its liability to break when fully drawn and also, possibly, to increase its *cast*, or ability to project its missile, a different kind of wood or some other substance suited to the purpose may be glued to its *back*, i.e. the surface facing the target as one shoots. When so treated, a bow is said to be *backed*. In the East the development of the bow was at some remote period carried beyond this stage, probably by necessity arising from lack of suitable wood in those areas where the development occurred.



When a bow is drawn, the *belly*, or inner surface, is under compression, and the back under tension. If suitable materials can be found capable of responding favourably to the resultant stresses and strains, great efficiency is attainable. In accordance with this principle the Oriental bowyer, forming a base from a thin strip of wood, placed a layer of horn on the belly and covered the back with animal sinew. The whole was held in place with glue and protected from the weather by a thin covering of tree bark, lacquer, or leather. Such a bow is termed *composite*, and the type is of great antiquity, for it may be seen in its earliest representations on the stele of Naram-Sin (twenty-third century B.C.) in the Louvre and on the Sumerian seal of Ibil-Ishtar (same period) in the British Museum. In the composite, it should be noted, *wood plays a minor part*, its main function being to provide a convenient way of joining the sinew and horn. A wooden self bow can, of course, be reinforced with horn and sinew, but this is not a true composite.

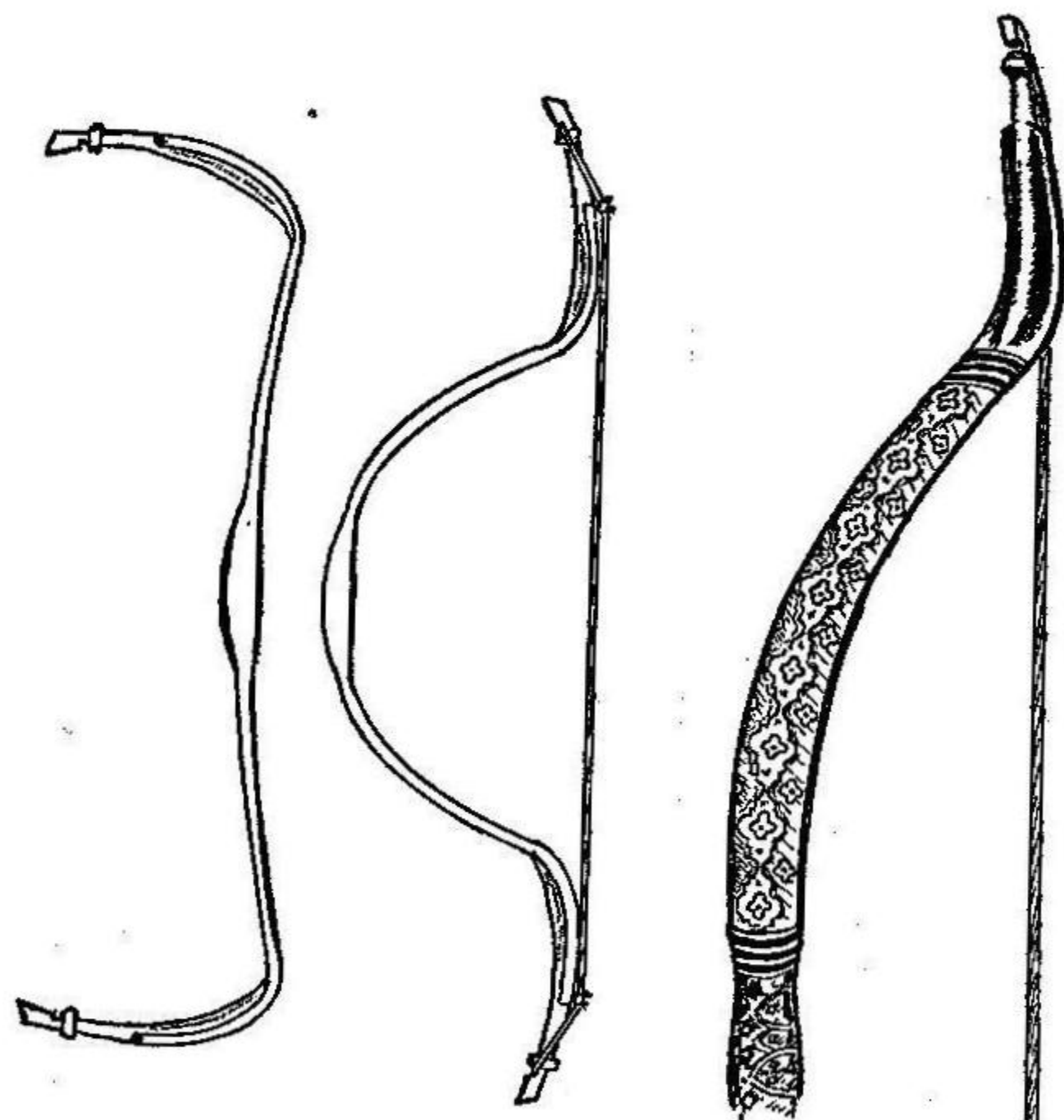
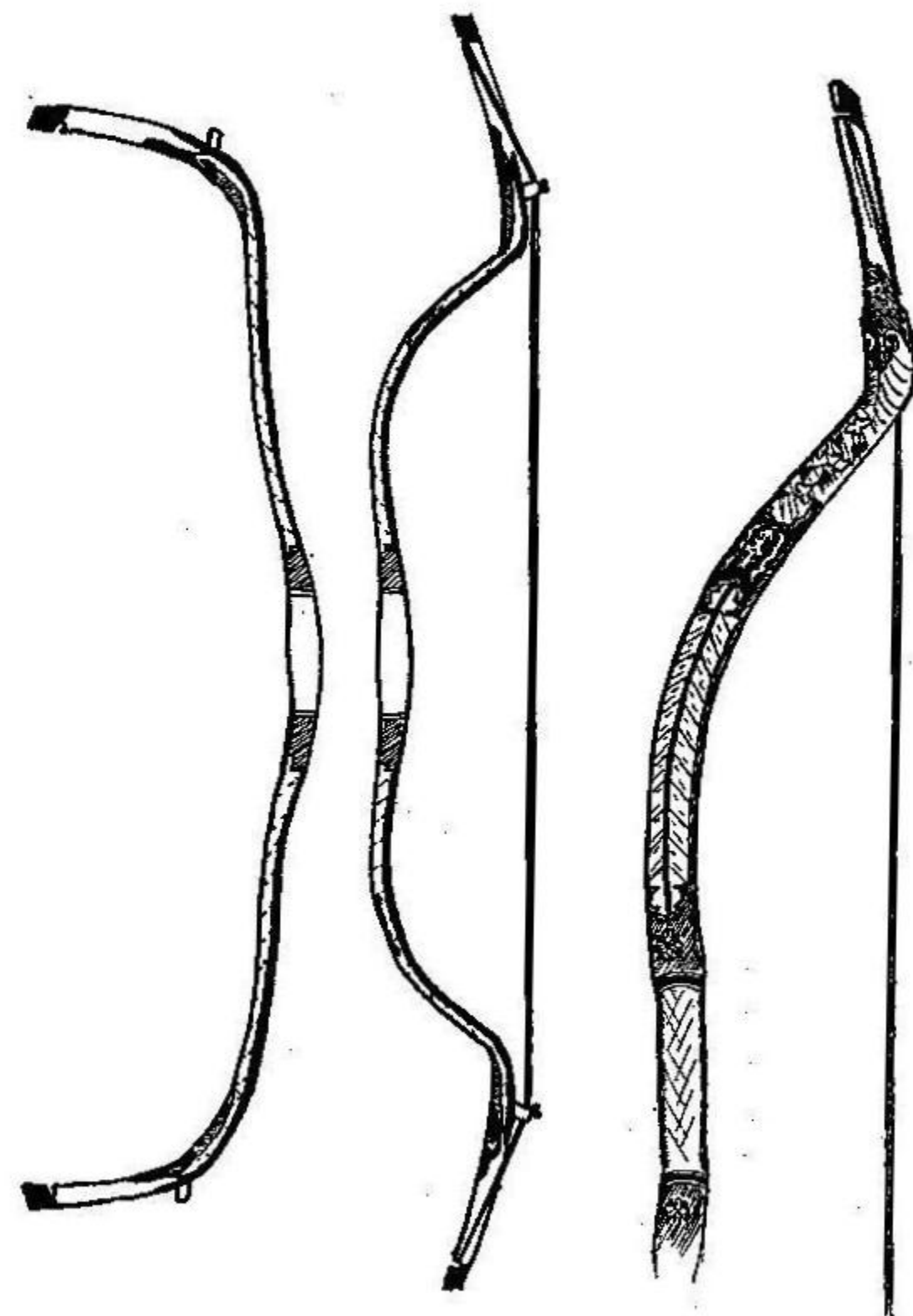


FIG. 2. COMPOSITE BOWS  
(a). NORTH INDIAN  
Total length when strung: 39 inches.

After some use most ordinary bows will assume a permanent curve, their tips coming back a little towards the archer when unstrung, and this set reduces the cast. If a bow, when made, can be so formed that it curves in the opposite direction, this design will not only overcome the weakness in question, but it will also increase the initial tensions in the bow and thereby add to its efficiency. A bow so made is said to be *reflexed*. By using the highly flexible materials of horn and sinew the Eastern craftsmen in most cases had their bows so highly reflexed during manufacture that, when unstrung, their tips even overlapped. With use, a bow of this kind would lose much of its initial shape and settle down to a shallow C-form upon removal of the string after use. Since such composites can withstand an enormous amount of bend, shortness of

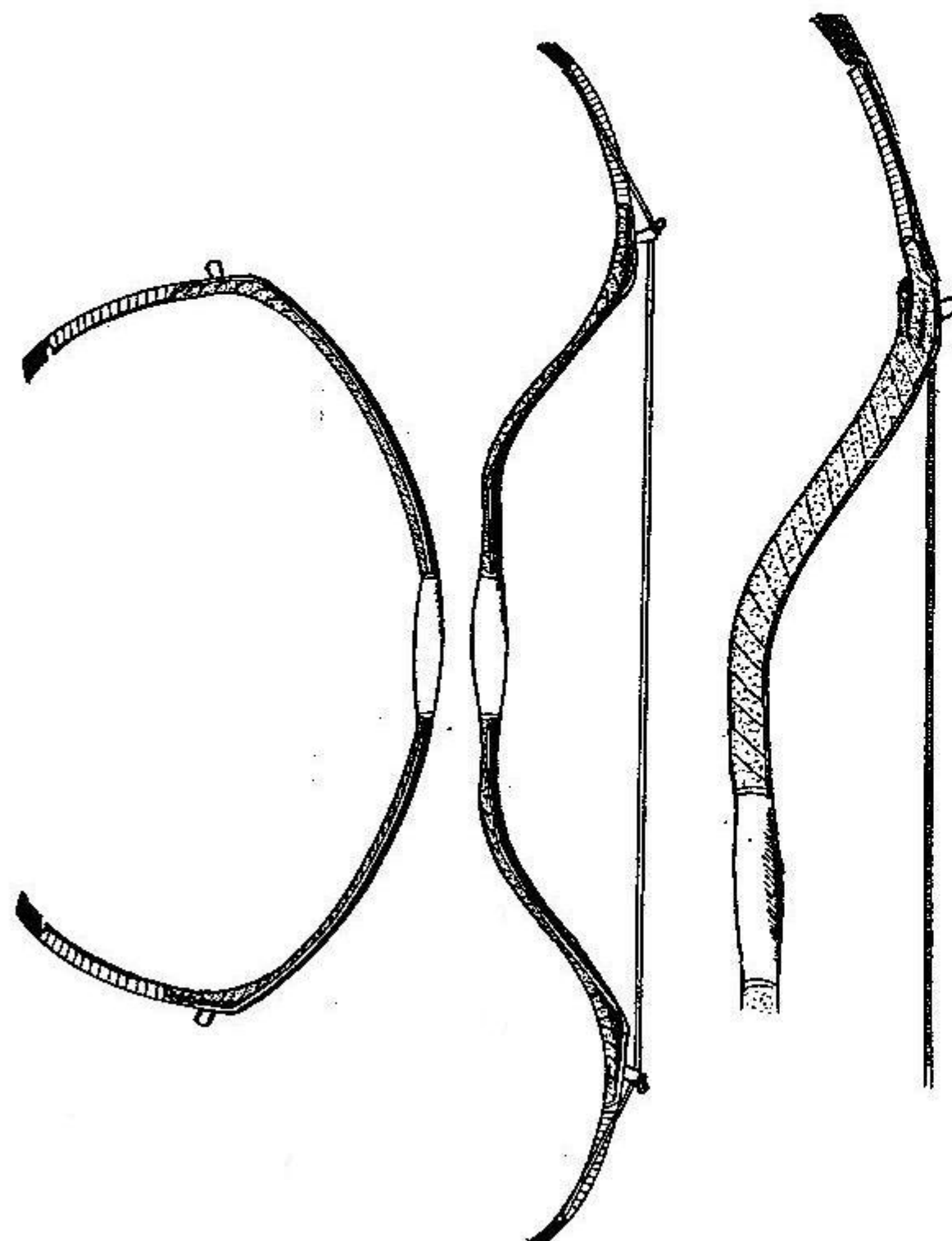


(b). SINO-TATAR (Manchu type)  
Total length when strung: 66 inches.



length could be achieved in design, and this feature made them very suitable weapons for the mounted archer.

In a well-designed bow the weight should increase quickly during the first few inches of the draw, after which the rate of increase should diminish as the draw progresses. This quality was achieved in the East by the fitting of a rigid end-piece (in Arabic, *siyah*, pl. *siyār*) to each end of the bow. When the bow was about half-drawn, the *siyahs* began to act as levers so that the draw could be continued with less increase in the weight than would have been the case without them. By way of example the Mongolian bow shown in Fig. 2c is very close to its full weight at 21 in. of draw measured from the grip to the centre of the string. From there to the full length of 34 in. the increase is only a few pounds. For a given weight at full draw—this quantity depending



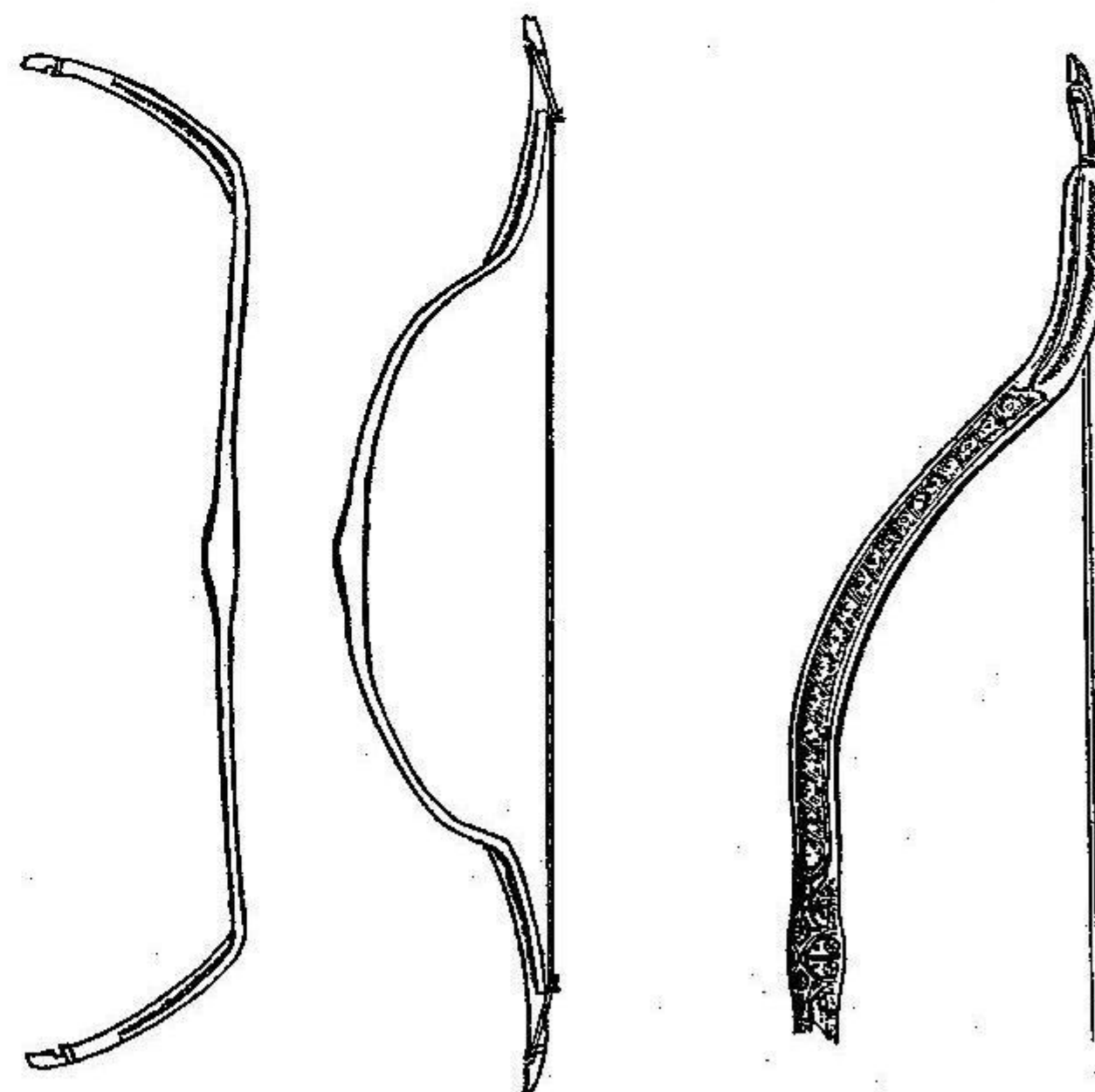
2 (c). SINO-TATAR (Mongolian type)  
Total length when strung: 63 inches.

on the archer's strength—the composite bow stores a great amount of energy which is then available for transfer to the arrow when the string is loosed.

When the *siyahs* project away from the archer before the braced bow is drawn, as is the case with the Manchu and Mongolian bows shown in Fig. 2, a string-bridge is fitted to prevent the string from slipping past the knee of the bow; for should this happen the latter would violently assume its unbraced shape and virtually turn itself inside out. This accident can happen with other composites if the string is too long, and the result can be unpleasant both for bow and archer.

A bad arrow cannot be shot straight by even the finest bow. Its shaft must be true, resilient, well fletched, and correctly balanced. The main difference between the arrows of East and West lies in the nock which fits on to the bowstring. In both cases the fit must be firm enough for the arrow not to fall from the string. The generally thicker Oriental string results in arrow nocks that are slightly bulbous in shape and sometimes more elaborate in construction.

Bowstrings should be light and strong. They should have no stretch once they have settled to the bow. They may be made out of vegetable fibres, sinew, silk, or leather. Those of vegetable fibres are usually waxed to hold the strands together and to keep the moisture in the string.



2 (d). INDO-PERSIAN  
Total length when strung: 45½ inches. Length nock to nock: 50½ inches.

Glue is sometimes used for this purpose. All silk or fibre strands are bound in the centre to guard against chafe from the arrow nocks and the thumb. When a bow is shot, the momentary thrust on the string as it checks the forward movement of the bow's limbs is in the order of five times the weight of the bow at full draw, depending on the type and design of the bow. Such, roughly, is the strength demanded of a bowstring. For war purposes a high safety margin would be allowed.

So far only the hand bow has been considered, which is so called to distinguish it from the *crossbow* or *arbalest* (Fig. 3). This last was widely used in both East and West, and the Saracens had a high reputation for their skill in constructing them. The advantages of the crossbow over



FIG. 3. CROSSBOWS  
(a). Primitive crossbow without a stirrup.



(b). Primitive crossbow with a stirrup.  
(From Payne-Gallwey, *Crossbow*, Figs. 24, 25.)



the hand bow are that it is more accurate, requires relatively little training to enable the user to shoot it effectively, and is usually more powerful, giving greater penetration of armour. On the other hand, it is more expensive and complex to produce, is slower to operate, and cumbersome to carry.

Although it can cast its missile over a great distance, it is really a short-range weapon since it cannot be aimed at a target much beyond eighty yards. In excess of this range the stock of the bow, the butt end of which rests on the shoulder, must be elevated above the target, with the result that the Bowman cannot clearly see his mark. As against this, the hand bow can be aimed up to the limit of its range. Depending on the extent of his skill, the archer can use the technique of 'underhand shooting' whereby he views his target beneath the bow-hand. The method was used by English longbowmen who were trained to engage up to a distance of 240 yards. Nevertheless, to shoot at such ranges with any accuracy needs many years of training, constant practice thereafter, and experience to enable one to estimate range correctly and allow for the effects of wind and weather.

In most of the crossbows mentioned in this work the actual bow, or *lathe*, which fitted into the stock, would have been of composite construction. This was the case in the West also prior to the introduction of steel for such purposes. The most widely used method of retaining the string when drawn and releasing it in shooting was provided by the nut whose operation is illustrated in Fig. 4.

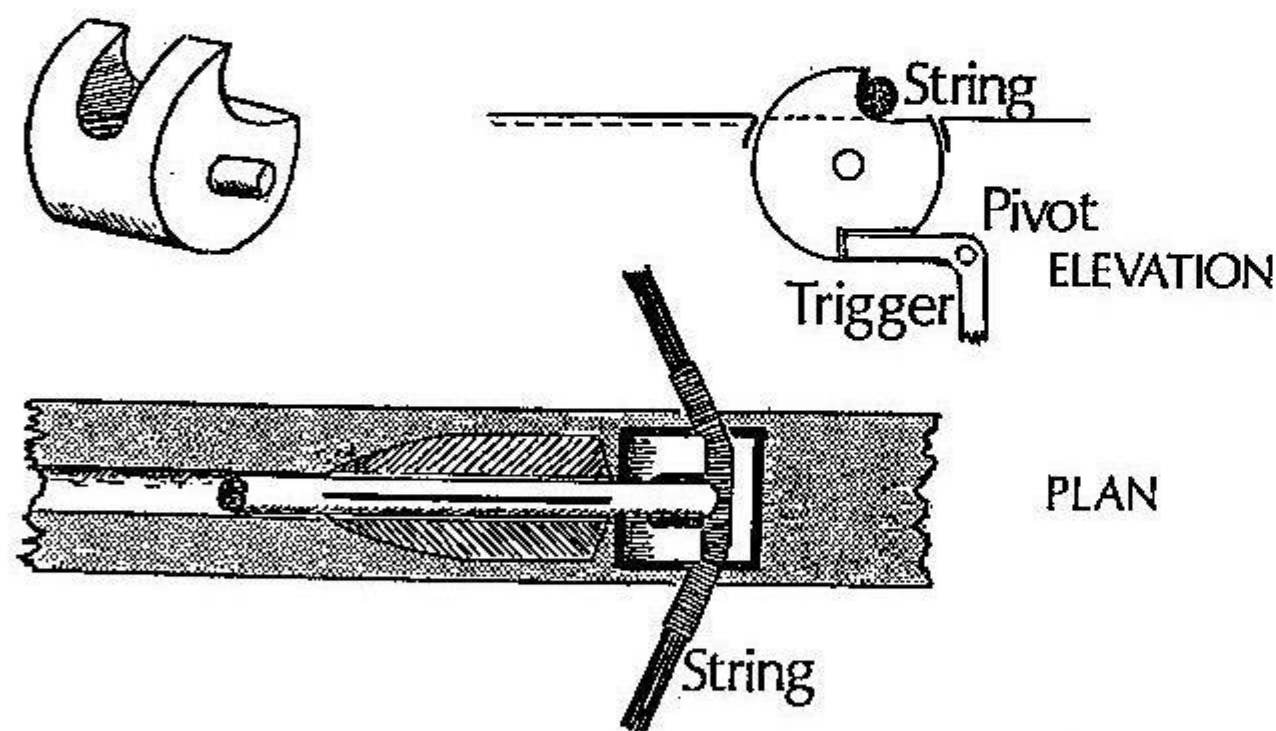


FIG. 4. CROSSBOW NUT

### 3. MUSLIM ARCHERY LITERATURE

The main subject of our book is the technical aspect of military archery as treated by a competent Mameluke authority several years before the last decade of the Bahri period. For more than a century sporadic interest has been shown—almost entirely by foreign scholars—in literature in the Arabic or Turkish language relating to military training and technique. In 1929 Helmut Ritter's review-article '*La Parure des Cavaliers und die Literatur über die ritterlichen Künste*' in *Der Islam* did much to publicize the store of Islamic manuscripts available for a study of this aspect of Muslim military history, and in recent years there has been a growing awareness of the need to exploit these resources. At the same time responsible scholars have recognized

the obstacles to profitable utilization of technical literature<sup>23</sup> and David Ayalon, the noted authority on the military society and army of the Mameluke sultanate, has warned that in the present state of our knowledge this kind of literature is of little value to students of Muslim history. Until much spade work has been done, he rightly asserts, 'the historian would be wise to refrain from using technical military treatises'.<sup>24</sup>

In the introduction to his *Muslim Manual of War* (1961) George Scanlon discusses in some detail—though not entirely without errors—the Oriental source materials for a study of Muslim warfare.<sup>25</sup> The existence of this discussion, which takes account of the contents of Ritter's paper, makes it unnecessary to cover the same ground in these pages. Something, however, must be said of archery literature. In this field the first significant European publication was J. von Hammer-Purgstall's '*Über Bogen und Pfeil. Der Gebrauch und die Verfertigung derselben bei den Arabern und Türken*' which appeared in the proceedings of the Imperial Academy of Science in Vienna in 1853.<sup>26</sup> Based on the Turkish work of Muṣṭafā Kānī (below), Hammer's paper, apart from the illustrations, which are excellent, is a disappointment. A good deal of its emphasis lies on religious and social aspects of archery, but from a technical standpoint it is utterly lacking in depth. Since the author did not really understand the subject matter of his sources, his translation of technical terms is not to be accepted without question, and we have preferred to leave his work aside.

Incomparably more important is Joachim Hein's '*Bogenhandwerk und Bogensport bei den Osmanen*' which appeared in three parts in *Der Islam*, XIV–XV (1925–6) and ran into more than 200 pages. The work is essentially an analysis and discussion of the Turkish treatise *Telḥīs resāil er-rīmāt*<sup>27</sup> (*Summary of the Treatise of Archers*) written by one Muṣṭafā Kānī at the command of the Ottoman sultan, Mahmūd II (1809–39), himself a skilled Bowman. While Hein rendered a valuable service by revealing to Western readers the essential contents of what is probably the most valuable treatise on Ottoman flight shooting, his knowledge of the technical aspects of archery was, as can be detected by the experienced eye, second-hand and far from profound. Fortunately, the German scholar's researches attracted the attention of Paul E. Klopsteg, an American physicist, who combined expert technical knowledge with a sufficiently keen interest in the subject to prepare a study of those parts of Hein's work on the *Telḥīs* which he felt to be of interest to archers. Privately published in 1934 under the title *Turkish Archery and the Composite Bow*, Klopsteg's book was so successful that in 1947 he produced a revised edition which, like the first, soon went out of print. Its contents accurately reflect the essential interest of the *Telḥīs*, which lies neither in target shooting nor the war bow, but in the Ottoman sport of flight shooting (Ch. 19). The author's treatment of the subject, which ranges from the making of the bow to the organization of the archers' guild, is detailed and authoritative, and his thorough exposition of the manner in which the flight bow is built is of unique and inestimable value for our understanding of the nature of composite construction. It should, however, be noted that in dealing with matters outside the sphere of his specialty Muṣṭafā Kānī relied on older sources which, as our own research has taught us, he did not always understand as well as he ought. Thus, in borrowing from his medieval predecessors—Taybughā amongst them—he often failed to discern textual corruption in the manuscripts on which he drew. Since Hein, it is obvious, did not appreciate this fact, it follows that apart from making mistakes of his own he transmitted those of Muṣṭafā Kānī.

Once awakened, through the efforts of Klopsteg, to the existence of a new dimension to their subject, Western archers with historical interests began to ponder the wealth of information that might lie concealed in Muslim technical literature of the Middle East. In 1945 their curiosity was partially satisfied and at the same time intensified by the appearance of a translation of an anonymous Arabic manuscript written in the Muslim West about A.D. 1500. This was *Arab Archery*, the outcome of close collaboration between an Arabist and an archer, respectively Nabih Amin Faris and Robert P. Elmer. Much that was new to the toxophilite emerged from



*Arab Archery*, and its unquestionable worth as a source of technical information was enhanced by the inclusion of useful appendices. At the same time it would be unrealistic to deny that from the standpoint of translation and annotation it leaves room for some improvement. In particular, unfamiliarity with the field of Arabic archery literature and an evident lack of patience to explore it have resulted in inaccuracies which might have been avoided even by some reference to Hein.<sup>28</sup> Only too frequently notes are lacking where they are most needed, though it must be said in all fairness that this criticism does not apply so much where important technical points are concerned. Apart from the fact that there is no historical introduction to orient the layman, there are too few diagrams, no bibliography, and an inadequate index. Nevertheless, we owe a great debt of gratitude to Faris and Elmer, as indeed to Hein and Klopsteg, for their most valuable role in affording a stimulus to our own research.

In 1956 a substantial paper entitled 'Mamelucko-turecka wersja arabskiego traktatu o łucznictwie z XIV w.' was published by A. Zajaczkowski in the Polish periodical *Rocznik orientalistyczny* (vol. XX, pp. 139-261). Its contents, which are clearly relevant to our subject, include a Mameluke Turkish text in facsimile, introduction, and glossary. Unfortunately, linguistic factors prevent us from evaluating its importance.

A work which is not primarily a study of bows or archery, but which is, to some limited degree, concerned with terminology relating to Islamic bows is Kalervo Huuri's *Geschichte des mittelalterlichen Geschützwesens* (pp. 94 ff.). Although of interest, it has not proved of great value in elucidating the more important problems with which Taybughā's work has confronted us.

Some impression of the range of unpublished material in the Arabic language may best be derived both from the detailed survey with which Hein prefaced his study of the *Talḥīs* (Isl., XIV, pp. 299-307) and from Scanlon's introduction to his *Manual* (pp. 11-14). Here no more than three works need be mentioned, and that only because we shall need to cite them for the purposes of comparison or elucidation. The first and by far the oldest, in that it dates from about the last quarter of the twelfth century, is a general treatise on arms, armour, and weapons of war, viz. *Tabṣirat arbāb al-albāb fī kayfiyyat an-najāt fī l-hurūb* ('Enlightenment for the Intelligent on the Means of Deliverance in Warfare') by Maḥdī ibn 'Alī ṭ-Ṭarsūsī. Partially edited and translated by Claude Cahen with the convenient label 'Un traité d'armurerie composé pour Saladin' (BEO, XII, 1947-8), the *Tabṣirah* contains an important section on archery which Cahen did not include in his extracts, but which has now been prepared for publication by Antoine Boudot-Lamotte of the University of Bordeaux.<sup>29</sup> The second, dating from the thirteenth century, is an independent treatise on archery of which the first part of the title is *Kitāb al-wāḍiḥ* ('The Clear Book').<sup>30</sup> Written by a certain at-Ṭabarī (on whom, see p. 40), the *Wāḍiḥ* was one of the principal sources utilized by the author of *Arab Archery* and is a major work, offering, among other things, a detailed description of the teachings of the Great Masters as they were known to at-Ṭabarī. The third work, by a Muḥammad al-Aqsarā'ī (d. 1348), is *Nihāyat as-sūl . . . fī . . . a'māl al-furūsiyyah*, whose verbose title indicates that it is a manual of instruction on the art of war and military skills and techniques. The first section of this manual, of which a critical edition was prepared (but not published) by A. L. S. M. Lutful-Huq in 1956,<sup>31</sup> is devoted to archery. It is comparatively short and, while by no means as important as the *Wāḍiḥ*, it nevertheless contains information which we have found useful. Since its teaching belongs to a somewhat different tradition from that considered in our work, care must be taken not to try and equate it with that of Taybughā.

To enter into a discussion of Persian and Turkish archery literature is beyond our present purpose. It should not on that account be thought that little or none exists or that it is of no value. On the contrary, it does exist and, far from being unimportant, we have reason to believe that its investigation is vital to the solution of many problems raised in the more important Arabic treatises. This is particularly true in the case of etymological problems and matters of technical terminology.

## 4. THE PRESENT WORK

## i

## The British Museum Manuscript

This book is based on the contents of an Arabic manuscript preserved in the British Museum with the shelfmark Add. 23489. Although it is undated, all circumstantial evidence suggests that it is not later than the fifteenth century, and it is possible that it goes back to the end of the fourteenth. Attributable to a certain 'Taybughā l-Ashrafī l-Baklamishī l-Yūnānī, it is entitled *Kitāb ghunyat at-ṭullāb fī ma'rifat ramy an-nushshāb*, or in free translation 'Essential Archery for Beginners'. The text has neither been published nor studied hitherto.

*Description.* The manuscript, which is enclosed in a red leather binding that is neither the original nor Oriental, consists of 139 folios measuring 27 × 18 cm. For the most part there are ten lines to the page written in legible Mameluke *naskhī* to give a text of approximately 21 × 14 cm. Although vocalized it presents a high proportion of inaccurate vowels. Originally cream-coloured, the paper is mostly stained to a brownish-grey by dampness which in certain folios has obliterated parts of the text, though illegible words can often be easily restored by reversing the impression they have left on the opposite page. There is some damage to the first folio, and towards the end small perforations in the paper begin to appear, until finally we are left with a sizeable hole in folio 138 from which anything that might have been of value in the colophon is irretrievably lost. A marginal note confirms that the manuscript is not an autograph, but a transcript. The verso of this same folio bears the names of two people. The more important is that of a certain Alfī Qānī Bak ash-Sharifī. Written in a large, imposing Mameluke hand, the name appears to be the signature of an official, and from the use of the title *Alfī* we know that its writer held the rank of Commander of a Thousand, the highest amirate in the Mameluke army.<sup>32</sup> Although the signature is accompanied neither by date nor other useful information, we may note, firstly, that just such a rank was held by the Grand Master of the Armour (*amīr silāḥ*) whose duties included supervision of the arsenal,<sup>33</sup> and, secondly, that in connexion with events of A.H. 902 (1496-7) Ibn Iyās mentions a personage whose name and rank are identical with those indicated by our signature.<sup>34</sup> The name recurs elsewhere as that of a member of the sultan's entourage in 1514 who stood out in Ibn Iyās' memory and whom he describes, amongst other things, as having charge of the arsenal.<sup>35</sup> Above this signature is the name of one 'Abd al-Laṭīf ibn 'Abd al-Qādir, who declares that after some searching he finally acquired the work he had been looking for, viz. Taybughā's *Ghunyah*. The date appearing with this information is A.H. 1085 (1674-5).

From the title-page we learn nothing about the author. Below the title an ornamental medallion in blue, red, and gold encloses the *ex-libris* of a Mameluke Superintendent of the Arsenal (*shādd as-silāḥkhānāh*) named as the amir Sayf ad-Dīn Jānim (not Ḥātim as in the B.M. catalogue) al-Malaki l-Ashrafī. These last two words indicate that the officer in question was the servant of the sultan who bore the title *al-Malik al-Ashraf* ('Most Noble Ruler'). There is a temptation, for reasons which we shall soon see, to think only of Sha'bān, but it must be remembered that Barsbāy (1422-38) and Ināl (1453-61) were also so styled. Furthermore, the only amirs we have been able to trace with names similar to that of the original owner of our manuscript are two for whom there are biographical entries in Ibn Taghribirdī's *al-Manhal as-Sāfi*.<sup>36</sup> Both bear the name Sayf ad-Dīn Jānim al-Ashrafī. The first, a relative of Barsbāy, who is described as having been a Commander of *Ṭabkhānāh*<sup>37</sup> and, in A.H. 836 (1432-3), Commander of a Thousand, died at some unspecified date after A.H. 852 (1448-9), in which year he was stationed in Jerusalem. The second, described as Bearer and Keeper of the Inkwell (*dawādār*) and surnamed Chief of the



Corps (i.e. of Mamelukes; *ra's nambak*)<sup>38</sup> from the time he had held that office, died about A.H. 850 (1446). Whether one of these amirs is the person whom we are seeking to identify, we cannot say. Certainly, there is nothing in their *cursus honorum* to connect them with the office which concerns us, but it is, of course, conceivable that such information as we have about them is either incomplete or not entirely accurate.<sup>39</sup>

In addition to the title and *ex-libris* the title-page carries the names and seals of various owners. These we can ignore. (See Plate 1.)

*Contents.* Briefly, the *Ghunyah* contains: (a) an introduction; (b) a didactic poem on archery in 149 verses cast in the metre *rajaz*; (c) a technical commentary on the latter; (d) additional sections and material not strictly related to the commentary, but relevant in the main to the subject of the work as a whole.

The introduction consists of a religious perspective of archery within the Islamic scheme of things and, more importantly from our standpoint, a brief, though irritatingly inadequate, indication of the nature, purpose, and background of the book. Here the author tells us that he composed a concise didactic poem on archery and that when 'it was finished and proved to be a comprehensive basic work and a full, perfect, and useful authority' (p. 4), he complemented it with a commentary and introduced new material. Although the Arabic does not make it absolutely clear, he seems to imply that neither his commentary nor the supplementary portions to which he specifically refers were undertaken immediately upon conclusion of the poem, but at some later stage. If this interpretation is correct, any date assigned to the poem (below) should not be regarded as necessarily applicable to the *Ghunyah*, but only as a *terminus post quem*.

From the verses of the poem we learn two things:<sup>40</sup> (a) that it was entitled *Ghunyat al-murāmi wa-ghāyat al-marāmi li-l-mu'ānī* (roughly, 'Essential Archery for the Fighting Archer, Or All That the Toiler Desires');<sup>41</sup> (b) that the author's name was as stated in the first paragraph of this section. Beyond the little that can be inferred from the name itself, viz. that he was by origin a Turkish slave imported from Greece and manumitted on conversion to Islam we know nothing for certain about Taybughā. The biographer Ibn Hajar, however, in his dictionary of notabilities deceased in the fourteenth century (eighth century A.H.) makes the laconic entry under the year A.H. 797 (1394-5): 'Taybughā ibn 'Abd Allāh, a certain celebrated warrior, died in prison in Aleppo.'<sup>42</sup> That the subject of the entry is none other than our author is more likely than not. The patronymic 'ibn 'Abd Allāh' was regularly adopted by converts to Islam after recruitment into Mameluke service and is, therefore, not inconsistent with other information concerning his name. Secondly, all internal evidence in the *Ghunyah* points to an author domiciled in Syria. Thirdly, the *Ghunyah* is definitely not the work of a theorist, but of a practising expert whose name, if we are to judge by the number of extant manuscripts of his book (below), would have been well enough known in Mameluke military society of the fifteenth century to merit inclusion in Ibn Hajar's 'Who's Who'.

## ii

### Other Manuscripts

Add. 23489 is only one of a number of manuscripts which either purport to be Taybughā's work or are, with or without acknowledgement, modified or expanded versions of it. In some cases the title is lacking or differs to a greater or lesser degree from that already indicated. Out of a possible total of seventeen manuscripts originally traced by us in reference works, fifteen subsequently became available for inspection, one in photostat, and the rest in microfilm. Careful collation resulted in a decision to divide them into seven distinct groups which it proved convenient to denote by the symbols, A, a, B, b, c, D (below, and pp. 195-96).

Without pausing at this stage to specify the source of each of our manuscripts and their

respective places in our scheme of classification we must first explain as briefly as possible our predilection for Add. 24389 (hereafter A<sup>1</sup>), which is, as we have indicated already, not an autograph. It is in fact an undated copy transcribed from some other manuscript of which we know nothing, and, since it is probably assignable to the fifteenth century and therefore later than either of the B manuscripts, date is not the criterion. Nor is the accuracy of the copyist's transcription, for scribal errors, though not abundant, are yet not infrequent. Paradoxically, it is primarily the poor and, at times, truly execrable quality of the author's Arabic that disposes us to believe in the value of the text supplied by A<sup>1</sup>. Taybughā, the imported ex-slave, was not a native Arabic speaker and, in spite of his education in the literary language, laboured as a writer under the handicap of what he himself in his introduction terms his 'barbarous Arabic' (*ujmat al-lisān*). In no manuscript (apart from the defective A<sup>2</sup> which has been copied from the same source) is there greater evidence of the latter. It is not merely a question of the usual grammatical errors—though these are common enough—of which the writers of the Mameluke period are so frequently guilty. It is, rather, a matter of linguistic inadequacy, which at times causes the author to express himself either in barely disguised colloquialisms or in such terms that his meaning is either doubtful or ascertainable only by the use of common sense or, in more difficult cases, the application of technical criteria. It would be easy, but tedious in a work such as we are presenting, to cite numerous examples; some of the more important can be turned up in our notes.

The text of a, an Istanbul manuscript dating from the very beginning of the fifteenth century, is a modified version of that represented by the preceding. Although it tends to drop difficult passages and misinterpret others, it does supply certain lacunae glossed over in manuscripts of other groups. It also adds some snippets of useful information.

In manuscripts of the B group we find a text characterized not only by a markedly higher standard of Arabic than that found in A, but also by fewer errors of scansion in the poem. The language is more idiomatic, there are fewer colloquialisms, and a higher literary standard is attained. To take but one example: it requires no great depth of knowledge or acumen to perceive that in the written language *kayfiyyat tashkīn al-qaws bi-n-nār* (sc. he should know 'how to heat a bow over a fire', B<sup>1</sup>, 75a) is a more acceptable mode of expression than the semi-colloquial *kayfa yu'ṭi n-nār li-l-qaws* (A<sup>1</sup>, 61a). Another interesting characteristic of the B group version is the disappearance or the emergence in modified form of material or phraseology to which the more sensitive elements of orthodox Islamic society might rightly or wrongly take exception. Thus the archer is not advised, as in A, to show his fellow-archers 'the affection that a dog has for its master' (p. 157), nor is the formal plea for God's mercy (*tarhim*) extended to include a horse that was tragically killed with its rider (p. 76), nor need a minor seeking to train as an archer obtain his parents' consent, but only that of his father (p. 157), and so on.

That the text of the B group of manuscripts is a revised and slightly enlarged version of A scarcely admits of doubt; that it goes back to the last decade of the fourteenth century is certain. By whom it was produced, on the other hand, we cannot say, but we feel safe in supposing that it was neither the author nor anyone who had the benefit of his co-operation since certain errors, principally of a technical nature, can only be satisfactorily explained as misinterpretations of what was written by the inarticulate originator of A, whom, in the absence of evidence to the contrary, we take to be Taybughā. Because of its early date and superior Arabic which, in spite of some demonstrable errors, for the most part correctly and lucidly interprets Taybughā's meaning, the B group version has much to commend it.

As regards b, a Leiden manuscript of indeterminate date, it is to the B group more or less what a is to the A group. There are marked changes in vocabulary, and Arabic words tend to replace terms of Persian and Turkish origin.

The C manuscripts, the earliest of which is not later than the beginning of the fifteenth century, present a text that has been revised and expanded far beyond the scope of the original. Not only is the poem, with close on 250 verses, noticeably much longer than anything in the A



and B groups, but there is also an increase in prose content. The interpolation of material of doubtful validity for the time and place with which we are concerned makes this C version a trap for the unwary, and those not qualified to exploit it judiciously would do well to avoid it. If handled with caution, however, it can be turned to advantage where certain problems are almost insoluble on the basis of A and B texts, or used to furnish supplementary data where necessary or desirable. For the first time we are offered a date for the composition of the poem, viz. A.H. 770 (1368-9).<sup>43</sup> Although we have no means of confirming it, we accept it on the grounds that it in no way conflicts with any known evidence. On the contrary, it falls within the reign of the Mameluke sultan al-Malik al-Ashraf Sha'bān, for whom the work would seem, from dedicatory verses in B<sup>1</sup>, b<sup>2-3</sup>, b, to have been originally written.<sup>44</sup>

The two undated manuscripts of the D group offer a text that differs in some important respects from that of C. It is probably directly descended from the latter and, needless to say, should be used according to the same principles and subject to the same caution.

Of all manuscripts known to us, there are only two which, for reasons beyond our control, we have not consulted, viz. the Cairo and Gotha items mentioned in Brockelmann, II, p. 169, the first of which, we are told, can no longer be traced. In the absence of the original manuscript of the *Ghuryah* it seems very doubtful whether any other would have much to contribute to what we already know, least of all at the technical level.

## iii

## The English Version

Because of the form in which Taybughā chose to impart his teaching a straightforward translation of his *Ghuryah* as it stands would make impossible reading. The poem as such would mean little without the commentary, and that part of the commentary in which the author follows the usual method of taking one or more verses word by word in order to explain the bare meaning before enlarging on the theme would bewilder and bore the reader with what, to us, are translator's notes. To make the work readable we have had to modify the text. As a separate entity the poem has been entirely disregarded, while in the commentary the verses together with the 'translator's notes' have been either omitted altogether or, if essential to the context, been paraphrased and woven into the adjacent fabric. Pious invocations, religious formulae, and sententiae in rhymed prose, so dear to the Muslim writer, have, except in special cases and for special reasons, been expunged as superfluities uncongenial to modern Western taste.

Having pruned the text in this way and in one or two cases—indicated in the notes—changed the position of subject sections to give a more natural sequence of chapters, we have left the hard core virtually intact and translated as faithfully as possible. When a literal rendering has proved impracticable, we have not hesitated merely to give the sense, or, if the Arabic does not fall quite naturally into an English mould, to expand a word or phrase to meet requirements. The Arabist, furthermore, will see that our language is often more technical than the Arabic. Where it is so, we have usually been guided by the need for clarity and brevity, and we have done our best to avoid 'blinding with science' by seeking out compromises. To illustrate, we feel obliged to translate 'the crease at the base of the finger between the first section of the finger and the palm of the hand' as 'the proximal crease', though we do spare the layman the more anatomically correct 'metacarpo-phalangeal crease'.

The more important expansions of the text are enclosed in half-brackets, ' ', and in no case where the text may admit of an alternative interpretation are these lacking. They have, of course, been regarded as indispensable where an addition has been made from another manuscript. Short explanations not worth referring to the notes are enclosed in parentheses as also Arabic or other foreign terms, etc. Finally, notes of special interest to the archer are indicated by asterisked references.

One small but important point must be made. For the impersonal idea Taybughā uses the second and third persons singular indiscriminately. When he passes from one to the other in a single sentence in which the one is in syntactical relationship with the other, we have brought the verbs into conformity with correct English usage. In all other cases the matter has been decided largely on its merits, for without re-writing the whole text we cannot easily rectify the author's slipshod habits.

As regards chapter-headings, many, but by no means all, are indicated in the Arabic text. Where they are lacking they have been supplied, and in Ch. 25 we have brought together under one comprehensive title several small sections, each with its own heading which is retained in sub-title form.

On folio 109b of our manuscript there begins a lengthy exposition of the rules and regulations of archery as a competitive sport. Much of this bears on the permissibility and implications of competitions in Islamic legal theory, and since it can have little or no general appeal, we have excluded it from the present work. All other material in the manuscript which is irrelevant to archery (folios 129a-136b) is also omitted.

## iv

The importance of the *Ghuryah*

Written at a time when the bow, as opposed to firearms, was still a primary weapon, the *Ghuryah* is a work of major importance in the history of arms and armour. Its indisputably practical author, who is clearly a master of his subject, makes a unique contribution to our knowledge of the Muslim horse-archer's techniques, of which, for the first time, we have a detailed explanation. Next in importance are the specifications which he gives of the best war bow of his day and area, expressed in convertible measurements whose value we have proved. Thirdly, he communicates information enabling us to assess the degree of accuracy expected of the average archer without clouding the issue with stories of fantastic shots. Similarly, he furnishes data giving us a clear idea of the minimum discharge velocities of adequate war bows. The work also contains much new and valuable information on a variety of subjects, notably on arrow-guides and other devices. Not least among its merits is that it constitutes a standard of comparison by which the value of *Arab Archery*—which it often clarifies and not infrequently contradicts—can be more accurately gauged. Finally, it includes two excellent chapters on rules of practice and professional ethics which, *mutatis mutandis*, are as valid today as when they were formulated.

Taybughā did, of course, draw to some extent on the work of other authors, notably in certain sections which he evidently added as afterthoughts. There is every indication that he was acquainted, though more probably indirectly than directly, with the contents of the *Tabṣirah* and the *Wādih* as well as other sources which we leave it to others to trace and investigate. What should be realized, however, is that whatever he transmits from others, he almost invariably transmits with the discrimination and understanding of one who knows his subject. In this respect he contrasts sharply with some whose technical writings we have examined and only too often found to be uncritical and confusing compilations masked by an impressive exterior.



1. We generalize. The Caliphs were at Samarra almost continually from 836 to 892. Moreover, not all the Caliphs were puppets from 945 to 1258, since after the fall of the Seljuqs a few of them, notably an-Nāṣir, did exercise some limited authority in Iraq.
2. *EP*, s.v. 'Abbāsids (B. Lewis).
3. *Mandqib*, pp. 11-12. Cf. English translation in *JRAS* (C. T. H. Walker), 1915, p. 646, which should, however, be used with caution.
4. *Ibid.*, p. 28 (*JRAS*, 1915, p. 666).
5. *Ibid.*, p. 29. A discussion of Turkish tactics may be found in Smail, *Crusading Warfare*, pp. 75-83.
6. *Buldān*, pp. 329-30.
7. *Buldān*, p. 295.
8. *EP*, loc. cit.
9. *EP*, s.v. Ayyūbids (C. Cahen).
10. *EP*, s.v. Bahriyya (D. Ayalon). Cf. Ayalon, *JAOS*, 69, p. 136. In Mameluke sources this first period is commonly called 'The Turks' State'.
11. *EP*, s.v.
12. *Scripta*, pp. 37 ff.
13. We are less well informed about Syria in the Mameluke period than about Egypt, and it would be wrong to assume that the situation was exactly the same in both countries. From all that we have read, we suspect that archery declined much more slowly in the former than in the latter, and the Syrian background, against which the *Ghunya* is written, suggests as much. It is worth noting that in the fourteenth century Syrian archers were valued as far west as Morocco and that in Fez they inhabited a quarter named after Hims (the ancient Emesa) in Syria. (See R. Le Tourneau, *Fès avant le Protectorat*, Paris, 1949, p. 66.) Archaeological evidence leaves no doubt that the Sasanid design of composite bow was known in Syria as early as the first half of the eighth century. It may well be, then, that the area enjoyed a tradition in archery dating from the late Umayyad period.
14. On the various meanings of *bunduq*, see Glossary.
15. *Scripta*, p. 56, n. 142.
16. Came to an end 1517. On the Circassians, who came from the Caucasus, see *EP*, s.v. Çerkes (Ayalon).
17. Ayalon, *JAOS*, 69, p. 145.
18. *Gunpowder*, p. 61. Cf. *EP*, s.v. Bārfid, sect. iii (Ayalon).
19. *EP*, s.v. Halka (Ayalon) and Awlād an-Nās (idem).
20. To belong to the Mameluke corps, it was necessary to have been born outside the Mameluke state and to have been imported as a young slave.
21. Detailed information on the education and training of a young Mameluke may be derived from D. Ayalon's *L'esclavage du mamlouk*, Jerusalem, 1951. Although less well trained than the Royal Mamelukes (those of the sultan), the amirs' Mamelukes seem to have attended military schools of their masters (Ayalon, *BSOAS*, XV, p. 460). It should be noted that these schools were not officers' schools. All Mamelukes passed out as private soldiers.
22. See P. E. Klopsteg, *Archery: the Technical Side*, pp. 122-46 and 178-89, and R. P. Elmer, *Target Archery*, pp. 440-67.
23. See in particular Scanlon's observations on Huuri's study of medieval artillery according to oriental sources and Ayalon's *Gunpowder (Manual)*, pp. 20-21.
24. *Scripta*, p. 31.
25. Pp. 1-21.
26. *Denkschr. d. kais. Akad. der. Wiss. Wien, Phil. Hist. Kl. IV*, 1853.
27. For convenience, Hein's transliteration of the title is retained.
28. *Isl.*, XIV, pp. 299 ff.
29. Since these lines were written this part of the *Tabṣirah* has appeared (text, translation, glossary, and notes) in A. Boudot-Lamotte, *Contribution à l'étude de l'archerie musulmane* (Damascus, 1968).
30. The second part of the title is uncertain. Different versions occur.
31. For details, see Latham and Paterson, *JSS*, 10, p. 253. Cf. Scanlon, *Manual*, pp. 9-11.
32. On which, see Ayalon, *BSOAS*, XV, p. 467.
33. Ayalon, *BSOAS*, XVI, p. 60.
34. Wiet, *Mamlouks circassiens*, II, p. 406.
35. *Idem*, *Journal*, I, p. 384.
36. Wiet, *Biographies*, nos. 803, 805.
37. 'The Amir of *Ṭablkhāna* was so called because holders of this and higher ranks were entitled to have a band playing (*ṭablkhāna*) in front of their houses.' (Ayalon, *BSOAS*, XV, p. 469.)
38. On which see Ayalon, *BSOAS*, XVI, pp. 60-61.
39. Ibn Iyās also mentions an amir Jānim al-Ashrafi whom he describes in speaking of his daughter in A.H. 927 (1520-1) as the old governor of the province of Damascus. (Wiet, *Journal*, II, p. 385.)
40. Vv. 27, 146.
41. The word *al-murāmi* is translatable as 'the competitive archer', but the sense which we give is preferable.
42. *Inbā' al-ghumr* (Bodleian Library MS Huntington, 123, fo. 129a). Cf. Ritter, *Isl.*, XVIII, p. 137.
43. C<sup>1</sup>, 17b; C<sup>2</sup>, 34a; C<sup>3</sup>, 12a.
44. B<sup>1</sup>, 11a; b<sup>1</sup>, 13b; b<sup>2</sup>, 6a; b, 5a.

## THE DOXOLOGY

In the name of God, the Merciful, the Compassionate.  
My Lord, ease my task for me, O Thou who art bountiful.<sup>1</sup>

Praise be to God, whose judgement is just, whose knowledge is complete, whose dominion is almighty, whose proof shines forth with overwhelming light;  
Who protects and safeguards His friends, who plucks out and shatters His foes;  
Who grants victory and succour to the Faith (i.e. Islam), who subdues and scatters Unbelief;  
Who unleashes His might and affliction 'against those who reject His authority, who brings in'<sup>2</sup> all His servants beneath His sovereign power!  
Without recourse to any, He does what He wishes; whatever He wills comes to pass without hindrance; whatever He decrees is executed unchallenged.  
It is He who has made men in their several kinds: the guided, the straying, the happy, the wretched, the clever, the stupid.  
It is He who pays each group of humankind its due, be it vengeance or punishment, favour or rewards, neither diverting men from that which they earn for themselves nor turning them away from that which they deserve.  
To Him be praise for that He has rendered the company of His supporters victorious and subdued His enemies—praise with which the banners of Islam will rise supreme and mastery will, in the course of time and with the passing of the days, be gained over all places and all mankind!<sup>3</sup>  
The blessing and peace of God be upon our lord Muḥammad, the Chosen, Bearer of the Unchallengeably Truthful Message and Incisively Manifest Discourse,<sup>4</sup> Head of the Pious House<sup>5</sup> and Unsullied Line, whom God sent as Prophet and Messenger that he might be a pathway to His knowledge and a pilot to the paths of His guidance, so that at the last he caused Truth to prevail and be followed, and falsehood to be vanquished and repulsed—a blessing to include his godly Family and his excellent Companions!

## CHAPTER I

### THE AUTHOR'S INTRODUCTION

*Most of the introduction is devoted to an exposition of the religious basis on which the practice of archery is held to rest.<sup>1</sup> Since the subject matter, containing a good deal of pious fiction, is of limited interest it is best summarized as follows:*

Archery is a religious obligation established in the Koran on the basis of Muhammad's own explanation of sura viii. 62, where the word *quwwah* ('force') is taken to refer to archery. The Prophet himself, furthermore, was an archer and possessed three bows. The terms in which he urged his community to practise riding and archery—preferably the latter—amount to a standing order, and archery is a *fard kifayah* (i.e. a religious obligation incumbent, not upon each individual, but upon the community by representation). When his Companions engaged in archery contests, the Prophet used to attend and would support one or other of the contending parties (3a-4b).

Certain authors relate that Adam, after being sent down from paradise, was commanded to raise crops. Two birds ate what he sowed, and so he complained to God, who sent Gabriel with a bow, a string, and two arrows. Being asked what these things were, Gabriel explained, as he handed them over, that the bow was the force (*quwwah*) of God, the string was the might (*shiddah*) of God, and the arrows the harm to be inflicted (*nikayah*) by God. He then taught Adam to shoot, whereupon he killed the birds. Knowledge of archery then passed to Abraham, Ishmael and Isaac, and archery is indeed the legacy of these illustrious ancestors (4b-5b).

There is an authentic tradition of the Prophet that it is a sin to give up archery after learning the art. There are, furthermore, numerous traditions of the Prophet which commend archery. He himself used to preach, leaning on a bow, and considered that there was no better weapon. Gabriel had an Arab bow on the day of the battle of Uhud (fought between Muhammad and the tribe of Quraysh to the north of Medina, March, A.D. 625). The excellence of the bow is the subject of many traditions of the Prophet, which are too numerous for inclusion in the present work (5b-9b).

*The author now continues:*

Since archery and riding are enjoined by authentic command of the Prophet himself and as I knew of no treatise by any previous author on the subject of shooting from horseback, I felt I should like to accord the excellent accomplishments of archery and riding joint treatment in a single work. My aim is so doing would be to comply with the command of God and His Messenger (Muhammad) and to assist those of my Muslim brethren who campaign and fight in the Holy War. 'This I could do' by virtue of such knowledge of the subject as Almighty God had imparted to me over a long period of painstaking care and endeavour and after acquiring familiarity with most of the information on record regarding the primary and secondary bases of archery as expounded in time past by men of repute and distinction who ranked among the authorities of their day and who lived in, and hailed from, all countries. I therefore wrote the



concise and instructive poem that follows (see p. xxxvi) and included in it treatment of such primary and secondary bases of archery as are required to afford the soundest and clearest exposition of theory and practice of the art to both infantry and cavalry. When my poem was finished and proved to be a comprehensive basic work on this art and a full, perfect, and useful authority worthy to be placed at their service, I supplemented it with a commentary and 'introduced' a number of principles 'not previously enunciated' and 'added new' sections to put the finishing touches to the content of the poem and to elucidate difficult points. By so doing, it has been my intention to explain modes of expression and throw light on allusions, so that the rarities of its contents might be brought within the grasp of him who would seek them out. May God, therefore, have mercy upon any man who views my work with approval and makes good any imperfections which it may contain! . . . In order to carry out my task I went into seclusion and, far from my homeland and handicapped by an inability to express myself well because of my barbarous Arabic, produced my poem.†

## CHAPTER 2

## THE PILLARS OF ARCHERY

'Successful shooting hinges on accuracy, the infliction of injury, the ability to strike from a distance, the ability to strike swiftly, and the ability to protect one's own body.'

These five points<sup>1</sup> are the pillars (*arkān*) on which archery rests, and the true archer is he whose mastery of them is complete. They are interdependent in the same way as five entities vital to archery are interdependent, namely, the bow, the string, the arrow, the thumb-guard and the archer. 'That such is the case is clear from the reasoning which follows.' Should a man's arrow be true to the mark but be harmless, it would be ineffective. Conversely, should his arrow be capable of inflicting injury but not true to the mark, it would be of no avail. Should the arrow be both true to the mark and also capable of inflicting injury but the archer fail to protect himself adequately against his foe, the latter may kill him. Again, should accuracy, the ability to injure, and the skill to afford oneself adequate protection all be present at the same time, but speed be lacking, the archer's adversary will very likely take flight and his quarry elude him because of slowness in shooting. Finally, should all the four conditions which we have mentioned be satisfied without the archer's keeping well away from the foe, his antagonist will possibly take him unawares and slay him. It is in fact only because archery can be used at a distance from the enemy that it has come to be regarded as superior to all other means of warfare. For the longer the range from which the archer can shoot, the greater the harm he can do his enemy 'with correspondingly less risk to his own safety'.

## COMMENT

Comparable subject matter is to be found in *Arab Archery*, pp. 18-19, where shooting is said to rest on four pillars, viz. speed, strength (of one's arrows), accuracy and care in self-defence. The second of these is similar to the second point in our list, for the argument is that unless one's arrows are strong and penetrating, the enemy will ward them off with his shield. To the four pillars there correspond four entities. With the exception of the thumb-guard, of which there is no mention, they are identical with those given above.

† For reasons explained in the Introduction (p. xxxviii) we do not translate the poem which immediately follows in the Arabic text (106-19a).

## CHAPTER 3

### ON BOWS

Although there are many kinds of bow, there are basically only two: the hand bow (*qaws yad*) and the crossbow (*qaws rijl*).

i

There are many kinds of hand bow. There is the old 'Beduin' Arab bow, which they used to make of *nab'* (*Grewia poplifolia*) and also of *shawḥaṭ*, which is the same as *murrān* (*Cornus mas*). This bow was made either of one stave or two 'jointed together'. The ancient Arab poet says:

I shoot with this which is all one branch and is three cubits and a finger.<sup>1</sup>

The settled Arabs, on the other hand, applied sinew to the backs of their bows (*yu'aqqibūna ḡuhūrahā*) and often lined the bellies with goat horn. Peculiar to the noble Hejaz, these kinds of bow have neither *siyahs* nor 'shaped' handles (*maqābiḍ*).

There is also the intermediate bow (*wāsiṭiyyah*), which is made of horn, wood, sinew, and glue. It was so called because it occupies an intermediate position between the Hejazi bow and the Persian bow. The Arabs also call it *mufaṣṣilah* ('that comprising separate elements 'fitted together').

The Khorasanians adhere to the principle that 'the length of' the lower *siyah* should be one-sixth of the laminated portion of the bow,<sup>2</sup> the upper *siyah* being longer by as much as the measurement of the little finger when turned down in finger-reckoning (on which, see Appendix 4 below, p. 167). The working part of the upper limb would, in this case, be as long as the archer's forearm, and the lower as long as his upper arm.

The Turks, Persians, and Iraqis are for their part agreed on the principle that the longer the *siyahs* and the shorter the limbs and the more rigid and slender the handle, the better the cast (*aḡrad li-s-sahm*). Better cast is in particular achieved by the slender bow (i.e. the flight bow; below, Ch. 19), in which, by their rule, the limbs must fall back (? *mustalq*; see Glossary) and the grip be short.

The best and most useful hand bows are those composed of wood, sinew, horn, and glue (i.e. the composite bow proper; below, p. 11). Its composite character displays profound wisdom and august and sublime workmanship, for it is produced after the formation of a human being and is of comparable structure. For even as man is built on four foundations, namely, bone, flesh, arteries, and blood, so is the 'composite' bow formed in like manner inasmuch as the wood corresponds to bone in man, the horn to flesh, the sinews, which are intricately disposed throughout its members, to the arteries, which are intricately disposed throughout man's members, and the glue to the blood by which the whole is held together. Like man, bows are provided with a back and a belly and can bend bellywise like man. When they are bent backwards, they will snap, as would be the case with man.<sup>3</sup>

Authorities on archery agree that in our time the best bows of this type are those manufactured

### ON BOWS

7

in Syria, the finest of them being the excellent weapon known as the 'superb' (*faḥlah*), which is the handiwork of the most highly esteemed masters (*ustādīn*) of the bowyer's art. This is because they have power, strength, speed of recovery (*as-sur'ah fi d-damarān*), suppleness, liveliness, and efficiency of performance. Furthermore, they have beauty and grace, give a smooth and comfortable draw (*salas al-jadhḥ wa-halāwatuhu*), and are light and elegant to carry. They shoot further and launch more effective shafts (*ankā sihām*<sup>4</sup>) than any other kind of hand bow. These are facts which could be denied by no one but a person unacquainted with a bow of this type or someone who had failed to get a really good specimen. If he has one, the archer should look after it well and keep it under constant supervision.

The proficient artisan is a man of experience with a mastery of the essentials of his craft. Moreover, in all things capability is the essential. This is particularly true of the bowyer's art,

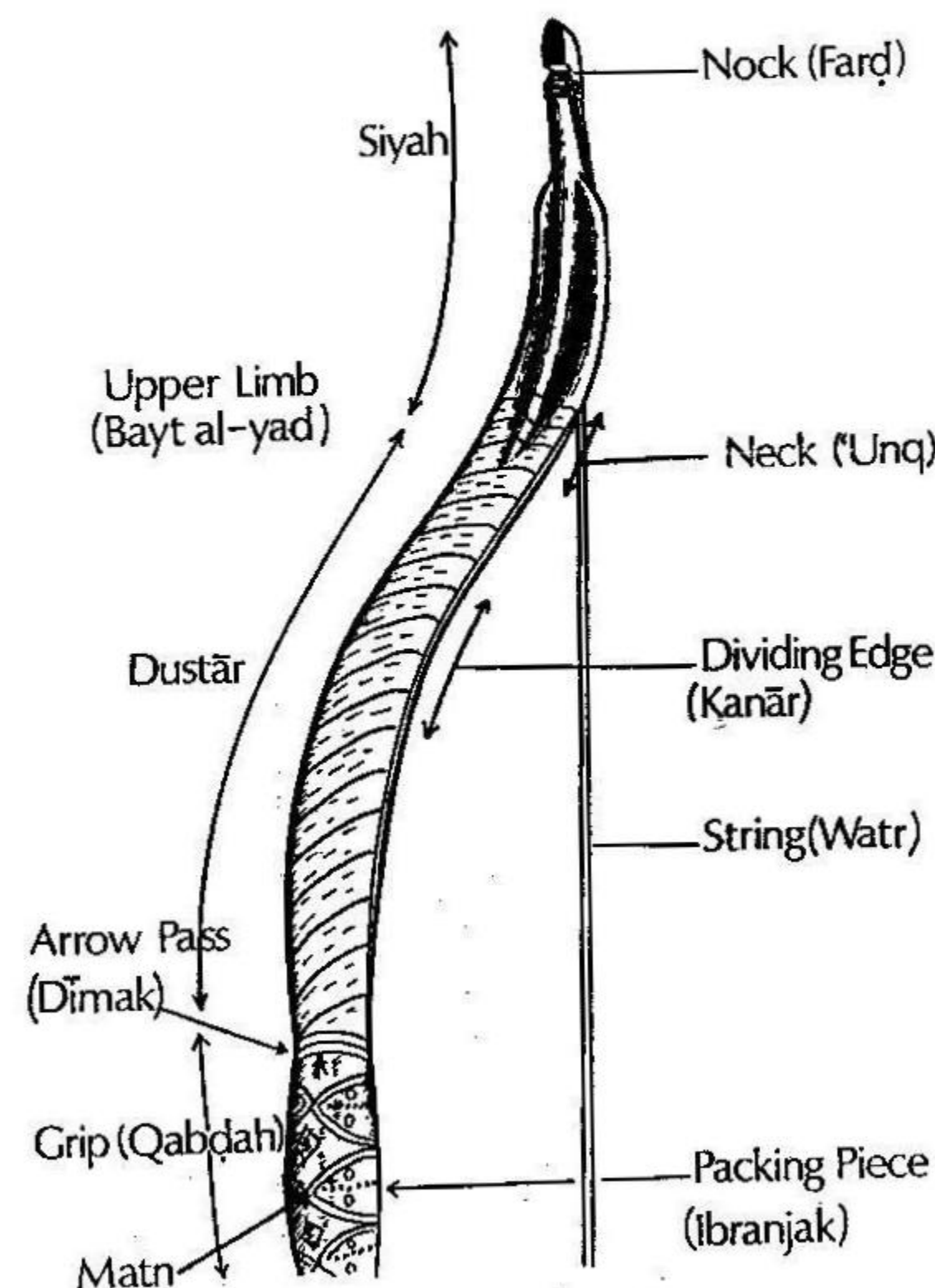


FIG. 5. PARTS OF A COMPOSITE BOW



for the fashioning of a bow calls for more competence than anything else if a truly good weapon is to be obtained. Its manufacture also calls for more patience, since it cannot be properly completed in less than a full year. Autumn must be devoted to the carving and preparation of the wooden core (*al-khashab*), on the one hand, and to the sawing and fitting of the horn (*al-lihām*; see Glossary), on the other. Winter is the season for binding and reflexing (*al-ḥazm wa-r-raḥ*),<sup>8</sup> and then at the beginning of spring the sinew is applied (*tarkīb al-'aqāb*). Next, in summer, the bow, as yet unfinished (*khām*), is strung and rounded to the curvature required (*layyuhā ḥalqar*).<sup>9</sup> It is then veneered with bark and painted (*at-tatwiz wa-d-dihān*).

According to the consensus of masters with experience of the weapon, be they craftsmen or archers, the mean length of a bow of this type, taken from nock to nock, should amount in all to one cubit and two-thirds and one-quarter of a cubit (50.2 in.), the unit of length being the carpenter's cubit, that is to say, the Hāshimī cubit, which admits of no variation, but is of uniform length in all Muslim countries (Appendix I, p.159).

Analysis of the length of the bow should result in the following measurements: the upper *dustār* (*d. al-yad*) should be one-half and one-eighth of a cubit (16.36 in.) and the lower *dustār* (*d. ar-rīl*) one-third and one-quarter of a cubit and one-half of a *qirāṭ* (15.82 in.); the grip should be one-eighth and one-half of one-eighth of a cubit (4.91 in.) and be broad, not rounded (i.e. presumably, in transverse section either ovate or elliptical from belly to back), so that it may not turn in the hand, and, further, 'to provide a finger hold',<sup>8</sup> be scooped at the sides (Fig. 6); the length of the upper *siyah* should be one-quarter of a cubit (6.55 in.), the lower *siyah* measuring one-quarter of a *qirāṭ* less (0.28 in.). They say that, like a growing branch, the thickest part of the limb should be that adjoining the grip. It should then taper until its most slender portion is formed by the tip of the *siyah*. The upper limb should be a little fuller than the lower and, unlike the latter, not be weakened by curtailment (for, the limbs being of unequal length, the lower must be a little weaker, if both are to flex equally when drawn). The length of the bow described is intended for really average men and truly medium heights as they are in our time. Some people, however, have shorter *siyahs* and longer working limbs. In such cases the recognized length of the upper *siyah* is one-sixth of a cubit and one and one-quarter *qirāṭs* (5.72 in.), the lower *siyah* being five *qirāṭs* exactly (5.45 in.). The upper *dustār* will measure one-half and one-eighth of a cubit and one-quarter of one-eighth of a *qirāṭ* (16.4 in.), amounting to one-third of the bow. The lower *dustār* will measure one-third and one-quarter of a cubit and one-half and one-quarter and one-eighth of a *qirāṭ* (16.23 in.). The grip will measure one-eighth and one-half of one-eighth of a cubit (4.91 in.).<sup>17</sup>

Flight bows (*qisiyy as-sabq*) should have short limbs, long necks, and speed of recovery (*'sur' at' at-tarjīh*). The way to string bows of this type is first to straighten out the curvature of the neck and *dustār* on each side (i.e. by retracting the *siyahs* from the reflexed position) and then to flex 'simultaneously' and to the same degree the centre of each limb.<sup>8\*</sup> For every ten *raṭls* (40.7 lb.) of bow weight there should be one *dirham's* weight (47.6 gr.) of silk for the string, such material being raw, wound silk that is new and extremely strong. Such is the information that we have on the subject.

## ii

Crossbows are of different types. The Franks, for instance, have the *jarkh*, the Maghrebis (North Africans) the *laqshah*, the Persians and Turks the *zanbūrah* and Islam (the Mamelukes?) the *bandūq*.<sup>9</sup> Crossbows of this type (or 'the last-mentioned type'; the text is not clear) are the most useful for land-forces. For naval operations, on the other hand, the most useful type is that made of yew (*taqs*). The limb of this weapon should be made of two opposing staves (i.e. presumably, one of two halves of a split length is reversed and joined to the other), and its stock should be of boxwood or orange.

In the West (i.e. North Africa and Muslim Spain) crossbows are a great favourite and are the weapons of preference. Those who use hand bows, however, deprecate them. My own view is that in the manoeuvres of 'mounted' combat, in the desert, and on expeditions the hand bow is a better and more serviceable weapon, whereas in fortresses, sieges, and ships greater power and advantage will be derived from the crossbow.<sup>10</sup>

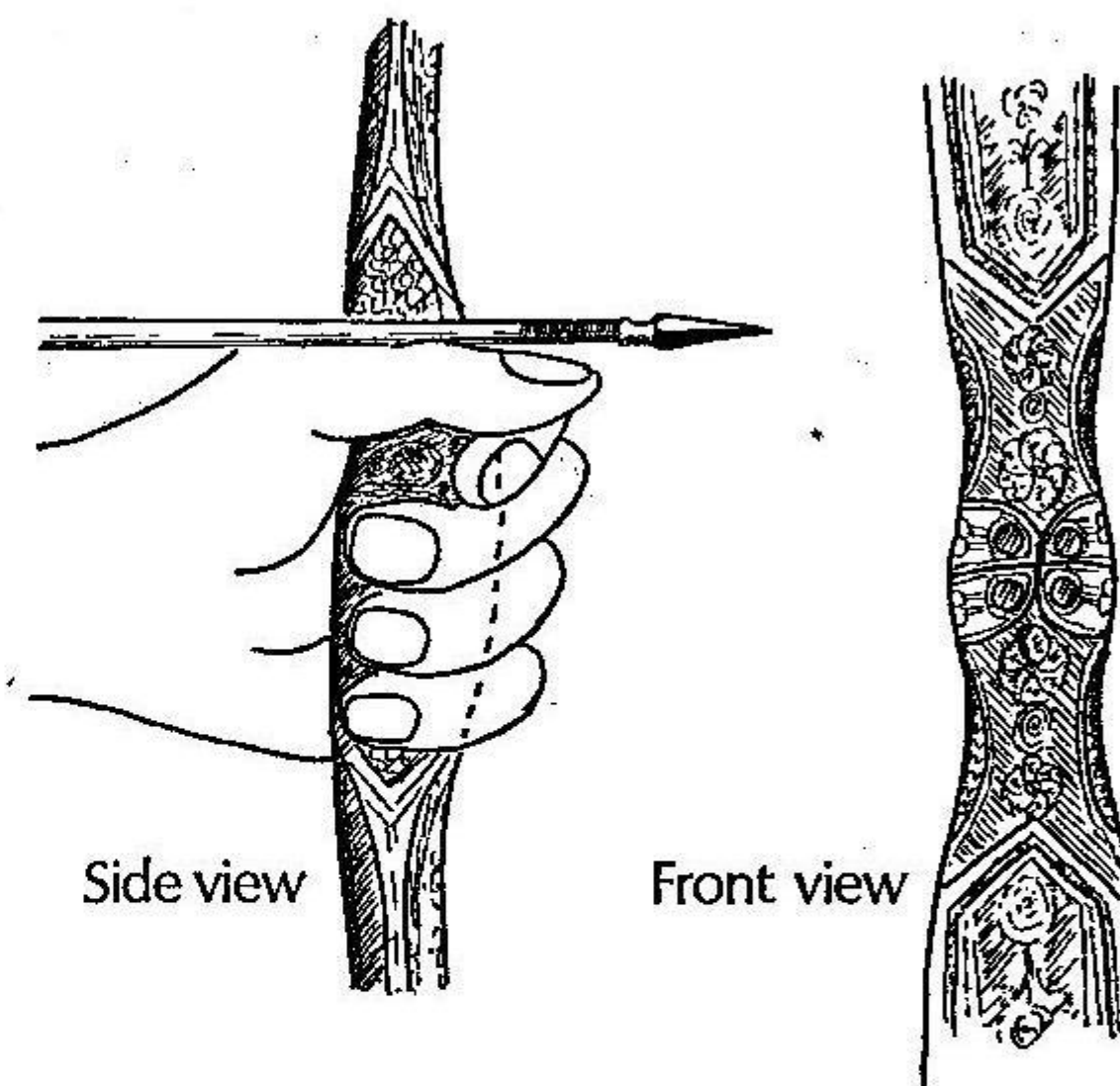


FIG. 6. GRIP OF AN INDO-PERSIAN BOW

## iii

The first thing that an archer must look at in his bow is the grip (*al-qabḍah*). The main point about this is that it should be just right for the hand and be neither too big nor too small for it. To examine the grip, he should grasp it with the whole hand and all fingers after first pushing back the flesh of his palm away from the base of his fingers into the centre of the hand. He should then look to see whether the tips of his fingers touch the heel of the hand. If they do, then the grip of the bow is too thin for the hand. If, however, there is half a finger's width or less to spare between the far border of the finger-tips and the heel of the hand, the size is just right. A greater or lesser gap is unsuitable, for if the grip is too thin for the hand, the tips of the fingers will touch its heel, in which case the grip will turn in the archer's hand at the draw, and he will not shoot well.

If it so happens that the archer can only get a bow that is too thin in the handle for his needs, he should build up the grip by affixing leather tailored to the size of his grasp so that the grip will then fit the hand. In extremes of temperature and for sweaty hands a piece of leather on the grip is particularly useful.



So far as the power of the bow is concerned, authorities on archery are agreed that the skill of the archer entirely depends upon his using a bow that is within the limits of his own strength<sup>11</sup> and physical power. In time past archers have only been concerned with those points on which they differed and prided themselves, namely, technique and grouping (*jam'*), without anyone ever mentioning so much as a word about the strength of the bow. Nevertheless, it is said that one should not shoot with a bow unless it is less powerful than himself and that no one ever shot with a bow that was even a fraction too strong for him without its revealing his faults and incapacity, doing him harm, ruining his shooting, and emboldening his rival without his knowing it.

### COMMENT

There is a striking omission in the preceding text: our author offers no glossary of the terminology applicable to the anatomy of the bow, such as is to be found, for example, in *Arab Archery*, pp. 13-16. In the CD groups of MSS the subject is discussed, but we suspect the relevant section to have been drawn from some other literary source and inserted for the sake of completeness. Since we have reason to doubt whether *all* the terms listed were valid for the time and place with which we are here concerned—indeed some may well have been unknown to Taybughā—, we relegate them to Appendix 2.

#### 1. Old Arab Bows

(a) *Bows of the Hejaz*. According to our understanding of the text, three basic kinds of bow were used by the Arabs of the Hejaz: (i) that made of a single stave; (ii) that made of two staves joined together; (iii) that backed with sinew and lined with horn. From some remote period the Beduins, or nomads, had used the first two kinds, while the sedentary population had developed the third. According to *Arab Archery*, pp. 10-11, (i) could either be a self bow or consist of a single stave split lengthwise, in which case it bore the name *filq*, while (ii) consisted of two staves so split and was termed *shartj*. (The technical implications of this information are discussed in some detail by Faris and Elmer, *ibid.*, p. 11, n. 5 and p. 158.) As regards (iii), there is no mention of its being a weapon of the sedentary Hejazis; it is said without further explanation that it was used 'only by experts or those who live near water'. It is described as backed, or bound, with sinew (*mu'aqqabah*—inaccurately translated by Faris and Elmer as 'reinforced'). The one really important point made in *Arab Archery* is that all these Hejazi bows were basically a stave of wood shaved down.

(b) The *wāsiṭiyyah*. In *Arab Archery* this is said to have been the composite bow (*maṣnū'ah*, *murakkabah*). One source quoted by Hein (*Isl.*, XIV, pp. 357-58) speaks of it as the 'Hejazi intermediate' (*al-Hijāziyyah al-wāsiṭiyyah*). There can be little doubt that it was the Arabian composite bow (cf. *Arab Archery*, pp. 11-12; Hein, *loc. cit.*), but whereas all sources which we have been able to consult agree that the bow was not, as might be supposed, so called after the city of Wāsiṭ (on the Tigris between Baghdad and the Gulf), none of them explains in which respect the bow occupied an intermediate position. After careful consideration we suggest that it was intermediate, not from the point of view of size, but from the point of view of construction and relative proportion of its components, having perhaps more wood, but less horn and sinew, than such composites as the Persian or Turkish. The difference would be immediately obvious in cross-section. (A variety of cross-sections of composite bows may be seen in the Pitt Rivers Museum, Oxford. See also Balfour, *JAI*, XIX, pp. 220-50 and *JRAI*, LI, pp. 289-309.)

The question of old Arab bows, of which our author had probably little, if any, first-hand knowledge, is a subject requiring investigation in its own right since there is a good deal of conflicting information in our sources—one of the most important is Ibn Sidah's *Mukhaṣṣas*—

which cannot be considered here. Taybughā's interest is the composite bow of his time and area, which can scarcely have been of Arabian provenance. He so takes the composite for granted that nowhere in his work does he ever trouble to apply the epithet to a bow, and there is much to suggest that his knowledge of the more primitive bows which he mentions, quite obviously by way of historical introduction and from a desire to link the bow with the Prophet's native Hejaz, is second-hand.

#### 2. Construction of a Composite Bow

From the foregoing chapter and the sources of information indicated at the end of this section a picture can be developed of many of the details of the construction and form of the bow described by our author.

The design of composite bows varied with time, place, climate, and the purposes for which they were intended (war, hunting, flight shooting, etc.), but the basic method of construction was the same throughout the East.

The first component to be worked was the wooden core, which to a large extent determined the final form of the bow and served as the foundation to which the horn and sinew were later glued. This frame on which the bow was built was made in three basic parts:

(i) The grip, or handle. This had to be relatively thick and rigid. A bow that bends in the hand upon drawing is normally unpleasant to use, as it kicks when shot and is, on that account, usually inaccurate. The thickness of the grip was determined by its need to fit the hand.

(ii) The *dustārs*. These were the two working parts of the limbs which took all the bend. The wood in these sections could either be flat or slightly oval in shape and about one-eighth of an inch thick along the centre line. The side to which the horn would later be attached was, as a rule, coarsely scored to increase the surface area exposed to the glue.

(iii) The *siyahs*. Working outwards from the grip, we find continuous with each end of the *dustārs* the ridged portion of the *siyah*. Here the wood was curved towards the tip and shaped to give, in cross-section, a shallow triangle which gave the structural rigidity required in the end of the bow. The width of the *siyah* tapers sharply into the tip, or ear. Initially the ears were longer than in their final form, with temporary nocks cut into the 'wrong' side to aid manufacture (below Fig. 7).

In details the construction of the wooden core varied according to the desired final shape of the bow and the quality and characteristics of the wood available to the craftsman. While we cannot be too dogmatic about these details, we may say that in Turkish bows the grip was commonly fashioned from one piece of wood, while both *dustār* and *siyah* were formed, without join, from another. In the Persian design, on the other hand, we find the grip, *dustār*, and *siyah* made from three different pieces of wood, and this method is sometimes encountered in Turkish bows. Sino-Tatar bows almost invariably have a long unbroken strip of bamboo for both *dustārs* and the grip. The latter has an additional piece of wood, or riser, glued to the back to give the required thickness. The most complex are the types from central Southern India, in which grip, *dustār*, the ridged section of the *siyah*, and the tip, or ear, were each made from different lengths of wood, thus giving seven separate pieces for the construction of the core.

This brief account will give a rough idea of the more common variations that can be found in existing bows. Other examples of construction could be cited, but it is not our purpose to penetrate too far into this field.

The various sections of the composite bow were united by means of single fish-tail, or V-form, splices and glued together. At the junctions between the grip and the *dustārs*, and the *dustārs* and the *siyahs*, the abutting surfaces of the wood were smoothly tapered in depth so that each section merged into the other, thus making it difficult to detect the end of one section and the beginning of the next in the finished article. In bows that have been stripped down dissection



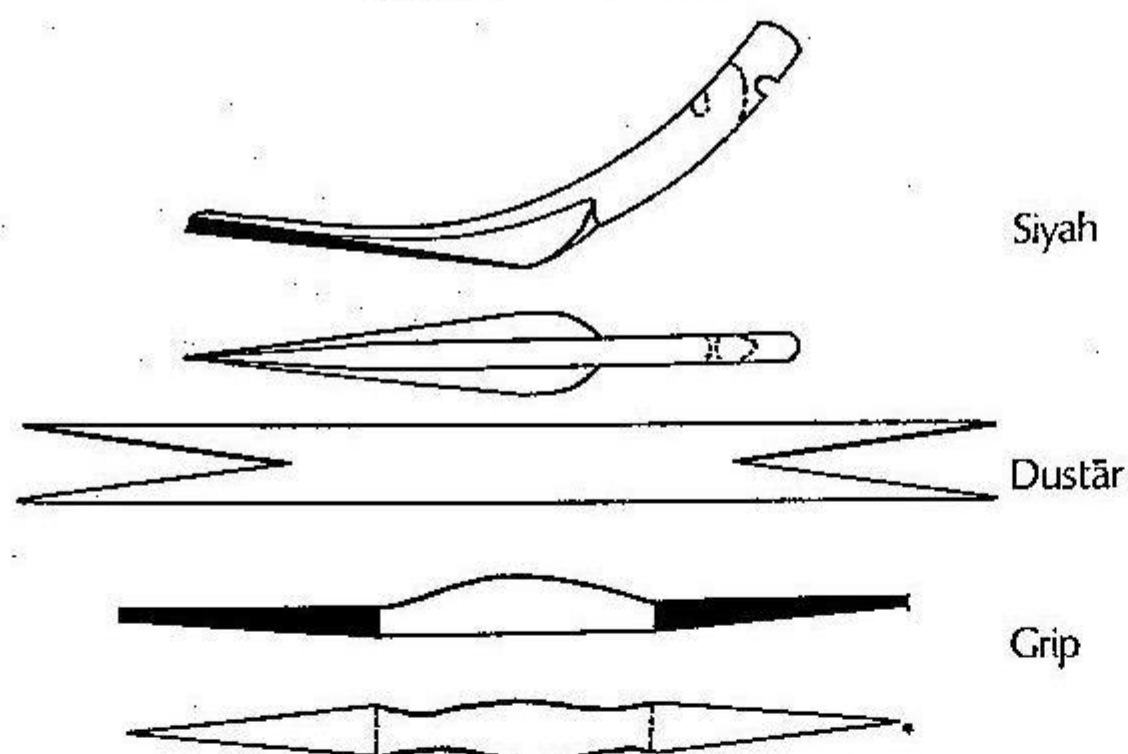


FIG. 7. PARTS OF THE WOODEN CORE OF A COMPOSITE BOW  
Dotted line on *siyah* shows final form.

has revealed such joints extending over a length of about  $3\frac{1}{2}$  in. Hence, although the actual grip might only be 5 in. long, the piece of wood on which it was built could be about 12 in. in length from point to point of the two 'V's to which it was tapered for fitting into the fish-tails cut in the *dustārs* (Fig. 7). Some splices exceed 5 in. in length, but a measurement of this order is unusual.

In MSS of the CD group and also in *Arab Archery*, pp. 11-12, it is clearly indicated that the wooden core was to be in five sections, viz. the grip, the two *dustārs*, and the two *siyahs*.

The width of all known composite bows increases at the place where the knots at the ends of the bowstring are intended to rest, the purpose being to avoid any risk of the string's slipping around the *siyah*, thereby causing the bow to capsize. Too long a string, for instance, might well slip in this way and cause the bow to spring violently back into its unbraced position. Such an occurrence would shock both bow and archer and could easily do serious harm to one or both. It was essential, therefore, that that part of the bowstring which ran from knot to knot of the end loops should not touch the *siyah*. If the design of the bow required *siyahs* so shaped as to predispose to this hazard, string-bridges were often fitted to support the loop-knots at the points where they would normally rest. Those from the Middle East were usually of bone, ivory, or horn. Disc-shaped and measuring about  $\frac{1}{2}$  in. in diameter, they were scooped or hollowed in such a way that the sides rose towards the outer edges of the bow to form small cradles for the loop-knots (Fig. 10). Since no mention of such a fitting has been found in any MS that we have examined, the recurve of the tips of the braced bow would seem to have been such that this device was not needed.

The dimensions of what our author considered to be the best of Syrian Mameluke bows are clearly given in the text as well as the length of the string it required (below, p. 22). The only point open to doubt is the bracing height, i.e. the distance between the grip and the string of the braced bow. Given the length of the various components, the bracing height would determine, *inter alia*, the angle through which the *siyah* was curved. A reconstruction is shown in Plate 18.

The craftsman, then, shaped and assembled the components of the wooden core. Having regard to the rigidity required in the grip and *siyahs*, on the one hand, and to the flexibility demanded of the *dustārs*, on the other, he could use different woods for different sections. Our

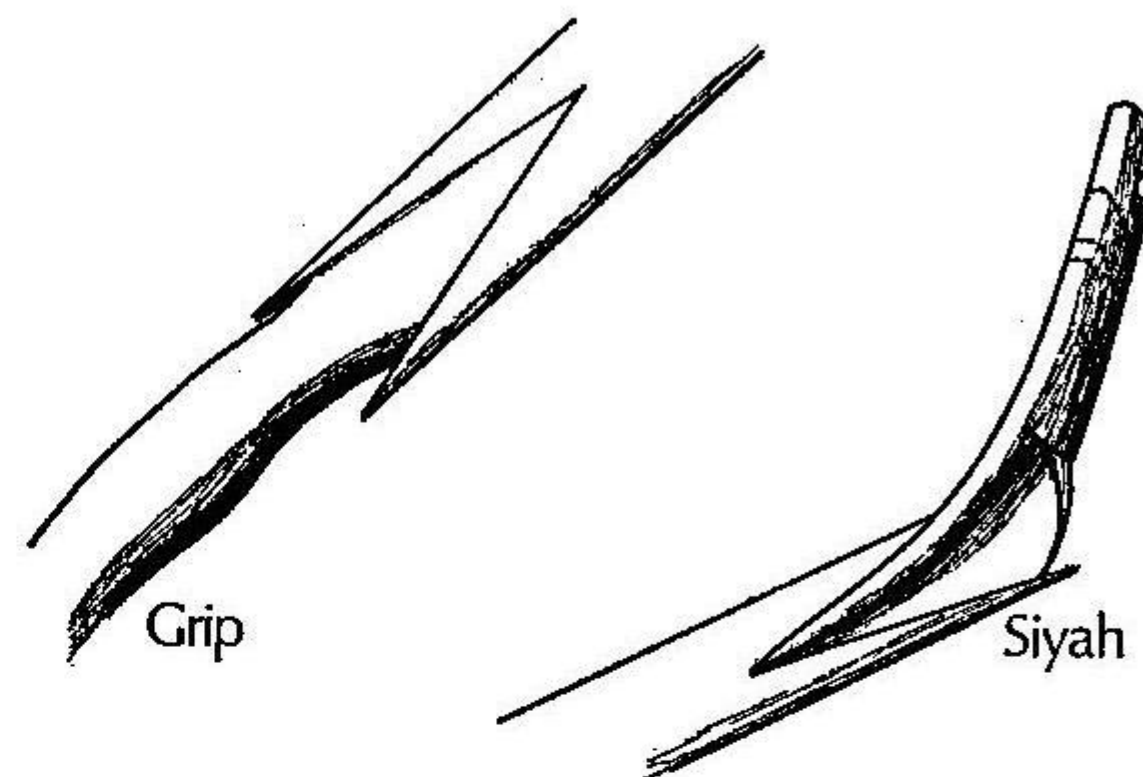


FIG. 8. METHODS OF SPLICING

(a). Grip and *siyah* showing splicing into *dustār* before trimming.



(b). Alternative method.

author indicates that work on the core was carried out in the autumn, a time of the year when the cooler weather and higher humidity would retard the setting-rate of the glue and give adhesion superior to that obtainable in the hot, dry summer.

While the glue was setting, the horn strips with which the belly would be lined could be sawn and prepared. Water-buffalo and certain types of goat and antelope could provide suitable material for the purpose. Since the horn of European cattle tends to split into thin layers when subjected to stress, it would not meet the needs of the Oriental composite bow. In dissected bows the horn has been found to taper in thickness from between  $\frac{1}{2}$  in. and  $\frac{1}{4}$  in. at the grip to half the amount at the centre of the *dustār*. Continuing to taper, it ends a little way past the joint between the *siyah* and the *dustār*. The thickness depends to some extent on the proposed weight of the finished bow.

Next, the horn was glued to the belly of the core. To ensure maximum adhesion, the two surfaces were usually scored to increase the surface area exposed to the glue. The horn was firmly bound to the core, care being taken not to press out too much of the glue in the process. The reflex of the bow was controlled by a cord tied between the two tips, and at this stage it was held in the form of a shallow 'C' (Fig. 9). For the glue to dry thoroughly about three months would be needed, after which sinew could be applied in warmer weather. Warmth would be essential, for on a cold day sinew is very difficult to handle and, if affixed under such conditions,



would almost certainly make for a poor bow. Hence the stipulation in our text that work of this kind should be undertaken in spring.

Some modern European authors, notably Payne-Gallwey (*The Turkish Composite Bow*, p. 4), have stated that the sinew was prepared from neck tendon, but we have proved by experiment that this is useless for two reasons. Firstly, it is far too elastic for the purpose for which it is intended and, secondly, it will not beat out into the fibrous form in which it needs to be applied, but will break up into small pieces. (It can, however, be used when cut into short lengths to build up the triangular section of the *siyah*, and we know of instances in which it has been employed for this purpose.) Leg tendon, on the other hand—preferably that of deer according to the findings of Dr. G. Fabian of Godolo, Hungary—is a suitable material. It can be dried, beaten out into fibres, and then impregnated with glue for combing into a layer along the back of the bow. It is important, however, to ensure that the temperature of the glue is not so high as to destroy its elasticity, which is sensitive to heat.

Having reached this stage, the bow was reflexed into a complete oval, and the tips were tied together, a cord being led from the latter around the grip to control the degree of bend (Plate 2). The sinew was thickly applied over the ridged portion of the *siyah*, leaving it, in section, almost an equilateral triangle with increased rigidity. Of all the components in the composite bow, the backing of sinew was the most important, and by correct application of the material a skilful

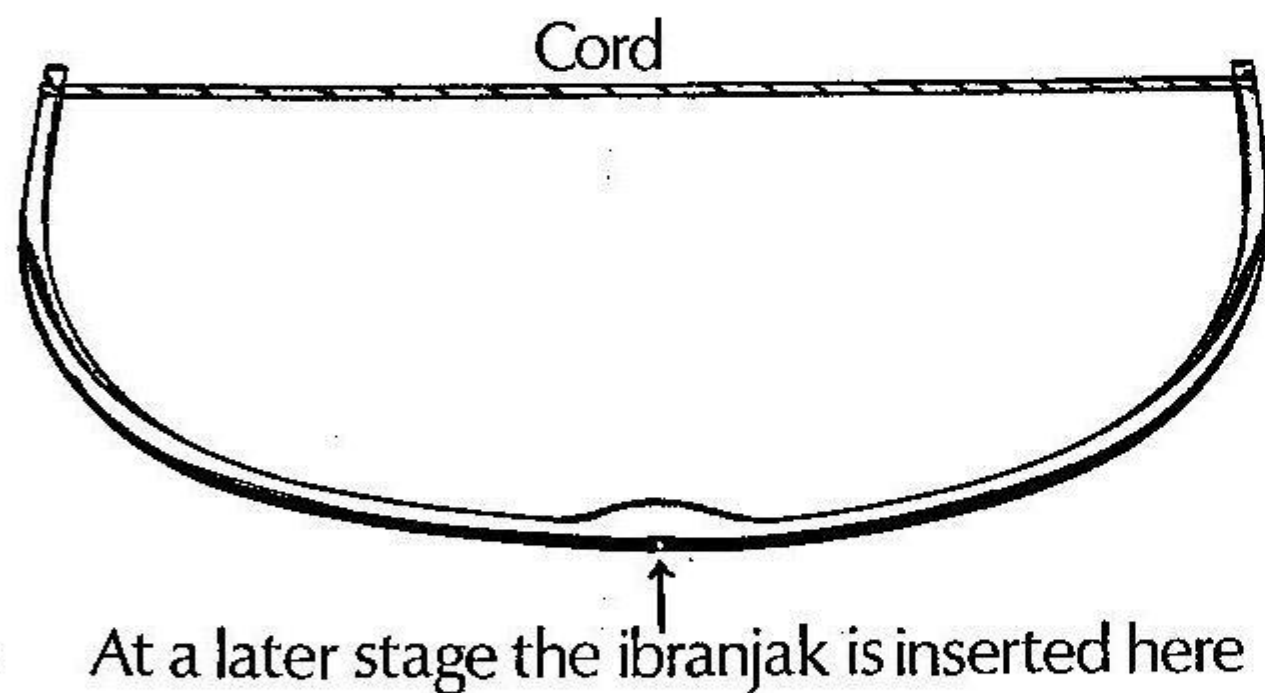


FIG. 9. WOODEN CORE WITH HORN APPLIED

craftsman could compensate for defects both in horn and wood. It was applied in one, two, or even three layers, but the full reflex was only achieved after completion of the final layer.

Experience shows that at this stage of manufacture the two horn strips, however carefully butted in the first place, are almost sure to part, thereby creating a gap, which, if left as such, would cause unfair shearing stresses to be thrown on to the bond between wood and horn when the bow is braced and drawn. To remedy this defect, a slim piece of packing—nearly always to be found in Oriental composite bows—was inserted between the ends of the horn strips. In existing bows it is of bone or ivory. This component was the *ibranjak* (see Glossary, s.v.), the purpose of which proved so problematical to Faris and Elmer (*Arab Archery*, p. 162, where it is tentatively suggested that it may have been a shock-absorber). It is mentioned later by our author on a number of occasions without any explanation, but it was, as Muṣṭafā Kānī says of the *chelik*—the term applied to the *ibranjak* of the Ottoman flight bow—the piece which united

the two halves of the bow (Hein, *Isl.*, XV, p. 263. Cf. Klopsteg, p. 115). It served the additional purpose of helping to maintain the reflex shape in the grip of the bow and of adding to its rigidity. It should be noted that where reflex in the handle does exist, it is slight, and the centre part of most Middle Eastern bows is virtually straight except in so far as it is shaped to fit the hand.

When the glue had thoroughly set, the impregnated sinew was hard enough to be shaped with a file. After removal of any obvious irregularities and hardened exuded glue, the bow was strung for very short periods at a time so that the bowyer could study the curves of the two limbs. The process of tillering then began so that both limbs, when adjusted, might be brought to the correct curve. During this time the bow would periodically be braced and drawn gradually to increasing degrees until it could be brought to full draw with even balance in both limbs. Heat and formers were used to assist in shaping the limbs.

In the last stages of manufacture the sinew backing of the bow was veneered with tree bark applied diagonally in strips so as to prevent it from splitting when the bow was drawn. To make it waterproof, it was varnished and then painted for the sake of appearance. A sinew binding beside the nocks strengthened the wood against any danger of its splitting under the impact of the string's loops at these points when the bow was shot. Turkish and Persian bows are usually found to have a strip of horn let into the tip to strengthen the ear (Fig. 10), but we have come across no mention of this.

From our text, as it stands in AB, one is apt to conclude merely that a composite bow took

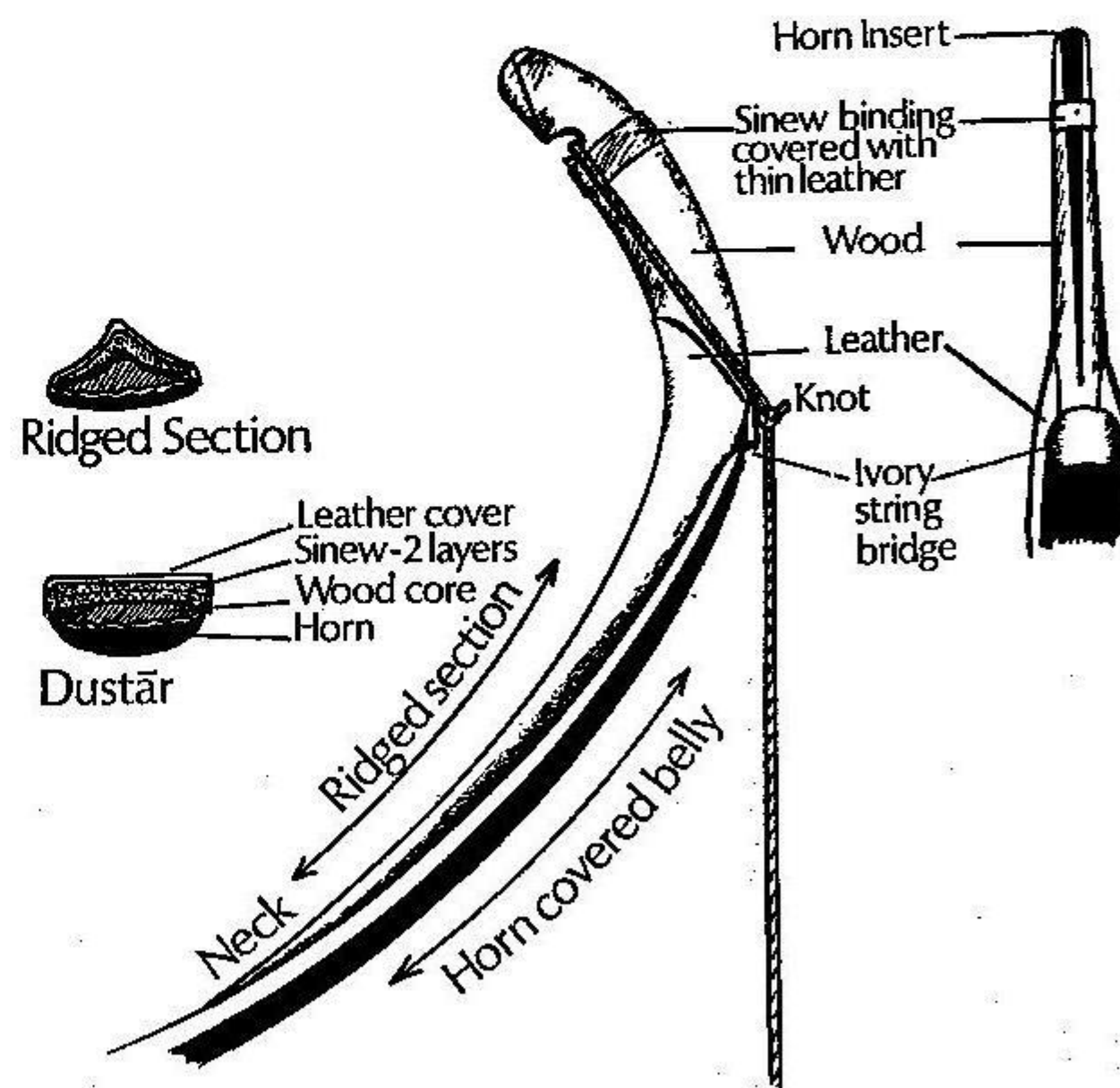


FIG. 10. *Siyah* OF A BASHKIR BOW (EIGHTEENTH CENTURY)



a year or so to make, but the wording of the CD MSS is such that we are left in no doubt that each of the various processes had its own particular season and that each and every one of the four seasons of the year was involved. In other words, our 'full year' need have nothing whatever to do with the time taken to produce a bow, though it could certainly be completed within that period. (On the view that Turkish bowyers must have spent about five years on the processing of a bow, see Klopsteg, p. 52.) What, in our view, is implied is that each process had to be carried out only at the correct time of the year, otherwise the result would be unsatisfactory.

Main Sources: In addition to Hein, Klopsteg, and *Arab Archery*, see Balfour, *JAI*, XIX; idem, *JRAI*, LI; Payne-Gallwey, *The Turkish Composite Bow*, London, 1907; H. S. Hamlin, 'A Study of Composite Bows', in *Archery*, April-Sept. 1948. Information has also been derived from correspondence and discussion with Messrs. J. Flinton, E. McEwen, D. Skinner; from MS notes of H. Ingo Simon; from a study of sections of bows in the Pitt Rivers Museum, Oxford, and of the H. Ingo Simon Collection (bows), Manchester Museum.

### 3. The Painting of Bows

Our author says nothing whatever about the painting of bows, but in D<sup>3</sup>, 108b, there is an addendum to the text giving instructions for the painting of bows with *sandarūs*—presumably, sandarac, a colourless resin from the tree of that name. The directions may be summarized as follows:—

Mix any desired colour with liquid sandarac. Apply and allow to dry off. Next, apply a varnish of pure sandarac and dry off. Now coat the surface with strong (? text uncertain) ox-gall. Apply paint of another colour to give, for instance, white on black, or red on green, or blue on red, and then place in the hot sun. When appropriate, sprinkle carefully with wine vinegar to bring up the colours in the design and dry off. Next wash off the gall and dry. Now apply sandarac by itself and leave. If desired, apply another colour in similar fashion.

### 4. Dimensions of Bows

The measurements given for parts of the bow are summarized below. Those for the grip do not include the tapered portions fitting into the *dustārs*.

Column 1 shows the normal measurements as given by our author.

Column 2 shows the variations which he records. (A different set of variations is to be found in CD (e.g. C<sup>2</sup>, 39a; C<sup>3</sup>, 15a), but since they are liable to confuse we omit them.)

	1	2
Upper <i>siyah</i>	6.55 in.	5.73 in.
Upper <i>dustār</i>	16.36 "	16.40 "
Grip	4.91 "	4.91 "
Lower <i>dustār</i>	15.82 "	16.23 "
Lower <i>siyah</i>	6.27 "	5.46 "
TOTAL	49.91 in.	48.73 in.

It will be noticed that the author gives the total length of the bow shown in column 1 as 50.2 in., so there would appear to be some minor discrepancy in the figures. For all practical purposes, however, the difference is negligible.

The lower limb of Taybughā's Syrian bow was shorter than the upper, and, although this characteristic is found in other designs, most composite bows from the Middle East that have so far been examined have limbs of equal length—an advantage in that they could be used either way up.

Compared with those of existing bows, our author's *siyahs* seem very short and his *dustārs* long. This would result in a slight decrease in the efficiency of the bow owing to understressing of the materials from which it was made. On the other hand, it would be a little more reliable in war and less liable to fracture or damage.

To illustrate these differences, we have drawn up a table of detailed measurements made from a selection of existing bows. It should, however, be noted that since it is usually very difficult to decide exactly where one section ends and another begins, the table below may contain minor errors.

Bow	<i>Siyahs</i> (from nock)	<i>Dustārs</i>	Grip	Total (nock to nock)
Bashkir*	12.0 in.	9.9 in.	4.25 in.	58.0 in.
Bashkir†	10.5 "	12.5 "	5.0 "	51.0 "
Persian‡	10.0 "	14.5 "	5.0 "	54.0 "
Ottoman flight§	9.0 "	9.5 "	4.5 "	41.5 "
Indian	9.0 "	11.5 "	5.0 "	46.0 "
Indian¶	9.5 "	13.0 "	5.0 "	50.0 "
Indian**	9.25 "	11.5 "	4.0 "	45.5 "
Indian††	9.75 "	12.5 "	4.0 "	48.5 "

The Khorasanian bow to which our text refers would at the most have been only 37 in. long, which is short even by comparison with the Ottoman flight bow.

The following additional information occurs in D<sup>1</sup>, 15b and is of some interest:—

'They (sc. the Turks, Persians and Iraqis) divide the bow into half at the halfway mark on the grip so that whichever limb is the weaker is taken by them to be the shooting limb (i.e. the upper). The Khorasanians do not believe in applying 'too much' sinew to their bows . . . and accordingly use less of this material than any other. With the Iraqis, on the other hand, sinew and horn are used in equal proportions. This is because of climatic differences in these countries. Experts say that if you are in a very hot country, you should soak the sinew with good, pure, well-prepared parchment glue because it gives moisture and suppleness suited to such a country and excessive heat . . .'

Specifications given by other authors cannot always be directly compared as they may refer to a bow of different design from that described in the present treatise. It is, however, interesting to record the observation of the author of the *Nihāyah* (see p. xxxiv) that the longest bow should be 12 *qabḍahs* ('fists', i.e. about 39½ in.) and the shortest 8 *qabḍahs* (about 26 in.). The longest *siyahs* should, he adds, be 16 fingers (about 13 in.) and the shortest 10 fingers (about 8 in.). (*Nihāyah*, Ch. vii, p. 72.) If our equivalent for the *qabḍah* is correct (see Appendix 1), the length of the bow must have been measured by a different method from that indicated by Taybughā. It may have been based on the shortest distance between the nocks or tips of the braced bow.

### 5. The Flight Bow

The mention of long necks in connexion with the flight bow probably implies that the ridged section of the *siyah* in the kind of bow with which the author was familiar extended a few inches

\* Coll. Ingo Simon, Manchester Museum No. O.7633.

† Coll. D. G. Quick and similar coll. E. McEwen.

‡ Coll. Ingo Simon, Manchester Museum No. O.7646.

§ Coll. Ingo Simon, Manchester Museum No. O.7624.

|| Coll. W. F. Paterson.

¶ Coll. W. F. Paterson.

\*\* Coll. W. F. Paterson.

†† Coll. Ingo Simon, Manchester Museum No. O.7652.



further towards the grip than in the case of the war bow, thereby shortening the *dustār*. That in its turn would give a higher speed of recovery to the tips of the bow when the string was loosed. This would normally result in a lower degree of accuracy, since the two limbs of the bow might not travel forward exactly together. Such an effect, however, would be of no consequence in flight shooting where discharge velocity is the all-important factor. Far greater stress would also be thrown on to the shorter working part of the limb, making such a bow less suitable for warfare.

#### 6. Crossbows

In Arabic the crossbow is termed 'foot-bow' (*qaws ar-rijl*). The origin of the term is simply explained in Marḍī ṭ-Ṭarsūsī's description of the type of crossbow with which he was familiar in the reign of Saladin: '... they (sc. crossbows) are drawn by applying the pressure of both feet together with the strength of the back, for, in order to pull, one must fasten around the waist a well-tanned and toughened belt of ox-hide, at the end of which are two hooks to take the string. One then puts the feet inside the bow ... and with the back pulls the belt at the point where the

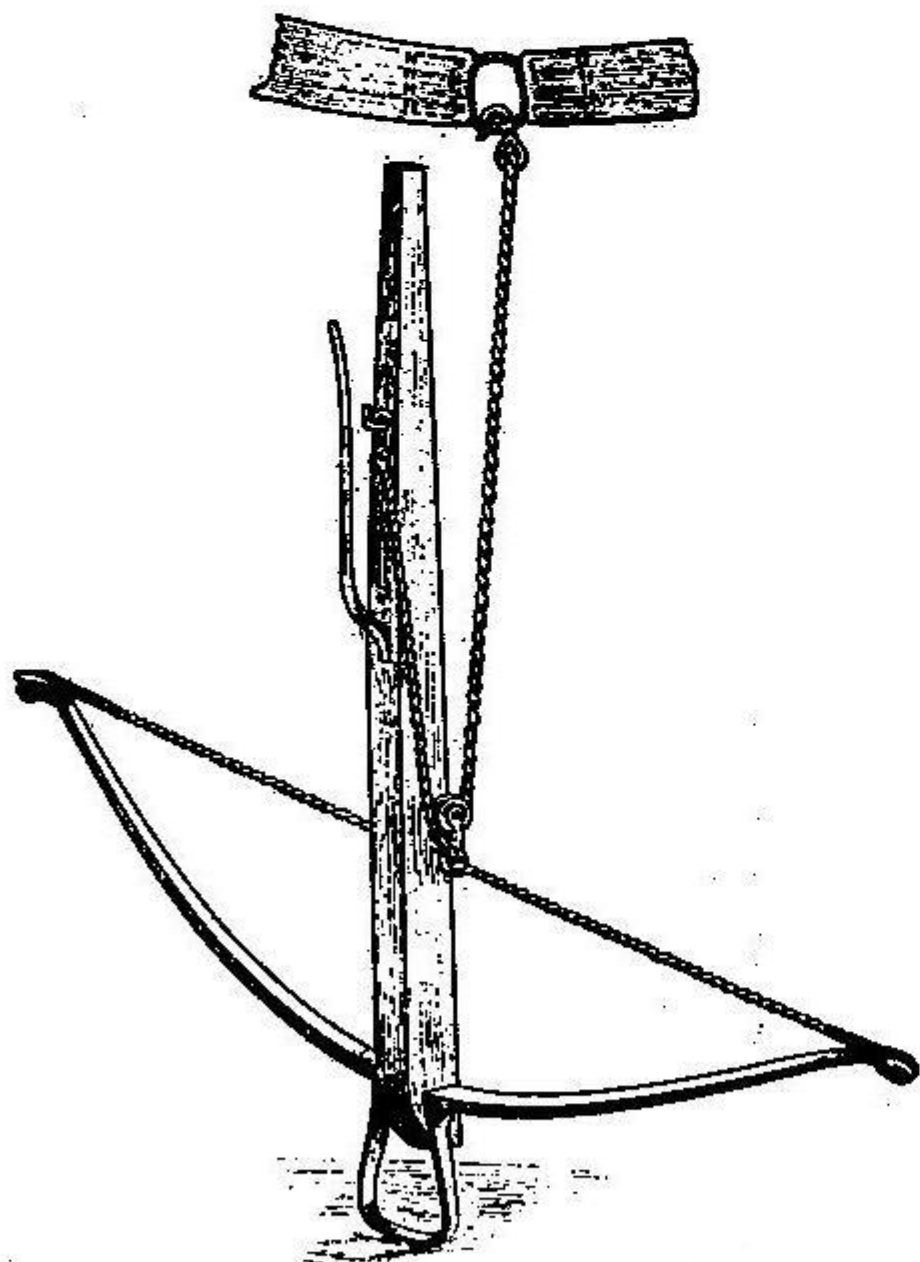


FIG. 11. CROSSBOW WITH CORD AND PULLEY (See Glossary, s.v. *jarkh*.)  
(From Payne-Gallwey, *Crossbow*, Fig. 30.)

two hooks are until the string reaches the catch (*qaṣṣ*) located in the stock ...' (*Tabṣīrah*, 88a-b. Cf. Cahen, *BEO*, XII, pp. 132 and 152, n. 12.)

Another type of crossbow—possibly a later development—required the use of one foot only. The foot was placed in a stirrup fitted to the front of the stock (Fig. 3b). This was the *qaws ar-riḥāb* or 'stirrup bow'. Europe distinguished between the two by the terms *arbalista ad duos pedes* and *arbalista ad unum pedem* (Payne-Gallwey, *Crossbow*, p. 60).

Because of the relative instability of nomenclature and technical and semantic developments, it would be unwise to be dogmatic about the meaning of certain terms used by our author in connexion with crossbows. Some information on Middle Eastern crossbows and arbalests may be derived from Reinaud, Huuri, Cahen (see Bibliography), and others, but there is insufficient technical detail to enable us to determine their construction.

*Jarkh*. From Ch. 16 and glosses in CD (e.g. C<sup>1</sup>, 22b; D<sup>1</sup>, 17a) it is clear that, so far as our author is concerned, this was the stirrup bow. It shot a bolt.

*Zanbūrak*, 'little wasp'. What meaning the term had for our author we cannot say. It appears, at some stage or another, to have been a weapon which shot a strong, heavy bolt of the same name closely resembling the Western quarrel (Reinaud, pp. 211-13; Cahen, 153-54).

*Bandūq* (more correctly *bunduq*). This was the *qaws al-bunduq*, a type of crossbow that shot pellets (*bunduq*) of metal of that name (Reinaud, pp. 217-18 and Hein, *Isl.*, XIV, p. 304. There is further mention of the missile on p. 139). In the present context the term is not to be understood as the firearm of the same name (*El<sup>2</sup>*, art. *Bārūd*). (Nor in the case of *zanbūrak*.)

*Laqshah*. We have no information at all on this weapon.

#### 7. The Naval Crossbow

Because damp sea air could have a most adverse effect on glue, the composite construction with wood, horn, and sinew, which was often employed in crossbows before the introduction of steel limbs, was unsuitable for naval operations. The best solution to the problem lay in the use of the more simple, but more reliable, wooden limbs. The yew recommended by Ṭaybughā is one of the finest bow woods obtainable, but there are problems in working it as the craftsman has to pay close attention to the run of the grain. By taking a length of the wood and splitting it in half, two lengths can be obtained with an almost identical run in the grain. If one length is then reversed and joined to the other, the two limbs should be almost identical. In this way the bowyer's problems are eased, and a better bow results. Such is the most probable explanation of the 'two opposing staves' indicated by our author.



## CHAPTER 4

### ON BOWSTRINGS

Experience with bowstrings led to the use of a string (*watr*) which is twisted lengthwise (*musaddā*) from new, wound silk of high quality. Our knowledge of this particular type we acquired from masters who came from Persia, and in Persian it is called '*chillah*'.<sup>1</sup> For flight shooting it is unrivalled by any other known type. There is also the 'Cathayan' string which originated in Cathay and was subsequently widely adopted in other countries. It is also made from raw, wound silk—and glue.<sup>2\*</sup> It is more durable than the first kind, is stronger in the bowcase (i.e. resistant to abrasion and pressure when the bow is carried strung in its case) and is also more serviceable. All other kinds of string are inferior to these two (below, p. 22).

As regards the weight (*wazn*, i.e. mass) of the string in relation to the weight (*hayl*, i.e. draw weight) of the bow, experts hold that the most satisfactory rule to observe is that contained in the following verse:

'As weighed by a balance the string should be one-third of one-tenth of one-tenth of one-tenth of the weight of the bow.'

What you do is to ascertain first the weight of the bow in Damascus *raṭls* and then the relative weight of the string it requires including the two end loops and, possibly, two *saysarahs* (a *saysarah* in this context being, most probably, some sort of protection against chafe where the loop fits into the nock of the bow). If you work out this formula, you will find that for every thirty *raṭls* (122 lb.) there are six *dirhams* Damascus weight (285 gr.) because one-tenth of thirty *raṭls* is three, or, in other words, 1,800 *dirhams*. One-tenth of that is 180 *dirhams*, one-tenth of which is eighteen, one-third of which is six. This is the reckoning on which there is a consensus of expert opinion, both ancient and modern. They point out that a fine string increases cast, but that an arrow discharged from such a string will flint.<sup>3</sup>

In the flight shooter's string (*watr as-sibāq*) there should be one *dirham*'s weight (47.6 gr.) of new and extremely strong wound silk for each ten *raṭls* (40.7 lb.) of bow weight. It should then be twisted lengthwise<sup>4</sup> in the appropriate manner. A heavy string will damage the neck of a bow and reduce its efficiency (because of the extra weight to be carried forward by the limbs of the bow).

To weigh a bow, you should string it and then fasten its grip to a peg in the wall or some similar device. Next, you should nock a full-length arrow (*sahm tamām*; below, p. 27) on the string and secure it so that it leaves neither the string nor the grip. You now hang your *raṭls* on the string (presumably, in a container)<sup>5</sup> and continue to add to them until the arrowhead attains the middle of the grip as in the greater draw (*kashf bayād*; below, p. 128), or comes back as far as the archer's reach at full draw (*wafā' ar-rāmī*). The sum of these *raṭls* will be the draw-weight of the bow in question.

Some archers weigh the bow with a pulley. What one does in this case is to fix a pulley to a 'second' peg set 'on the same' wall in line with the first, 'the bow being held perpendicularly by

### ON BOWSTRINGS

21

the grip to the first peg'. The archer then fastens a rope to the string 'at the nocking point', puts the rope into the pulley, and attaches his *raṭls* to the end of the rope. It is argued that this method reproduces the manner in which the bow is drawn. The first method, however, is the sounder of the two. Only those who wish to exaggerate the power of the bow and make a show of its strength adopt the other method (which is inaccurate because the pulley introduces friction loss, thus enabling the weight of the *raṭls* to be increased beyond the weight of the bow).<sup>6</sup> Any person weighing a bow should be quick to remove the *raṭls* from it, otherwise he will weaken it, and it may well break (since a good bow at full draw is close to breaking point and will, if so held for any length of time, lose some elasticity). It is said, and rightly so, that a thick string will be more taut at short range, and a thin one at long.

For crossbows there should be one *ūqiyyah* (almost 5½ oz.) of string to every 100 *raṭls* (407 lb.) Damascus weight.<sup>7\*</sup> This means that for every *raṭl* of bow weight there should be one-half of a *dirham*'s weight (23.8 gr.) of string. The lathe (i.e. the bow proper of the crossbow) is one-fifth of the string,<sup>8</sup> and so the length of the actual bow should be multiplied by five. Four strands should be twisted lengthwise from this, and then from each end one should turn back 'and knot' the two loops of the string. This, then, is the way to obtain the length of the string of the particular crossbow involved.<sup>9</sup>

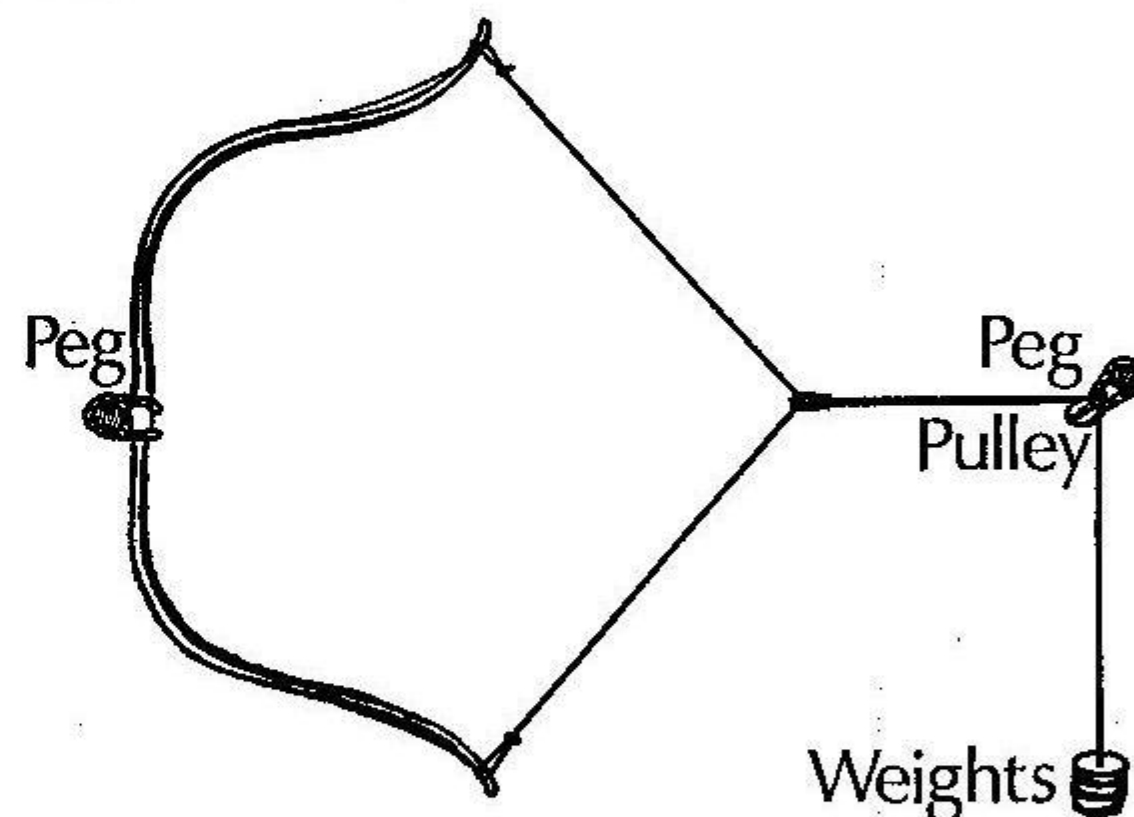


FIG. 12. WEIGHING A BOW WITH A PULLEY

A long string will improve cast and put increased sharpness and speed into the arrow. If it is too long, however, 'it will slip around the side of the *siyah*, and' the bow will turn itself inside out (i.e. spring violently back into its relaxed, reflexed position), and the string will lash the archer's forearm and chest. A short string, on the other hand, will give greater accuracy<sup>10</sup> and make for a safer and more stable bow. It does, however, give a slow arrow. A string of medium length is more appropriate than either because it gives 'perfectly adequate' speed and good grouping, and is safe for both bow and archer.

If the length of the string is assessed from the length of the bow, the string must be shorter than the bow by one-half of one-sixth. The way to do this is to ascertain the length of the bow from nock to nock and then to deduct one-half of one-sixth from the result. What remains will be the length of the string for the bow in question, measured from the centre of the ends of the two



loops once the string has been knotted and stretched to prevent it from lengthening out later. The nock of the bow is, of course, the place where the loop of the bowstring fits. The way to measure the length of the bow is to put the end of a loose thread at the centre of the side of the nock which is in the *siyah* and then to pass the thread over the *kanār* of the bow, or, in other words, its edge dividing its belly from its back, as far as the middle of the side of the other nock. The result will be the length of that particular bow. (*We omit here a few lines of pious, but irrelevant, reflection.*)

Once the bow is strung,<sup>112</sup> place some suitable object between the string and the centre of the grip and if—by the appropriate cubit of the trade—it is one-third of a cubit and one-third of a *qirāṭ* long (9.1 in.) (or, 'one-quarter of a cubit and two-thirds of a *qirāṭ*' (7.3 in.), according to a technically more probable variant<sup>113</sup>), then the string is just the right length (below, p. 23).

If the bow is of medium size, being neither long nor short, the size of the string's loops should be such that one can insert the middle three fingers, or to be more precise, the index finger, the middle finger, and the third finger of the right hand. In size it should be two *qirāṭ*s (2.2 in.) of the cubit specified above, if the *siyah* is five *qirāṭ*s (5.5 in.) of the said cubit. The rule for the loop, then, is that it should take three fingers 'or measure (roughly) one-third of<sup>113</sup> the length of the *siyah*. The smaller the loop, the greater the cast. A small loop, however, is not without hazard, for it can break the *siyah* at the top end (i.e. at the tip). Too large a loop, on the other hand, will reduce the cast of the bow and can break the *siyah* at the bottom end (i.e. at its base where the *siyah* joins the *dustār*).

## COMMENT

### 1. Materials

As already stated in our introduction, the basic requirements of a good bowstring are that it should be light, strong, and without stretch once it has settled to the bow. The strings recommended by our author were made of unspun, raw silk whose threads were twisted together to form a string of the required length. Glue was used to bind the strands together, the purpose being not only to prevent entanglement upon removal of the string from the bow, but also to increase the strength of the string. Wax could be used instead, but it is not mentioned in our text.

Although silk is Ṭaybughā's one and only choice, it is noteworthy that Mardī, writing in the twelfth century, makes no mention of any material other than animal hide—and human skin!—though he advocates a mixture of silk with horse-hair for the string of the siege engine called *ziyār* (*Tabṣirah*, 83a, 97b–98a. Cf. Cahen, *BEO*, XII, p. 130). The author of *Arab Archery*, pp. 94–95, while mentioning silk, does not attach the greatest importance to it, but deals at some length with strings made from camel-hide. To produce a string of this material, a strip of leather was subjected to various processes of stretching, twisting, smoothing, and, finally, coating with gum arabic. (On the use of hides, see also Hein, *Isl.*, XV, p. 7.) It is possible that in early times Turkish strings were made of horse-hair (Hein, *ibid.*, p. 1. Cf. Klopsteg, p. 54).

### 2. Loops

Most existing strings for use with Oriental composite bows are made with the end loops quite separate from the main string. The latter is a long skein of thread formed by winding around two pegs set at the required distance apart. The loops are knotted into the ends of the skein, as shown in Fig. 13. The same knot was used in bowstrings throughout the East from China to Turkey. Though more rarely found, some strings were made longer so that they could be knotted back upon themselves to form the end loops.

The advantage of this second type was that a string-maker could supply prepared lengths which the user could knot to suit his own bow. This would certainly be the more practical approach for the archer in combat and was, we suggest, that adopted by our author, whose interests in the present treatise are primarily military. The first method would impose the necessity of having the skeins of exactly the right length, which would mean that they would have to be made to order unless the archer was prepared to perform the task himself.

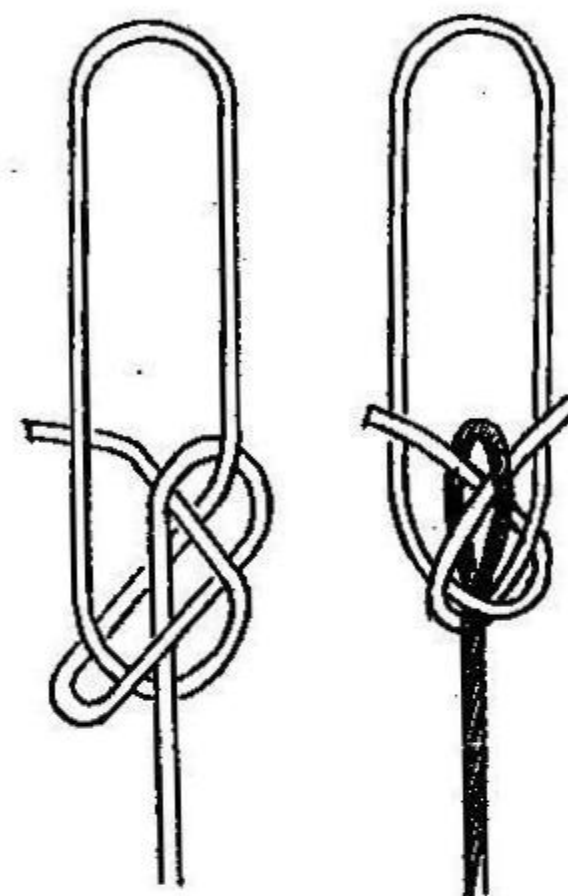


FIG. 13. BOWSTRING LOOP-KNOTS

### 3. Bracing Height

For accurate shooting, the bracing height, or distance between the grip and the string of a braced bow, must be constant. Any alteration will affect discharge velocity, a greater height reducing that velocity and a lower height increasing it. Too low a height, moreover, will give rise to an unstable bow. The bracing height achieved by a bowstring of specified length in relation to a given bow can, therefore, be an important guide to anyone attempting to determine the design of a bow. Some versions of our text give measurements amounting to 9.1 in., while others give the equivalent of 7.3 in. A reconstruction of Ṭaybughā's bow from all other specifications at our disposal suggests that the latter figure is correct. (See p. 170.)



## CHAPTER 5

## ON ARROWS

i

The best arrows<sup>1</sup> should possess the following characteristics. They should be roundly hewn, be of hard, solid wood, and be entirely devoid of knots, splinters, and pitting. They should be free from distortion and rotate quite evenly when twirled on the finger nail (below, p. 30), especially when you spin them 'with right finger and thumb'<sup>2</sup> as they rest upright on their heads<sup>3</sup> 'in the centre of the right palm'.<sup>4</sup> The swiftest arrows are those of slim contour with low fletchings and thick fore-shaft (*muṣaddar*; see Glossary). An arrow of this description is termed a 'candle-form' (*qālib ash-sham'ah*). It should be thickest at the arrowhead and then gradually taper until it reaches its narrowest at the base of the nock. The nock (*fūq*) should be circular and of the same size as the thickest part (*badan*) of the shaft. The most accurate arrows are of the 'barley-grain' contour (*qālib ash-sha'trah*) with a middle thicker than the ends. 'They should be equipoised when balanced without head or fletchings'.<sup>5</sup> Straight-hewn (*mustawī n-naḥt*) arrows are those of uniform thickness from end to end. As long arrows they are inferior to the other two types, but as short they are better than either. (Short arrows are presumably those for use with an arrow-guide or with a crossbow as opposed to the normal 'long' arrows; below, p. 29.)

The nock should be of medium size, for a thick nock will slap the grip, and you will then spoil your shot. The thin nock, on the other hand, is weak (and will readily break). For short arrows the archer should put a thread around the circumference of the string and then, dividing it into three, make the nock the size of one of these thirds. It follows from this observation that as every bow has its own particular string, the arrow nock should in each individual case be one-third of its circumference. In the same way you also determine the size of a crossbow nut (*jawzah*) and its aperture (i.e. in the crossbow). This will be dealt with later. *Kharṭ* arrows (?) are useless.<sup>6</sup>

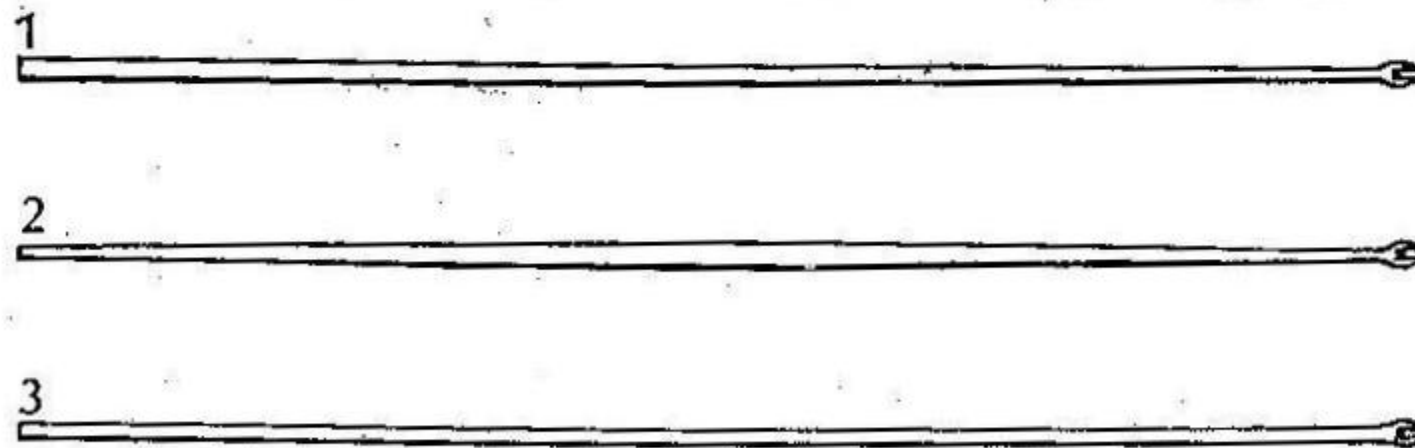


FIG. 14. ARROW SHAFTS

1. Candle-form.
2. Barley-grain.
3. Straight-hewn.

ii

Specialists say that the most suitable heads for both *maydānt* arrows and *yaghliq*, or war, arrows are those with a weight one-seventh of that of the whole shaft plus its head (*naṣl*). Anything short of, or in excess of, this specification is wrong. For, if the head is too heavy, the arrow will gad (*taharraka*) on its descent to the mark, while if it is too light it will gad as soon as it leaves the string. This is quite apparent in the case of crossbow bolts. The heavier the head, the more effective it is at short range, 'but at long range it will topple and do little damage'.<sup>7</sup>

It is related that Ṭāhir (al-Balkhī; below, p. 39) told the following story: 'I had heard,' he said, 'of a certain Persian against whose arrows no man could protect himself owing to their power of penetration. So I sought him out and worked for him for a time, though I was afraid to ask any questions. Eventually he went out hunting one day. By this time I had joined the family and so I was able to say to his wife, "There is something I should very much like you to do for me." "And what is that?" she asked. "Please show me your husband's bow," I said. So she gave me one of his bows, and I drew it. Much to my surprise it was as light (*layyin*) as ours. "Good heavens!" I exclaimed. "Can your husband pierce any kind of armour with a bow as light as this?" "Yes," she replied, "there are two things about it which enable him to do so. Just look at his bowstring and his arrowhead." To my surprise the string was as thick as one's finger and the arrowhead exceedingly large.'<sup>8</sup> We have put this story to the test and found that it is as Ṭāhir says.

The most reliable and effective arrowheads are those which are either triangular or square (i.e. in cross-section; Fig. 15). These are for use in battle and for piercing iron and all kinds of

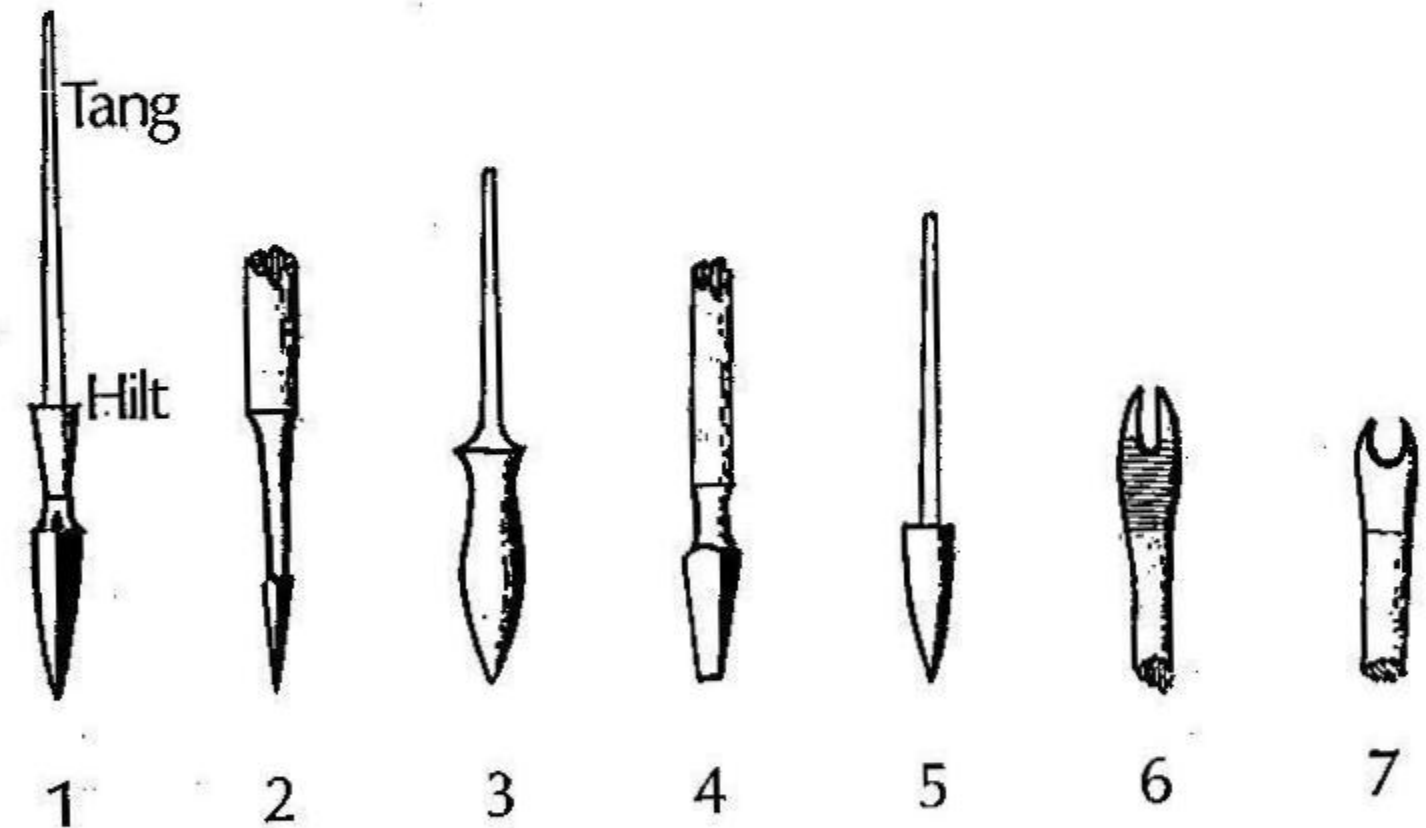


FIG. 15. ARROWHEADS AND NOCKS

1. *Yaghliq* from N.W. India.
2. *Yaghliq* from Doge's Armoury, Venice.
3. 'Olive-shaped.' (From Saxton Pope, *Bows and Arrows*, Plate 14.)
4. Chisel-head from N.W. India.
5. *Maydānt* target head (conjectural).
6. Turkish nock.
7. Indo-Persian nock.



armour. There are various types of arrowheads, of which the most useful are those just mentioned. The *haydarī* head (a broadhead for hunting?)<sup>9</sup> is not as good as either of these two kinds. Target heads (*nuṣūl al-ahdāf*) should be rounded.<sup>10</sup> There is also a kind of head resembling an olive (Fig. 15.3), which, some masters have told me, is the most useful of all arrowheads for battle and for piercing shields and which in Turkish territory is used by archers more than any other type. They also have an arrowhead resembling a chisel. Like the *maydānī*, it is cylindrical, but its tip is not pointed. On the contrary, it looks as if it has been cut 'obliquely' from its 'lineal' midpoint and tapered 'to a blade' on two opposite sides so as to present the appearance of a scalpel (Fig. 15.4). The edge 'of the blade' is as wide as the diameter of the body. I have tested this head and found that it will pierce the laminae of a brigandine (*qarqal*)<sup>11</sup> as well as it is possible to do so.

The art of mounting the arrowhead lies in observing the following rules. The head should be evenly rounded on all sides, no one side being heavier than another.<sup>12\*</sup> It must be so made that it is perfectly straight from its point to the end of its tang (*silān*), the end of the tang being narrower than its base. The wood of the shaft should be bored 'right in the centre'<sup>13</sup> to a distance that is less than the length of the tang of the arrowhead so that its end can be inserted into unbored wood in its natural state (*khām*) (and so fit tightly).<sup>14</sup> The war head, and indeed any arrowhead designed to penetrate iron, should be made of steel.<sup>15</sup> In these cases the tip must be tempered, and a fraction snapped off if it is intended to pierce laminae of armour<sup>16</sup> (below, p. 31). This technique is a well-guarded secret, and the result a weapon capable of piercing armour plates and shoulder-guards.<sup>17</sup> The heavier it is, the greater its power of penetration.<sup>18</sup> This is well known.

## iii

As regards fletchings (*rish*), there are different types. The best and most serviceable are vulture feathers, after which come those of the eagle (below, p. 31). Right-handed feathers make more accurate arrows and are suitable for *maydānīs*. Left-handed feathers, on the other hand, give a swifter arrow and are suitable for flight- and war arrows. The way to distinguish the right-handed from the left-handed is to put the nock of the arrow to your breast, and if the feathers lean over to the right, they are right-handed, whereas if they lean over to your left, they are left-handed (the converse is the case in English practice). It is wrong to fletch the one arrow with both types. It should be fletched either wholly with right-handed feathers or vice versa. The rule for a set (*nadab*) of *maydānī* arrows is to have them all exactly alike. For when feathers differ in kind none of the arrows are any good (below, p. 31). The most useful fletchings are the *makyūl* or 'balance pan' (?) variety<sup>19</sup> closely followed by 'gazelles' (below, p. 32). The longest fletchings should be no more than six finger-widths and the shortest three. Fletchings that are long and low (*lāṭī*) are better than those which are short and high (*ālī*). At their highest they should be no more than a finger-width. Four feathers hold a truer course and give better grouping and greater accuracy, but three are faster and give greater range (*asbaq*).<sup>20</sup> There are some archers who use six feathers, three low and small and three high and long, but too many feathers retard an arrow. For best results there should be one-half of a finger-width between the feather and (the beginning of) the nock.<sup>21</sup> The feather should be cut from the base, and the tips left like those of a swallow's wings.<sup>22</sup> On a flight arrow you fit only three fletchings.

They say that tail-feathers are better for an arrow than wing-pinions because the latter will not lie straight on the shaft. Nevertheless, secondaries are better than tail-feathers because they are more pliable (below, p. 31).

Every feather has a belly and a back, so see to it that fletchings are put belly to back. For when they clash and are belly to belly, the arrow is ruined, as is also the case if one feather is higher or longer than another.<sup>23</sup> An archer who shoots arrows that are fletched (*murayyash*) with left-handed feathers should aim for the right of the target and vice versa.<sup>24</sup>

The centre portion of a feather gives a better fletching than either of its two extremities. A

feather on a shaft should not be twisted (*maftūl*). The further the fletchings are from the nock, the better the cast and the truer the course.<sup>25\*</sup> The same is true of light feathers.<sup>26</sup>

In one of the Maghrebi manuals 'on archery' the author says that the skilful archer should fletch some of his arrows<sup>27</sup> from the right wing and some from the left so that if he is shooting and the wind then comes in from his left, he can shoot with fletchings taken from the right wing. If, on the other hand, the wind comes in from his right, he can shoot with left-handed fletchings. Under such conditions arrows so fletched are more suitable and will not fall short as others not so fletched will do. The author also says that one should bend the rear end of the feathers<sup>28</sup> in the direction to which they themselves incline, for if they are bent over backwards (i.e. as opposed to bellywise), they will cause the arrow to gad. If one spirals them too much, however, the arrow will fall short in its course. The best fletchings are tail-feathers.<sup>29</sup>

## iv

Archers differ on the size of the arrow an archer should use.<sup>30</sup> The correct measurement should be such that it will allow the archer at full draw comfortably to bring the head of the arrow to the distal phalanx of the thumb at the centre of the bow's grip as the middle phalanx of the right index finger (*shahādah*) is brought right back to the lobe of the ear. The right elbow should be on a level with the shoulders, as also the hand grasping the bow. All should be on the same level (i.e. in the horizontal plane), none of these parts being higher 'or lower' than another. The optimum, then, is the length of the draw (*jadh*) of which an archer is capable and which will at the same time permit a graceful appearance.<sup>31\*</sup> The whole person should be evenly poised by which, 'to repeat,' is meant that the right elbow, the shoulders and the left fist should be on the one level, none of these parts of the body being higher or lower than another.

The length of the *maydānī* arrow in our time and country (i.e. Syria)<sup>32</sup> is, in terms of the carpenter's cubit, one and one-eighth cubits and one-half of a *qirāṭ* (30 in.). Such an arrow is called *tamām* ('full length'). This measurement, of course, is intended for really medium men. A tall man (with long arms) will have to have it longer, while a short one (with short arms) will be unable to bring it to full draw (*ajaza 'an istfā'ihū*) and will in consequence have to have it shorter. The war arrow should be one *qirāṭ* (1.1 in.) less (i.e. than the standard *maydānī*).

## v

To find the correct balance (*awzān*, lit. 'weights'; he means the correct position of the centre of gravity), first place the arrow across the left index finger 'with the nock towards the palm of the hand'<sup>33</sup> and balance it. When it is evenly poised like the beam of a balance, reduce the length of it by a fist 'by grasping it with your left hand, your little finger being placed'<sup>34</sup> at the fletching end. 'This is to be done without allowing any shift in the balance already established.'<sup>35</sup> Next, with another arrow you measure the distance from the nock (*kāz*) to the little finger and then, by reversing this gauge, measure the same distance from the arrowhead. If the point which was on the little finger now reaches the left index finger (*sabbābah*)—some say the middle finger—the arrow is correctly balanced (in other words, the centre of gravity should be half a fist, or slightly less, towards the head from the middle of the arrow). If 'the measure' reaches beyond 'the left index finger', the head is too heavy, while if it falls short, it is too light.

## vi

The nock (*kāz*) should be of medium size, neither too small nor too big. The arrow for use with the *jarkh* should 'easily fit into'<sup>36</sup> the nut and neither shift about in it nor fit too tightly.

To determine the correct balance of *jarkh* arrows and darts (*nabl*) intended for use with arrow-guides, you reduce the length of the arrow by a fist from the direction of the head and then place



it on the left index finger and balance it. If it rests there like the beam of a balance, it is correct. If not, what we have already said above also applies here. As regards the *qalam* (a type of cross-bow bolt; below, p. 29), it should balance with the base of the head on the left index finger. With the arrow designed for the *mukhlah*<sup>27</sup> the balance is between the proportions of one-third and one-quarter, the quarter being taken from the direction of the head and the remainder from the direction of the nock. If it will balance in this manner, it is just right.

A heavy head is better than a light one in all cases, especially in the case of arrows for use with the *mukhlah* and the *jarkh* and also in the case of darts. A light head is useless. There is a type of bolt (*nabl*) with a tip of iron the size of a small chickpea, the shaft (*badan*) being thinner than the tip and only as heavy as the whole head.<sup>28</sup> The upper portion (i.e. the shaft) is of wood and of the same size as the nock. To be correctly balanced, it should equilibrate on the left index finger with one-third of it in front and two-thirds behind. They say it will fly without fletchings, but fletchings do help it. It is designed to penetrate armour.

The more slender, or thinner, an arrow, the greater its velocity, whereas the thicker it is, the more inefficient and slower it is.

### COMMENT

Arrows may be divided into two basic types: (a) the long arrow (*sahm jawil*, or collectively, *nushshāb*), measuring about 30 in. in length and designed for use with the hand bow, and (b) the short arrow (*sahm qasir*). Originally intended to be shot from the normal hand bow by means of an arrow-guide (*majrā*, *mijrāt*, on which see Ch. 26), the 'short arrow' amounted to what we should in fact call a dart. A term frequently applied by our author to darts is *nabl* (sing. *nablah*), a word which he regularly uses also in the sense of 'crossbow bolts'. Measuring about 16 in. or less, both darts and bolts were of a number of different kinds and appear to have been named according to the salient features of their design or performance, etc.

#### 1. Long Arrows

(a) *Yaghliq*, or *harbi*. This was the war arrow, the head of which was virtually a spike of square or triangular cross-section. This design was the most effective for the penetration of armour and mail. Although well made, it would have been a mass-produced article manufactured to a standard specification, unless specially ordered for persons of importance. Before an engagement the ordinary archer would have been equipped with a quiverful of selected arrows most suited to his needs, but, his quiver once emptied, he would have had to accept whatever the supply-train or arsenal had to offer.

(b) *Maydānī*. As the name implies, this was an arrow designed for use in the *maydān*, or training-ground, in which the archer practised, competed, and, on high days and holidays, displayed his accuracy and skill before the ruler or the highest officers of state, or both. Whether the term *maydānī* was applied to more than one kind of practice arrow, it is difficult to say. It certainly applied to the target arrow (*sahm al-hadaf*). One of the archer's prized possessions would have been a carefully matched set of target arrows of the finest craftsmanship fashioned from the best available materials and identical one with the other in weight and point of balance. Though basically of the same weight and balance as the war arrow, the target arrow would have had a length and weight that had been carefully adjusted to suit the archer and the bow he used. The head was round in cross-section and pointed either as an ogive or a cone. An important and interesting reference to *maydānīs* is to be found in D, where we are told that 'they should be hewn from well-proportioned billets of uniform length, thickness, and weight. Each of the batch should then be equilibrated one by one after the manner of the beam of a balance to establish the centre of gravity. This done, a mark should be made to indicate the point at which the

top and bottom are brought into harmony one with the other. Whenever the marks are found to coincide in a number of arrows, they should be made into a set for a round (*nadab*). At the shorter of their two ends they should be fitted with well-proportioned heads of the same weight and quality. The fletchings should also match.' (D<sup>1</sup>, 20a; D<sup>2</sup>, 49b.)

(c) *Amājī*. This was a type of *maydānī* with a blunt head which was used by the mounted archer for shooting at marks placed on the ground (Ch. 15). They doubtless took hard treatment, and for this reason are likely to have been more roughly made than the target arrow. Limited penetration into butts of earth or sand would be assured by a blunt head (n. 10 above), which would not be liable to damage in the same way as a pointed head.

(d) *Sabqt*. This was the flight arrow which was used when competing for distance regardless of accuracy. It was essential to have it as light and as strong as it was humanly possible to make it. The wood of the shaft would be carefully selected and, though thinned to the highest degree, it had yet to be sufficiently strong and stiff to withstand the impact of the string when shot. There is reason to suppose that both long and short arrows were used for this purpose. (Ch. 19.)

The technique of flight shooting, which is different from that of precision shooting, was brought to a very high degree of perfection by the Ottoman Turks whose arrow design has never yet been surpassed. (For details, see F. Isles, *JSAA*, vol. 4, 1961, pp. 25-28.)

(e) *Haydari*. In our view the term is suspect; it seems very probable that we should read *janwari* 'animal, for use against animals', i.e. a hunting head. (See Glossary, s.v. *haydari*.)

#### 2. Short Arrows

(a) *Darts*. References to these devices are frequent in Arab works on archery. Although they would appear to have lacked the weight to penetrate armour or mail, we can at least be sure that they were effective as a harassing device, especially against unprotected horses of enemy cavalry. Practical trials show that they are projected at a high velocity with a low trajectory. This factor makes for accuracy, and at short range they would certainly have been most unpleasant to face. At long range it would have been possible for massed archers to put down a barrage of such missiles as far as about 400 yards.

MSS of the CD groups offer some information on darts. The following details have been extracted from them (some versions are more accurate and/or informative than others):

No arrow for use with a guide should be longer than 2 spans (*shibrs*) and a digital phalanx (*uqdah*; in all, about 16 in.). The war variety, that is, the *husbān* ('hailstones'), should measure 2 spans, while the *dūdānī* should, with the head, be 1½ spans. The smallest arrow for use with a guide should measure no less than ½ span (about 2½ in.). Into this category fall the types *jarād* ('locusts'), the length of which ranges from 1 span to ½ span, and the *'usfūri* ('sparrow-like, bird-like'). For best results the short arrow should be half the length of the long, or, in other words, 2 spans. (C<sup>1</sup>, 32b; C<sup>2</sup>, 55a; C<sup>3</sup>, 25a; D<sup>1</sup>, 23a; D<sup>2</sup>, 52b.)

From this last sentence it would seem that the long arrow was 4 spans long. As it measured 30 in. (above, p. 27), the span would be about 7½ in.

Further information on darts may be obtained from Cahen, *BEO*, XII, pp. 132-33, and *Arab Archery*, pp. 124-31, etc.

(b) *Crossbow bolts*. MSS of the CD groups again supply some information. The relevant portions follow closely upon those concerned with darts (see references immediately above, section 2 (a), and our observations on the versions). The specifications that are given relate to bolts for use with particular crossbows the detailed construction of which is not known to us. Those mentioned are (a) the *'aqqār*, 'murderer', which, if the definitions of Cahen (*BEO*, XII, 152, n. 10) and Huuri (*Gesch.*, p. 120) are valid for the context, was a crossbow drawn by placing the feet on its limbs, and (b) the *rikāb* 'stirrup', which, as its name indicates, was the stirrup bow mentioned above (p. 19) as *qatōs ar-rikāb*. The details may be summarized as follows:



Crossbow bolts (*nabl qatōs ar-rjīl*) should be the length of the distance from the (fore?) end of the grooved guide (*majrā*) along the top of the stock to the nut. (The length would have been in the order of 12 in.) For shooting at short ranges they should be 2 fingers shorter. In the case of the 'aqḡār the (head of?) the shaft should be level with the breast of the stock (*ṣadr al-qaḡīb*; i.e. presumably, the front end) for precision shooting and opposite the pin (*mismār*) for distance. For shooting at short range a bolt should have a socketed head (*bazlah*) of iron weighing 3 *dirhams* (142.8 gr.) with a shaft (*sahm*) of 6 *dirhams* (285.6 gr.). This is the right size for the *rikāb*. For the 'aqḡār, on the other hand, the weight of the bolt head should be 3½ *dirhams* (166.6 gr.) and the shaft (*khashab*) 7 *dirhams* (332.2 gr.). In D<sup>1</sup>, 53a, it is held that an arrowhead with a tang driven into the shaft with glue and bound with sinews is stronger and more effective than a socketed head (which is always liable on impact to break the shaft at the shoulder of the socket) and will admit of great accuracy. (Cf. D<sup>1</sup>, 23b-24a.)

### 3. The Spinning Test

Both ancient and modern archers have used this method to determine the straightness of a shaft. It is simple and effective and, to master, needs very little practice. The thumb-nail is placed together with a finger-nail to form a shallow 'V' in which to cradle the arrow close to its centre of gravity. The shaft is then spun with the other hand. If true, it will spin smoothly, whereas if it is in any way distorted, it will rattle between the nails.

The technique described here is termed *idrār* by Ibn Sidah who says that, when spun, the arrow should produce a lowing or whining sound that can only come from a straight and correctly shaped shaft of sturdy wood (*Mukhaṣṣas*, VI, 52). Perhaps a 'hissing sound' would be a more accurate description.

### 4. Weight of Long Arrows

In our text nothing is said about this very important topic, but some information is offered in the CD MSS. We summarize here some of the weights supposedly specified by the ever-quoted Ṭāhir al-Balkhī (C<sup>1</sup>, 29a-b. Cf. C<sup>2</sup>, 50a-b; C<sup>3</sup>, 21b-22a; D<sup>1</sup>, 21a; D<sup>2</sup>, 50a-b. See also *Arab Archery*, pp. 113-16, 174). The ranges given obviously refer to effective target ranges and not to maximum ranges. (In the first column the weights are those of the Baghdad standard, on which see Appendix 1.)

Arrow weights, etc.	Bow weight in lb.	Range in yds.
8 <i>dirham</i> arrow (385.6 gr.) 30 <i>raṭl</i> bow 100 cubits	26.8	54.5
8 <i>dirham</i> arrow (385.6 gr.) 40 <i>raṭl</i> bow 125 cubits	35.75	68.1
8 <i>dirham</i> arrow (385.6 gr.) 50 <i>raṭl</i> bow 150 cubits	44.7	81.75
10 <i>dirham</i> arrow (482 gr.) 60-70 <i>raṭl</i> bow 160-170 cubits	53.6-62.5	87-92.5
12 <i>dirham</i> arrow (578.4 gr.) 100 <i>raṭl</i> bow 270-300 cubits	89.4	147-163.5

Specifications of arrow weights presented in a more detailed manner are to be found in the *Nihāyah* and have been investigated by us (Latham and Paterson, *JSS*, X, 1965, pp. 253-61). Since no figures are given for bow weights, however, they cannot be compared with the above. The lightest possible arrow is given as 304 gr. and the heaviest as 600 gr., the first for use with the lightest bow, and the second for use with the heaviest.

### 5. Arrowheads

In modern times trials have been conducted to test the penetrative power of arrows, and useful information has been obtained. On the results of these trials the reader would do well to consult *Archery (Badminton)*, Ch. xxiv, S. Pope, *Hunting with the Bow and Arrow*, pp. 46-49, and E. G. Heath, *JSA*, vol. 4, p. 18 (on the bodkin head).

The tapered spike, or bodkin, head gives the best penetration of armour or mail, and this was the type used so effectively by the old English archers against armoured cavalry. The weakest part of this, or indeed any, arrowhead was the tip, for, if too fine, it could bend or snap on impact with armour and fail to penetrate. To a large extent, however, this hazard could—given correctly tempered steel and a reasonably square hit,—be overcome by slight blunting of the tip. When shot by strong and skilful archers, arrows fitted with such heads were capable of an astonishing degree of penetration, and actual examples can be found in abundance in Hansard's *Book of Archery* where we read, for instance, of an arrowhead so effective that it not only transfixed the protected leg of a horseman in armour, but even penetrated his saddle and went on to deal a mortal blow to his horse (p. 200).

The broadhead is of little use against armour, but is most effective for hunting, for which purpose it was designed.

Two unusual shapes are mentioned in the text, namely, the olive and the chisel. Although it is doubtful whether the penetrative qualities of the former would be equal to those of the bodkin, the latter would overcome any possible weakness liable to arise from a finer point and would be fully effective against armour.

### 6. Feathers

In English practice a feather is described as right-handed or left-handed according to the results obtained by viewing the top surface from the base of the quill when held towards the person. If the web of the feather runs to the right from the quill, it is right-handed, and vice versa.

When a fletching is prepared, part of the quill is left on the base of the web. If this is not done, or if too much of the quill is cut away, the feather loses much of its natural stiffness and, accordingly, its quality. We are in complete agreement with the author that all fletchings on an arrow must be of the same hand and that the centre part of the feather is superior to either of the two ends. There are no valid grounds for preferring right-handed or left-handed feathers.

English fletchers have always favoured wing-pinions for strength. The difficulty presented by their natural curve (below) could be overcome quite simply by placing the prepared fletching in a hot, damp cloth for a minute or two before affixing it to the shaftment as this temporarily softened the quill and allowed it to be fastened in alignment with the axis of the shaft. Tail-feathers, though not as tough and strong as wing-pinions, are straight and therefore easier to handle. The tail-feathers of both the vulture and eagle, however, have for all practical purposes no weakness so far as the archer is concerned and, furthermore, they are stronger than goose pinions which were those most widely used in the West.

The web of a feather has a natural curve, and even when a straightened quill is fastened in alignment with the axis of the shaft, the arrow will spin in flight. It is for this reason that the feathers on an arrow must be of the same hand, for, if of different hands, they will result in



unsteady flight and excessive drag. With a broadhead it is generally accepted that a higher rate of spin is needed to counteract the effect of a side wind on the blade, and in this case the quill is set slightly out of true to increase the spin in the natural direction given by the feathers. Archers still debate not only the merits or otherwise of using such spiralled fletchings for all arrows, but also the question whether four fletchings should be used as opposed to three. It is not the place here to enter into their unending controversies on these points.

The shapes into which feathers have been trimmed after being set to the shaftment have varied widely over the centuries and in different areas. All the illustrations and miniatures in the numerous MSS which we have so far examined for the period which immediately concerns us show them cut to a low arc of a circle. As observed in note 19, the two names applied by our author to one type of fletching are uncertain. In A we find *makyūl* and *aktāf*. The first of these terms (for which in B, *et al.* we have the apparently meaningless *makbūl*) means 'measured' or 'a measure', while the second means 'shoulder-blades'. For the latter the reading of B<sup>2</sup>, b<sup>4</sup>, and b is *akuff* 'pans of a balance', which, so far as we can judge, could only mean that the fletching was trimmed to a contour similar to that of the rim of a balance pan. Such a line would correspond to the design seen in miniatures. It is possible, however, that we should read *aktāf* (second vowel short) with the meaning 'broad-shouldered', which, from a grammatical standpoint, would make better sense. It is also just possible that we should take *makyūl* in a sense similar to that of *mukattal* 'round and compact', 'stout and short', or the like.

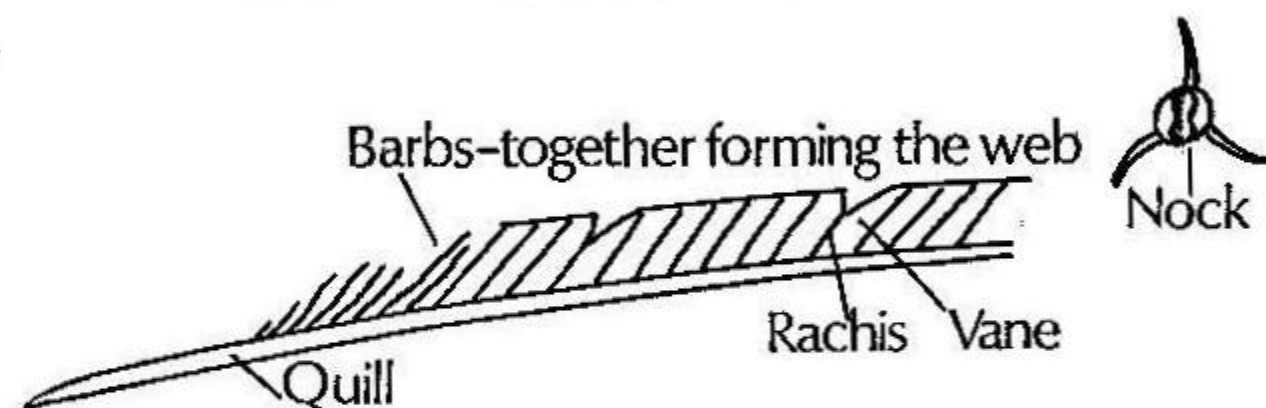


FIG. 16. PARTS OF A FEATHER AND FLETCHED SHAFT VIEWED FROM NOCK  
To English archers the feathers on the shaft are right-handed (p.26)

The term 'gazelle' (*ghizlān*, sing. *ghazāl*) does not suggest any particular shape. It is interesting to note, however, that our author recommends that the rear ends of the feather be left like the tips of a swallow's wings, thus following the natural line of the rachis. This corresponds to the martin trim mentioned in *Arab Archery*, p. 113, and it may well be that to some the appearance would be evocative of a fleeing gazelle.

The Maghrebi writer's view that right-handed feathers should be used when the wind comes in from the left, and vice versa, should be disregarded. There is in fact no difference in performance between left-handed and right-handed feathers either as regards direction of flight or behaviour in a crosswind. On this point we are supported by Dr. P. E. Klopsteg whose expert scientific assistance we gratefully acknowledge.

#### 7. The Size of the Nock

Taybughā's recommendation that the nock should be one-third the circumference of the string is basically sound. Applicable to long and short arrows alike, this rule would give a good fit. In D there is the following observation: 'A long nock gives a more accurate and stable arrow than a short one, though the latter gives greater speed. The most appropriate lengths for a nock

are those which will take the width of two bowstrings, or the fletchings from their highest point or the arrowhead from the point where the tempering ends. The converse is true in the case of flight arrows.' (D<sup>1</sup>, 20a; D<sup>2</sup>, 49b.)

That the depth of the nock for the normal long arrow should be equal to twice the thickness of the string is reasonable. If the converse is true in the case of flight arrows, this may be taken to mean that the flight nock should only equal one thickness. The point about the fletchings and tempering would appear to be that both the height of the feathers (i.e. their breadth from the quill) at their farthest from the shaft and the length of the tempered tip of the arrowhead should measure the thickness of two bowstrings. They could, therefore, be used as a gauge.

In b, 13a-b, the interesting view is expressed that in the case of the flight arrow the depth of the nock should be one-third of the thread (used to measure the circumference of the string), in the case of the *maydānī* one-half, and in the case of the *qīqaj*, or *qīghaj* (see Glossary and Ch. 15) two-thirds.

#### 8. Lengths of Arrows

The only right way to determine the correct length of an arrow for any given archer is for that archer himself to come to the position of full draw and then measure. Other methods can only give an approximate result, and some degree of error is almost inevitable. For target shooting, the archer, then as now, would almost certainly have had his own set of arrows made to measure, but in combat, as already stated, he would have had to accept a standard length supplied by the arsenal. It is logical to suppose that such arrows would have been made for archers with the longest draw; for too long an arrow would be safer than one that was short, the reason being that in the heat of action there would be a danger of the archer's overdrawing a short arrow and bringing the head inside the bow. With luck the arrow would merely glance off the wrong side of the bow and be wasted. The real hazard, however, would be that he could put the arrow through his own hand, or, if the head of the arrow was to hit the inside of the grip, the shaft would break, the rear end being driven into his hand, the foreshaft rebounding into his face.



## CHAPTER 6

## ON THUMB-GUARDS

*Kushtuwān*<sup>1</sup> ('thumb-guard') is an arabicized form of a word borrowed from the Persian. In Persian the term is *angushtvān*<sup>2</sup> ('finger-protector') and in old Arabic *jast'ah* or, it is said, *khat'ah*.<sup>3</sup>

There are many kinds of thumb-guard to suit individual tastes and purposes. Experience attests the value of that which is of a single layer of leather without either padding<sup>4</sup> or lip (*saysarah*), but it demands a great deal of practice for the archer to be able to retain the string (with a steady hold).<sup>5</sup> For this reason a lip has been added, and 'now in its modified form this type' is the most useful and convenient thumb-guard for all archers. Those who have long thumbs should see that the lip is thick, while those with short thumbs should keep it thin. This kind of guard will show up faults in locking (on which see below, Ch. 10), and for this reason thumb-guards of bone and horn<sup>6</sup> are often used. This type, however, even though it can conceal an archer's faults, may well break when most needed and thus put a man out of action. Some guards are therefore made of gold or silver.<sup>7</sup> There are people, such as the Turkmens, who use a plain circular band as a thumb-guard so that it can be kept on their hands at all times like an ordinary silver signet ring (after the Chinese style? Plate 7). This is an excellent type for persons who have to endure the hazards of expeditionary operations (presumably because it could be kept in place for immediate use). Some people even shoot without any thumb-guard at all, and by dint of intense practice they become accustomed to so doing. There is no greater asset than the ability to shoot in this way if one is so endowed.<sup>8</sup>

The golden rule for a thumb-guard is that it should be exactly the size of the thumb, neither bigger nor smaller.<sup>9</sup> According to Ṭāhir, the use of a thick lip will increase cast (*aṭrad li-s-sahm*; in other words, be better for distance), but greater accuracy<sup>10</sup> will be attained (e.g. in target shooting) by the use of a thin one. The best policy is to adhere to that to which one is accustomed. If one has no particular habit in this respect, then it is better to follow the instructions which we have given above.

## COMMENT

It is regrettable that Ṭaybughā should be so brief on such an important subject. The author of *Arab Archery* is much more informative and offers some interesting details on the making of horn and leather thumb-guards (pp. 123-24).

## 1. Construction of the Guard

(a) *The leather guard.* This was made from a T-shaped piece of leather. The ends of the horizontal portion were carefully sewn together to form a loop into which the thumb could fit, while the stem was left to cover the inside of the pad at the end of the thumb. The thumb-tip

and knuckle remained uncovered. The author's assertion that the loop must fit the thumb is fully supported by experience. If it is too tight, discomfort results at the draw and, if too loose, it is liable to be pulled off by the bowstring upon release. It is also clear that the length and shape of the lip need to be tailored to the requirements of the individual. A fine leather lining and a lip like a small broad bean is recommended in *Arab Archery*, whose author adds that a slight groove should be impressed into the surface of the leather (p. 123). This, presumably, would follow the crease of the thumb and would make for consistent positioning of the string during shooting.

(b) *The drawing-ring (Middle East).* The manufacture of a drawing-ring clearly required far more care and attention than the leather guard. In existing specimens the hole into which the thumb fits is slightly oval so that the ring has to be turned through ninety degrees from its final position to slip over the thumb-joint. When finally turned to its shooting position, it cannot possibly slip off the thumb if the fit is correct. The shape of the inner surface depends on the contour of the thumb. If too little of the inside of the lip is cut away, the string will put excessive pressure on the inside of the thumb, while if too much is cut away it may be very difficult to retain the string on the inner upper surface of the ring during the draw. The curves of the inner and outer surfaces of the lip are, to some extent, complementary, and their design must be balanced against the shape of the thumb for which they are made. A ring would therefore have to be made to measure by a careful craftsman with an eye for detail, and all existing examples show this to have been the case. A well-fitting ring is a pleasure to use, and there can be no doubt that a really successful one would have been highly prized by its owner. (See Plate 7.)

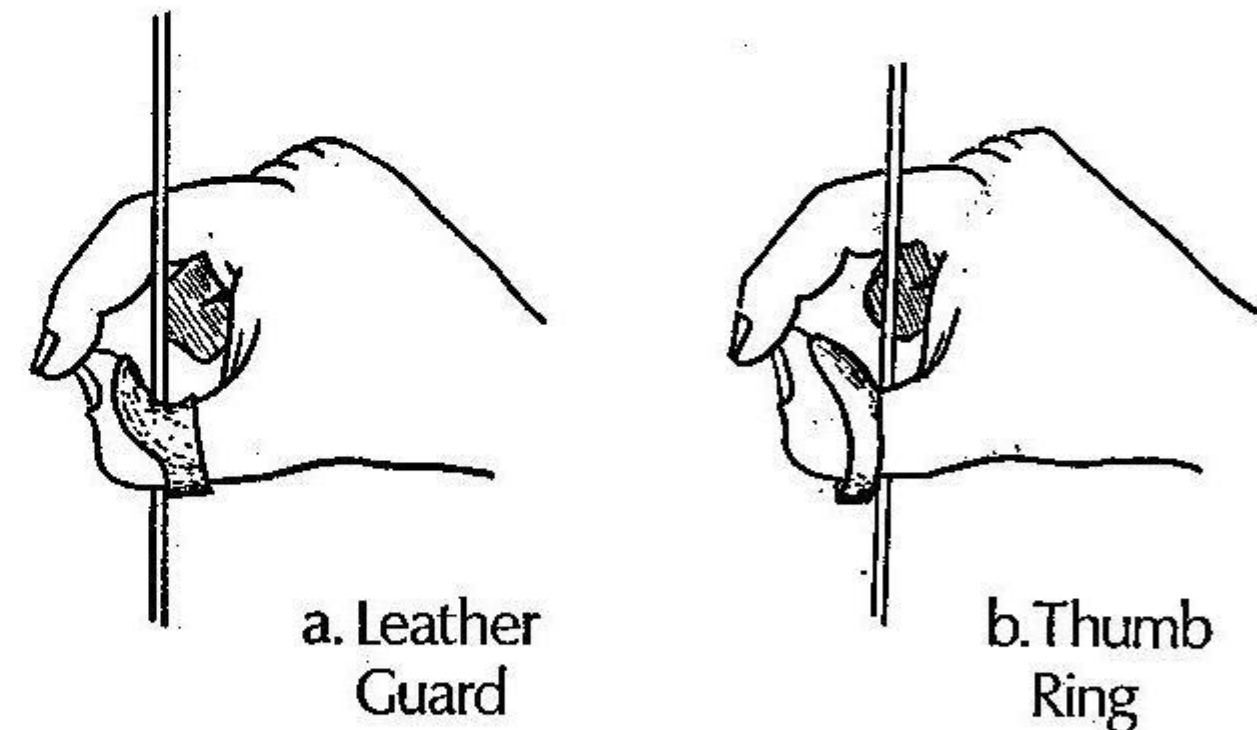


FIG. 17. THUMB-GUARDS

In addition to literature already indicated either above or in the notes the reader might profitably consult J. Flinton, 'Musing on the Thumb Ring', *JSA*, vol. 1, 1958, pp. 38-39; W. A. Browne, 'The Thumb Ring in Art', *JSA*, vol. 2, 1959, pp. 34-37; W. F. Paterson, 'Thumb Guards', *JSA*, vol. 6, 1963, pp. 14-15; W. E. Bishop, 'On Chinese Archers' Thumb-rings', *Archery*, vol. 26, no. 11, November 1954, pp. 10-14; G. C. Stone, *Glossary of Arms and Armor*, New York, 1934 (reprinted 1961), s.v. 'Archers' Rings', pp. 14-17; E. S. Morse, *Bull. Essex Inst.*, XVIII *passim*; idem, *Additional Notes*.



## 2. Drawing with a Ring or Guard

The archer pays great attention to the exactness of his grip upon the string, for even the smallest variation can affect a shot. The position of the fingers or the thumb relative to the string is to some extent a matter of personal preference according to the best results obtained by the individual.

We shall see in due course (pp. 51, 55) that the archer is recommended to take the string in the crease formed by the thumb-joint, or else a fraction either above or below it towards the tip of the thumb. In any of these positions the string can lie either straight across the thumb or at a slight angle. Given all these variations, to say nothing of the relative position of the tip of the thumb on the middle finger and the forefinger upon the thumb, it can readily be seen how faults can occur when using a leather guard. The worst fault is lack of absolute consistency in even the most minute detail of one's hold or lock upon the string.

Archers will be aware that a good, clean, and unvarying loose of the string is difficult to achieve and demands constant practice and attention to detail. Until this is mastered shooting will be erratic. The importance of this aspect of shooting cannot be overemphasized.

With the ring, wide variations do not occur, and it is easier to be consistent. The two main reasons for this are that the string can rest only in one position, and the movement of the tip of the thumb across the middle finger is limited by the lip of the ring. Hence our author's statement that the ring will be preferred by the inferior archer.

Several years' experience of shooting with a leather guard permits the view that it gives its user superior control and that the Bowman who has mastered the technique, will, if shooting for accuracy, outshoot an opponent who is using a ring. It should, however, be noted that for flight shooting the ring gives a sharper release and is therefore to be preferred for that purpose.

## CHAPTER 7

ON THE FUNDAMENTALS OF ARCHERY<sup>1</sup>

Among countless numbers of 'able' bowmen those most famed for their knowledge and skill in archery are Bahrām Gūr ibn Yazdigird ibn Shāpūr Dhū l-Aktāf, Ṭāhir al-Balkhī, Ishāq ar-Raffā, and Abū Hāshim al-Bāwardī (on all of whom, see Comment). These were the men who won renown for their methods of shooting, and from ancient times right up to the present people have been adherents of their teachings. Aṭ-Ṭabarī (p. 40) it was who transmitted their techniques, though his own method was eclectic.

Each of these Great Masters<sup>2</sup> had a method of his own which suited the requirements of his trunk and limbs, depending, as will be mentioned in due course, on whether his measurements were long, short, or medium and whether he had a broad chest with a long arm-span or vice versa. Rarely will any one man in all respects be of exactly the same proportions as any single one of the Masters. On the contrary, physical proportions are bound to differ from one person to another. You will, therefore, appreciate that all methods must really be eclectic (*ikhtiyārī*) according to the different requirements imposed by the size of one's trunk and limbs.

There are differences of opinion on what constitutes the fundamentals of archery (*uṣūl ar-ramy*).<sup>3</sup> According to Abū Hāshim, they are four: grasping, locking,<sup>4</sup> drawing, and releasing. To these Ṭāhir added sighting, thus making them five. The majority of archers follow this teaching and quote the following verses:

'Archery is the finest thing that God's Messenger (Muḥammad) recommended, and the manliest of men are those who can be proud of their shooting.

Its fundamentals are five, of which the first is the grasp, followed by locking, drawing, releasing, and sighting.'

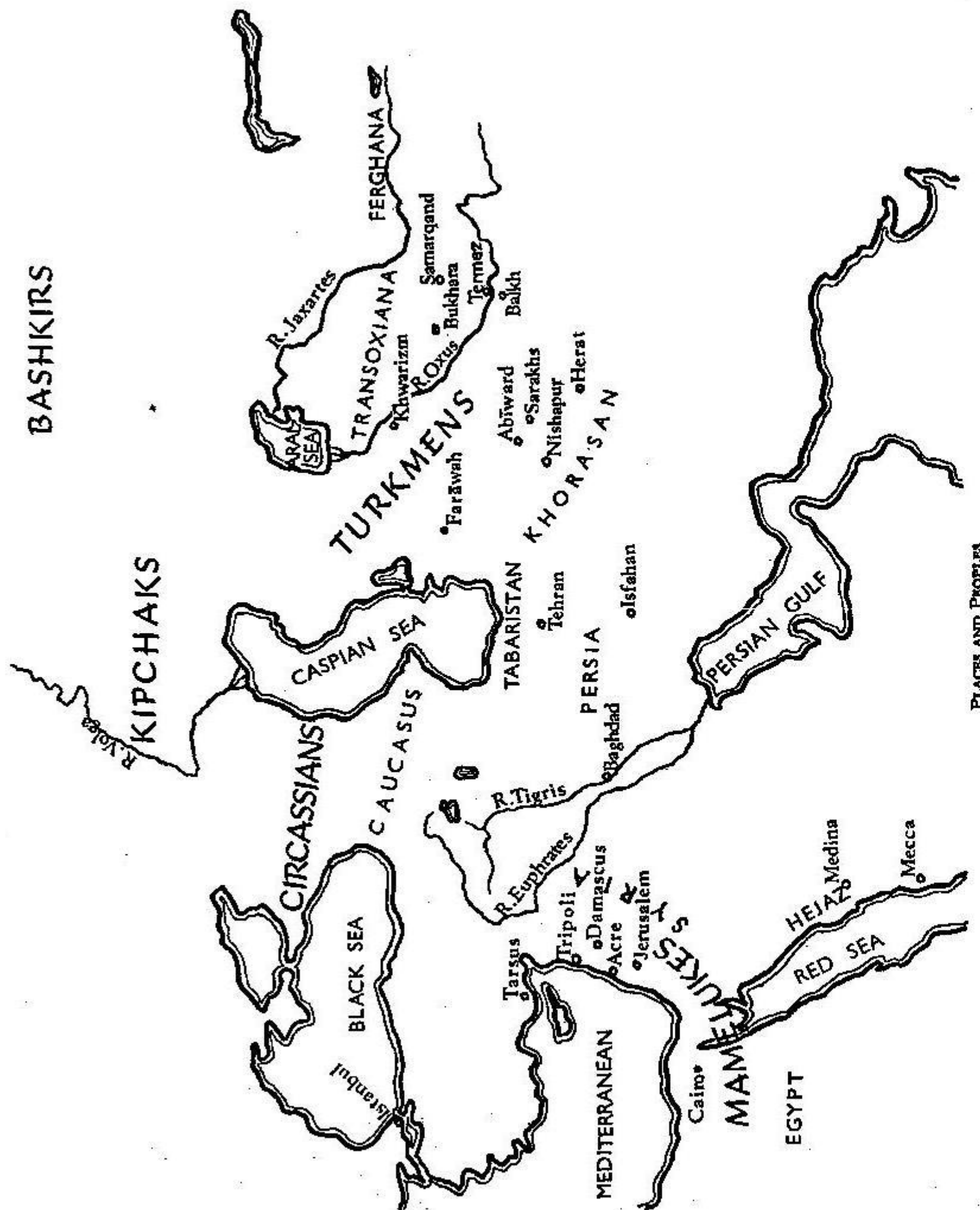
Some add nocking and make the fundamentals six. This is the number we adopt for the simple reason that a fundamental of anything is that which is indispensable to it, and, as nocking is indispensable to archery, it is therefore a fundamental. There are some who add stringing, but strictly speaking stringing is connected with the art of bow making because it requires a knowledge of how to adjust the bow, how to correct any distortion in its curvature (*taqwīm i'wajājihi*), and how to prepare strings.

## COMMENT

## 1. The Masters of Archery and the Great Masters

A Persian ruler of the Sasanid dynasty, Bahrām Gūr, or Vahram V (A.D. 420-38), is frequently accorded a prominent position in archery literature. In the works of poets and illuminators—mainly Persian—his legendary feats as an archer and hunter are a commonplace. He is 'Bahrām, that great Hunter' whose name is known to many through Fitzgerald's *Rubāiyāt of Omar*





*Khayyām*. In technical writings certain styles of shooting and points of technique are not infrequently ascribed to, or associated with, the Sasanid kings, and in this connexion the names of Ardashir (Ardashir I, son of Papak, A.D. 226–41) and Khusraw (Chosroes I, A.D. 531–79) are to be found in addition to that of Bahram Gūr (see, e.g. *Nihāyah*, pp. 63–66 *et passim*).

An examination of Marḍī's *Tabṣīrah*, which we know to have been written in the time of Saladin, reveals among acknowledged exponents of archery a preponderance of persons whose names bespeak their role as repositories, transmitters, and continuators of the techniques of Central Asia and the Iranian cultural orbit of medieval times. Typical are the following examples: as-Sarakhsī, 'of Sarakhs', between Meshed and Merv (Khorasan), at-Tirmidhī, 'of Termez', on the Upper Oxus near Balkh (Khorasan, now in Uzbekistan), al-Harawī, 'of Herat' (Khorasan, now in N.W. Afghanistan), as-Samarqandī, 'of Samarkand', principal town of Transoxiana (now capital of the province of Samarkand in Uzbekistan). Names of this kind, though generally less numerous than in the *Tabṣīrah*, could easily be cited from other Arabic and Islamic treatises on archery (e.g. Hein, *Isl.*, XIV, pp. 300, 307, 313, etc.). Furthermore, the ascription of this or that technique to the men of Merv or Balkh, for instance, or to the people of Khorasan or Transoxiana is not an unusual phenomenon (e.g. *Tabṣīrah*, 73a; *Nihāyah*, Ch. xiii, p. 69, Cf. *Arab Archery*, index, s.v. Khorasan, etc.).

The dates at which the archers named by Marḍī flourished—among them Ṭāhir, Ishāq, and Abū Hāshim mentioned in the first paragraph of this chapter—have so far defied our attempts at discovery. Indeed, for all the pre-eminence with which Ṭāhir, Ishāq, and Abū Hāshim subsequently emerge in Islamic archery literature as the Imams, or 'Great Masters', of technique, we have yet to uncover any biographical details that will shed light on their dates. To judge from their names, they were certainly all Muslims and therefore could not have antedated the first quarter of the seventh century A.D., and, as they are mentioned by Marḍī, the second half of the twelfth century can be taken as a rough *terminus ante quem*. To suppose that they lived no earlier than the middle of the eighth century would, in the absence of evidence to the contrary, be a reasonable guess since it was from early Abbasid times that large-scale recruitment of troops and officials from Khorasan and Transoxiana began (Introduction, p. xxiii). Other possibilities suggest themselves, but hypothesis is no substitute for factual evidence.

In the matter of dates this is as far as we can go. As regards Abū Hāshim, it is important to dispel all doubts surrounding what, for convenience's sake, we will call his cognomen. The problem is that archery literature confronts us with four possibilities, viz. al-Bāwardī, -Bārūdī, -Māwardī, -Nāwardī. So far as Ṭaybughā's treatise is concerned, A<sup>1</sup> and the MSS of the B group limit the choice to al-Bārūdī and al-Bāwardī. Of these the first is the relative adjective of a small town in Lower Egypt, while the second is that of Abiward, or Bāward, a town and district on the northern slopes of the mountains of Khorasan in an area now within Turkmenistan (U.S.S.R.). Having regard to our observations in the first two paragraphs above and bearing in mind the reputation and prowess of the archers of Khorasan, we take Abū Hāshim *al-Bāwardī* to be the man's true name and believe Faris and Elmer's—and indeed Hein's—Abū Hāshim al-Māwardī to be erroneous (*Arab Archery*, p. 16, *et passim* and *Isl.*, XIV, p. 329. Cf. also *Nihāyah*, *passim*). To an Arabist it will be obvious how readily the rather unusual Bāwardī could be transformed by a scribe into the much more familiar Māwardī or the easier Bārūdī, or else be corrupted to the meaningless Nāwardī as in the *Tabṣīrah* (43b).

The second element of the name Ishāq ar-Raffā' is taken by Faris and Elmer to be ar-Raqqī, 'of Raqqah', a place in northern Syria (op. cit., p. 16. Cf. Hein, loc. cit.), but this reading runs counter to an overwhelming weight of evidence in favour of *ar-Raffā'* and is an obvious orthographic error.

As regards Ṭāhir al-Balkhī, the second half of his name links either him or his forebears with Balkh, now a village in northern Afghanistan, but once a great capital of Khorasan and a centre renowned, among other things, for the excellence of its horsemen and archers (cf. Ritter, *Isl.*,



XVIII, p. 120). In *Arab Archery*, p. 114, he is made out to be the grandson of Shāpūr Dhū l-Aktāf (Shapur II, A.D. 309–79), but if the author of the *Tabṣirah* is correct in naming him Ṭāhir ibn Muḥammad (70a), he would have been a Muslim and (unless he was a convert adopting the patronymic 'ibn Muḥammad'—which is most unlikely) the son of a Muslim, and could obviously not have been the grandson of a man who died two and a half centuries before Islam.

In aṭ-Ṭabarī ('of Ṭabaristān', a Persian province south of the Caspian) we have to do with Aḥmad ibn 'Abd Allāh Muḥibb ad-Dīn aṭ-Ṭabarī (d. 1295?) who was the author of *The Clear Book on Archery* (*Kitāb al-wāḍiḥ fi r-ramy*, etc.) of which there are several extant manuscripts (Cf. Hein, *ibid.*, p. 300; Ritter, *ibid.*, 136, 141). He has no connexion whatever with the great historian and scholar Abū Ja'far Muḥammad ibn Jarīr aṭ-Ṭabarī (A.D. 839–923) as certain Muslim authors seem to think (e.g. Muṣṭafā Kānī in Hein, *ibid.*, p. 299). From his own testimony we learn that he was trained in the teaching of Abū Hāshim by Muḥammad ibn 'Isā s-Samarqandī, in that of Ṭāhir al-Balkhī by 'Abd ar-Raḥmān al-Farāwī ('of Farāwah', now Kızıl Arvat, Turkmenistan), and in that of Ishāq ar-Raffā' by Abū Sa'id al-Khwārizmī ('of Khwārizm', now Khiva, Uzbekistan) (*Wāḍiḥ*, 57b ff., 1st., 43b ff.).

## 2. The Fundamentals of Archery

Ṭaybughā's statement that there were differences of opinion regarding the number of fundamentals is amply borne out by what we have learned of the subject from several other Islamic manuals. In general the authors of these works go into much greater detail than does Ṭaybughā and deal not only with the 'roots', or fundamentals, but also with the 'branches' (*furū'*), or secondary bases, of archery (e.g. Hein, *ibid.*, pp. 330–31 and *Arab Archery*, p. 17). An enumeration and discussion of conflicting views on the number and nature of these 'roots and branches' are beyond the scope of the present work. Nevertheless, we feel obliged to comment, firstly, that the fundamentals attributed by Ṭaybughā to Abū Hāshim and Ṭāhir (see also Hein, *ibid.*, p. 330) do not wholly agree with those ascribed to them, for instance, by aṭ-Ṭabarī and the author of *Arab Archery* (whose information may well have been derived from the *Wāḍiḥ*) and, secondly, that our author makes no mention whatsoever of any views held on the subject by Ishāq. Table 1 below will enable the reader to see in what details aṭ-Ṭabarī differs from Ṭaybughā as regards Abū Hāshim and Ṭāhir (*Wāḍiḥ*, 23a–24a, 1st., 17a–18a. Cf. *Arab Archery*, pp. 16–17).

TABLE 1

Ṭabarī		Ṭaybughā
	1. Abū Hāshim	
1. Grasp ( <i>qabḍah</i> )		Grasping ( <i>qabḍ</i> )
2. Clench ( <i>qafḥah</i> )		Locking (' <i>aqd</i> )
3. Aiming ( <i>i'timād</i> )		Drawing ( <i>madd</i> )
4. Loosing ( <i>iflāt</i> )		Releasing ( <i>iflāq</i> )
	2. Ṭāhir	
1. Nocking ( <i>tafṭiq</i> )		Grasping
2. Clench		Locking
3. Grasp		Drawing
4. Aiming		Releasing
5. Loosing		Sighting ( <i>naẓar</i> )

N.B. As Ṭaybughā's technical vocabulary differs from that of aṭ-Ṭabarī, an attempt has been made in the table to carry over the differences into the English rendering, although in practice there is no difference between aiming and sighting (*i'timād*, *naẓar*), loosing and releasing (*iflāt*, *iflāq*), and so on. In *Arab Archery*, p. 49, the *qafḥah*—translated by Faris and Elmer as 'clench'

and for that reason retained by us—is defined as the folding of the little finger, the ring-finger, and the middle finger tightly into the palm of the right hand. We see no reason to accept such a definition and for linguistic and technical reasons take the view that in most contexts it is synonymous with the term '*aqd*', thereby concurring with the opinion implied in Faris and Elmer's note in *Arab Archery*, p. 16, n. 13 (below, p. 54).

In Table 2 are listed the fundamentals ascribed to Ishāq by aṭ-Ṭabarī (cf. also Hein, *ibid.*, p. 331):

TABLE 2

1. Standing to the mark (*al-intiṣāb ilā l-'alāmah*) so that it is in line with the left eye.
2. Bracing (*itār*), or stringing. (On the technical difference between the two terms, which we, like Faris and Elmer, treat as synonymous, see *Arab Archery*, p. 162.)
3. Nocking.
4. Clench.
5. Grasp.
6. Aiming.
7. Drawing on to the mouth (*al-jarr 'alā l-fam*).
8. Halting of the arrowhead between the knuckles (or, perhaps, 'phalanges') of the thumb.
9. Loosing.
10. Letting the left hand go forward (*al-faṭḥah bi-sh-shamāl*).

This last is clearly a form of follow-through in which the left hand is allowed to move away from the body towards the target at the instant of loosing, but without any rotary movement of the bow as recommended by Ṭaybughā (below, Ch. 14). Faris and Elmer would appear to have been confronted with the same expression and to have misunderstood its meaning, for they speak of 'opening the hand' (*Arab Archery*, p. 17. Cf. also Hein, *loc. cit.*). The sense is made perfectly clear in the *Wāḍiḥ* (but not 1st. MS) 24a by the gloss *wa-hiya t-tazliq* 'that is to say, slipping', where *tazliq* would appear to be a technical synonym with the meaning 'slipping the hand, causing, or allowing, it to go forward with a smooth, sliding movement'. This interpretation makes excellent technical sense, for there can be no sound loosing without some stable forward movement of the bow-hand. (Cf. Fig. 46).



## CHAPTER 8

### ON GRASPING THE BOW (QABD)

Grasping is the act of placing the side of the *matn* (below and p. 45) of the bow's grip in the crease which lies between the palm of the hand and the fingers (i.e. the *proximal*, sometimes called by the author the *first crease*). This action is discussed first not only because it is the first of the fundamentals, but also because the first thing that a man does to a bow is to apply his grasp to it. The *matn* is the middle of the back of the bow's grip.

Now, if the bow's grip is placed in a man's grasp after the manner prescribed, the spine of the *matn* (lit. 'the middle of the *matn*'s back'; below, p. 45) should lie in the centre of the proximal phalanges of the fingers. This is Tāhir's method (see, however, p. 130). It is the best and most practical of all the grasps and the least likely to occasion mishaps. To elaborate: if you wish to grasp the bow for the purpose of shooting, then, with your hand open, first place the side of the

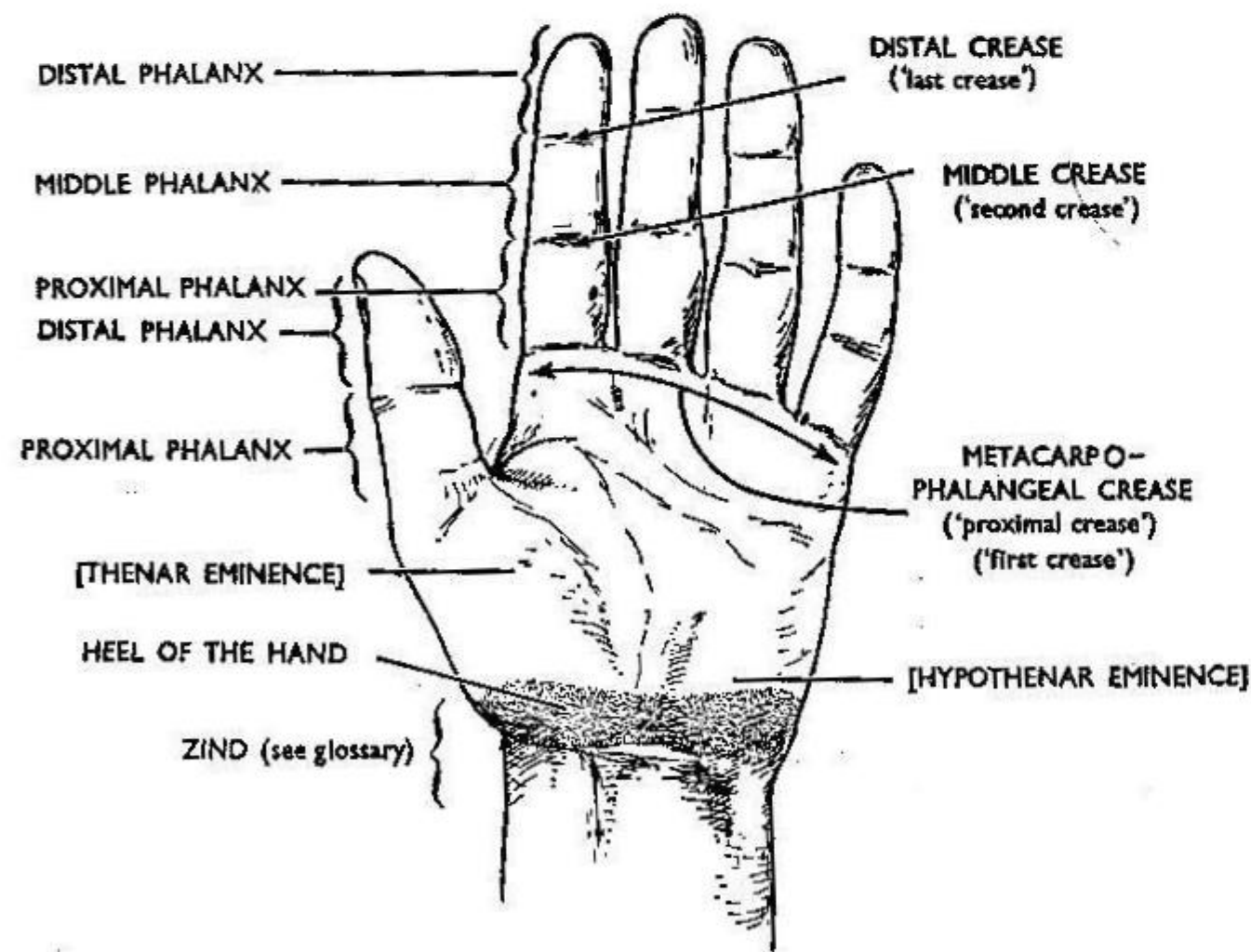


FIG. 18. PARTS OF THE HAND

### ON GRASPING THE BOW

*matn* of the bow's grip in the crease between the palm and the fingers. In the case of a big palm with long fingers, the spine of the *matn* must then be placed centrally in the *middle crease* formed by the fingers (i.e. the proximal interphalangeal crease, sometimes called in Arabic the *second crease*). A man with short fingers, on the other hand, should put the 'spine of the' *matn* in the first crease, which is the one lying between the base of the fingers and the palm. Finally, a man with medium-sized fingers should place the spine of the *matn*<sup>1</sup> of his grip in the centre of the proximal phalanges (Fig. 19). I believe this to be a basic operation that is second to none. If your fingers are too long for the grip, you will find it a great advantage to make it thicker by affixing a piece of leather.<sup>2</sup>

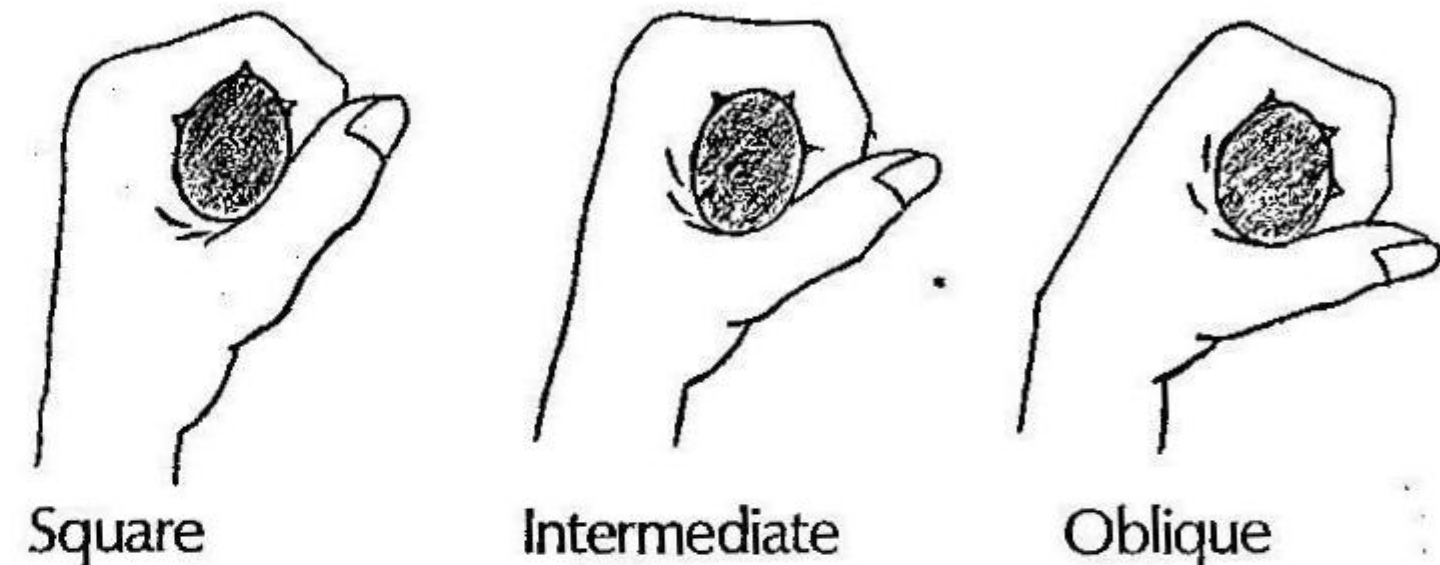


FIG. 19. GRASPS ON THE BOW

(a). Long fingers.

(b). Medium fingers.

(c). Short fingers.

Once the grip has been placed in the appropriate hand with fingers outspread, the bow should be grasped with the little finger followed by the second finger. In sequence, the little finger should be applied first, then the second, or ring-, finger and finally the third, or middle, finger. The pressure applied to the grip should grow very much like a building, and just as the archer should grasp first with the little finger and then with the second, so also, if he is to use his fingers (*qubbāḍ*) properly, he should begin by exerting the greatest pressure with the little finger, followed next by the ring-finger until finally the pressure reaches its lowest in the middle finger. You may then also say that under these conditions the pressure on the grip will give a hold as strong as a building, so that the bow will neither deviate nor turn in the hand. The pressure exerted by the grasp should be at its peak the very moment the arrow is loosed.

Once you have a tight hold on the grip with the said three fingers, gently curl over the end of the index finger without tensing it in any way. Fasten it only loosely on the grip, for if you tense the index finger, the other three fingers already tensed will for that very reason relax, and you will accordingly impair your grasp. The rule for the index finger is that it should not be wrapped around the grip. Only the end of it should be bent over the margin of the *matn*, and that is all.<sup>3</sup>

Having bent over the end of the index finger, place your thumb upon it in contact with the grip of your bow. Your thumb must lie as still as a corpse without even the slightest movement. It should not be pressed into the grip because it forms the guide for the arrow, and if it is tensed the arrow will blister it. Tensing of the thumb will also slacken the grasp.

The grasp just described is the best, the most practical, and the safest of all the various possibilities. It was Tāhir al-Balkhī's choice 'and is known as the grasp of '99'.<sup>4</sup>

Should you wish to use a different grasp from the one I have just mentioned, grasp as before with the three appropriate fingers, but place the end of the thumb over the back of the middle



finger. This will give you a different kind of grasp from the first—and a highly important grasp at that. When using it, always tuck in the index finger behind the *matn* so that when the maximum draught (*al-wafā' at-tāmm*) has been attained at full draw (below, p. 56), the finger will not lie in front of the arrowhead, which may subsequently split and injure it. This grasp is extremely useful, and will give a highly effective shot, as well as a good distance in flight shooting. It will enable the archer to draw a longer arrow than is possible with any other kind of grasp 'because the base of the thumb can then spread out, thereby allowing the arrowhead to be brought in behind the grip as far as the skill of the archer permits—a considerable advantage in flight shooting involving the use of a single bow and arrow'.<sup>6</sup> Furthermore, the archer's draw on the bow will be much stronger than any other. The Turks call this particular grasp the *changal-i bāz* (Pers. 'falcon's talons'). It is the flight shooter's grasp because he can use it to get an extra length of draw on the arrow and bring in the arrowhead right up to the very base of the thumb so that it (i.e. the head) leaves the grip of his bow. This draught has neither superior nor equal because the archer can bring the arrowhead in upon himself (inside the grip).<sup>6</sup>

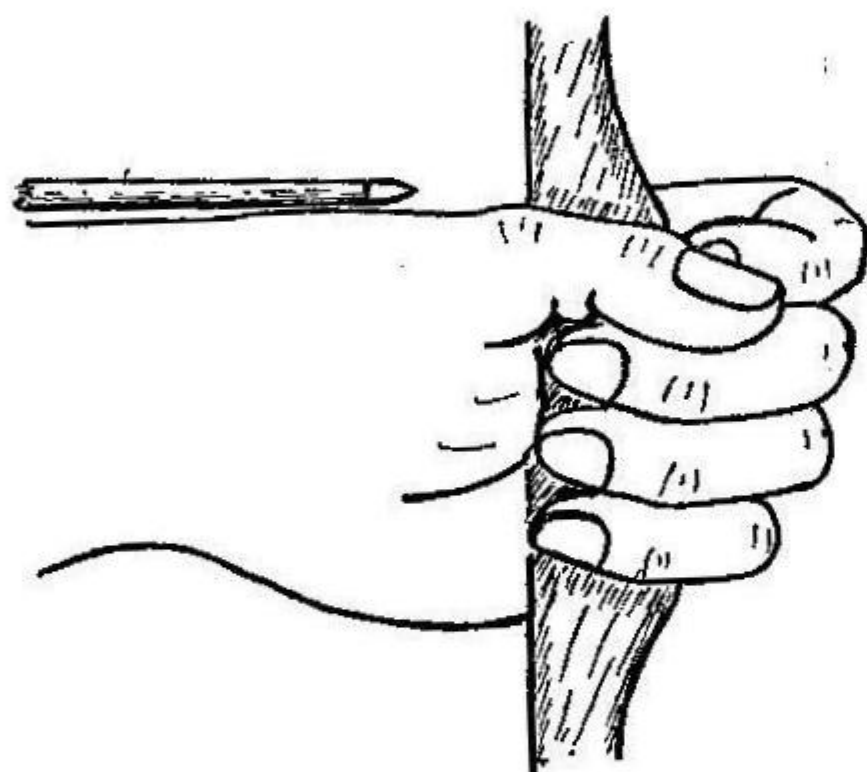


FIG. 20. THE 'FALCON'S TALONS'

There are some archers who run the shaft over the 'proximal' phalanx of the thumb. This is a perfectly good technique. Others run it over the index finger and slant the thumb towards the arrow. Others there are who set up the thumb and place the index finger beneath it so that they then look as though they are reckoning thirteen (on finger-reckoning, below, p. 167). The arrow in this case passes over the top of the thumb-nail. There are yet others who run the arrow over the ends of the index finger and the thumb and look as though they are reckoning thirty. The first two techniques, however, are to be commended above all the rest. Those who use the second of these, incidentally, will run the arrow through the middle of the groove formed between the thumb and the index finger. No fault ever results from it.

Do take care lest the ends of the fingers touch the heel of the hand when grasping. I give this grave warning to anyone who would touch the heel of the hand with the ends of his fingers 'while grasping', as will indeed be the case if the grip of his bow is too thin or his fingers too long. The point has already been adequately explained.

## COMMENT

1. The *Matn*

From our author's definition of the term *matn* as the 'middle of the back of the grip' (*wasṭ ṣaḥr al-qabḍah*) it is not immediately clear what meaning the term 'middle' is intended to convey. When he goes on to speak of the 'middle of the back of the *matn*' we are confronted with the bewildering problem of determining what is meant by 'the middle of the back of "the middle of the back" of the grip'. One's first reaction is to suspect a pleonasm. Careful reading of the text, however, shows that this is not the case. It will be seen that the *matn* has a side (*janb*) and a back (*ṣaḥr*) and that if the archer places the side of the *matn* in the proximal crease, 'the middle of the *matn*'s back' will lie in the centre of the proximal phalanges of his fingers. From this it is evident that the 'middle of the *matn*'s back' is the mid-line longitudinally dividing the dorsal surface of the grip. The *matn*'s 'back' is, as it were, its *backbone*, or *spine*, and might be taken as a strip about  $\frac{1}{2}$  in. wide running down the centre of the handle.

It remains only to determine what is intended by 'the middle of the back of the grip' as a definition of *matn*. If it is meaningful, it can only be interpreted as that section of the dorsal surface of the handle which the archer actually grasps when shooting. This interpretation is borne out by the fact that in MSS of the C group (a) the term *matn* is replaced by the expression 'back of the grip' (*ṣaḥr al-qabḍah*), which we are then told is 'that part (sc. of the dorsal surface of the grip) which is in contact with the fingers when the bow is drawn' (C<sup>1</sup>, 36b; C<sup>2</sup>, 60b; C<sup>3</sup>, 29a), and is defined as such (C<sup>1</sup>, 38b; C<sup>2</sup>, 63b; C<sup>3</sup>, 31a), and (b) the archer is given the following advice: 'Try to apply your grasp to the middle of the grip so that the space remaining at the top of the grip should be the same as at the bottom. If a finger's width is left both at the top and the bottom, it is as required. To have more or less is incorrect, although no harm will be done if the upper space by which the arrow passes is just a little bigger than it should be' (C<sup>1</sup>, 37b; C<sup>2</sup>, 62a; C<sup>3</sup>, 30a). For our author, therefore, *matn*—in the present context at least—means the *centre*, or *middle*, *section* of the grip's dorsal surface, i.e. the section lying between each end of that surface of the grip. This interpretation is wholly consistent with the meaning of *matn* as (a) 'back', i.e. the part of the body extending from the neck to the end of the backbone and therefore excluding the extremities between which it lies, and (b) 'main part' of a thing.

To sum up, the *matn* is the 'body' or 'centre section' of the handle above and below which lie its extremities, while the 'middle of the back of the *matn*' is the 'mid-line', 'spine', or 'backbone' that runs down it. The body of the grip of Middle Eastern composite bows is almost invariably raised into a conspicuous ridge, or hump, on the dorsal surface (Fig. 6). This was formed by the application of layers of sinew over a shaped wooden base and it is perhaps not without significance that *matn* may also denote in Arabic a raised, hard ridge.

It cannot be overemphasized that both *matn* and *ṣaḥr al-qabḍah* are frequently used quite loosely and that the meaning can only be exactly determined by context. Later in the work our author uses *matn* without any qualifications to mean 'mid-line of that part of the dorsal surface which is held when shooting'.

## 2. Grasping the Bow

The choice of grasp to suit any particular archer mainly depends on the length of his fingers. A variety of different grasps could be enumerated to confirm the pronouncement: 'Expert archers have disagreed on the exact manner of holding the grip' (*Arab Archery*, p. 46). At the same time a good deal of conflicting evidence could be presented from medieval Islamic sources, but to little purpose. We therefore confine ourselves merely to directing attention to three basic grasps later discussed by Ṭaybughā (Ch. 22, pp. 122ff.):

(a) *The square grasp* (*al-qabḍah al-murabba'ah*). Attributed to Abū Hāshim. See, however, D<sup>1</sup>, 26a; D<sup>2</sup>, 55a: 'This is the method of Ishāq ar-Raffā' and the reason for it is that if one's



fingers are long (sc. like Ishāq's), they will turn on the grip.' (Cf. C<sup>1</sup>, 36b; C<sup>2</sup>, 60b-61a; C<sup>3</sup>, 29a.)

(b) *The oblique grasp (al-qabḍah al-muḥarrafah)*. Attributed to Ṭāhir. 'This is Ṭāhir's method . . . which is suitable for persons with a small palm and short fingers . . . A man with short fingers should put the back of the handle in the first crease between palm and fingers to give him control over his grip-fingers (*qubbāḍ*).' (D<sup>1</sup>, loc. cit.; D<sup>2</sup>, loc. cit.)

(c) *The intermediate grasp*. Attributed to Ishāq, but see D<sup>1</sup>, 26a, and D<sup>2</sup>, 55a, according to which it was the teaching of Abū Hāshim, Bahrām Gūr, and at-Ṭabarī. (Cf. C<sup>1</sup>, 36b; C<sup>2</sup>, 60b; C<sup>3</sup>, 29a.) Almost all other authors consulted by us, however, agree that Ishāq's grasp was intermediate. (*Tabṣīrah*, 48b; *Arab Archery*, p. 47, etc.)

It should be noted that the grasp attributed to Ṭāhir in the second paragraph of the chapter (p. 42) is at variance with what our author has to say later. Irrespective of the assertions of other writers, we are justified in supposing that either Ṭaybughā or some scribe has made a slip; for he himself tells us later not only that Ṭāhir had short fingers, for which he recommends, even in the present chapter, that the *matn* be placed in the proximal crease, but also that Ṭāhir did in fact place the *matn* in that crease formed by the joints of the little finger, ring-finger, and middle finger (below, p. 130).

A wide range of opinion on the manner in which the grip should be held and conflicting views on the persons to whom particular grasps should be attributed may be derived from a number of sources, notably *Tabṣīrah*, 47b-50a; *Wādih*, 30a-b, 37a, 43a-b, 47a ff.; *Nihāyah*, Ch. vii, p. 64, etc. See also *Arab Archery*, pp. 46-49. Hein, *Isl.*, XV, p. 61, should be read with caution as corruption in the text used as the basis for translation has passed unrecognized, and there is also some misinterpretation.

### 3. The 'Falcon's Talons'

The name of this grasp is spelled and pointed in A<sup>1</sup> (41b, line 3) as *jinkalbāz*. The expression is Persian as indicated in the text. It is conceivable, but less likely, that we have to do with an arabicized form with the same meaning, viz. *chang al-bāz*. That our etymology and spelling are correct is—in spite of the variety of forms in which the expression occurs in other MSS—almost certain, for the manner of gripping described in our text strongly resembles that of a falcon's talons, and in a society familiar with falconry such a comparison would be undeniably meaningful. Muṣṭafā Kānī compares the configuration of the fist of the flight shooter to the shape of the head of a harp (Hein *Isl.*, XV, pp. 62-63. Cf. Klopsteg, pp. 92-93), but since *chang* can mean not only 'harp', but also 'talons', his statement is suspect, especially if we take into account his need to explain that the harp is a 'Frankish (i.e. European) stringed instrument'.

The technique described, whereby the arrowhead is drawn inside the grip, is of extraordinary interest. To do this, an archer must have considerable control, for such a practice without the use of some shield such as the Turkish *siper* (Hein, *ibid.*, pp. 9-18; Klopsteg, pp. 59-67 and his figs. 28, 29, 30; *Arab Archery*, pp. 174-5 and plate facing p. 40) is fraught with danger, and the hazards of overdrawing an arrow have already been mentioned (p. 33). The technique is a strictly flight-shooting device, but it must have been used, for in D<sup>1</sup>, 27a, and D<sup>2</sup>, 56a, we encounter the remarkable comment: 'I have seen a man at full draw who, by means of this grasp, drew four finger-widths more than his opponent. This was because he used a short arrow, yet attained maximum draught at full draw (*istawfā bi-l-wafā' at-tamām*).'

As a flight-shooting device the technique would have obvious advantages if the shot were successfully accomplished, but it would be a rash man who would use it in battle. It is the hazard which most likely led to the development of the *siper* (Pers. 'shield')—a shallow groove of horn, ivory or tortoise-shell, about 1 in. wide and 4 in. long, which was strapped to the wrist, enabling the point of the arrow to be drawn several inches inside the bow. Two specimens of this shield are to be found in the Manchester Museum (Ingo Simon Collection, Nos. O.7739 and O.7740). See Fig. 40.

## CHAPTER 9

### ON NOCKING (TAFWIQ)

One way of taking up the arrow prior to nocking, which is the second fundamental, is to take hold of it—'nock towards the elbow'<sup>1</sup>—with the palm and 'all five'<sup>2</sup> fingers of the right hand as if you were taking hold of a stave. This is a Turkish method of taking up an arrow (*maskah Turkiyyah*). An accomplished archer will take hold of the shaft with the middle finger, thumb, and index finger, and have the arrowhead in front of the ends of his fingers. The arrow in this case is held at a point two-thirds 'of the distance from the head', the remaining third coming up towards the forearm through the centre of the groove formed between the right index finger and thumb. 'The effect will be that of a scribe taking hold of a pen.'<sup>3</sup>

Of these two methods, the first is more convenient, reliable, and practical for the archer, especially if the arrow is to be drawn from a quiver (Plate 16). Hold the arrow in position with the fingers of your left hand. In other words, hold the shaft with the left thumb, index finger, and middle finger against the grip of the bow. Some people call this the 'clinging lock' (*aqd al-luzūm*) of the left hand on the arrow (Fig. 22 f).

Take the nock of the arrow in the three appropriate fingers—the thumb, index finger, and middle finger of the right hand—and, while nocking, keep your eyes on your foe. Now nocking is the operation of fitting the arrow's notch to the string, this notch being termed the *fūq* of the arrow or the *kāz* (see, however, pp. 130, 138), which is a Turkish word (i.e. *gez*). The operation should be carried out in the following manner. 'Once the arrow is held in place against the grip', you should run your fingers over the stele (*badan as-sahm*) to see whether there is any break or fault in your shaft 'such as splits or splinters which may injure the left thumb'.<sup>4</sup> You continue to run your fingers along it in this way until the nock of the arrow finds its way into the centre

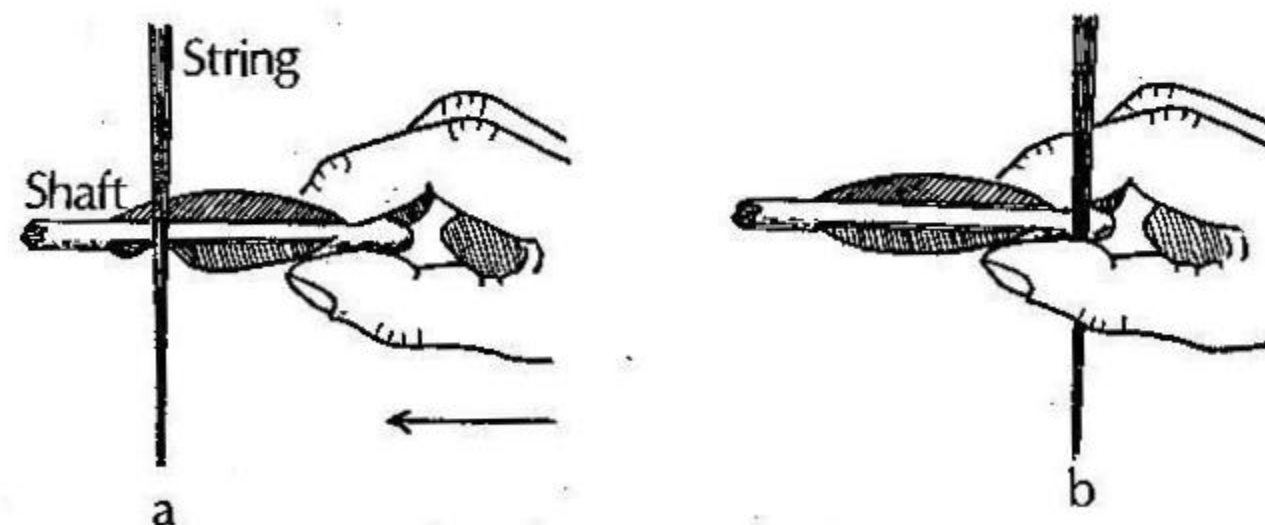


FIG. 21. NOCKING

- (a). Running the shaft forward against the string.  
(b). String running under the thumb.



of the middle phalanges of the middle finger and index finger and the proximal margin of the distal phalanx of the thumb. Then, 'with fingers pressing on the nock,' you give 'the end of the shaft' one shove with the right hand and bring back the left 'which is holding the bow' without allowing the string 'against which the arrow is running' to leave the stele until the string 'comes in under the thumb and' rides just clear of the nock (Fig. 21). You then move both hands back (i.e. in the direction from which they came) and slip the string into the nock, still keeping your eyes on your foe. In other words, at no time do you look at the nocking operation, but rather keep your eyes fixed all the while on the mark at which you are about to shoot, that is to say, the enemy's position. 'It cannot be overemphasized that' your sight must be trained constantly upon this mark without leaving it even for a single instant, for if an archer takes his attention away from his foe, the latter will do him some injury and perhaps even kill him. All archers must put in a good deal of practice until their eyes get accustomed to being used in this way and the operation becomes a natural function.<sup>6</sup>

The business of nocking that has just been described should be executed with rapidity, which can only be acquired by repeating the operation time after time. Only constant practice will bring the experience required by the technique, for to nock speedily without looking at the operation is difficult and can only be achieved by repeated practice and constant training.

### COMMENT

Nocking is treated, to a greater or lesser extent, by different authors in different ways. Here is not the place to assemble all the material we have discovered on the subject and to enter into a comparative study. One or two points, however, do call for some comment, and for this purpose *Arab Archery* may be used to most advantage. It should be noted that, in order to avoid vexatious repetition of references, it is to pp. 40-42 of this work that we refer.

#### 1. Taking Hold of the Arrow

(a) *The 'Turkish' method.* (Cf. *Wādih*, 42a; Hein, *Isl.*, XV, p. 76; Klopsteg, p. 96.) This is identical with that said in *Arab Archery* to have been advocated by the school of Ṭāhir al-Balkhī. It was 'easier than other methods and a speedier way of drawing an arrow from the quiver when in hot pursuit of game or an adversary' (C<sup>1</sup>, 39b-40a; C<sup>2</sup>, 65b-66a; C<sup>3</sup>, 32a). Hence its appeal to Ṭaybughā, the exponent of military techniques.

(b) *The 'pen' method.* (Cf. *Wādih*, loc. cit.) This is identical with that said in *Arab Archery* to have been advocated by the school of Abū Hāshim. Ṭaybughā omits to indicate that the little finger and ring-finger were folded into the palm.

There is no mention in our treatise of the method said in *Arab Archery* to have been preferred by the school of Ishāq (cf. *Wādih*, loc. cit.). This consisted in picking up the arrow with the index finger and the middle finger at one span's distance away from the arrowhead just as a bird would pick up a piece of straw in its beak. It is ignored by our author presumably because it had no place in combat.

#### 2. Supporting the Arrow at the Grip

On this point the author of *Arab Archery* is more informative than Ṭaybughā and offers two basic methods. The archer could either (a) place the arrow at one fist's distance from its head between the left thumb, index finger, and middle finger which had already been released from the grip for that purpose, or (b) keep the said three fingers closed on the grip until the right and left hands came together, at which moment he would open them (i.e. the left fingers) and put a

'38' lock on the arrow at one span from the head while running his right hand over the remainder of the stele as far as the nock to detect any faults there might be in his shaft. This second method is said to have been that of Ṭāhir's school. From careful reading of the text it would seem to have differed from the first only in two points, viz. the manner in which the fingers took the arrow, and the distance at which the stele was held from the head. In MSS of the C group mention is made only of the left index finger and thumb in this connexion (C<sup>1</sup>, 40a; C<sup>2</sup>, 66a; C<sup>3</sup>, 32b).

#### 3. The Position of the Nock against the Fingers

According to *Arab Archery*, the nock prior to insertion of the string into the notch should rest against the fingers in one of three positions, which differ fractionally from those given by Ṭaybughā. They are, however, worth mentioning if only to illustrate the wide divergence of opinion on the subject. After running his hand down the stele the archer could hold the nock (a) between the index finger and the thumb with the notch against the distal phalanx of the middle finger (Abū Hāshim), or (b) with the middle phalanx of the index finger, the fore part of the thumb, and the tip of the middle finger (Ṭāhir), or (c) between the index finger and thumb with the notch between the first two phalanges of the middle finger (Ishāq).

#### 4. Insertion of the String

Two basic methods are advocated in *Arab Archery*. When the stele is against the string the archer may (a) quickly and forcefully push the arrow forward and bring the nock back on to the string (Abū Hāshim), or (b) push forward without clearing the string and then open the fingers to nock as soon as string and nock make contact (Ṭāhir, Ishāq).

#### 5. The Nocking-point

This is the part of the bowstring to which the nock of the arrow is set. Since it tends to be taken for granted by many Islamic authors it is worth while to note the following remarks (D<sup>1</sup>, 28b; D<sup>2</sup>, 57a-b).

'The nocking-point (*maṭṭiq* at-*tafwīq*) on the string should be directly in line with the arrow-pass (*majrā s-sahm min qabḍat al-qaws*), being a little higher if the mark is at close range and a little lower for shooting at long range. If one nocks low, the arrow will fly beyond the target, which is a desirable thing in flight shooting or when shooting at a man in armour so that the arrow may fly upwards and slip in between the laminae . . .'

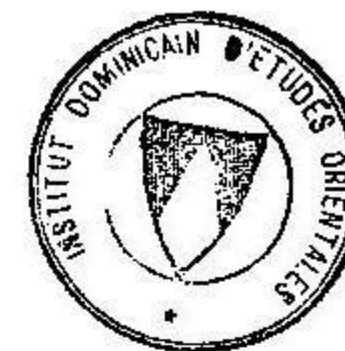
The observation is interesting, but it contains some false reasoning inasmuch as low nocking confers no advantage of any kind. It leads to unsteady and even, possibly, uncontrolled flight. Today's English teaching is that the nocking-point should be  $\frac{1}{2}$  in. above the point that is directly opposite the arrow-pass and it must *never* be below (e.g. F. Bilson, *Bowmanship*, London, 1965, p. 69).

All existing silk bowstrings from the Middle East that have been so far examined are bound with thread at the centre to prevent chafe on the string from the thumb and the nock of the arrow. In an old string the nocking-point is also a common breaking-point, hence the need for added protection there. In some cases extra binding is found immediately above the nocking-point, and the extra thickness provides a means of accurately locating the nock. The arrow can then be nocked just below the binding and slipped up the string until it is stopped by this thickened portion. This ensures that the arrow is nocked at the same place each time. As none of the strings examined go back more than about two centuries and since we have found no earlier



evidence of any kind to indicate that the nocking-point was in any way marked, it may well be that this practice was a later innovation.

To nock quickly without looking is a very difficult operation. Nevertheless, we have no reason to doubt that proficiency could be achieved after many hours of practice.



## CHAPTER 10

### ON LOCKING AND COUNTING ('AQD')

The act of locking the fingers on the bowstring and about the arrow's nock is termed '*aqd*', which also denotes the act of reckoning by the use of different finger positions<sup>1</sup> (Appendix 4). The method 'which I recommend' consists in locking your fingers in the position in which they would be for the purpose of representing sixty-nine. Some allege that my lock of '69' is that of '63', but in fact you conceal the finger-nails, and when you do that, you reckon nine, 'not three'. We have gone into this point with those who are conversant with finger-reckoning and found it to be a fact. Those who use the system differ about the manner in which three should be reckoned, but as regards nine there is no disagreement.<sup>1</sup>

What you do to obtain the lock of '69' is to gather the little finger, the ring-finger, and the middle finger 'of the drawing hand' into the centre of the palm and then to conceal the finger-nails. This gives you nine. You next place the tip of the thumb in the centre of the middle phalanx of the middle finger and wrap the end of the index finger over the base of the thumb-nail. You will then have reckoned sixty-nine. This is the right and proper lock which 'all good' archers use.<sup>2</sup>

When drawing the bow, lodge the string in the crease of the thumb, or, to be more precise, in the proximal margin of the joint between the two phalanges of the thumb. By so doing you will provide the string with a rest (*maqarr*) from which it will not slip when the bow is drawn. This rest is the place in which the string<sup>3</sup> should always be lodged, for it is the right and proper place (i.e. if a bare thumb or simple leather guard is used, for with a ring the string is positioned above the joint). If the little finger, ring-finger, and middle finger are strongly pressed home, an extremely firm lock will follow. Such treatment is essential because it is upon the pressure of these three fingers 'with concealment of the nails'<sup>4</sup> that a good strong lock depends.

After pressing home the said three fingers, put the tip of the thumb on the centre of the middle phalanx of the middle finger and keep it there the whole of the time from the very moment you loose. Next, cover the base of the thumb-nail with the middle phalanx of the right index finger, the base of the thumb-nail being the point from which it commences growth, or the end opposite to that which is cut when it is too long. What you do is to place the middle phalanx of the right index finger on the junction of the nail and flesh 'of the thumb'. See that some of the thumb-nail remains visible—don't conceal it completely. An archer, incidentally, when paring his nails, should take care not to be too hard on his thumb-nail<sup>5</sup> 'because it protects the flesh at the end'.<sup>6</sup> It is, in fact, better to leave the nail alone in times of war or when there is a lot of shooting to be done.

The real art of locking lies in pressing the end of the right index finger on the thumb without too much bending, for if the right index finger bends and curls around the thumb, the finger will not respond as it should upon release. With archers this is a common fault, the term for which is *kuzzāz* (i.e. 'spasm', which, strictly speaking, is the result of a fault rather than the fault itself). It will result in the string's rapping the end of the right index finger because it is bent



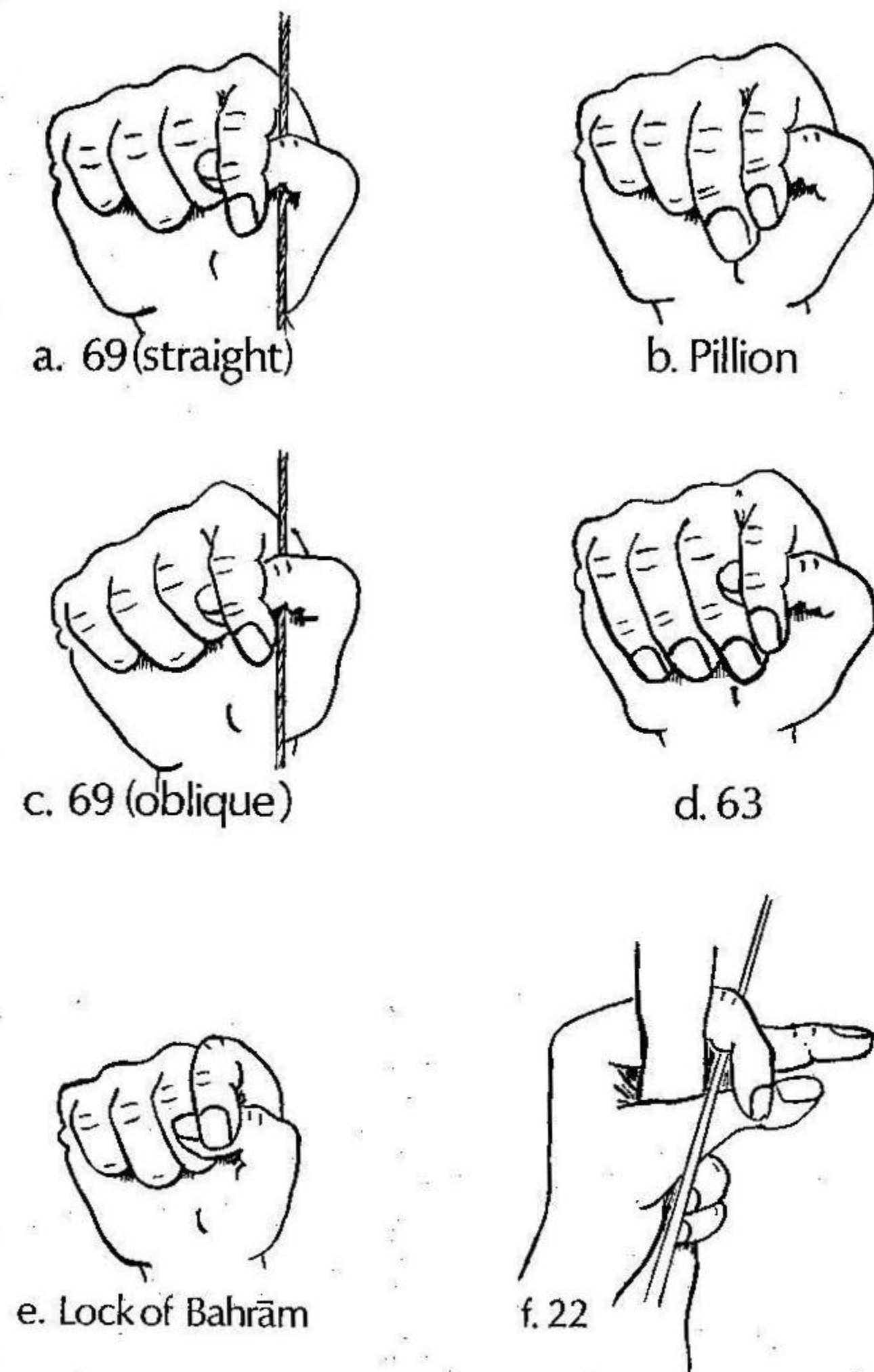


FIG. 22. LOCKING AND COUNTING

too far around the thumb. It is, then, not only a fault, but also a cause of injury, so do beware of it.

You may also use the pillion lock (*'aqd ar-radif*) which is well suited to bows that are strong, stiff, and powerful, but it gives a slow release. What you do in this case is to lock as already indicated above, but then to mount the middle finger on the right index finger and place it on the thumb beside the index finger.

You may also use the lock of '63', which is the same as that of '69', except that the nails are visible in this case, but are concealed in the other. Then again, there is the lock of '73' and that of '22'. The latter is called the 'clinging' lock and applies to the left hand when holding the arrow in place along with the grip of the bow during the nocking operation (Fig. 22f).

There is also the Slav (*'aqd as-Ṣaqlībah*) lock in which the archer puts his three middle fingers on the string and extends the index finger along the shaft of the arrow.<sup>7</sup> The thumb has no place<sup>8</sup> in this lock, for which they make finger guards of gold, silver, iron, and copper (Plate 9). With this lock the bow is held in the vertical position (*wāqifah*).

Finally, you have the ancient Arab lock of pre-Islamic times.<sup>9</sup> With this you draw with the four fingers minus the thumb. Some would draw in this manner holding the bow in a horizontal position (*rāqidah*). The arrow was placed between the middle finger and the ring-finger, and they would draw to the breast.

Apart from the '69', the 'pillion', and the '63', none of these locks is of any advantage, but it may happen that they could be required for some contingency or special purpose—for which reason they are mentioned here.

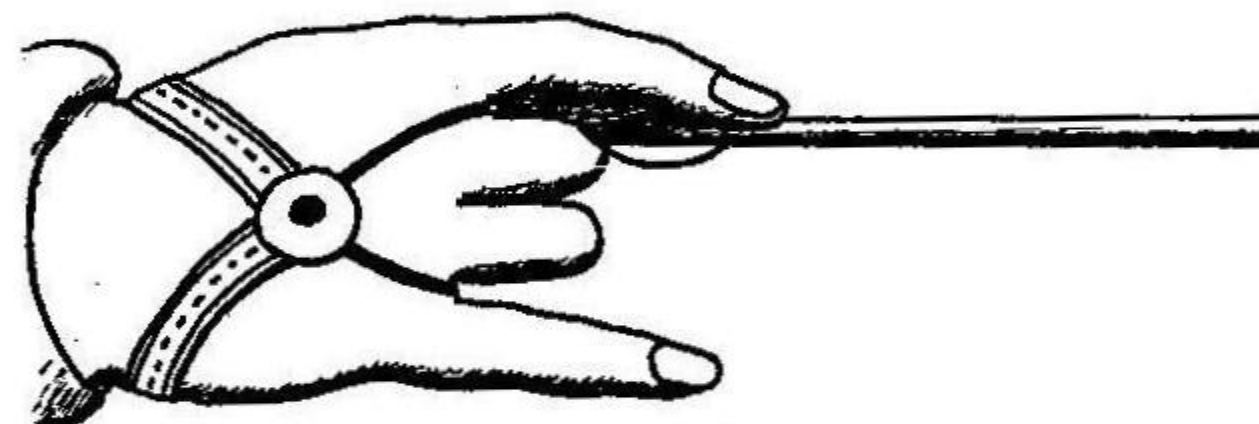


FIG. 23. SASANID LOCK

From a silver plate, item No. 7700, Archaeological Museum, Teheran. This—and similar evidence—suggests that the locks supposedly used by Bahrām and Chosroes were not as stated.

A straight lock (*al-istimā'*) will give a steadier draw, and an oblique (*at-tahṭif*) a speedier dispatch to your arrow (i.e. result in a faster loose, which will add a little velocity to the arrow; it is achieved by the greater speed at which the thumb will disengage from the string). Some archers place the string a little in front of the crease of the thumb-joint in the direction of the tip. This is a good technique giving a fast loose (*sarī' al-iftlāt*) and good cast (*jārid li-s-sahm*).

The main principle behind these observations is that for every type of finger there is a particular lock, just as for every type of palm there is a particular grasp. The lock of Bahrām (*al-'aqd al-Bahrāmī*), for example, involves lengthening the short, that is, the thumb, and shortening the long, that is, the right index finger.<sup>10</sup> Chosroes' lock (*al-'aqd al-Khusrawānī*) is the reverse of that of Bahrām—it involves lengthening the long and shortening the short.<sup>1</sup> The lock may be varied, then, to suit the individual, but<sup>1</sup> the nock of the arrow may not be shortened 'to suit the lock'. It is a great fault, so beware. (His meaning is: if as a result of the kind of lock which you adopt, you find the end of the nock pressing against any part of your thumb or index finger, you must not shorten the nock to remove this pressure. You must either take a different lock or accept the pressure.)



## COMMENT

## 1. The Lock: Terminology

(a) *Arabic*. As indicated in the introduction, the string of the Asiatic composite bow was drawn and held by the thumb, which in turn was held by the index finger to give what is known as a 'thumb-lock'. After careful consideration of such evidence as has been available to us—much of it in manuscript—we have come to the conclusion that, whatever extension of meaning it may later have had (e.g. *Arab Archery*, p. 49), the verb *qafala*, 'to make secure, close, lock' (noun, *qaflah*), which some authors use in connexion with the thumb-lock, originally expressed only the basic action of confining the string with the thumb and index finger. It is difficult to see how it could possibly have been used to indicate the relative positions of the index finger and thumb, to say nothing of the three remaining fingers. This being the case, it is our suggestion that the need to describe the various positions in which the fingers, taken as a whole, could be arranged in order to achieve the thumb-lock imposed the necessity of introducing the verb *'aqada* (noun: *'aqd*, plural, *'uqūd*) into the archer's vocabulary. The word had the twofold advantage of meaning not only 'to fasten', but also 'to reckon with the fingers' according to a highly developed and precise system whereby configurations of the fingers of a single hand were employed to convey numerical values (Appendix 4). It could, therefore, be used in conjunction with numerals to communicate exact information about the configuration to be assumed by the fingers when putting a lock on a bowstring. In most contexts, however, *qaflah*—never used by Ṭaybughā—is synonymous with *'aqd*, and *qafala*, like *'aqada*, functions with numerals to convey precisely the same information.

(b) *English*. Ever since Morse (see Bibliography) described the various methods of drawing a bowstring as 'releases' many English and American authors have applied the term 'release' or 'loose' to what is in fact a 'lock' (hence 'Fisher loose', 'Mediterranean loose', 'Flemish loose', etc.). As the same word is also used in archery to denote the release of the string, it is obvious that 'lock' is a more precise and appropriate term so far as the act of holding it is concerned. Lest the layman be misled, Morse's 'Mongolian release' is none other than the thumb-lock.

## 2. The Locks of '63' and '69'

Although Ṭaybughā has obviously taken the trouble to verify the method of communicating the values of sixty-three and sixty-nine these numbers are transposed in MSS of the C group so that the lock given in the foregoing chapter as '69' is described as '63' and vice versa. When transposed in this way, the locks of '63' and '69' will be found to be identical with those given in *Arab Archery*, p. 43, in which it will be observed that nine is reckoned with the nails of the middle finger, ring-finger, and little finger exposed (p. 20) so that the tips of the fingers rest on the palmar surface near the heel of the hand instead of being pressed into the palm.

There is no doubt that the lock in which the middle finger, ring-finger and little finger are clenched into the palm so that the nails are concealed is the strongest of all locks. We may conclude, therefore, that when the author of the *Nihāyah* (Ch. viii, p. 65) asserts that '63' is the strongest, his view of the manner in which it is reckoned is the same as that of the author of *Arab Archery*, with whom Muṣṭafā Kānī is also in agreement. (Hein, *Isl.*, XV, p. 65; Klopsteg, p. 95.) Practical trials prove that '63' and '69' are the two most effective locks, and, although there is evident disagreement about which is which, there is absolutely no doubt about the configurations with which we are dealing.

## 3. Other Locks

According to the author of *Arab Archery*, the locks 'agreed upon by experts' numbered six: the '63', '69', '73', '83', '24'—called the *Khusruwānī*, or 'Chosroes' lock—and '72' (p. 43).

From the description that he gives of the last-mentioned lock it cannot be that of '72' (cf. *Arab Archery*, p. 43, n. 20). It is, however, our 'pillion' lock, or *'aqd ar-radif*, otherwise termed *'aqd at-tardif* (*Tabṣīrah*, 62b), and there can be little doubt that Faris and Elmer's 'reserve draw' is a translation of *'aqd ar-radif*; for one meaning which *radif* certainly has, but which is inappropriate in the present context, is 'reserve'. The pillion lock admitted of variations such as those described, for instance, in the *Tabṣīrah* (loc. cit.) and the *Nihāyah* (Ch. viii, p. 65), but it seems to have been regarded by most, if not all, authorities as a lock which was awkward or gave a slow loose, and it is even asserted that it resulted in a loose that mainly launched flirting arrows (*siḥām muḍḍaribah*) (D<sup>1</sup>, 30b; D<sup>2</sup>, 58a). It is of interest to note that it was the lock used by Japanese archers.

As regards the Chosroes' lock, it should be noted that to reckon twenty-four amounts to much the same thing as 'lengthening the long and shortening the short'. The view that it was 'worthless except in drawing supple bows employed in trick shots' (*Arab Archery*, p. 43) is not shared by the author of the *Nihāyah* who maintains that it gave a most powerful loose and was extremely good for the arrow (Ch. ix, p. 65).

Among other locks of which we find mention are those of '20', used edgewise for shooting a number of arrows simultaneously (*Arab Archery*, p. 149), '23' (D<sup>1</sup>, 30b; D<sup>2</sup>, 58a), '30' and '37' (*Nihāyah*, Ch. viii, p. 65). Yet others could be enumerated, but enough has been said to illustrate the interesting fact that the number of variations of the thumb-lock used in the East was relatively large. Small variations in forming the lock would be determined partly by personal preference and partly by the relative lengths of the archer's finger and thumb. It is important that an archer, once having decided which lock is best suited to his needs, should never vary the form as even the slightest alteration will affect the direction of his shots.

## 4. The Position of the String

In discussing the position in which the string should rest against the thumb Ṭaybughā is assuming that the archer is not wearing a ring. There seem to have been as many views on the position of the string in relation to the thumb as there were opinions on how the bow should be grasped and the string locked. The three positions indicated in our text seem to have been the most important, though here again there is considerable disagreement from one writer to another about the persons or schools to whom they should be attributed. We need only say here that the author of *Arab Archery* ascribes the oblique position—said to have been the oldest and that used by expert Persian archers—to Abū Hāshim, the straight position to Ṭāhir, and the third position—said to give a quicker release than the straight and a greater range than either of the other two—to Ishāq (pp. 45–46). For different opinions on the subject, see in particular *Tabṣīrah*, 59a–64a.

Slow and quick releases are related to the speed at which the thumb disengages from the string. A quick release such as can be achieved by the oblique lock adds slightly more velocity to the arrow and can therefore have its advantages. Our author's oblique lock is analogous to the Fisher loose intended for use with the three-finger, or Mediterranean, loose (*Archery (Badminton)*, p. 377).

Archers will be well aware that to develop a clean and unvarying loose is one of the most difficult facets of technique to achieve.



points to effective shooting (*nikāyah*), of which nine lie in the attainment of maximum draught by a properly completed draw and only one in the archer's (meaning, presumably, that a successful shot largely depends on the completion of a faultless draw). The completed draw (*wafā*) is one of three kinds:<sup>9</sup> the lesser (*bidāyah*), the standard (*kifāyah*), and the greater (*niḥāyah*) (below, pp. 123, 127ff).

## COMMENT

'Drawynge well is the best parte of shootynge' (Ascham)

## 1. The Essentials of the Draw

With the performance of the draw the archer, now done with the preliminaries, enters upon that phase of his shooting which is directly concerned with his shot. He should draw smoothly and easily with fairly equal distribution of weight between both arms for 'to drawe easely and vniformely, that is for to saye not wagging your hand, now vpwarde, now downwarde, but alwayes after one fashion . . . is best both for profit & semelnesse' (Ascham, p. 105).

Since the strength of the draw comes not from the arms, but from the muscles of the back and shoulders, the archer must, if he is to achieve a powerful draw, keep his right elbow in the same horizontal plane as his shoulder while drawing. Once the bow is full-drawn, both arms should support and maintain equal tension until the arrow is loosed. To draw correctly is of great importance, for a bad draw will almost certainly culminate in a bad shot.

## 2. Methods of Drawing

There are three *basic* methods of drawing: (a) that whereby the archer with hands relatively close together at waist height begins simultaneously to push against the bow, pull on the string, and raise his hands; as the bow moves upwards he gradually increases the distance between his hands V-wise until the bow is full-drawn and the arrow horizontal; this technique is favoured by most modern archers and, so far as can be judged from our text, was our author's method also; (b) that whereby the archer raises his bow-arm almost fully extended towards the aiming point with little disturbance of the string until that arm is level, and then draws; (c) that whereby the archer raises both arms above the horizontal and draws as he lowers his hands to the correct elevation. This last method has always been favoured by the Japanese.

## 3. Creep

It is nowadays Western practice to complete the draw and then to hold for several seconds during which final aim is taken. There is a great danger at this stage that the arrow will 'creep', or nose forward, either because of a slight bending of the bow-arm or an easing of the shoulders occasioned by muscle strain. If the arrow does creep, it will not be full-drawn at the moment of loosing and will accordingly fall short of the mark. Ascham, doubtless alive to this danger, advises that 'Holdynge must not be longe . . . it must be so lytle y<sup>e</sup> it maye be perceyued better in a mans mynde when it is done, than seene w<sup>th</sup> a mans eyes when it is in doynge' (p. 105).

## CHAPTER II

## ON DRAWING THE BOW (MADD AL-QAWS)

To draw, the points of grasp in each hand must be tensed, by which is meant, the little finger, the ring-finger, and the middle finger of both hands. At the same time both elbows must be tensed. In tensing the right elbow extra care must be taken because it is of fundamental importance to the achievement of a good draw.<sup>1\*</sup>

It is related that a woman once brought a boy of hers to the Imam ash-Shāfi'i<sup>2</sup> and asked him to teach him archery, to which he assented. 'He must,' she said, 'be strong in both fists, quick at both points, and free from both faults.' She turned on her heels, and the Imam ash-Shāfi'i quickly rose to pay her respect and asked her to which family she belonged. She told him that she was descended from Sa'd ibn Abī Waqqās.<sup>3</sup> 'You speak the truth,' he said. 'This is indeed his teaching.'

Authorities on archery are agreed that 'strong in both fists' refers to the tensing of the three appropriate fingers of both hands, but they disagree on what 'both faults' are. Some say that they are rapping (*tarq*) and 'deflecting the arrow by' slapping the arrow-pass (*tadmik*),<sup>4</sup> though other opinions have been expressed in abundance. The truth of the matter is that the two faults are pinching 'the nock' (*khang*)<sup>5</sup> and rapping, for these are the worst faults in archery (on faults and their consequences, see below, Ch. 21. 'Both points' are left unexplained, but they are, we suggest, the nocking-point and the anchor-point (below, p. 126), the reference being to speed in nocking).

When ready to draw the bow, tense your elbows and fists, then raise both hands and elbows until they are on a level with your shoulders, poised like the beam of a balance.<sup>6</sup> Elbows, fists, and shoulders should be like a paper-rule, running in one straight line so that no one part is higher or lower than another. At all points the distance from this line to the ground should be the same. 'To repeat and emphasize,' the distance from this line to the ground should be one and the same at all points. This rule is reiterated to impress upon the novice that we have here a principle that is of fundamental importance to good shooting. All ancient archers gave their pupils the same advice.

Correct use of the right elbow is the essence of a good draw, and maximum draught is attained when the lobe of the ear is reached. Drawing to the lobe will enable the archer to determine what the length of his arrow should be. What he does is to put his back to a wall and bring the arrow to full draw (*yastawft s-sahm*) so that both his elbows come in contact with the wall. The draught of the arrow is then ascertained by noting that point on the shaft which is found at full draw to lie between the phalanges of the left thumb, for the distance between that point and the nock will be just the right length for his particular arrow. No other measurement will meet his needs. This question of finding the length of one's arrow has always been a problem to archers and a subject on which they have different ideas.<sup>7</sup> For its solution the best teaching ever expounded is the one I have just described and, in recommending it, I have explained a method which men are loath to disclose and which is therefore left unmentioned by others.

It is reported that at-Ṭabarī said, 'Abd ar-Raḥmān al-Farāwī<sup>8</sup> told me that there are ten



## CHAPTER 12

## ON SIGHTING (NAZAR)

## i

When sighting the mark, turn your eyes so that the lines of vision of both eyes merge and the two eyes become as one, and a single object is seen in the same way as it would be with one eye only. The reason for this recommendation is that the use of both eyes gives stronger vision. It is, however, apt to be attended by inequality of vision, and in most cases a person will see a single object in two different places or as two separate objects. This indeed is what will happen when he views a distant object in line with some part of the raised hand; for in the majority of cases a person will, under such circumstances, see the object<sup>1</sup> at which he is looking with a master eye (lit. 'with one of his eyes having stronger vision than the other'). 'If the left eye is the master, he will see it<sup>1</sup> with his right eye to the left 'of the object, while if the right eye is master, he will see it<sup>1</sup> with his left eye to the right 'of the object'. If, on the other hand, there is equality of vision in both eyes, he will aim with first one, and then the other, without the ability to co-ordinate, not knowing in his bewilderment where the true line of vision lies. The knack lies in turning the eyes askant so that the line of vision of the one shifts into that of the other by bringing the pupil of the left eye into its exterior angle (*mu'akhhkhar*) and the pupil of the right into its interior angle (*muqaddam*). He can then aim with them both as though with one eye. Sighting of this kind is termed *ahwal* ('squint-eyed') and is particularly good (below, p. 61). It is a difficult technique to master, but for a horseman or a man in armour it is a valuable asset. It is, furthermore, the ancient form of sighting used by the Chosroes (i.e. the Sasanids, A.D. 226-651).

If you are unable to sight with both eyes, then close one eye as you take aim so that you see the target as it really is. This should only be done at the very moment the arrow is released and with such alacrity that it is not noticeable to the person aiming.

Each form of sighting just described calls for careful practice until it is mastered and it becomes a habit.

## ii

The art of sighting can be acquired in the following manner.<sup>22</sup> Using either one or both eyes, train your sight on a lamp, and any disparity of vision which you may experience will become apparent to you. What you do first is to place a lamp at a distance (in the dark?). Then, taking a gentle bow, you squat in a position between the oblique and square (i.e. frontal; below, p. 101) just as you do when addressing yourself to the mark from the squatting position. You next nock an arrow and align its head with the flame, all the time pulling on (*naza'a fi l-qaws*) the bow. While so doing, you keep one eye closed and the other open, then open both together and draw to the limit of the arrow, all the while keeping your sight on the light until the disparity is corrected to your satisfaction.

Sight the target outside the bow from the back of the hand. What constitutes the outside of the bow is a controversial point. Some say that to sight outside the bow means setting your sight along the arrow and that to sight inside the bow is to sight from the back of the hand because it lies between the bow and the archer. The correct understanding of the term is as stated 'in the opening sentence of this paragraph' because the inside of the bow is the space between the bow and its string. So, properly speaking, internal sighting will be that which is carried out by means of the arrowhead (i.e. as seen between the bow and the string), and to draw conclusions on the subject from a picture of Bahrām Gūr 'as some who take the contrary view do' is of little use, because a picture on a wall or in a book is not large enough to show such detail (on these forms of sighting, see Fig. 24 and below, pp. 61-62).

External sighting can be done in three ways. In one of these you look askance with both eyes as described above. By a second variation the arrowhead lies outside the bow in line with the mark, while the archer looks at the mark with both eyes and aims with the left. He then rapidly snatches the arrow (below, p. 64) and releases. Thirdly, he can train the arrowhead on the mark outside the bow. In this case he uses his left eye to aim and keeps his right on the *dustār* of the bow without using it to sight any part of the mark, keeping the knuckles of the left hand in line with the centre of the mark.

You can also sight by split vision. This is done by training the arrowhead on the mark with the left eye outside the bow and coming into focus by directing your right eye on to the mark from inside the bow. Never take your right eye off the arrowhead or your left from the mark at which the arrow is to be loosed.

'You may adopt a variation of this method as follows.<sup>1</sup> First, you use both eyes to train the arrow on the mark outside the bow. Then, when only one-third of the arrow remains to be

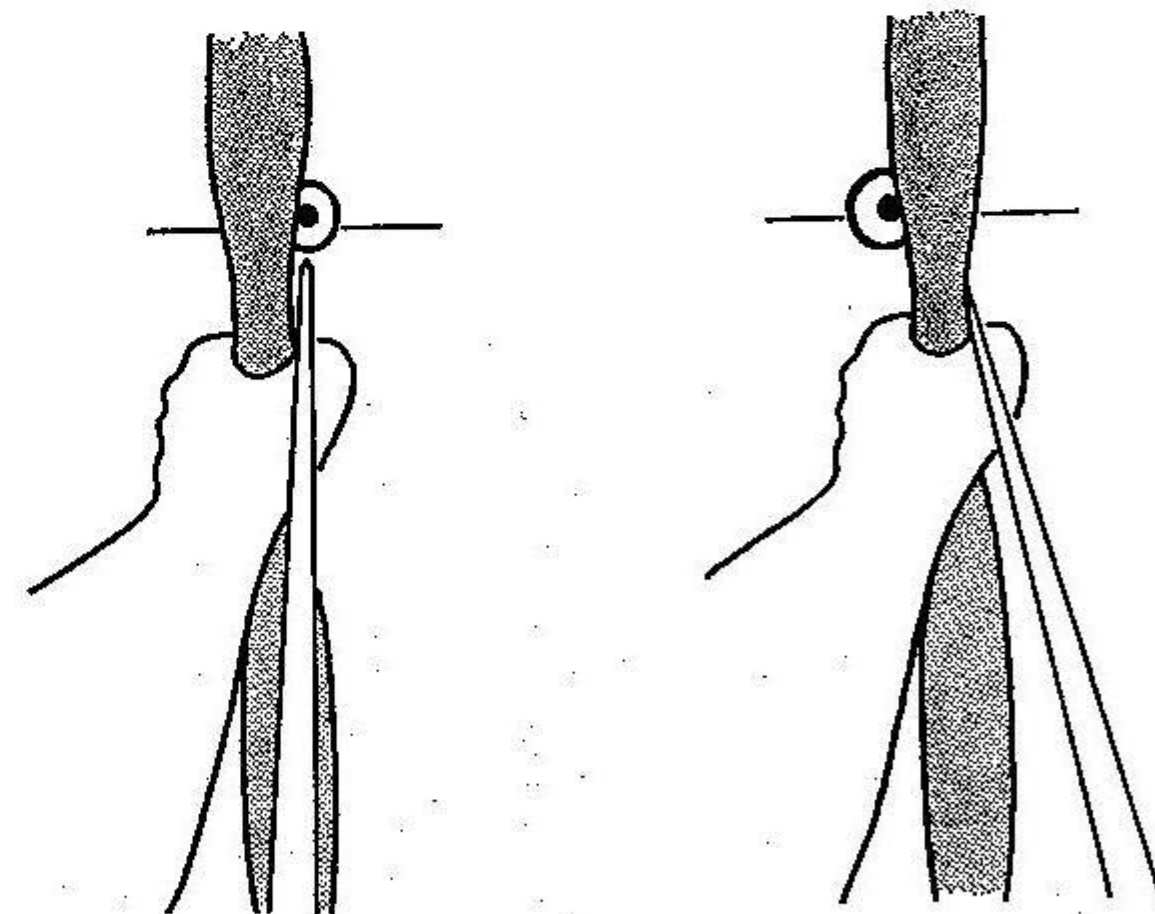


FIG. 24. AIMING

(a). Aiming 'inside' the bow.

(b). Aiming 'outside' the bow.



drawn and the arrowhead disappears from sight 'behind the bow,' you keep the left eye trained on the mark and with the right watch inside the bow for the arrowhead to come on to your hand. When the arrowhead is as far back as it can go at full draw, you release. This is an excellent method and is, furthermore, the most accurate and the least confusing of all. Those who practise the technique adopt a squatting position between the square and oblique postures.

## iv

Some archers gauge elevation and direction (*wasana*) from the beginning of the draw and make continual adjustments until the moment of release. What you do in this case is to train the arrowhead on to the mark, gauge precisely, and draw, training your sight along the left forearm with both elbows evenly and correctly balanced. This is Ṭāhir's method. Alternatively, you can sight the mark first and, when you have drawn half the arrow, gauge precisely and at that instant bring the arrow to full draw and release. This is a more careful method. Others only gauge at the end. In other words, elevation and direction are not precisely gauged (*lā yatahaqqaq al-waṣn*) at the beginning of the draw. On the contrary, the archer waits and, when a fist's length of the arrow remains to be drawn, he holds for a moment, sights, and then, snatching rapidly, releases. This is the military technique, and it is of far greater value than any of those already described.

You may also gauge by taking the process right through from the moment you begin to draw until full draw is reached, but then giving a quick release. This is an excellent method for target shooting, but it is best to accustom oneself to military techniques.

## v

To hit an enemy at some distance away, aim at his head 'by elevating the upper limb of the bow',<sup>3</sup> for an arrow loses height on its way to the mark. 'If aimed in this way, however,' it will find its way into your adversary and kill him. To get your arrow into an enemy at close range, on the other hand, you should aim for his leg 'because in the first stage of its flight after leaving the bow an arrow gains height'.<sup>4</sup> You can in this way make allowances for different distances between the two extremes. Some archers say that if you cover your opponent with your left fist and shoot, you will kill him, but this is only true if one is at a certain specified distance. Archers hold different opinions about the angle of ascent and velocity of an arrow. Judgement and length of experience, however, are the only real means of obtaining the best results.

All that we have said so far depends for its success on a steady left hand, a firm hold on the grip, correct locking, alignment of both arms, correct sighting, presence of mind, a sound draw with the 'right' elbow in the appropriate position, a clean release with tension in both elbows and, above all—for on this hinges everything else—imperturbability.

## COMMENT

It goes without saying that the ability to aim is essential to accurate shooting. Although it becomes intuitive with experience, the art is not easily acquired and is indeed unattainable until and unless the archer has complete control of his bow. Methods of aiming in Islamic manuals are numerous to the exhaustion of almost all possibilities. The individual, therefore, had to make choice of method. To some extent at least, his choice would appear to have been dictated by the size and design of his bow; for the doctrine that all sighting should be 'external' was, we are told, that of the users of the short Khorasanian bow, while the view that it should be all 'internal' was held by archers who used the 'average longer bow' (*Tabṣīrah*, 65a). The method selected

would also depend to some degree on factors such as style and kind of shooting (target, hunting, war, etc.).

It is more than likely that the range of methods known to Ṭaybughā was far greater than the foregoing chapter may suggest. If he appears sparing with his knowledge, it is because of his concern with the needs of the warrior. Deterred, we suspect, by his intensely practical mind from burdening his readers with confusing prolixity, he restricts himself to what he personally regards as essential information. It is our intention, in commenting on what he has to say, to follow his example and to resist the temptation to assemble a wealth of material which, however interesting it may be, would only bewilder the general reader.

## 1. Monocular and Binocular Sighting

Modern teaching, like that of Ṭaybughā, favours the use of both eyes in aiming, but nevertheless allows the closing of one if the archer finds the binocular method too difficult.

To the hunter, binocular vision is very necessary for judging range, for if one eye were to be closed throughout the draw, it is probable that errors in elevation would result. We can, therefore, safely assert that what is applicable in the case of the hunter in this respect would be equally applicable in the case of the combatant archer.

The 'askant', or 'squinting', method of binocular aiming of which Ṭaybughā thinks so highly is mentioned by the author of *Arab Archery* (p. 53) who does not however share his enthusiasm for it: 'This type of aiming . . . by some is supposed to be the best . . . In the opinion of the author, however, it is the worst and most faulty and possesses the greatest margin of error; for if the archer should close one eye and open the other and aim with it by sighting obliquely, and then should close the eye which he had left open and open the one which was closed and should aim with it, he would realize that the aim of the two eyes in this position is never the same. How, then, could aim taken by this method be accurate?' Ṭaybughā, however, to whom this method was obviously suited, does not assert its universal value. In fact, he clearly confines it to persons with 'equality of vision in both eyes'.

## 2. Sighting from the Side of the Bow

Under this head we are concerned with the lateral aspect of aim as opposed to the vertical which is related to range.

In his explanation of what is meant by the 'outside' and the 'inside' of the bow Ṭaybughā agrees with the author of *Arab Archery*, who defines the latter as 'the side toward your right . . . along which the arrow passes at the time of release', and the former as 'the other side which is toward your left' (p. 52).

Given an arrow that is matched to the bow and its user and will therefore travel in the direction in which it is pointing the moment it is loosed, the line of aim may vary laterally according to three basic techniques which call for some explanation:

(a) External sighting (*an-naẓar al-khārij* or *min khārij al-qaws*).

When the arrow is drawn to the ear or thereabouts, its tail, or nock, is displaced to the right of the line of sight as given by the right eye. This displacement is roughly equal to the width of the bow (Fig. 25). This being so, the left edge of the bow must, for an accurate shot, be seen in line with the target. To aim in this way is, according to our author's terminology, to aim 'outside the bow'. (Fig. 24 b.)

This method admitted of variations, and the same three variations as are mentioned by Ṭaybughā are described in more or less detail in *Arab Archery*, p. 53. There the author attributes Ṭaybughā's third variation—his own personal preference and that in which the



archer keeps his right eye on the *dustār* and blind to the target—to Abū Hāshim. All three variations—'in universal use among the kings of Persia'—are declared suitable for archers using the oblique posture, whether seated, standing, mounted, or in armour, and are pronounced 'very effective because of the length of the draw that is used in them' (ibid., pp. 53–54).

(b) Internal sighting (*an-naẓar ad-dākhil*, or *min dākhil al-qaws*).

When the arrow is drawn to the chin or between lip and chin its nock should lie in the vertical plane immediately beneath the right eye, and the line of sight thus run along the line of the shaft. It follows that, in this case, it is the right edge of the bow that must be aligned with the target. The archer will then be aiming 'inside the bow'. (Fig. 24a.)

Viewing the target according to this method is treated in *Arab Archery*, p. 54, but, to judge from the author's comments, it had obvious disadvantages as a military technique. Hence, no doubt, the absence of any mention of it by Taybughā.

(c) External-internal sighting (*qismat al-'aynayn*, 'division of the eyes').

When the arrow is drawn to, or near, the right-hand corner of the mouth (i.e. to an intermediate position), aim must be taken between the two last and is achieved by the use of both eyes.

Both forms of the 'split-vision' technique mentioned in our text are dealt with by the author of *Arab Archery*, pp. 54–55. Expressing himself more clearly and in somewhat greater detail, he instructs the archer using the first method to set the upper end of the grip on a level with his nose, align the arrowhead with the target, and focus his sight on both with the left eye from outside the bow and with the right from the inside. Drawing horizontally at the level of his lips until all but a fist's width remains, he should complete his draw with a sudden jerk and release. The method is ascribed to Ishāq. The second technique, we are told, is said to be more accurate than any other, and this is Taybughā's view, as we have seen.

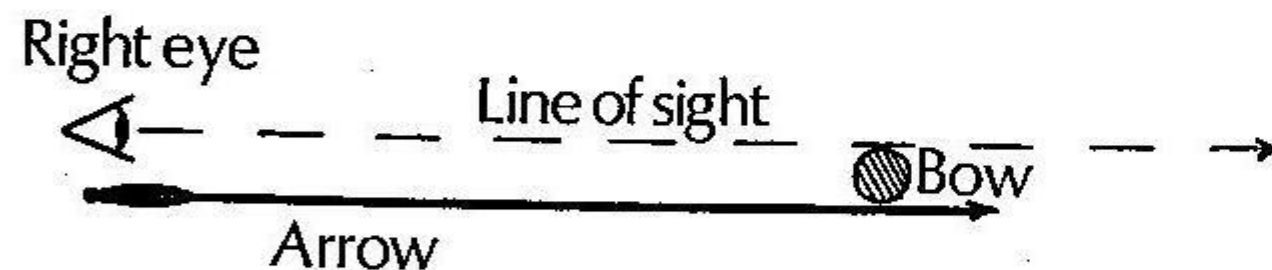


FIG. 25. AIMING: EXTERNAL.

A point not to be overlooked is that if the left eye is the master eye and the archer shoots right-handedly, the bow must be displaced well to the right of the target to compensate for the distance between the left eye and the nock of the arrow.

The Japanese draw roughly as far back as the point of the right shoulder and consider that the ideal aim is achieved with the left edge of the bow running through the centre of the target. If this cannot be done, the bow may be displaced either to the right so that the target may be viewed well to the left of the bow, or to the left so that the target is obscured by the bow as viewed by the right eye (Acker, *Japanese Archery*, pp. 65–67).

### 3. Gauging Elevation and Direction

In *Arab Archery*, pp. 55–56, Taybughā's first two techniques are viewed as two variations of the method used by archers who faced the target directly.

His third technique, on the other hand, is given as one of two variations of the method used by archers who faced the target obliquely. It is recommended for warfare on the grounds that the

bow could be concealed from the enemy while most of the draw was being made. When the arrowhead was a fist's width away from full draw, it could be turned on the enemy. The second variation—not mentioned by Taybughā—differed only from the first in that aim was taken not only when the arrow had been drawn to within a fist's width from its head, but also at the very beginning of the draw. Taybughā does not appear, however, to have shared the view that it was the 'best method and . . . suitable for all purposes'.



## CHAPTER 13

## ON THE LOOSE (ITLAQ)

The traditional teaching of authorities on shooting is that there are two forms of loose whereby the arrow, after being brought to full draw, may be discharged from the centre of the bow (*kabid al-qaws*). One of these is called *mukhtalas* or 'snatched'. The term is derived from the verb *ikhtalasa*, which is used to describe the action of a thief practising fraudulent sleight-of-hand 'and is an appropriate extension of the meaning', for the movement in this kind of loose is such as to be almost imperceptible. The second form is termed the *sākin* ('held'; lit. 'motionless'), the implication being that the completed draw (*al-madd at-tamām*) is followed by a hold (lit. 'steady pause'). There are said to be 'not merely two forms of loose, but' three: the snatched, the held, and the twisted (*mafrūk*).

The manner in which the snatched loose is accomplished is as follows. The bow is drawn and then there comes a pause, or rest, before full draw is reached. This is immediately followed by full draw executed with a snatch that is as quick as lightning to the eye. What the archer does to achieve this result is to draw until only a small portion of the arrow remains,<sup>1</sup> and then, holding briefly for the count of one, he snatches the remaining portion of the arrow and looses with a snap of the fingers from the inside of the string. At the loose that part of the arrow which remained at the hold should have been grabbed back, as it were, with such rapidity as to be imperceptible to the bystanders, leaving them with the impression that the archer failed to bring the whole of the arrow to full draw. This is the finest and most practical loose for military purposes and when competing for distance.

The second form of loose, namely the held, is executed in the following manner. The full length of the arrow is drawn to its absolute limit, and, when the hands are motionless—by which is meant completely and utterly immobile—the arrow is released. In more precise terms, the archer should draw the arrow until there is nothing left to draw and then, 'before loosing,' hold with firm control for the count of one, two, or three, but no more. It is a good technique to adopt for shooting at a mark or at targets.<sup>2\*</sup>

It is related that al-Hasan,<sup>3</sup> when bringing the arrow to the centre of the bow,<sup>4</sup> would say, 'In the name of God'<sup>5</sup> and that whenever he loosed, he would say, 'God is greatest'.<sup>6</sup> It is also related that Idris ibn Yahyā<sup>7</sup> said, 'As-Saffāh<sup>8</sup> once paid me a visit in the course of which he asked me whether I was an accurate shot. I replied that sometimes I was and sometimes I wasn't. Whereupon he told me to say 'upon drawing and releasing,' "As God wills! There is no god but God, and there is no power apart from God!" He added that if I made these pronouncements, I would hit the mark and not miss, God willing'.<sup>9</sup> The archer should bear all this in mind as it will be a great help.

The archer should complete the operation by coolly and calmly forming a crescent (*muhallilān*) with an upward twist (*farkah*) of the wrist (frontispiece). More explicitly, the position of his hand immediately after release should be such that his right index finger and thumb lie hard by his ear in the form of a crescent, this being achieved by an upward 'and outward' twist of the wrist.

'that will reverse the position of the hand and thus leave the little finger uppermost. This action should be part of the loose and there should be no lag between the two'.<sup>9</sup> To accomplish the loose, the right index finger and then the thumb should be opened in rapid sequence. As far as the twist is concerned, it is essential that the movement should come from the wrist. One further point: the archer will find it a great help, when loosing, to open his middle finger along with his right index finger and thumb.

A number of advantages are to be gained from this technique: it will safeguard the right index finger against raps from the string, afford protection against a broken thumb-nail and bruising of the inside of the thumb, give a clean loose, and do no damage to the surface of the (leather) thumb-guard.

The loose should be accomplished with a backward punch (*lakzah*), or thrust, of the right elbow as though the archer were jabbing someone behind with his elbow. Some archers open out the forearm (frontispiece) as they loose.<sup>10\*</sup> The first method, however, is safer and sounder, especially in combat and confined spaces 'because injury can be caused (presumably either to oneself or to a fellow archer standing close by) if the forearm and fingers are opened out in a confined space'.<sup>11</sup> To close the fingers after the loose is a better and more practical technique in battle.<sup>12\*</sup>

## COMMENT

Although our author, in common with others who deal with the details of shooting technique, breaks down its various aspects into constituents, it is important to note that in practice the actions which go into the making of a shot are essentially indivisible, for each action merges with the next to form a rhythmic whole. On paper this fact is perhaps nowhere more strikingly illustrated than in the foregoing chapter, in which the reader will have observed the extent to which the loose involves the draw.

## 1. Essentials of the Loose

Mastery of the loose is 'the consummation of shooting . . . and the life of the whole art depends on it' (Acker, *Japanese Archery*, p. 68). The hand must not go forward with the string (sect. 4 below), and the loose must be clean and unvarying, for if accuracy is to be achieved, the archer must know as exactly as he can how the arrow will leave his bow. If the loose is not clean, deflection can result. A clean loose is more easily achieved than a consistent one. According to accepted classification, the loose can be either fast or slow, but the type actually employed is of less consequence than consistency. A fast, or sharp, loose will increase the velocity of an arrow and is therefore preferable to a slow, or sluggish, loose, which, as might be conjectured, gives a slower flight. It is easy to understand, therefore, how higher or lower flight, as the case may be, will result from an inconsistent loose and how such a fault can be responsible for wider variations in flight than any other single factor.

Variations in the loose from the thumb-lock result from two main causes: firstly, variations in the pressure of the thumb tip against the middle finger and hence in the degree of tension in the muscles of the thumb, and secondly, variations in the pressure of the index finger on the thumb-nail and the manner in which it is released.

## 2. Disengagement of the Drawing Hand

With a thumb-lock, effective accomplishment of the type of loose with which we are concerned depends on clean and rapid disengagement of the thumb from the string. It will be noted that our author speaks not of a simultaneous disengagement of thumb and index finger, but of a rapid sequence. This advice is also that of Muṣṭafā Kānī who is, however, somewhat more



explicit: '... the right index finger should be released, then the thumb. Both movements, however, should follow one upon the other so rapidly that an onlooker cannot see, nor the shooter distinguish, the separate actions... If the finger and thumb are opened simultaneously the string will emit an "undesirable" twang, the thumb-nail and the end of the index finger will be injured, and the flight affected' (Hein, *Isl.*, XV, p. 71. Cf. Klopsteg, p. 100). According to at-Ṭabarī, it was the practice of Abū Hāshim to open the middle finger along with the thumb and index finger (*Wāḍih*, 31a).

*The farkah.* One problem connected with the thumb-lock is that the string, when loosed, is liable to catch the tip of the index finger. Although the blow may be so slight as to inflict no injury, it will nevertheless cause some deflection of the string as it travels forward and, correspondingly, some change, however small, in the direction of the arrow as it leaves the bow. By means of the *farkah*, or 'twist', the index finger could be swept clear of the string. That this was indeed its purpose is evident, for practical trials extending over a number of years have shown the distinct merit of this technique. Both Abū Hāshim and Ṭāhir al-Balkhī are said by at-Ṭabarī to have used the *farkah* when loosing. Ishāq ar-Raffā, on the other hand, preferred a 'straight' (*mustawī*) disengagement without any twist at all (*Wāḍih*, 44b).

### 3. Forms of Loose

#### (a) In the preceding chapter.

(i) The *mukhtalas*. From correct use of this method the archer would derive the advantage of a somewhat faster loose than the *sākin* would permit. The consequent increase in the velocity of his arrow would add to its range in flight shooting and to its penetrative power as a missile in war. Exposure to the danger of creeping would be minimal, but liability to errors and variations of draught would be an unavoidable hazard. Furthermore, because of the slight extra thrust taken by the arrow, even the most fractional deviation from perfection in the accomplishment of the loose would cause it to flirt. Hence its unsuitability for target shooters and beginners (*C*<sup>1</sup>, 50a; *C*<sup>2</sup>, 81b; *C*<sup>3</sup>, 41b, etc.).

(ii) The *sākin*. Basically, this is the form of loose employed by the modern target archer of the Western world. Although it gives a slightly slower release than the *mukhtalas*, the hold at full draw, if properly executed, makes for a consistent draught and enables the shooter to achieve greater stability and take more careful aim. It therefore offers the advantages of 'greater accuracy, and a steadier flight', and it is understandable why it should be advocated as 'the first method of release to be learned by a novice' (*C*<sup>1</sup>, 50a; *C*<sup>2</sup>, 81b; *C*<sup>3</sup>, 42a, etc.).

(iii) The *mafrūk*. The sense of Ṭaybughā's remark that there were said to be three forms of loose, viz. the *mukhtalas*, the *sākin* and the *mafrūk*, is not entirely clear. The implication could be either that he had heard of, but was not himself familiar with, or did not approve of, a loose termed *mafrūk*, or that that term was applicable not to a form of loose *stricto sensu*, but rather to an extrinsic point of technique whereby a form of loose could, or should, be accomplished. To us the second of these alternatives seems the more plausible interpretation, for while it cannot be denied that instances of *mafrūk* as a term applicable to a form of loose in its own right can be cited (below), there is nothing whatever in our text to suggest otherwise than that Ṭaybughā merely regarded a loose as *mafrūk*, or 'twisted', when accomplished with a *farkah*, or 'twist', in the sense already explained.

#### (b) In Arab Archery and Muṣṭafā Kānī's Telhīs.

For reasons which will soon be apparent the observations of the authors of both these treatises merit consideration (*Arab Archery*, pp. 58-59; Hein, *Isl.*, XV, pp. 70-72; Klopsteg, pp. 99-100).

By the author of *Arab Archery* the forms of loose are classified as *mukhtalas*, *mafrūk*, and *mutamaṭṭī*. Of these, the first—rendered 'sprung' by Faris and Elmer, a translation which we discard in favour of 'snatched'—conforms more or less to Ṭaybughā's definition. The second,

on the other hand, is described as follows: 'The twisted loose consists in drawing the arrow to its full length, pausing for a count of two, *giving the arrow a twist with the right hand from the inside of the string* [our italics], and then releasing the index finger and thumb and relaxing the hands. The twist (*farkah*) consists of pressing lightly upon the string with the base of the index finger and turning the right hand a little until the space between the thumb and index finger adheres to the side of the archer's neck, and, as it were, rubs against it.' As it stands, this passage makes such little technical sense that it makes of *mafrūk* a greater problem than that which it might have been expected to solve. The loose designated *mutamaṭṭī* (*Arab Archery*: 'outstretched') is executed in much the same way as Ṭaybughā's *sākin* except that there is no pause at full draw.

Muṣṭafā Kānī's vocabulary pertaining to the loose is substantially the same as Ṭaybughā's, but the senses in which he uses identical or similar terms are markedly different. That this should be the case is not so surprising as it may seem at first sight if it be recalled that the two authors, the one writing in Arabic in the fourteenth century and the other in Turkish in the nineteenth, are separated by more than four and a half centuries. Over so long a period, which saw the decline of the bow's importance as a weapon of war, semantic changes could well be expected to occur following the shift of emphasis from military to sporting techniques, notably in the sphere of flight shooting so highly developed by the Ottomans. At all events, for the Turk the *ikhṭilās*, or 'snatch'—a term substantially identical with our *mukhtalas*—signifies 'drawing rapidly and loosing without a pause as soon as the right hand has reached the ear' (Klopsteg, p. 99). The accomplishment of a deliberate loose following a slow and placid draw is termed *sākin*, while the *mafrūk* (*mafrūk*) amounts to much the same sort of loose as Ṭaybughā's *mukhtalas*.

Enough has been said to illustrate the dangers of equating the meanings of identical or similar technical terms occurring in the works of different authors separated by time, distance, or language, or all three.

### 4. The 'Backward Punch'

By following our author's advice to accomplish the loose with a 'backward punch' of his right elbow the archer will avoid not only any tendency to creep (above, p. 57), but also the equally undesirable fault known as the 'forward loose', by which is meant forward movement of the drawing hand at the instant of loosing. The forward loose, like creep, with which it may be combined, will result in loss of range and is therefore a serious error. The 'backward punch' will ensure that the shooter's drawing hand will come back off the bowstring without his applying any forward movement to the arrow at the moment of release. The action must, however, be carried out with meticulous care and attention so that not even the slightest increase in draught results. To increase the draught in this way is a fault known in Western terminology as 'snatching'.



## CHAPTER 14

## ON THE FOLLOW-THROUGH (KHATRAH)

[The *khatrah* is a particular kind of follow-through for which there is no satisfactory English equivalent. See *Comment and Glossary*.]

To thrust the bow forward 'with a downward push of the left hand'<sup>11</sup> immediately after the loose is an action which has won the esteem and authority of prominent archers as a principle of fundamental importance (see frontispiece, where the archer, right centre, has just completed this type of follow-through). It has no place in the traditions of the ancients, but carries only the authority of latter-day archers of repute, who tried it, proved it, and formulated the dictum, 'Twist with your right and thrust with your left'. Although we have found no mention of this action by any of the founders of the great schools, experience testifies to its soundness and practical value. We can testify from experience that the movement increases both cast and range in the same way as a rider driving a horse can bear witness to an extra burst of speed when he gives his mount a lash in full career. It is a proven fact, however, that the action must be strongly executed and come from the wrist-joint like the punch of a man in anger. What the archer should do is to dip the bow 'sharply' from the grip<sup>2</sup> in such a way that the moment the string is loosed he would appear to give his arrow a push with the string. 'After the loose' the string may lightly strike the forearm, thus enabling the archer to keep the bow under control and prevent it from dropping right down. 'If, of course, the bow can be checked' without the string's touching anything at all, so much the better. The tone of the string, furthermore, will emit a clearer note 'and thereby demonstrate a skilful archer's superiority'.<sup>3</sup>

Such is the teaching that has come down to us about this kind of follow-through. We have put it to the test and proved its value. Needless to say, however, if the thrust anticipates the loose it will ruin a man's shooting, while, if delayed, it will be pointless. It will certainly conceal his faults and at the same time enhance his appearance, but he should beware of executing the operation with the whole arm as those unskilled in archery do, otherwise he will surely pay for his action; for the use of the whole arm will cause him to catch the shaft, and, if the thrust anticipates the departure of the arrow, 'it will deviate from the course along which it is aimed'.<sup>4</sup> If, on the other hand, the movement is accomplished when the arrow has already left, it will not only, as before, confer no advantage, but it may also, should it bring down the arm, be detrimental to the shooter, especially in combat, for he may well catch the *siyah* against something and break it. Alternatively, the *siyah* may strike him in the side and do him some injury. Add to which that, should an archer use the whole arm from a squatting position, he will strike the ground with the *siyah* and break it, while if he is mounted, he will strike his charger 'or his comrades around him, especially in a crowded field'.<sup>5</sup> Altogether it is a most dreadful fault, so beware of it.

## COMMENT

What an archer does with his bow-hand immediately after the accomplishment of the loose is an integral part of the act of shooting and as important as all his previous actions. He must in

fact follow through, otherwise consistent and accurate performance is unattainable. At full draw a pressure of perhaps 60 lb. or more is exerted by the bow-hand and arm against the grip of the bow. When the string is loosed, some movement must result from muscular reaction following the sudden removal of pressure. In a correctly executed shot the bow-hand should move directly towards the target. This forward movement is slight, but somewhat more complex than our simplified explanation is apt to suggest (for a more detailed exposition of the subject, see *Archery: the Technical Side*, pp. 141-46). In order to assure the movement, many modern archers consciously thrust the bow-hand towards the target and, keeping the hand at the end of the act in the same plane as before it, hold the position for a second or two. This action constitutes the basic follow-through, of which the main characteristic is that the hand remains in line with the target until the arrow is well clear of the bow. Experience shows that if an archer develops the habit of dropping his bow-arm as soon as he has made his shot, he is liable to start letting it fall before the arrow has in fact left the string. If he shoots in this way, the least that can happen to his arrow is that it will fly low.

A brief reference has already been made to the forward movement of the bow-hand (above, p. 41). Its importance was recognized by the authors of Arabic manuals, but the fact is apt to escape the attention of the layman since the subject is not treated under a separate head as in the present case. Generally speaking, it is discussed in conjunction with the movement of the drawing hand away from the target as an integral part of the accomplishment of the loose. What they have to say on the matter is largely suggestive of modern teaching: the hands are to move away from each other (sc. in line with the target), the chest to be widely expanded, and the shoulder-blades drawn together. In *Arab Archery* (pp. 60-61) there would seem to be no doubt that the author is speaking of a follow-through along these lines, though this is not immediately apparent from the English translation, in which, to judge from parallel texts (e.g. *Tabṣīrah*, 74a-b; *Wādīh*, 24a), the technical sense of the key verb would seem to have eluded the translator. The verb to which we refer is that interpreted as 'release' in cases such as 'releasing both hands simultaneously', 'beware of releasing one hand before the other', 'releasing the one and leaving the other unreleased', etc. If we are not mistaken, the verb in fact is used in reference to positive movement of the bow-hand towards the target and of the drawing hand away from it.

The form of follow-through with the bow-hand advocated by Ṭaybughā is the *khatrah*, a term which, in the absence of a suitably simple English equivalent, is more easily explained than translated. As in the case of the kind of follow-through with which the modern target archer is familiar, the bow-arm remains in line with the target and the hand is punched towards the mark. By contrast, however, the wrist is bent and the hand dipped to rotate the upper end of the bow directly forward.

From the technical standpoint the *khatrah* may be criticized on the grounds that tilting of the string is apt to begin before the departure of the arrow. If such a movement is invariable, however, the archer will learn to make allowance for its effects. Furthermore, a positive action does make for consistency and elimination of any variations in the movement of the bow that might otherwise occur.

The *raison d'être* of the *khatrah* would appear to reside in the method of grasping the bow as advocated in Chapter 8 where it is laid down that the little finger should exert the greatest pressure on the handle, or grip, the ring-finger less, and the middle finger least. If these instructions are followed, it will be found that the bow's grip is subjected to forward rotary pressure. Reduced to its simplest terms the explanation is not far to seek. Although the main pressure of the grasp falls on the sides of the handle, some pressure is nevertheless communicated to the back of the bow near the base of the handle, while, at the top end of the latter, pressure is taken by the belly at the point where it rests in the fork of the thumb and index finger (Fig. 26). It is evidently Ṭaybughā's intention to permit the resulting forward rotary pressure to find its logical conclusion in forward rotary movement rather than to try to counter a natural tendency in this direction



by reversal of muscular action, for to arrest the movement in such a way could lead to erratic shooting. The *khayrah*, then, may be considered a logical development within the framework of his whole method of shooting, and, as such, must be commended.

In MSS of the B and C groups the suggestion that the bow may be controlled by the string's lightly catching the forearm is replaced by the recommendation that the downward movement of the bow be arrested by the *siyah*'s lightly striking the base of the armpit (frontispiece). The first method may well have been idiosyncratic and on that account dropped, though whether by Taybughā himself in some revised version or by an editor, it is impossible to say. It is noteworthy, however, that a very similar method is mentioned later in the present work (p. 130).

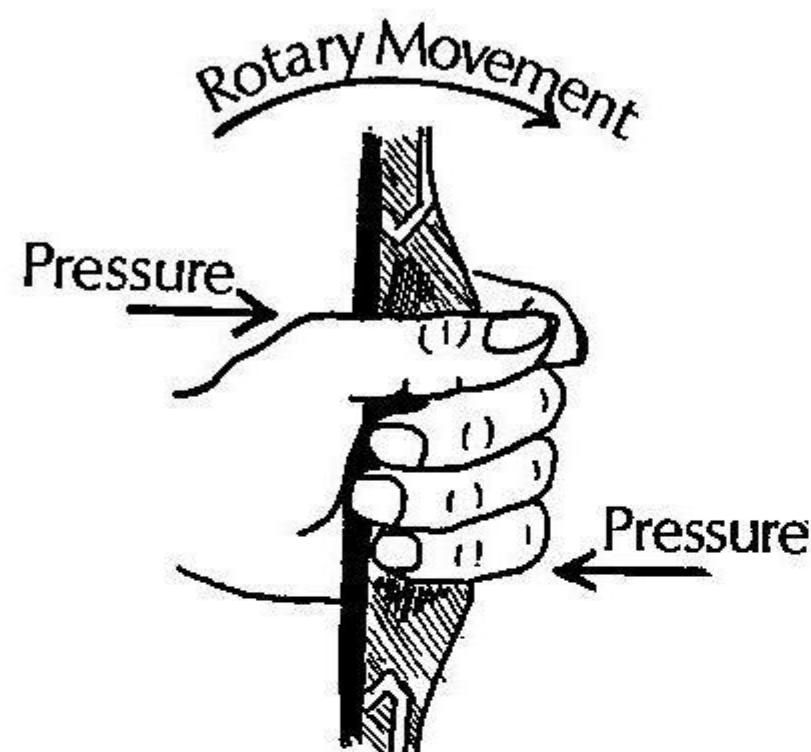


FIG. 26. THE FOLLOW-THROUGH ADVOCATED BY TAYBUGHĀ  
(See also Fig. 46.)

## CHAPTER 15

### ON SHOOTING FROM HORSEBACK

#### i

According to traditional teaching propounded both by Turks well-versed in our subject and by horsemen trained in the art of mounted combat,<sup>1\*</sup> shooting as practised by horse-archers falls into two main classes, namely, that known as 'shooting at a slant' (*ṣiḡhaj*; *qīqaj*; see Glossary) wherein the archer directs his shot downwards, and that known as 'gourd-shooting' (*qabaq*) wherein he shoots up into the sky (below, pp. 77-78). Both classes are fundamentally alike in that each requires the rider first to come to a canter in which he gradually builds up the speed of his mount, next to put it to a gallop, and then after shooting to turn off at the end of the course. The arrow is shot at full gallop, or, in other words, after the horse has attained full stride and is in mid-career. After the arrow has been discharged the horse should continue its gallop 'to the end of the field'.<sup>2</sup>

#### ii

In either type of shooting it is essential first to gain a sound knowledge of equitation, to acquire practice and skill with horses, to ride them in attack and retreat, to learn to control a horse's head with the bridle, and so on, until finally the rider is thoroughly accustomed to such details, and they become a matter of habit to him. All this constitutes a highly important skill which must be acquired by every horseman, particularly the Mameluke trooper. The technique is best learned from masters in the art of lancing, for they have a greater knowledge and experience of these things than anyone else. It is from such mentors that one learns the art of thrusting and parrying with the lance as well as the technique of wielding the mace, sword play, and so on. Those who attain perfection in such matters will have attained perfection in the art and manners of the mounted warrior.<sup>3</sup>

A combination of all these skills has only ever been brought to full perfection in the case of certain Turks in Islam (the Bahri Mamelukes?) and those mounted champions of religion, the Companions of the Prophet.<sup>4</sup> To their innate skill in the art of mounted combat such men added a skill and valour in faith, witness, and religious certitude together with a readiness to sacrifice their lives for the love of God and the sake of His good pleasure as well as love of His Messenger, Muhammad.<sup>5</sup> No nation ever offered them resistance nor was there ever any nation with which they waged war but they buried it, humbled it, or took it by the forelock. With succeeding generations, however, the bonds which had held their predecessors together weakened as a result of disintegration, lack of cohesion, and a paucity of entrants 'for military training of the kind described'. When this happened, they were overtaken by weakness and debility commensurate with the loss of solidarity they had sustained . . .<sup>6</sup>

The horse-archer should control his horse's head with a martingale (*ṣirīṣār*) and fit an 'aid' (*musta'ān*) to hold the reins in place. The martingale is a familiar piece of equipment, the



purpose of which is to control the head of a horse whose neck is poorly bent to the bridle. The need for it arises because a mount of this kind, when pressed by its rider, will put its head down and toss it up and, in consequence, gallop uncollectedly. It is therefore liable either to fall or strike its rider 'in the chest' with its head. This, then, is why a mount whose neck is not properly bent to the bridle must be equipped with a martingale.

Our second item, the aid, is a folded strap fitted to the end of the reins to enable the rider to keep them securely in his right hand. It should be fitted under the knot that fastens the reins together at the top, and a second knot tied in the reins to limit the movement of the horse's head when necessary. This second knot will be quite familiar to cavalymen and equestrians from its use on the polo field. The pommel, which goes in between the reins, should lie below the second knot (i.e. the reins as shortened by the second knot may be slipped over the pommel, which will keep them in place and hold the horse's head).<sup>9</sup>

Because of the harassing discomforts it may cause, the mace should be placed beneath the stirrup-leather to prevent it from shifting about. The mace is familiar enough to require no comment. There are certain horsemen, however, who are ignorant of the techniques of the cavalryman, and, when such a one gallops his horse, his mace shifts about beneath his thigh and works its way out, with the result that it either hampers the rider or drops off. The proper procedure in this case is for the rider to secure the shaft of his mace well in beneath the leather so as to allow it no freedom of movement whatever. Although this is all commonplace so far as the instructed are concerned, it is not so with the majority of people. The point must therefore be mentioned because the purpose of manuals is to instruct the ignorant and to remind the conversant of what they may have forgotten or overlooked.

The aid should be secured to the right hand by means of a 'retainer' (*mahbas*) on the ring-finger. This item is fastened to the aid by a thin thong and serves to attach the aid to the ring-finger to prevent it from slipping from its grasp when shooting. This operation should be carried out after mounting. (See Plate 12.)

In sitting a horse it is of fundamental importance for the rider to sit erect in the middle of its back and then to lean forward slightly as he breaks into a canter (or, according to another version, 'to sit up straight at the canter and then to lean forward slightly as he puts his mount to full gallop').<sup>10</sup> The inclination should be such that it is imperceptible; it is only a slight inclination accompanying a forward rise as the knees are pressed in firmly to grip the horse.

The length of the stirrup is determined by the length of the rider's leg, for horsemen differ in size, and each man has his own particular length. The stirrup must be made to fit the leg and be neither too long nor too short, but, as has been proved by experience, correspond exactly to the length of the leg. What the rider should do is to sit erect in the centre of the saddle, slip his feet from the stirrups, let them hang down, and look at their position. If the bottom edge of the stirrup touches the inner ankle-bone, the heel of the foot being always lower than the stirrup, this will give the correct measurement. If the edge is higher or lower, it should be lengthened or shortened accordingly until it is of the appropriate length. This is an important and well-respected principle which it will be profitable to observe.

To lodge the little toes in the stirrup, they should be pressed against the outer support of the latter, the outer being the opposite of the inner which lies next to the animal. The foot itself should be pressed down in a horizontal position. In other words, no part of the foot, whether toes or heel, should point upwards or downwards. On the contrary, both toes and heel should be on the same level and be held firmly in position—though there is something to be said for having the heel dip slightly from the stirrup towards the ground. The foot should not be brought so close to the horse's flank as to touch it, but rather held a little way away from it. It should not, however, be too far out from the animal's flank, but as close as it may be without actually touching it, except when the mount is given the heel. The knees and calves, on the other hand, should be held well into the animal. When kicking the horse's flank with the spur, the position of the latter

should be a span or less away from the site of the girth. It should be no further away than that, otherwise it is a fault in the eyes of the cavalryman.

## iii

Holding the reins with middle finger and ring-finger, the archer should grasp the bow with the whole hand. In other words, he should set the whole of his palm and his fingers to the handle of his bow and, using only the middle finger and ring-finger of the same hand, hold the reins in the middle until the moment he draws 'so that he can nock'.<sup>11</sup> Once he is at the draw, it makes no difference whether the reins are slipped or not.

When charging, he stands in the stirrups and leans forward ever so slightly, taking care not to lean over too far. It is a half, and not a full, standing position that is required as the rider rises in his stirrups. In precise terms, he should stand in this manner and lean forward slightly over the saddle-bow, bending his waist over a little so as to set his navel on it.

In grasping the arrow it is of fundamental importance for the archer to take it up with the whole of his hand and all fingers as he would a stave. Its nock should be pointing to his rear and its head to his fore, and the shaft held in his grasp at a point two-thirds of its length away from the head. After grasping the arrow in this way he nocks, setting it on the string with the three appropriate fingers in the usual way as described earlier (above, p. 47). When the arrow is nocked, its head should occupy a position between the horse's ears, but above the animal's head without catching it at all.

Kicking the horse into the charge, nocking the arrow, drawing the bow<sup>12</sup> with the arrow in place, and slipping the rein from the left hand should all be carried out after the manner of a single operation. The charger by this time should be in full career, and, as soon as the archer has completed the sequence of operations just described, he should hold himself 'at the draw'<sup>13</sup> as still as some bird that stills its wings in flight and holds them motionless, such as the vulture, eagle, or the like. To put the matter plainly, he should move the bow neither up nor down with his left forearm. The same rule applies to his right arm. In other words, both arms should be kept in the same plane as his horse continues to charge as fast as it possibly can.

A point that should have been made is this: lest the horse flag at the gallop and need to be whipped, the rider should be equipped with a switch that can be secured to the ring-finger of his right hand along with the aid that is holding the reins. This he can then use to whip up his flagging charger before taking up his arrow 'in full career'<sup>14</sup> and executing the subsequent operations as already described.

'To return to the point which we left.' When once he has drawn the bow 'and brought his arrow to full draw'<sup>15</sup> he should hold himself as still as some bird such as a vulture or eagle—for both these birds soar in the air without any movement of the wings—until he reaches the mark. When he draws level with the latter and his left stirrup comes a little in front of it, he should release the arrow and gracefully follow through with the appropriate thrust (*khatrah*) (above, p. 68) as he combines elegant dexterity unmarred by clumsiness with deliberate movement and a clean loose.<sup>16</sup>

## iv

There are many ways of shooting an arrow from horseback. Of these, we deem seventeen to be the right number, but the rule we pass on from our master archers (*ustādīn*) is that there are ten, and because the masters are agreed on these ten we take them to be primary, the rest being secondary, whose number might be increased. (On the problematical question of classification as raised by the account that now follows, see p. 80.)

To begin with, the archer may shoot downwards to the left parallel to his left thigh. This is, as we have already said, what is termed 'shooting at the slant', the same type of shot in an upward



direction being called 'gourd-shooting'. There is a third way of shooting which lies between these two (i.e. shooting horizontally).

If the archer 'charges with the intention of shooting, but<sup>117</sup> does not succeed in making his shot in the manner described, either because he has been too slow in nocking or for any other reason, he should not loose his arrow. If it is merely a matter of his overshooting the mark with his horse, he should continue in his charge, all the while spurring his mount. Having drawn the bow, he should then ease it down without loosing, for archers account a mistimed loose a fault.

The archer may turn his chest to the right and, in so doing, skilfully incline his hand to cant the upper limb of the bow, which is the top half<sup>118</sup> and called the 'shooting limb', above the animal's neck.<sup>119</sup> By adopting the position described he can shoot an arrow that is fully effective against anyone in front of him either at short range or long.<sup>120</sup> It is the horse that imposes the necessity of the procedure indicated, for should the archer shoot without canting the bow, its lower limb will strike the animal.

If he so wishes, the archer may, once the bow is drawn and the arrow at full draw, deftly bring the lower limb of his bow over the horse's back to his right side.<sup>121</sup> Then, after holding at full draw for a moment or so<sup>122</sup> and resting before release, let him shoot by the shoulder of his horse.

By turning his chest to the left with a skilful and gentle twist from the waist, which should be brought round in a relaxed movement that is both graceful and effortless, and then drawing and canting his bow above the horse's croup,<sup>123</sup> the archer can shoot to his rear (i.e. from the left with his bow aslant). Should he wish to shoot to the rear, but in a manner different from that just described, he should point the top of his bow upwards, keeping its leg to the ground and slightly away from the flank of his charger so that he will not strike the animal when he releases the arrow (i.e. from the left with his bow upright).

Both methods which have been described as suitable for shooting to the rear may be used whether the target be high, as in gourd-shooting, or low, as in shooting at the slant. There are

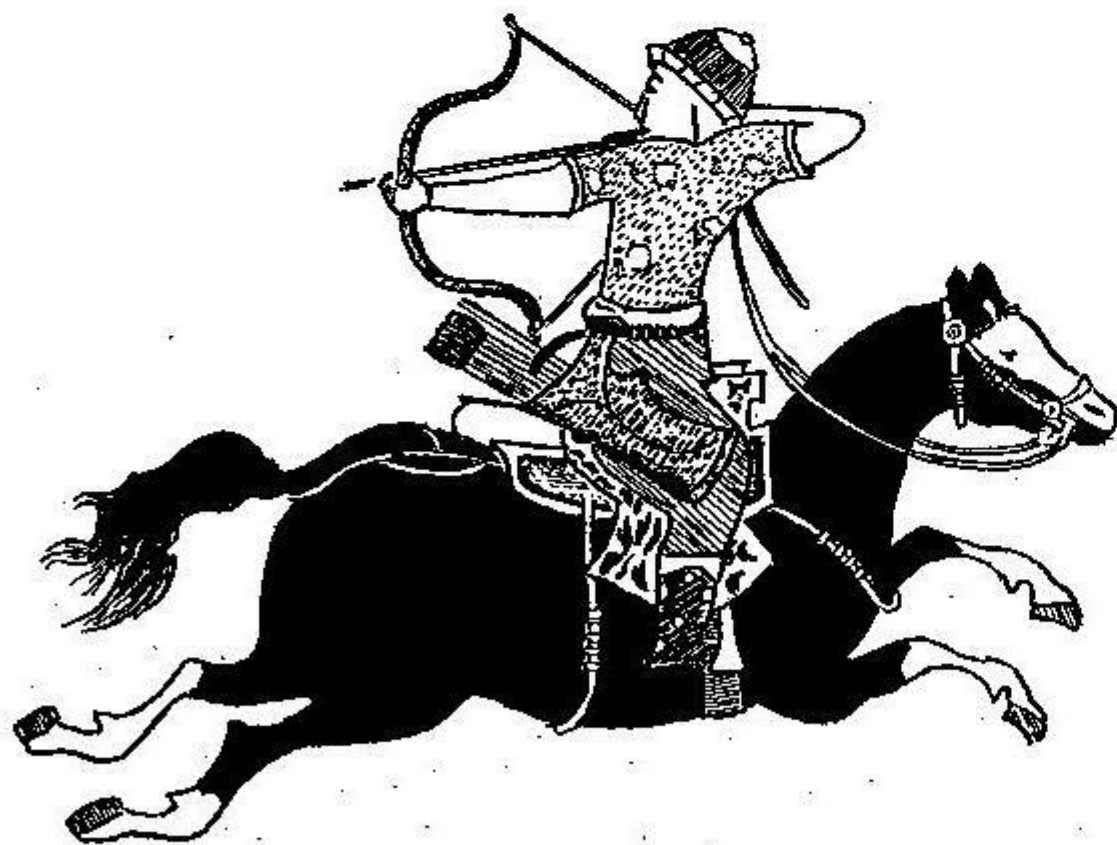


FIG. 27. SHOOTING REARWARDS FROM HORSEBACK

Note reins and switch in right hand.

From a fifteenth-century miniature, Topkapı Sarayı Müzesi, 2163, Istanbul.

then, four kinds of shot: two for shooting at the slant and two for gourd-shooting.<sup>124</sup> There is also the possibility of two other kinds of shot from the right of the horse's croup<sup>125</sup> 'above the right thigh',<sup>126</sup> but to shoot in this way is difficult.

Should the archer prefer another method, he may, after drawing the bow and holding at full draw in the usual way, bring his right hand up over his head and then, tucking the latter in beneath his right forearm so that his hand lodges in the hollow in the nape of his neck, shoot (to his rear) hard by his horse's thigh, either to right or left of it. Should he wish to adopt this technique for shooting forwards, he should, after drawing and holding, carefully bring in his bow-hand over the neck of the horse and shoot downwards in front of the right knee. This type of shooting, which can be used either on the right flank of the horse or the left, is termed *jarmaki* by archers and also admits of four kinds of shot (see end of next paragraph and Plate 14).

If one wishes 'to use this technique in another way'<sup>127</sup> the bow should be turned around so that the string comes into immediate contact with the back of the left forearm outside the body. This should be done before drawing the bow. The archer's next step is to draw from behind him in the manner described after first nocking the arrow. What he does is first to place his left forearm behind the hollow in the nape of the neck between head and neck.<sup>128</sup> Next, he nocks the arrow, locks, draws, and then, using the four kinds of shot already described, shoots from behind from the nape of his neck—the four kinds of shot being two to the fore of the archer and two to his rear.

Finally, the archer may shoot anyone he likes from beneath his horse's neck, on either the right side or the left, provided he is shooting at short range. This brings us to the last of the various methods of shooting from horseback. What the archer should do here is to draw his bow with the arrow and hold. He should then twist his left arm and shoot beneath his horse's neck from one side to the other. This technique imposes upon him the necessity of discarding his horse's<sup>129</sup> martingale and leaning over somewhat at an angle. 'This requires long practice.'<sup>130</sup>

With these two methods of shooting the number of the ten basic ways in which an arrow may be shot from horseback is complete. There is, however, no restriction upon the limit to which the forms of shooting may go, for they are governed only by men's aspirations, by their skill in the techniques of mounted combat, by the extent of their intelligence and acumen, and by their manual dexterity. Each archer, therefore, may add to his repertoire as he wishes.

After discharging the arrow at the target in any of the aforementioned ways, the bow should be cast down from the fist on to the left forearm or upper arm. The string should be on the outside, that is to say, towards the archer's back. The left arm should be inside between the bow and the string. The bow will then be suspended on the archer's forearm and his hand left free to take up the reins again.

All the various forms of mounted archery which have been mentioned should be executed at the charge, with the horse all the while at full gallop. There should be no slackening of pace, even after the loose, until the horse reaches the end of the field. 'To put it plainly, the rider should continue to press his mount after casting his bow on to his forearm.'<sup>131</sup> The horse should finally swerve off to the left at the end of the field.

v

As regards procedure and rules there is no difference between gourd-shooting and shooting at the slant, for it has already been explained that the two are essentially the same, the only real difference being that in the one the direction is downward, whereas in the other it is upward. In gourd shooting the best way to shoot is for the archer to look upwards over his mount's croup when he is just beyond the mast (*khashabah*).<sup>132</sup> His best policy is to follow the arrow with his gaze until it has passed beyond (*sic*) the mark. To follow the arrow to its target applies to both types of shooting 'and indeed to all types of archery'.<sup>133</sup>



A point to be stressed here is that when archers meet for the purpose of engaging in either of the two exercises and one of them begins to charge and start shooting, a second party should not come in behind until he is a good distance away from him so that, should the first by any chance fall, he, the second, will be able to turn his horse away to avoid coming down on top of him. Another point to remember is that the archer should not retrieve his arrow until all the shooting is over.

The field should have an even surface and, for the horse, be in fit condition underfoot. If one side of the field is higher than the other, the charge must follow the ascent. Furthermore, a crosswind blowing from one side of the field to the other is what is required. If, however, there is a direct wind, then it should be behind the archer as he makes his charge.

In gourd-shooting the archer should beware of his horse's bumping into the mast and for this reason keep a man's arm-span between his horse and the mast. The closer the archer is to the mast, the better and more skilful his shooting must be. Great caution must, however, be exercised in this respect because when the archer is engaged in shooting and slips his horse's reins, his mount is liable to swerve towards the mast and collide with it with fatal results to both horse and rider. I personally have seen with my own eyes a skilful archer belonging to the company of His Excellency, the late Azdamur (Özdemir) the Treasurer, Viceroy of Tripoli,<sup>34</sup> whose Amir of the Hunt<sup>35</sup> he was, experience such a mishap on a public holiday in the city of Tripoli in Syria. He shot at the gourd and was proclaimed by the onlookers. Then, even as he was shooting and priding himself on the crowd's applause, he took his mind off his horse, and it collided with the mast. As a result of the accident he died that same day as also did his horse.<sup>36</sup>

Everyone, therefore, who practises archery on horseback should see to it that he does not shoot from an untried horse. Indeed, his very first steps should be to try out his horse without engaging in archery. He should introduce it to the 'gourd' and the 'slant' while riding at walking pace without at any time putting it to the charge and do this several times, so that it may get to know both kinds of shooting and not take fright and shy when confronted with them. At the next stage he should put his horse to the charge as he would in actual shooting without, however, at this juncture, actually shooting. 'The purpose of this is to accustom his horse to continue its gallop after the reins have been dropped from the hand.'<sup>37</sup> When he finds that his horse can make a good entry and approach, displaying no faults and being sure-footed, he may thereafter shoot at his pleasure.

Should an archer wish to avoid the risk of bumping into the mast, he should stretch a rope across the field between two masts and attach the gourd to the middle of the rope. He can then charge, pursuing a completely unobstructed course under the gourd. It is a much better policy to erect two such masts rather than one, especially for novices, so as to protect them from this great hazard.

If horse-archers happen to be out in the open country and wish to practise gourd-shooting, but can obtain neither masts nor rope with which to erect the target, a circle should be marked on a stretch of flat terrain<sup>38</sup> with a diameter of about 10 arm-spans (22 yards). They can then charge and, upon reaching the centre (i.e. area) of the circle, shoot up into the sky. Any arrow that comes down again in the centre of the circle can be considered accurately shot, for this circle will be the equivalent of a gourd or the same as a target. 'Indeed this practice calls for more precise shooting and is far less dangerous than the true method.'<sup>39</sup> I have heard it said that any archer who, upon shooting, bends his arms behind him a little will rarely miss the circle. You may also fix up a hoop on a spear like the *birjās* (see Comment) and shoot at that.

The field should be divided into three sections and the mark placed at the end of the second. To achieve success and a proficient performance, the archer should begin by cantering over the

first third of the field and then give the horse its head as he prepares to perform in the manner already described (or, another version: 'So that he can nock<sup>40</sup> and perform proficiently, the archer should canter from the start over the first third of the field, charge over the second, shoot at the target, and finally continue his charge to the end of the third.'<sup>41</sup>). The shorter the range to be traversed by the archer, the more skilful his shooting must be. The longer the field, the easier it will be for the novice. They say that the maximum length of a field should be a distance of 130<sup>42</sup> arm-spans (about 284 yards) and the minimum 60 (about 131 yards).

For best results in shooting at the slant the archer should swing around to his rear and shoot at the mark by the animal's left thigh. In this class of shooting, furthermore, he should override the mast by one arm-span and then shoot in the turning position.

For shooting at the slant he should also use an arrow with a slim head, such as the butt head (*amāṭiyyah*), and not a *yāsij* arrow (broadhead?), for the latter may sever the arrows of his colleagues (already in the target) and even do his colleagues themselves some harm. The best arrow for gourd shooting is the 'small, light' cylinder type.

## COMMENT

The foregoing chapter may well be considered the most important part of our book, for although there is no lack of eye-witness accounts of the oriental horse-archer's skill and proficiency, we know of no record of his techniques that is as detailed and instructive as that of Taybughā.

In MSS of the CD groups the chapter is prefaced with some brief but informative observations on mounted archery (C<sup>1</sup>, 77b-78a; C<sup>2</sup>, 121b-123a; and D<sup>1</sup>, 52b-53a; D<sup>2</sup>, 76a-b, respectively C and D, in which the accounts are similar but not identical). Not surprisingly, the Turks and Turkmens (C), or the Turkmens and Mongols (D) are named as the principal exponents from whom the horse-archers of the Middle East acquired their skills.

### 1. *Qabaq* and *Qighaj*

(a) *Qabaq*. From the discussion in Appendix 6 it will be seen that this word denotes (i) a gourd proper; (ii) a gourd transformed into a pigeon-container and used as a target for horse-archers; (iii) an artificial gourd fashioned out of a precious metal and serving the same purpose as the preceding; (iv) a mast surmounted by any of the preceding; (v) in conjunction with the word 'shooting', shooting from horseback (or otherwise?) at an elevated target.

In our text it is natural to assume that for everyday purposes the mark was an ordinary gourd. It cannot, however, be taken for granted that the latter sufficed for ceremonial occasions, for we know from more than one source that it was a practice of Mameluke rulers to transform gourds into containers for pigeons or doves. At festivals and on high days and holidays horse-archers would vie with one another to prove their marksmanship by freeing the birds from their mast-top prisons (D). If the 'gourd' was of gold or silver, the successful competitor would be awarded his target together with a robe of honour (Appendix 6).

Something of the history of this exercise in Mameluke times has been outlined by D. Ayalon (below, p. 78.) According to this scholar, the sport enjoyed great popularity during the first Mameluke period (A.D. 1250-1382) and was in its heyday in the sultanates of Baybars I, Qalāūn and al-Ashraf Khalīl, i.e. from 1260 to 1295. It was often performed on a grand scale with much pomp and ceremonial at the births and circumcisions of the sons of the sultans or grand amirs. In the Circassian period (1382-1517), on the other hand, its popularity appears to have waned, and references to it in contemporary sources are scarce.

Although there is every reason to suppose that the exercise was introduced to the Middle



East from Central Asia where it was practised by the Turkmens (C, D), its origins cannot be traced from written sources. We, for our part, venture the hypothesis that it arose from the need to hunt birds from horseback. Birds of the right size and kind would be required not only for food, but also for feathers with which to make and repair arrows, and we may well believe the Chinese poet's assertion that 'Tartar chieftains shoot so well that the birds are afraid to fly' (*Chinese Poems*, tr. A. Waley, p. 128). If acceptable, the hypothesis may be pressed a stage further with the suggestion that a pole surmounted by a suitable target, perhaps a bundle of rags, would be erected near a nomad encampment so that boys might be taught the fundamentals of the art, and others afforded a valuable means of practice and amusement. Proficiency in archery can be achieved only by constant practice, and some kind of facility, however crude, must surely have been devised from the earliest times.

From a purely military angle the main purpose of 'gourd' shooting must have lain in its usefulness as a means of developing the skill and agility of the horse-archer. Some impression of the dexterity attainable may be formed from a text to which Ayalon draws attention (*Scripta*, pp. 55-56). In 1293, so we are told, Amir Badr ad-Din al-Baysari devised a saddle with a very low back (that of the normal saddle would be raised; cf. Plate 14) which he used for the gourd-shooting event at one of the big festivals of the year. When he drew level with the mast and then, contrary to normal practice, passed it without having made his shot, it was thought he had lost his opportunity to shoot, but suddenly he leaned right back with his head on the horse's rump and, shooting from a supine position, hit and broke the gourd.

The purpose of the sport is explained by Busbecq in the following terms:

'They [Turks of the sixteenth century] have a Custom derived from the Parthians, that they counterfeit flying away on Horseback and presently turn back and kill their unwary Pursuers. The way they learn to do it, is this: They erect an High Pole, almost in plain Ground, with a Brass globe atop of it; about this they spur their Horses, and having got a little beyond, the Horse still Galloping, they presently turn about, and flying along, shoot an Arrow into that Globe. The frequent use hereof makes them to expect, that their Bow being turned in their flight, their unwary Enemy is shot through.' (*Embassy into Turkey*, London, 1694, pp. 210-11.)

In Persia the Maydān-i Shāh in Isfahan seems to have been an important centre for this kind of sport, for we have more than one account of the dexterity of the archers there. A French Huguenot traveller of the seventeenth century writes:

'In the midst of the piazza stands a kind of May-Pole, or Mast of a Ship, where the People exercise Shooting at Birds. When the King comes to shoot, they set a Cup of Gold upon the top of the Mast, which he is to strike down with an Arrow. To which purpose he must ride full speed, nor is he permitted to shoot till he has past the May-Pole, turning himself upon the crupper of his Horse . . . The Cup belongs to him that strikes it down; and I have seen *Sha-Sefi* . . . in five Courses strike down three Cups . . .' (Quoted by E. Crawshaw Williams, *Across Persia*, London, 1907, pp. 281-82. For a similar account, see Sir John Chardin's *Travels*, II, p. 200.)

With variations in the nature of the target (melon, arpus, apple, trencher filled with small silver coin, criminals under death sentence, heads of rebels, etc.) the game is frequently mentioned by European travellers. The height of the mast probably varied, but it is given by one writer as 'some twenty-five feet'. (F. B. Bradley-Birt, *Through Persia from the Gulf to the Caspian*, London, 1909, pp. 266-67.)

(b) *Qighaj*. In the present context this term (see Appendix 6) may denote: (i) an exercise in which an archer, shooting parallel with his left thigh, directs his shot at a ground target; (ii) any kind of shooting from horseback in which the target is so situated as to require the archer to shoot downwards; (iii) the target at which either of the preceding is directed.

Nothing is said in our text about the nature of the mark, but the view that it may have been a butt made of a wicker basket filled with sand (below, p. 173) is not unreasonable. The possibility that the term *qighaj* denoted other targets of a similar kind should not, however, be excluded. Hansard—without an accurate reference—quotes an eye-witness account of a display outside Cairo in the sixteenth (?) century which records that 'on one side were three artificial hillocks of sand, about fifty paces distant one from the other, and on the summit of each stood a spear and a banner, being marks destined for the archers' (*Book of Archery*, pp. 34-36). Busbecq describes an ordinary Turkish butt as being a bank of sandy, gravelly earth, four feet from the ground and formed with boards (op. cit., p. 206). (See also Plate 10.)

Although Taybughā makes no direct reference to the range at which the target was engaged in the *qighaj* exercise (sense (i) above), an archer shooting parallel with his left thigh and half standing in his stirrups with a slight forward lean would, we suggest, have had his mark almost directly beneath his left knee at the moment of loosing. The practical value of this form of shooting is obvious, and it is almost otiose to point out its direct relevance to hunting and warfare. From a military standpoint the ability to engage an awkwardly situated ground target would be an essential qualification in a horse-archer. It is easy to envisage a situation, for instance, in which the mounted warrior in the heat of battle suddenly comes at full tilt upon an enemy, perhaps just unhorsed and either lying on the ground or in the act of rising almost beneath the hooves of the onrushing horse. With a loaded bow and no time to switch to sword or mace the man on horseback could only dispatch his foe with a quick shot at an awkward angle. The essential purpose of *qighaj* shooting, therefore, would certainly be to train archers to kill under every possible condition in combat.

Between the two forms of shooting, *qighaj* and *qabaq*, there was, so Taybughā tells us, a third, by which, assuming that the first two are directed almost vertically downward and upward, he must mean shooting in a horizontal, or nearly horizontal, plane. The classification is not a pedantic superfluity, for, whereas considerable contortion is needed to be able to shoot either almost directly downwards or upwards, the body is tolerably erect when the shooting is horizontal. If an archer could shoot accurately both upwards and downwards, any shot that was roughly horizontal would have seemed relatively simple.

## 2. Reins and Accoutrements

(a) *Sirifsār*, 'martingale'. The word is undoubtedly a borrowing from the Persian *sar-afsār*, which is nebulously explained in Persian dictionaries as a kind of headstall, or as the head of the reins, meaning that part which is taken into the hands, and so on (e.g. *Farhang-i Nafisi* and Steingass, s.v.). In our text we have an unambiguous definition. On the other hand, we are not told exactly what kind of martingale was used for the purpose in question. Under certain conditions in which a horse might stumble, a running martingale will allow the animal to lift its head sufficiently to recover its balance, whereas a standing martingale could be a serious impediment. The need for a martingale was evidently considered by some to be a particularly bad fault in a horse-archer's mount (C<sup>1</sup>, 78b; C<sup>2</sup>, 124a).

After examining a large number of miniature paintings we have found only one certain depiction of a martingale for the fourteenth century (A. Sakisian, *La miniature persane*, Paris, 1929, Fig. 31, p. xxii, École Mongole, commencement du xiv<sup>e</sup> siècle). This, like those dating from about the sixteenth century, presents the appearance of a standing martingale.

(b) *Musta'an*, 'aid'. This is a technical term which, in the sense it has in our text, is not recorded in any Arabic dictionary known to us. The translation we adopt is based on a literal rendering, viz. 'that to which recourse is had for help'. According to one definition, the aid was a fine leather strap which was about two spans long—presumably when folded, though it is by no means certain that it was always a loop as indicated in our text. It was used by some archers, but not



others, according to personal preference (C<sup>1</sup>, 79a; C<sup>2</sup>, 124a-b). Leather, it would seem, was not an essential material; cord would do equally well (B, *et al.*).

(c) *Mahbas*, 'retainer'. According to our text this item was worn on the ring-finger to enable the archer to retain his reins while shooting. It is, perhaps, not commonly realized that control of a horse is virtually lost when the reins are dropped. It has been modern cavalry practice to train the horse to follow a straight course under these circumstances, and there would seem to be every reason to suppose that mounted warriors in past ages would adopt the same policy. To regain control the archer must recover his reins as rapidly as possible.

While it is clear from our various MSS that the 'retainer' was a ring of some kind, there are differences of detail in the definitions given. According to one explanation, it was both (i) a ring tied into the reins beneath the rein-knot, presumably to accommodate the aid, and (ii) a ring used for the purpose described in our text (C<sup>1</sup>, 79b; C<sup>2</sup>, 125b; cf. D<sup>1</sup>, 54b; D<sup>2</sup>, 77b). Elsewhere it is defined as a ring designed to slip over the top end of the loop formed by the aid to make a smaller loop which would accommodate the ring-finger (a, 51a).

### 3. Forms of Shooting from Horseback

From the text, as it stands, it is not easy to discern which are the ten forms of shooting from horseback declared to be basic, or to conjecture with any hope of certainty which are the seventeen of our author. The matter is further complicated by the fact that in the MSS of groups C and D (below) they are said to be fifteen. The problem is to decide what criteria are applicable. Is a form basic because of the direction in which a shot can be made? In other words, is it basic because it is vital to the attainment of the maximum field within which the archer can effectively operate? Or is it basic because of technique and posture? Or, finally, is it basic by reason of a combination of all such factors.

While it is not intended to embark upon an unprofitable enumeration of classifications that may be developed on the foundations implied by our questions, it is at the same time appropriate to point out that direction does not always demand a fundamental change in posture. In certain situations the archer's posture may remain virtually unchanged even though the directions in which he is shooting may be different, while in others he will be obliged to make a fundamental postural change. To shoot directly upwards, for instance, entails contortion of the body which must be brought well over to the right; otherwise the muscles of the back and shoulders cannot be brought into play, and a bow of sufficient power cannot be used. To draw a strong bow, it is essential that the two shoulders be roughly in line with the target, and an archer could obviously not shoot the gourd while sitting upright in his saddle by merely raising the bow-hand above his head. On the other hand, to shoot downwards at long range would not require a posture fundamentally different from that used for shooting in a roughly horizontal plane.

To those for whom esoteric interpretations have no appeal one solution that may commend itself is as follows:

1. To left flank, forward and downward parallel with thigh (*qighaj*).
2. To left flank, forward and upward (*qabag*).
3. In horizontal plane (target roughly level with left shoulder).
4. Ahead with bow, upper limb to right, canted above horse's neck.
5. To right flank, forward and downward.
6. To left flank rear, upward or downward, with bow canted over horse's croup.
7. To left flank rear, upward or downward, with bow vertical.
8. *Jarmaki* of two kinds, each with four shots.
9. Beneath horse's neck from right to left.
10. Beneath horse's neck from left to right.

Shots 6 and 7 executed on the right-hand side may reasonably be discounted either as variations or as forms of shooting too difficult to be considered basic. Unless the shooter was ambidextrous—and nowhere is there any suggestion that horse-archers were trained to be so—such shots would certainly be most difficult. For possible alternatives to 8, 9, and 10, see J. D. Latham, 'Notes on Mamlūk Horse-archers', in *BSOAS* XXXII, 1969, pp. 265-66.

For the sake of comparison, which will afford the reader an opportunity of evaluating additional or discrepant details contained in them (italicized below), we have thought it worth while to précis in the following composite account the versions contained in groups C and D (C<sup>1</sup>, 83b-86b; C<sup>2</sup>, 131b-136b; D<sup>1</sup>, 58a-60b; D<sup>2</sup>, 79b-81b; portions occurring in D, but not in C, are indicated in parentheses):

The ways in which an arrow may be shot amount to fifteen and have to do more particularly with shooting at a ground target (*qighaj*). An archer may shoot downwards parallel with his

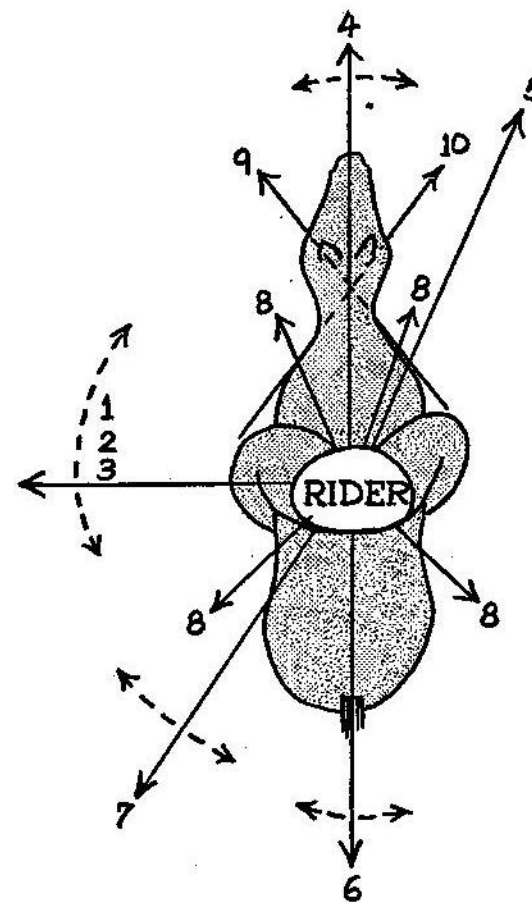


FIG. 28. SHOOTING FROM HORSEBACK  
Schematic operational field viewed from above.



left thigh—this is *qighaj*—or upwards, which kind of shooting is called *qabaq* . . . The rider may turn his chest to the right, canting the upper limb of his bow across the horse's neck with the arrowhead above its right ear. The bow may also be canted with the lower limb across the horse's neck, and this will also make three (shots? Up, down, horizontal?). Thus, the archer will be able to strike a mortal blow against an enemy in front of him either at short range or long. For this kind of shooting he would do well to have not less than 10 cubits (about 6 yards) between himself and his target.

To shoot right in front of his horse, he should first draw and hold and, tilting the lower limb of his bow across the animal's neck, transfer it to his right side. To do this, he should bring up the lower part of his right thigh on to the saddle and turn his left until the front of it comes against the saddle as it presses against the stirrup next to the horse's belly. (D: Some shoot at the mark as soon as the horse's head draws level with it.)

To shoot at a target to his rear, the archer should easily and without straining or forcing turn to the left from his waist and draw his bow at an angle across his horse's croup. He may also shoot with the bow in a vertical position. Both methods can be used to shoot upwards or downwards and at short or long range. (D: The shot is made when the croup is in line with the mark.) This gives four kinds of rear shot, and two more at the horizontal will bring the number up to six. Then there are two more on the right side, one immediately over the right thigh and the other to the left of it, but to shoot in this way is difficult. [We emend here, reading 'asir' difficult for 'asir' ten, with which the subject matter has undoubtedly been made to accord.]

For another kind of shot to the rear the archer, after drawing and holding, may bring his right hand up over his head, tuck his head in beneath his right wrist so that his hand rests in the nape of his neck. This technique will enable him to engage a target close by the right or left thigh of his mount. By bringing round his bow-hand once his right hand is anchored in the nape of his neck, he can shoot forward and downward to either side; for by bringing his bow round over his horse's neck he can shoot down in front of his right knee. This form of shooting is called *jarmaki*. The technique can be varied by holding the bow, as yet undrawn, with the string on the outside of the left forearm. Bringing the grip of his bow to the nape, the archer can then nock and lock on his right shoulder. He can nock while his left hand grips the reins, raise both arms, tuck in his head under the right forearm, draw, and shoot in the four ways already described, i.e. two to fore and two to rear.

Finally, the archer can shoot to left or right under the horse's neck. These two methods complete the fifteen. Here the archer draws and holds, then bends his left arm to shoot under the neck from one side to the other. This kind of shot requires him to discard the martingale and lean over slightly. It needs a good deal of practice. This completes the basic ways of shooting; secondary ways are legion.

As in the case of our own text we are confronted with the problem of deciding which forms of shooting are considered basic and, again, it is a matter of conjecture. Under these circumstances it is best to leave the question open.

#### 4. *Jarmaki* (?): the Term and the Technique

Almost all MSS give this term as *jarmaki*, *jarmuki* or the like, which immediately suggests a relative adjective derived from *Çermük* or *Çermük* in the province of Diyarbakir in modern Turkey, but we tentatively propose that the word be regarded as the Arabic adjectival form of the Turkish adjective *çarpık* (>*jarbak*>*jarmak*) 'awry', i.e. deviating from the line of sight. Such a term makes excellent sense, for, by anchoring the drawing hand in the nape of the neck, the line of the arrow is displaced, albeit deliberately, to the left of the line of sight in order to

shoot at a target unattainable by means of the normal draw to the chin or side of the face.

Practical trials show that a modern Western archer not trained in this method of shooting from boyhood will not find it easy. If the bow is drawn in the normal way with the string inside the arm, the weapon has to be tilted to enable a full draw to be achieved. With the string outside it is difficult to avoid hitting the elbow on loosing. How any accuracy can be achieved is another problem. Basically, an archer draws to the face so that he can orientate his shot by looking along the arrow. As the *jarmaki* technique results in a relatively large lateral displacement of the arrow from the line of sight, shooting by this method must be purely instinctive, and skilful application can, it is clear, only be achieved by considerable practice and experience.

The advantage of the technique is that it increases the lateral angle over which a horse-archer can engage a target. By way of example, let us suppose that an enemy appears about 20° to the right of the direction in which the archer is riding, and, for some reason, he cannot, or does not wish to, turn to the right to engage. By rising slightly in his stirrups, putting his weight on the left foot, and twisting his body to the right so as to bring his right thigh over the top of the saddle, he can shoot in the normal manner, drawing to the face. When he reaches the limit to which he can turn his body in this way, but still needs to extend the arc over which he can shoot because his target lies to the right of that limit, he can do so by drawing behind the neck as described and artificially deflecting the line of his arrow to the right. Apart from enabling a horseman to engage targets over a wider arc, the *jarmaki* technique is of definite merit for shooting at very close range when the rider is almost immediately above his target. Similarly it could be applied by an archer standing at the top of a fortress and shooting at an enemy at the base of the wall (below, p. 137).

Some brief mention is made of this form of shooting by de Bertier, Cordier, and Guglielmini in *Le tir à l'arc* (Paris, 1900), pp. 9–10, where it is stated, contrary to the information supplied by Taybughā, that the string must of necessity lie outside the left arm. Attention is drawn to the support afforded the drawing hand by the neck which allows the use of a very powerful bow, and the view is taken by the authors that the horseman's position favours this kind of shooting which is the only easy way of engaging a target to the rear. What is most interesting from our point of view is the statement on the authority of a contemporary traveller that the technique was still used in Turkestan where he had several times seen it applied by riders of his escort. The informant had observed that the horsemen of Turkestan showed great skill in using either hand to shoot a bow in this way.

A point worth mentioning here, not because it is in any way connected with the *jarmaki* technique, but because it calls for comment too brief for separate treatment, is the difficulty of shooting under a horse's neck. How the bow could fail to strike the horse when the arrow was loosed is almost beyond our comprehension.

#### 5. *Birjās*

'The *birdjās* game', writes Ayalon, 'is often referred to [in Mameluke historical sources], but without any particulars whatsoever' (op. cit., p. 56). Vocalized as *birjās*, *burjās*, or *barjās*, the term is variously defined by almost all the lexicographers as (a) 'a game, similar to that called *jariḍ*, in which mounted players combated or pursued each other throwing sticks' (Dozy, s.v.); (b) 'a butt to shoot at, especially elevated high in the air' (Steingass, s.v.); (c) 'a mark to shoot at' (Redhouse s.v.). In our text the term denotes something resembling a hoop on a spear. That it was such is undoubtedly true, for some account of an exercise called the '*birjās* charge' is to be found in a sixteenth-century Paris MS in which the point is confirmed (Bibliothèque Nationale, Arabe 2,826: *Kitāb al-makhzūn jāmi' al-funūn*, 104a–b). In this the cavalryman, having set a hoop by means of a wooden truck on top of a short lance, charges and, engaging the target on his left, aims to snatch up the hoop with the end of his full-length 'candle-form' lance. How the term



comes to denote 'a mark to shoot at' in Persian and Turkish can easily be understood both from our text and from other references to archers' shooting through rings used in lance exercises (e.g. Hansard, *Book of Archery*, p. 121). The definition recorded by Blachère (*Dict.*, s.v.) is, therefore, correct.

## CHAPTER 16

### ON SHOOTING THE STIRRUP CROSSBOW FROM HORSEBACK<sup>1</sup>

To shoot this weapon, the mounted archer should equip himself with a broad strap after the style of the familiar Frankish drawing-strap (*jabbādh*; Fig. 29). The drawing-claw (*khattāf*) should have two hooks. What the archer does is to slip the drawing-strap over his left shoulder like a strap of the kind used by porters for heaving massive loads (*hamīlat al-haykal*), placing the claw below his right armpit 'close to the nipple'.<sup>2</sup> When he wishes to shoot, he takes the reins in his left hand and the bow in his right and sets the string in the hooks, keeping the stock right in



FIG. 29. CROSSBOWMAN WITH A CLAW FOR BENDING HIS CROSSBOW  
ATTACHED TO HIS BELT (DRAWING-STRAP)  
(From Payne-Gallwey, *Crossbow*, Fig. 33.)



between them.<sup>13</sup> He then bends forward in a stooping position until the front half of his right foot is in the stirrup with which his weapon is equipped. The archer now stands in his stirrups, as he draws the string at its centre point until it catches in the stock-nut (*jawzah*) and he can then settle it firmly with his right hands. This done, he bends over forward, removes his foot from the bow,<sup>14</sup> and, lifting the crossbow off the hook, transfers it to his left hand and holds it along with his reins.<sup>15</sup> He nocks his bolts (*nabl*) with the right hand and shoots in the usual way to destroy the enemy.

†Finding that the long, heavy bow that is made for men with a powerful pull of 100 *raṭls* Syrian weight (?; see p. 88) was a highly effective weapon in the field, I made a stock for it, such as the stirrup crossbow has, and then for the stock I designed a sturdy nut, which has proved to be one of the best there is. One of its great advantages is that its action is automatic in that, once the string is drawn right up to it, it catches it without the intervention of any manual operation whatsoever. Another of its merits is that the string never leaves the surface of the stock, and one is thus safeguarded against all mishaps likely to befall the user of the usual stirrup crossbow. The archer does not have to adjust the nut immediately after each shot as he must with the normal weapon of this kind. On the contrary, he doesn't touch it with his hand at all. I also fitted a long clip (*khurṭūm*, literally, 'proboscis') of horn over the nut to prevent the bolts from falling out during shooting. (Cf. Fig. 30.)

This weapon has proved to be one of the most useful of all arms available to warriors in the service of God and the most effective against the enemy. It is, furthermore, a weapon so simple that even a slightly-built archer can, without any discomfort, shoot a bow with a draw-weight close on one *qinṭār* (100 *raṭls*), Syrian weight<sup>16</sup> (?; see p. 88), or even more. It is also an easier weapon for the learner than either the hand bow or the ordinary stirrup crossbow.† As a weapon, its strength and effectiveness are facts which common sense cannot refute because it does the work of the normal bow of its type<sup>17</sup> but has greater power. Furthermore, it can be used after only a few days' practice. It would take too long to elaborate upon its superiority and advantages. Let us then be content with the little that has already been said, which is quite enough for anyone of any wit and common sense.

### COMMENT

The foregoing chapter is problematical. Quite apart from its complete absence from A<sup>2</sup> and the different positions it occupies in the subject sequence of other MSS (n. 1 to Ch. 16, p. 203), there are several respects in which the text of the corresponding section in these other MSS differs from ours both in form and substance. For the sake of example we now compare that portion of our version which is marked with daggers with the corresponding portion in B<sup>1</sup>.

'I had observed this kind of bow for some time and seen the Arab bows with two nocks in their necks that had been designed for this purpose, noting their devastating effectiveness in the field. The usual types of nut, however, were not as satisfactory as one might wish. I therefore racked my brains and finally God, of His goodness and bounty, inspired me with the idea of a new kind of nut, one of the merits of which is that when the bow is drawn and the string makes contact with the nut, it catches the string automatically without any manual intervention on the part of the archer. There is no need, then, for him to adjust the nut immediately after each shot as is usually the case. Another of its merits is that the string will not leave the body of the stock when drawn up to the nut as happens with all other crossbows. I next fitted a long clip of horn over the nut to prevent the bolts from falling out, thus enabling the archer to shoot in any direction he likes. The nut in question is of the usual kind, the only

† NOTE. On the passage marked by daggers, see Comment.

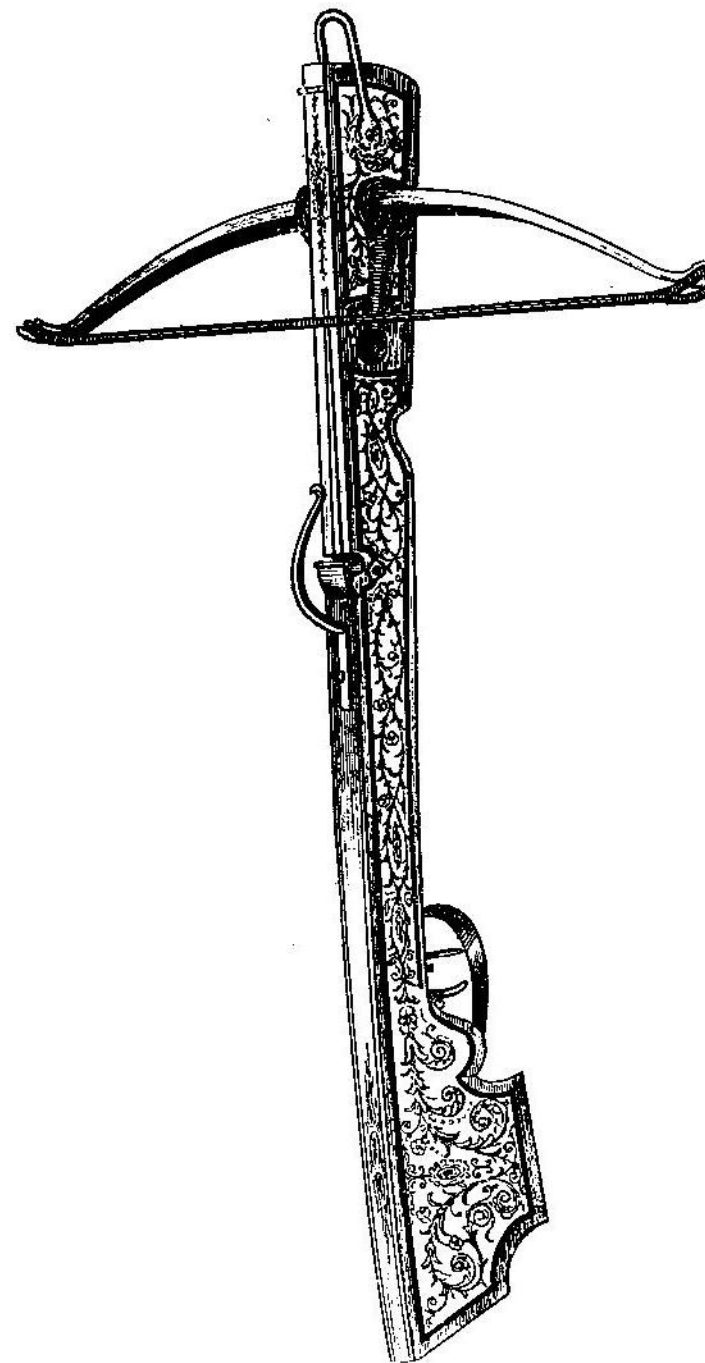


FIG. 30. SMALL TARGET AND SPORTING CROSSBOW WITH RETAINING-CLIP  
German, end of seventeenth century.  
(From Payne-Gallwey, *Crossbow*, Fig. 105.)



difference being that when the string is released, it regains the same position as before the loose. Next, to replace the crossbow stirrup, I designed a somewhat lighter hook which the archer can slip into his stirrup proper . . . This weapon, which is a simple affair, is easier for the beginner to handle than the hand bow, and he can shoot long bolts with it.'

Two points are particularly noteworthy. In the first place, it is only in A<sup>1</sup> and *a* that the crossbow fitted with a stirrup is termed *jarkh*. In all MSS of the B group it is merely termed *qaws ar-rijl*, 'crossbow'. Which term is correct it is difficult to say without exhaustive investigation of the problem. We shall for the present confine ourselves to pointing out that Marḏī, writing two centuries earlier, clearly distinguishes between the *jarkh* and *qaws ar-rikāb*, stirrup crossbow (BEO, XII, p. 132).

The second point, which poses a much greater problem, concerns the weight of the bow under discussion. In none of the B group MSS is there any mention of 100 *raṭls* or, indeed, any weight at all. The omission is technically significant, for it is beyond the physical capacity of an archer to draw a hand bow weighing 407 lb., the avoirdupois equivalent of 100 Syrian *raṭls* of the period in question. Even when modified in the manner described, the weapon would almost certainly have been far too heavy for drawing with anything as simple as the belt-and-claw, though it could have been drawn with relative ease by certain forms of mechanism. Since our author is not given to inaccuracies of the order involved in this instance, we can only conclude *either* that this portion of the treatise is not his work *or* that 100 *raṭls* is a figurative expression for 'the heaviest possible' (cf. English 'a ton weight'), the qualification 'Syrian weight' being an insertion by another hand. The second of these alternatives is quite feasible if account be taken of (a) the fact that the renowned Ṭāhir al-Balkhī is said to have assigned to the heaviest bow a weight of 100 *raṭls* (above, p. 30), which by the Khorasanian standard of the twelfth century, would amount to no more than 89 lb., and (b) the fact that in no MS of the B group does the qualification 'Syrian weight' occur. While the first possibility can by no means be excluded, we are nevertheless reluctant to dismiss this whole section as the work of a different author since in A<sup>1</sup> there is no marked departure from the distinctive style in which the rest of the treatise is written. It is, of course, possible for another pen to have distorted the original text of Ṭaybughā and to have been responsible for technical errors which were subsequently recognized and eliminated as the text was redrafted and edited. Whatever the truth of the matter, we can at least be certain that, if we discount what is said about weight, the technical information contained in our chapter is valid for the last quarter of the fourteenth century and is for this reason worthy of explanatory comment.

The most common and widely used device for holding and releasing the string of a crossbow was the nut. The details of this fitting varied, but it was essentially a cylinder of ivory, bone, or steel rotating on a spindle mounted in the stock. Part of it was then cut away to accommodate the string, and a wide slot allowed the nock of the bolt to rest against the string between the two lugs which were then left at the top of the cylinder (Fig. 4). The trigger engaged in a recess cut into the underside of the nut, and it was usually held in this position by a spring. Details of crossbow mechanisms may be found in the works of Payne-Gallwey and Giorgetti (see Bibliography).

When the sere of the trigger was disengaged from the nut, the pull of the string caused the latter to revolve on its spindle in the forward direction, leaving the tail projecting above the stock. In the case of modern crossbows or older weapons in good working order the string, when redrawn, travels along the surface of the stock until it reaches and presses against the tail of the nut. Further pressure then causes the nut to revolve in the backward direction until the sere of the trigger automatically re-engages under pressure of a spring and locks the nut in position ready for another shot.

Though such mechanism may seem simple, it is interesting that in Mameluke Syria of the

fourteenth century the nut had to be reset by hand before the string was drawn back and hooked behind the two lugs. This meant that for the last few inches of the draw the string had to leave the surface of the stock to be lifted over the nut, which is a slightly more difficult operation than that described above.

It may well be that manual resetting was merely an intelligent safety precaution to ensure that the nut really had engaged with the trigger before it received the load of the drawn bowstring. To speed the reloading operation a reliable self-cocking mechanism is obviously a great asset, but our author's meagre description does not indicate how he achieved this or why this feature was absent in the usual types of bow. Perhaps they lacked a spring to enable the trigger to engage in the nut.

The dangers of the usual weapon referred to in our text might, basically, be two. Firstly, because the nut had to be reset by hand, the direction of traction on the string as it was drawn back had to be altered just as it was coming under maximum tension. This would have made the bow more difficult to control at that moment and, if the stock should slip from the grasp in any way, the results could be most unpleasant. Furthermore, as the string left the stock one of the hooks of the claw could get behind one of the lugs of the nut, which would have made it very difficult, if not impossible, to seat the string correctly before disengaging the claw. The whole operation would then have had to be restarted. Secondly, if the trigger mechanism was unreliable, there would have been the danger of the string's being accidentally released. With the archer off his guard, and his hand in the way, he could suffer severe injury. This eventuality could arise from the lack of a spring to secure the trigger which would, under such circumstances, be a 'hair' trigger apt to release the nut at the slightest touch.

Our author's mention of a device fitted over the nut to hold the bolt in place is of interest. A horn spring for this purpose is not mentioned by Payne-Gallwey until he deals with mechanisms of the sixteenth century (*Crossbow*, pp. 170-72). The advantage of such a fitting to the horse-archer is obvious. Without it he would have to hold the loaded bolt in position with his thumb on the top of the stock until he was ready to shoot, otherwise the bolt would be liable to fall from the bow at any time.

Generally speaking, the crossbow is not a good weapon for a horseman as it is both cumbersome and slow in operation as compared with the hand bow. As our author so rightly points out when dealing with bows, they are not well suited to cavalry operations. One is inclined to wonder if *all* the contents of this chapter are, in fact, intended to apply to the horse-archer at all. Although we have examined many hundreds of miniature paintings from the Middle East, we have not seen one showing a crossbow carried or used by a horseman.



## CHAPTER 17

## ON BRACING THE BOW (ITAR AL-QAWS)

Some masters in the art of shooting maintain that bracing the bow is a fundamental, while others consider it a secondary basis of archery. The former hold that any archer who is not proficient in bracing is incompetent, and in their eyes he is not a complete archer.

A bow may be braced in quite a number of ways, but here we shall confine our attention to the most useful.

*A military method*

The following procedure is a military technique. Grasp the grip of your bow with your left hand in such a way that you have the back, as opposed to the belly, which will be the side nearer to the string 'when the bow is braced',<sup>1</sup> facing you.<sup>2</sup> You put the nock<sup>3</sup> under the fourth toe of your left foot to prevent the loop of the string from slipping out when the bow is flexed (*inda n-naz'*) for bracing. The fourth toe and little toe must then be wrapped over the loop and tensed. At this point a very good tip must be noted: the archer can always secure the loop of his string to the nock 'of the lower *siyah*'<sup>14</sup> with a piece of thread to keep it from slipping out when bracing. Your next step is to plant your right leg in an upright supporting position (between the bow and its string). This done, quickly and firmly set the belly of the arm (*yad*) of your bow—in other words, its longer half (*sic*), or upper limb, which is termed the 'shooting limb' (*bayt ar-ramy*)<sup>5</sup> and which is the section between the *siyah* and the grip—on to your right knee at a point close to the grip with the string resting on your calf. Now apply pressure to the bow with the palm of your right hand, holding the loop of the string in the ends of your fingers. The way to do this is first to grasp the grip of the bow with your left hand and the lower part of the upper *siyah* and the string with the right, the knot of the loop being held in position between the right index finger and middle finger. You then grasp the middle of the sides of the loop with the ends of the index finger and thumb and apply pressure to the bow with the front of the right palm as you tense the right knee and left leg, at the same time pulling the left hand and grip towards you and pushing with the heel of the right hand until the loop slips into the nock in the *siyah*. Keep hold of the upper *siyah* and the loop of the bowstring to guard against the danger of the *siyah*'s springing round into its unbraced position (*inqilāb*), for if one is in too much of a hurry to take his hand off the neck of a bow, it may, if too flexible or in any way twisted, spring round and perhaps break, doing harm, in any event, to the archer. Once the loop has been slipped into the nock in the *siyah*, the whole hand should be used to maintain a tight hold on them both until it is quite certain that they are properly in place and that the *siyah* has settled. Then the archer—whose hand ought never at any stage to have left the grip—should turn the bow with both hands, take the *siyah* of the lower limb in his right with the string towards his face, and examine the bow. Should he find it to be out of true or twisted, he should correct it.

<sup>1</sup>Once the bow is braced, the necks should be adjusted and pressure applied to the stronger limb until the archer thinks the bow is as it should be.<sup>16</sup> Then, 'grasping the bow with his left

hand, as previously described,<sup>1</sup> he should take the centre of the string in all fingers of his right, and, if the bow is stable and not very much older than the string, draw it.<sup>7</sup> If, on the other hand, the bow is much older than the string, or is twisted, or displays some characteristic that will be detrimental to it 'when drawn', he should leave it to settle to the string and later test it by drawing gently to see whether the necks have settled and whether the string is right for its draw-weight<sup>8</sup> or not. All tests of this kind, of course, are applicable only if the archer finds the bow to be true. Should he detect some twist in it, on the other hand, he should draw it only after adjusting it and leaving it for a while to settle.<sup>9</sup> If the twist is quite marked, he should defer bracing<sup>10</sup> until he has heated his bow on all sides over a gentle flame with the application of

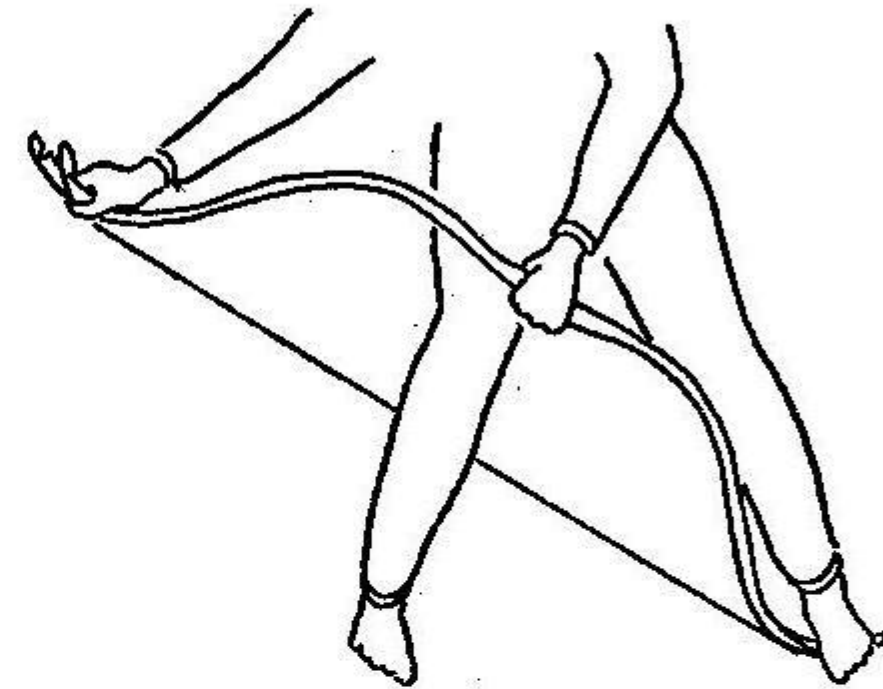


FIG. 31. BRACING: MILITARY METHOD

rather more heat to the concave surface (*baṭn*) of the distortion and the belly (*wajh*) of the bow. It should then be gently and lightly pressed into shape in a former (*qālab*). To do this calls for dexterity, deftness, and technical skill, and great care must be taken to ensure that the bow neither springs round nor gets burned. How to correct a bow in this way is something every archer should know really well and be determined to master; for it is a great fundamental and an accomplishment that none can afford to ignore since a bow is prone to distortion and must be constantly watched. Care of this kind will keep a bow in condition and prolong its life. Sound shooting cannot be achieved with a bow that is not itself sound. Any archer, therefore, who cannot brace his bow properly and correct any irregular curves it may develop is incompetent, contemptible, unenterprising, and wholly unworthy of the name of archer.

*Bracing on horseback*

To brace a bow on horseback while charging 'or wheeling',<sup>11</sup> grasp your bow as described in the preceding section, but bring it in against the horse's neck. More precisely, set the neck of the lower limb against the base of the animal's neck at the juncture of its neck and chest. The rest of the procedure is as already indicated in the last section.<sup>12\*</sup>

If you wish to try a different method, lodge the neck of your bow quickly but securely in the instep of the right foot with the string in place and the grip pressed firmly against the outside of the right knee. Next bring your right hand to bear on the neck of the bow, that is to say, the base of the *siyah* and, with your left, draw the string up until you can slip it into the nock.



In other words, you put the lower *siyah* of the bow under the sole of your right foot, hold the upper *siyah* with your right hand and the string with your left, and complete the operation in the manner described. If you wish to brace on the left side, the method is the same (*mutatis mutandis*).

By another method you can use your right hand to take hold of the neck to which the string has been fixed and hold the loop between your teeth.

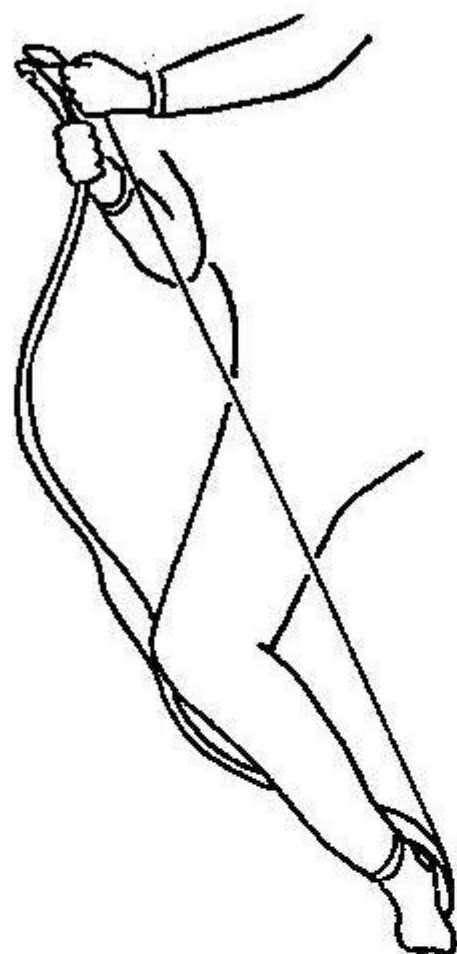


FIG. 32. BRACING ON HORSEBACK

#### *Bracing under peaceful conditions*

In combat the few methods of bracing mentioned so far<sup>13</sup> will be found by cavalry and infantry (as the case may be) to be the best, the most practicable, and the easiest to use. Under safer and more leisurely conditions, on the other hand, one good way of bracing is to sit cross-legged, putting the right leg inside the left. Seated squarely in this position, the archer fixes the loop of his bowstring in the nock of one or the other of the *siyahs* and, with his right hand, keeps it in place at the base of the bow's neck. Holding the remaining loop in his mouth he now takes the other neck in his left hand, sets the grip beneath his right thigh, and tightens his hold on the bow as he pulls it up with both hands. The *siyah*, which is taken in his left hand he sets on top of the left thigh, leaving that hand free to take hold of the loop in his mouth. Then, pulling the bow with his right hand, he bends his body over the left thigh so that he can slip the free loop into its nock. This done, he examines the limb and his bow as previously directed (Fig. 33).

An alternative method may be used. He again sits squarely (on the ground) and fixes a loop in the nock of one of the *siyahs*, but this time gives the free loop to someone near at hand. Taking the necks of the bow in both hands, he places the centre of the grip beneath his right knee<sup>14\*</sup> or, 'better still,' in behind both knees, and proceeds to flex the bow with both hands together. He then tells the person holding the free loop to slip it into the nock (Fig. 34). This done, he parts his legs inside the bow (thereby bringing his thighs to bear on the *dustārs*) and sets the *siyahs* as truly as he can. What he should do is to look at the stronger limb of his bow (i.e. the lower,

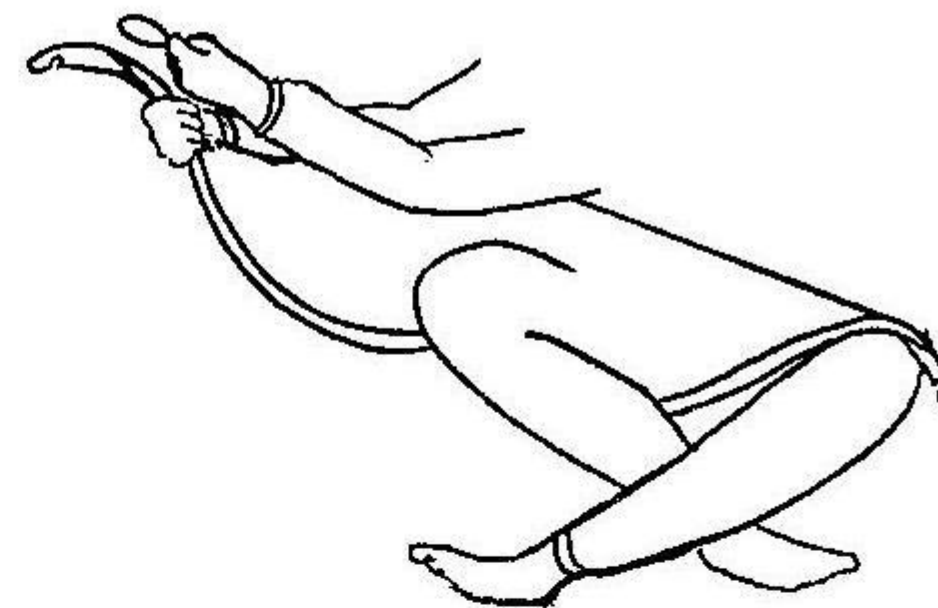


FIG. 33. BRACING IN SQUATTING POSITION

which is liable to bend less than the upper) and put more thigh against it, at the same time easing the thigh which is pressed against his weaker limb,<sup>15</sup> but at no time allowing his hands to leave either neck<sup>16</sup>. He sits in this position for quite some time until he feels sure that the bow has settled. He then removes one thigh and looks, and, if he thinks that the bow has in fact settled, he may take out the other. If it has not, however, he should replace his thigh (and wait until it has).

This method of bracing is most suitable for bows that are apt to quiver and spin round and in cases where the bow is a good deal older than its string. It is also better for the bow. By applying this technique an intelligent man can bring his bow to the required curve without a bracing-board (*kharkumān*) either because he wishes to display his skill and knowledge or because the want of a bracing-board leaves him no alternative (Fig. 35).

A useful piece of equipment for bracing purposes is the *barshaq*,<sup>16</sup> which is a strap or cord with which the string is held fast to the weaker limb. Two may be needed for one bow according to the requirements of the case.<sup>17</sup> If the bow, for instance, is a self bow and there is danger of one of the limbs giving way, a *barshaq* should be applied to each limb to hold it in check.

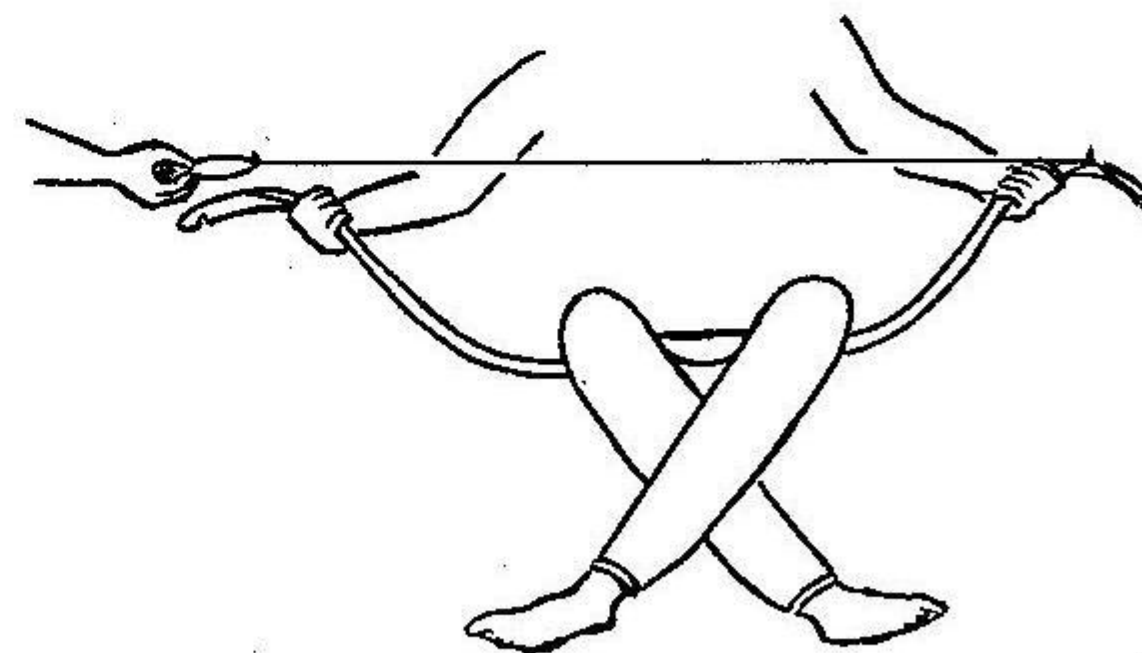


FIG. 34. BRACING WITH AN ASSISTANT



A knowledge of things of this kind should be regarded by an archer as a sort of religious obligation because of the frequency with which the need to apply it will arise in combat and on campaign.

Where one limb of a bow is weaker than the other, the stronger of the two should be heated over a gentle fire. If no fire is available, the archer should put his hand around it and briskly rub it up and down for a time until it gets warm. If 'on campaign'<sup>18</sup> in winter when the weather is cold, his best policy is to put the bow inside his clothes and warm it with his body. When going to bed at night, he should also keep the bow inside his clothes to protect it against the damp.

When on campaign, an archer should never neglect his bow for a single moment, and in extremes of temperature he should inspect it 'day and night, hour by hour, and not let it out of his mind, even though he be absolutely certain that it is stable and true'.<sup>19</sup> Moreover, he should protect his hands against the cold in the early morning lest, needing to shoot, his limbs and fingers fail to respond, leaving him unable to shoot at all or, if able to do so, unable to equal his usual performance. This is a rule which should not be ignored, for 'he who neglects to do what he ought, may repent when repentance will avail him not'.

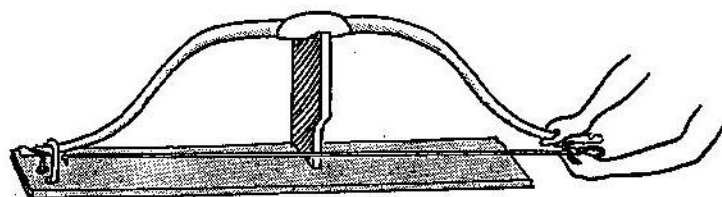


FIG. 35. A BRACING-BOARD  
(*Kharkuman?*)

#### *Bracing a stiff bow*

The way to brace a stiff bow is to take the upper *siyah* with your right hand and, in a standing position, to place your right leg in between the bow and the string, keeping the bowstring on top of your shin and the belly of the bow against the rear of your right thigh beneath the hip-joint. You then put the tip of the lower *siyah* against the front of your left leg and, with your right hand on the upper *siyah* and your left hand holding the loop of the string, you push your right hand forward. You may, alternatively, hold the neck of the bow with your left hand, place the lower *siyah* against the front of your right leg, and, putting your left leg between the bow and the string, push with the left hand as you hold the loop in your right.

If the bow is too strong to be braced in this way, you should use a broad strap two cubits long and four fingers wide (about 4 ft. 4 in.  $\times$  3 in.). To the ends of this you fit two loops made of either bowstring or leather of the same sort as your string's chafing protector (*saysarah*).<sup>20</sup> You next put the strap behind your back as you would when drawing a stirrup crossbow. If the bow has two nocks in each *siyah*, you put one loop in each nock. If your bow is not so made, however, you can have two hooks on your drawing-strap instead of two loops, or else secure the loops to the *siyahs*. Then, drawing with your waist, you push with your feet 'against the centre of the bow's grip'<sup>21</sup> and attach the string. There is no need to enlarge on a subject which can be dismissed briefly once the gist is grasped.

#### *On bracing a bow in water*

To brace in water, you put your head between the string and the bow with the bow's grip on your shoulder 'at the nape of your neck'<sup>22</sup> and each loop of string positioned in the centre of each neck. With a hand on each loop and neck you apply pressure with both palms together until the loops fall into the nocks in your *siyahs*. Alternatively, you may hold each neck with your hands,

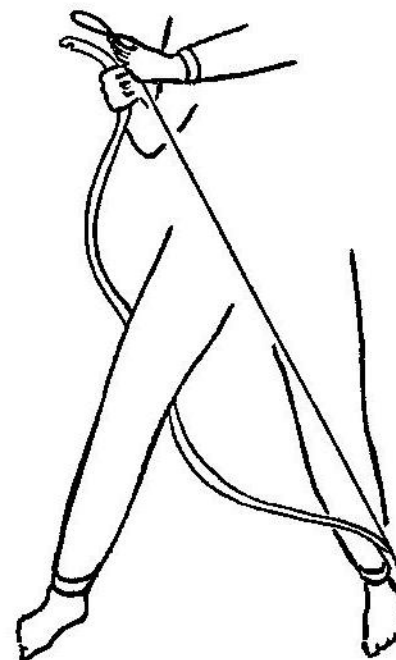


FIG. 36. BRACING A STIFF BOW

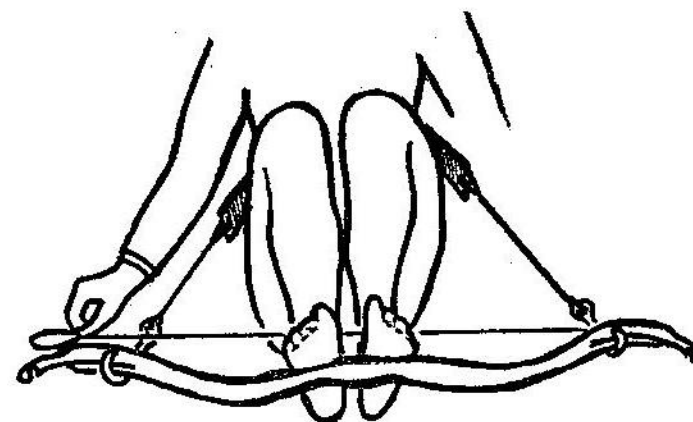


FIG. 37. BRACING WITH A DRAWING-STRAP



having one loop fixed in the bow and the other in your mouth, and then bend the bow with your hands until you get the nock which is in its *siyah* into the loop that is in your mouth. This requires a good deal of practice, but it is one of the finer points of bowmanship. If you propose to shoot, you hold your bow crosswise and use it in that position.

### COMMENT

Bracing the highly reflexed Oriental bow can be difficult. Roughly C-shaped when unstrung, the weapon must be completely reversed for this purpose. As already noted in the introduction, the increased tension resulting from reversal adds considerably to the ultimate power and efficiency of such bows.

Although reflexed composites will tolerate a surprising degree of flexure, any unfair stress or strain can easily result in breakage, and for this reason bracing demands great care. The object of any method is to exert equal pressure on the two *siyahs* as the grip is forced in the opposite direction.

#### 1. Ways of Bracing

So far as can be judged from Middle Eastern sources consulted by us, the ways of bracing a composite bow were far more numerous than our text might lead us to suppose. It was asserted by some authors that there were no less than one hundred, and a certain Muḥammad ibn al-Ḥasan al-Harawī even wrote a work in which he described one hundred and twenty—most of which, however, are said to have been repetitious and useless (*Arab Archery*, p. 29). While not proposing to follow al-Harawī's example, we nevertheless venture to illustrate the point by mentioning some methods not indicated in the preceding chapter. For convenience let us begin by comparing our ten with the twelve methods indicated in *Arab Archery* (pp. 30-37). These may be summarized as follows:

1. Pressure bracing (i). This is identical with Taybughā's military method.
2. Pressure bracing (ii). The only difference between this and the preceding is that no extra support is given by the knee.
3. Concealed bracing. This can be used by a Bowman either on horseback or on foot. The lower *siyah* is placed against the outside of the thigh with the back of the bow towards the archer. With one hand he pulls the grip towards him and with the other pushes the upper *siyah* away from him. It is termed 'concealed' because the aim is to prevent an enemy on the side of the archer opposite to that on which he is bracing from observing his action. It may, of course, be carried out on either side.
4. Bracing of the fleeing archer. In this an archer facing a sword- or lance-thrust flees and, while running, braces his bow, its back towards him, by striking the ground with the lower *siyah*, pulling the grip with the left hand and pushing the upper *siyah* with the other. Alternatively, he may grasp the bow with its belly towards him and the lower *siyah* lying between his feet. In this case the grip is pushed forward with the left hand, and the neck of the upper limb pulled towards him. The first method is quicker, but the second better for the safety of the bow. As a bow can easily be broken by either, we have not put it to the test.
5. Bracing of the wounded archer. This is almost identical with Taybughā's first method of bracing a stiff bow, but only one hand need be used, the supposition being that the archer's other hand or arm is out of action. The string is set in the lower nock, and the other loop around the upper neck of the bow as in the case of pressure bracing. The one hand then bends the bow and slides the loop into the upper nock. The archer shoots with one hand as he lies on his back, holding the grip between his feet.

6. Water bracing. This is virtually the same as one of the methods given by Taybughā.
7. Sleeve bracing. The bow is slipped up the right sleeve—obviously ample—and brought out through the left fully braced. Unfortunately, detailed instructions are not given.
8. Bracing of the archers. This is the same as the method mentioned by Taybughā in which the archer has an assistant to slip on the string.
9. Bracing of the lone archer. This is the same, but the archer fits the string himself by flexing the bow against one knee with both hands. He then holds one *siyah* in place with the other knee. The other *siyah* is held with one hand, while the opposite hand fits the loop into the nock.
10. The bow is flexed across the back. The lower *siyah* goes between the legs and is held at the base of the thigh. One hand then pulls down on the upper *siyah*, and the other slips in the string.
11. The archer kneels on the left knee and stretches out his right leg. One *siyah* is set on the left knee, the grip goes under the right leg, and the other *siyah* is pulled up with the hand.
12. The grip is taken in both hands and the *siyahs* pushed away with the two feet. The free loop is slid along by the appropriate foot until it slips into the nock.

One method to which there is no reference in our text, but which is described in MSS of the B group, is worthy of mention—due account being taken of some evident confusion between right and left. Holding one neck of the bow with its loop in place, the archer takes the other loop between his teeth. Passing the bow between his thighs, he lodges it beneath the left and applies his left hand to the neck that is free, firmly setting the neck in his right hand on the right thigh. The neck once steadily in place on that thigh, the archer takes the loop from his teeth with the right hand, exerts pressure with the left, and slips the string in the nock located in the neck that is pressed against the left thigh. The great advantage of this method is stated to lie in the fact that the archer may put a stronger limb beneath his thigh to reduce its strength and in this way balance the two limbs, albeit after several attempts. The method could also be used by a horseman (B<sup>1</sup>, 60b-61a; B<sup>2</sup>, 49a-b).

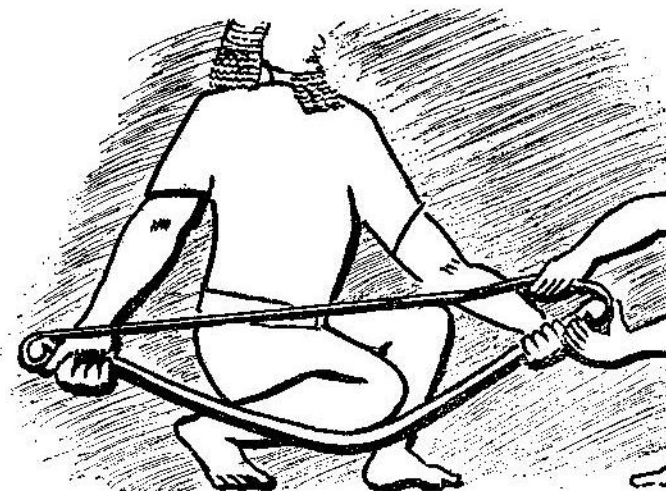


FIG. 38. BRACING

Assyrian archer bracing his bow with the aid of an assistant. From fragment of a relief from Ashurbanipal's palace (c. 668-630 B.C.). British Museum.



For further information on methods of bracing the European reader unfamiliar with Arabic, Persian, or Turkish, would do well to consult Hein, *Isl.*, XV, pp. 54-60 and Klopsteg, pp. 86-90.

## 2. The Relative Ages of Bow and String

When referring to the age of a bow in relation to its string, Taybughā may have in mind either the fitting of a completely new string to a bow or the changing of a used string from one bow to another. In a new string there is usually a small degree of stretch to be removed. Normally this should come out within a few seconds of fitting it to the braced bow, which should then be carefully watched lest a little too much stretch render it unstable. Should this happen, the string should be removed and shortened by adjustment of the loop-knots so that when it is fully stretched the length will be correct. Slightly more stretch can be expected to occur during the first few shots, after which the string should settle and no more adjustment be needed.

It will be recalled that the bracing height, or distance between the grip and the string of a braced bow, must be constant (above, p. 23). A small variation will affect both range and the direction in which the arrow leaves the bow. Slight though the effect may be, it is nevertheless sufficient to impair the accuracy of the shot, and close attention is needed until the string is fully stretched and has been 'shot in'. Since some stretch results from the tightening of newly tied loop knots, even a well-stretched string transferred from one bow to another might give a little if the loop-knots required adjustment as a result of difference in length between the two bows concerned.



FIG. 39. BRACING  
Scythian archer bracing his bow. From a silver bowl, Hermitage Museum, Leningrad.  
(After Balfour, *JRAI*.)

## 3. Aids to Bracing

(a) *Kharkumān*. We do not know the exact form of this device, but there is almost no doubt that it was a bracing-board. The term is a loan word from the Persian compound *khar*+*kamān*. The latter presents no difficulty; it is the regular word for 'bow'. The former has several meanings of which the most apt in this instance would appear to be 'a bridge' as for a stringed instrument. The bracing device would consist of a board with a bridge, or central upright support, which

would be at right angles to the grip of the bow when raised in bracing. As can be seen from Fig. 35, in which we illustrate the general principle, the effect is comparable to that of a bridge raising the strings of a musical instrument. The support would be absolutely rigid and the top padded to avoid damage to the grip. Such a device could not be carried around by an archer, but it would be reasonable to expect its inclusion in the equipment of baggage-trains, arsenals, and bowyers' workshops.

(b) *Barshaq*. This term—also from Persian—appears to denote an appliance amounting to little more than a kind of binding to secure the string to the *siyah*. It is defined in *a*, 66a, as 'a strap or cord about one and a half spans (about 11 in.) in length. Once it was tied at the ends, the bow could be inserted, the purpose being to hold the weak limb'. The exact details of its application are uncertain, but it seems from this description to have been a kind of loop which could be slipped over the *siyah* and tightened in some way.

If one limb of a bow were unstable, there would be some advantage in securing the string to that limb for the purpose of bracing and retaining it until the bow settled. It could be that the *barshaq* was so used, and that upon its removal the bow was immediately fit for use. Alternatively, it might have been applied and left awhile to correct a fault when it would have been inopportune to light a fire to remove some slight distortion by the application of heat.

A number of devices for correcting faults in bows are known to have existed, but here is not the place to accord them the space that would be required by a detailed discussion.

## 4. Defects in a Bow

Of the two major defects that bracing may reveal, the first is weakness in the neck. Because of the form and shape of the bow, the neck has a natural tendency to lateral displacement. Its inherent stiffness normally militates against this, but if any weakness develops, it can occur. At best there will be slight lateral displacement of the neck so that its mid-line will not lie in the same plane as that of the string. When a braced bow is sighted from one end to the other, the string should appear to bisect the bow along its entire length. If, however, the neck is displaced it will not do so. Should side-warping of this kind not be detected and the bow be drawn, the defective limb will be subjected to a most severe twisting strain and possibly break.

If the worst happens, the neck will twist violently round when the bow is braced, the string will slip past it, and the bow spring back to its unbraced form or capsize. Apart from the risk of damage to the bow, such an occurrence can have unpleasant consequences for the user, who may be struck with some force by one of the *siyahs* as it flies back. Hence the warnings given by our author to the archer to keep a firm grip on the bow until he is sure it is stable and has settled to the string.

## 5. Heat Treatment of Bows

Once a twist has developed in the limb of a bow, it may force the neck out of line with the results already described, and even if it does not do so, unfair strain will be thrown on to the bow. Before bracing a composite bow, the archer should therefore assure himself of its soundness in this respect. To test it, he should hold it by one of its ends and align the two *siyahs*. If, when viewed from end to end, they are in the same plane, the bow may be braced. If, on the other hand, they appear to cross each other, the defect must first be remedied.

Provided that the distortion is not excessive, correction presents little difficulty. After careful examination to decide the exact point of distortion the offending section is thoroughly warmed. For this purpose there is nothing better than an open fire, and a dull charcoal fire is especially suitable (cf. Klopsteg, p. 89). The process is slow and gradual. Back and belly are alternately exposed to the fire for about half an hour until a pervasive warmth—not hotness—is achieved. When subjected to such treatment, the materials become relatively pliable, and a firm correcting



twist may then be applied. To permit the bow to cool completely, an hour should be allowed, after which it can be re-examined. If it is still not true, the process must be patiently repeated until it is.

The curvature of the two limbs can be balanced in the same way. If imbalance is present and cannot be corrected by the simple application of pressure after bracing, the stiffer limb must be warmed before bracing. The amount of heat required and the time allowed for the bow to warm are largely a matter of judgement based on experience, but with a little practice the technique is not difficult to master.

#### 6. The Mould

If the distortion in a bow is excessive, it may not be possible to remedy the defect simply by heat and manipulation, and in these circumstances one has to resort to more forcible means such as the use of a mould. We do not know the nature of the mould used by the Mamelukes, but, whatever its form, such a device would only be found in a baggage-train, arsenal, or craftsman's workshop. One kind of mould with which we are familiar is the Ottoman *destgāh*, of which a line drawing may be seen in Hein, *Isl.*, XIV, p. 344 or Klopsteg, p. 52. Basically, it is a board in which a number of slots are cut to grip different parts of the bow. The bow would be warmed as for simple heat treatment, and the offending section placed in the appropriate slot. The archer or bowyer could then apply a very strong twist, which, as our author points out, must nevertheless be done carefully and adroitly. Whatever the form of mould used by the Mamelukes, the principle must have been the same as that of the *destgāh*, even though the device itself may have been more or less elaborate. There is a suggestion in our text that heat may have been applied while the bow was in the mould as the archer is warned not to burn the bow. This could be taken to imply that the bow was strapped to the mould after the application of a correcting twist, then heated rather more strongly, allowed to cool in the mould, and finally removed.

One would have thought that work of this kind was more a task for a craftsman than an archer. It is interesting, therefore, that Ṭaybughā expects the archer to be able to do it himself.

## CHAPTER 18

### ON STANDING BEFORE THE TARGET

A standing position (*qiyām*) will afford the archer a greater degree of stability than can be achieved by squatting, and it has the additional advantage of being easier for the learner. There are four kinds of stance 'of which three are designed for target shooting and vary accordingly as the archer stands squarely to the mark (*mutawajjih kathīr<sup>an</sup>*) or in a position of acute obliqueness (*munharif shadid<sup>an</sup>*) or in an intermediate position (*mutawassiḥ*) between these two extremes (Fig. 45). Lastly, there is a stance to suit the archer's needs in combat and flight shooting.

A learner should take up a slightly oblique stance before the mark and set the latter in line with his left eye. Keeping his left knee straight and pointing the toes of his left foot directly towards the mark, he should plant his right foot in a transverse position with the left heel pointing in the direction of his right instep (*bayād*). With sufficient space between his two feet to accommodate the length of the bone of the forearm he should put his weight (*ya'tamid*) on the right foot and ease (*yukhiff*) his left.

Using an alternative method, he can place the left foot in a transverse position so that its little toe is opposite the mark and plant the right foot lengthwise with its big toe pointing directly at the mark.

'There is yet another method. In this case the archer sets the mark<sup>11</sup> in line with his left shoulder and stands with both feet firmly planted in the transverse position. There should be no great gap between the two feet—only a span, or even less than that. This is Ṭāhūr's method.

#### *The Military Stance<sup>2</sup>*

In this position the archer has his Achilles' tendons meeting, but parts his feet in front. He stands in this way because he is wearing armour. It is a difficult thing to do, 'and I do not care for it', but I record it here in accordance with the practice of our masters. My own view is that the archer should put a space between his legs almost big enough to allow another man to pass between. In this way he can stand more firmly and can get up, stand, and dodge<sup>3</sup> more rapidly.

In battle you can put your shield over your forearm, fasten it to it, and advance on the enemy sideways. When you eventually reach the spot where his arrows are falling, you drop on your knees with head down and hands on the ground and rotate your shield<sup>4</sup> over your head so that if the enemy shoots at you, none of his arrows will hit you. If one should hit, it will strike your shield. If you are able to shoot at the enemy and so wish, you can nock and draw in that position without casting so much as a glance at him before bringing the arrow to full draw. You then raise your head, sight, and shoot. This is a very convenient manoeuvre when one is engaged in siege operations against fortresses, cities, and the like.



## COMMENT

Strict adherence to the Arabic text would require our chapter to be entitled 'On Standing and Sitting Before the Target', but, as none of the MSS of the A group deals with the second of these two subjects, we have excluded 'and Sitting' from our English title. The subject will be taken up in section 2 below.

## 1. Standing

The oblique, frontal, and intermediate positions are discussed in *Arab Archery*, pp. 81-84, where they are said to have been the positions of Abū Hāshim, Tāhīr, and Ishāq, respectively:

(a) *The position of acute obliqueness*. Known in Great Britain and the United States as the sideways position, this is quite rightly said to permit a longer and more powerful draw. The bow arm can be fully extended, and the unrestricted use of the back- and shoulder-muscles permits the application of maximum strength. It enabled the oriental archer discharging his arrow from the right of his bow to hold a shield while shooting. This important advantage resulting from the use of the thumb-lock would be denied to users of the three-finger method as practised in the West, for the arrow leaving the bow from the left would have to pass between bow and shield with resulting interference from the latter. To shoot with a shield was perhaps not as simple for the Oriental as one might suppose. Of the various types of shield in use in the Middle Ages, that most current in the area with which are concerned was too deeply concave on the inside to permit both the grip of the shield and the handle of the bow to be held in one hand without some kind of supporting device. To overcome the difficulty, the archer's most practical approach would have been to slide his forearm through the shield's grip and to support it by means of a shield-strap, or *guige*. This would have been fastened to two of the four rings which one normally finds inside the boss and then hung around the neck to afford additional support against the rim. The *guige* need have been nothing more than a silk scarf. Such an expedient was used by mounted warriors as a means of carrying a shield when not in use. (For helpful advice in this matter we are indebted to H. R. Robinson of H.M. Tower of London Armouries.)

(b) *The frontal position*. The advantages of this position were said by its advocates to lie in increased accuracy and the fact that it permitted the user to wear a coat or two of mail which would crowd the tip of the bow if shot in the oblique position. Although the author of *Arab Archery* concedes its merits for a near target, trick-shooting, and weak bows, he warns his readers that it will shorten one's draw, weaken one's shot, and not allow the use of a shield.

(c) *The intermediate position*. This is said to combine the advantages of the other two without having the disadvantages of either. It is advocated as the best standing position for warfare and other purposes.

## 2. Sitting

In the terminology of Arabic-speaking archers 'sitting' (*julus*) seems to denote almost any posture that is not standing or lying. In many contexts it is best translated as 'squatting'.

As in the case of standing, the positions could be oblique, frontal, or intermediate. Four different seats are described in the chapter on sighting in MSS of the C group (C<sup>1</sup>, 48a-b; C<sup>2</sup>, 78b-79a; C<sup>3</sup>, 40a-b; cf. D<sup>1</sup>, 36a; D<sup>2</sup>, 62a). They are:

(a) *The sprinter's seat (jalsat al-hārib)*. The archer bends his right knee, digs it into the ground to take his weight (D: and sits on his foot). His left shank he keeps erect (D: but bent slightly over to the right). It is Abū Hāshim's method and was that of most of the ancients and the Persians. It may be used the opposite way round. It is a good position that is suitable for users of a strong bow or novices.

(b) *The fencer's seat (jalsat al-muthāqif)*. The archer rests on his left shank which is raised but with the knee pointing towards the ground. He keeps his right erect. The feet are kept apart the length of the bone of the forearm or less, and his weight is distributed between the two.

(c) *Innominate*. The archer squats on his raised feet, ankles together. The shanks remain erect. It is suitable for persons with deep chests or persons using the oblique position. Most archers use it, and it is convenient for a man in armour.

(d) *The king's seat (jalsat al-mulūk)*. This is described as a 'square seat' (*jalsah murabba'ah*), meaning that the user is square to the target and not sideways. It could, perhaps, mean 'cross-legged'—as interpreted, it would seem, in *Arab Archery*, p. 85. It is suitable for men with deep chests, for trick-shooting, and for use with a light bow.

The foregoing postures are described in more or less the same terms by the author of *Arab Archery*, who interestingly remarks that (c) was used by most archers in Khorasan and Egypt, and that (b) was the posture adopted by most Andalusian archers (pp. 84-85).



## CHAPTER 19

### ON FLIGHT SHOOTING (RAMY AS-SIBĀQ 'ALĀ BU'D AL-MASĀFAH)

If, in shooting, it is your wish to outdistance your competitors you should use a bow with short *dustārs* and choose a light arrow. It has already been remarked (above, p. 8) that flight bows should have short *dustārs* or, in other words, be shorter in the working limbs than ordinary bows, have long necks, and be quick to recover (*sarī'at ar-rifū*)<sup>1\*</sup> upon removal of the string (i.e. have greater resilience than the ordinary bow). Enough, too, has already been said about the kind of arrows to be used. We need only add that the lighter the arrow, the greater its range. The lightest flight arrows in our experience weigh six *dirhams* (285.6 gr.). They break easily and can only be used by really first-class bowmen, for if the archer, in locking, subjects an arrow of this kind to pressure, or if, upon loosing, he tilts the top of his bow or twists the grip, he will break it. Flight shooting, in fact, clearly demonstrates whether an archer knows his business or not, and shows up his proficiency or incompetence in the art of bowmanship.

It is generally agreed that in flight shooting you should keep the sun and wind behind you and stand obliquely with legs apart. Stand on your right leg, all the time keeping the left at ease, for although both legs have a part in the stance, it is the right that should take the weight as the left is held at ease 'from the moment the draw begins until the loose is actually completed'.<sup>2</sup> It is a good idea, therefore, to put your left foot up on to a stone or something that will serve the same purpose.

The moment he begins to draw<sup>3</sup> the flight shooter should tilt the foot of his bow forwards and bring up his bow-hand until he reaches the point where half the sky is exactly halved. In other words, he should find the point of elevation that lies half-way between the zenith and the horizon; for if the hand is raised beyond or below that point, some loss of range will result. Great care must therefore be taken to determine the right elevation and to set the bow at the correct angle. For precise reckoning the archer should take an elevated object of the appropriate height or a spot of the same altitude and use it as a guide.<sup>4\*</sup>

Given a perfect draw and loose, you will succeed in outstripping other competitors and take the prize if you follow my advice. Instructions relating to the draw and loose have already been given. It remains only to note that the greater the draw, the greater the distance attained.

For perfect flight performance the archer should lock the arrow without exerting pressure on any part of the nock and, having drawn with true alignment 'of arms, shoulders, fists, and shaft' as fully as the 'greater draw' (*waḡā' nihāyah*) permits, loose with a rapid snatch and twist accompanied by a 'forward' and upward thrust 'against the grip' as he spreads his chest and arms. Some flight shooters move forward a little and release while still in motion, accompanying the action with a hard stamp of the left foot. This technique is a great asset to anyone who can train himself to it and really carry out our instructions in the proper manner. 'It will, however, thoroughly discredit a man if he doesn't know how to apply it correctly and will result in a poor distance. The real art lies in having a fully drawn arrow at the moment of loosing and simul-

taneously timing the actions of stamping, chest expansion, and inspiration to coincide with the departure of the arrow from its true nocking-point at the base of the thumb-lock. The slightest deviation from this ideal will result in a bad shot.<sup>5</sup>

Certain advantages are to be derived from flight shooting. For instance, it teaches an archer not only to appreciate the significance of atmospheric conditions, but also to draw a taut bow and develop a sharp, clean loose.<sup>6</sup> Furthermore he will learn to attain maximum range and effectiveness, which is what is wanted in warfare, especially when it comes to siege operations. It does, on the other hand, have its drawbacks in that it can reduce his degree of accuracy and precision in shooting, impair good grouping (*jam'*), increase his expenditure and debt, and bequeath a legacy of enmity between archers and their nearest and dearest.<sup>7</sup>

Among the most cunning tricks that can be played when shooting flight arrows is one in which the archer drills a hole through the shaft near the fletching and plugs the hole when making his own shot, but clears it when it is his opponent's turn to shoot. Another trick is to drill down the centre of the shaft from inside the nock and to leave the hole open when shooting himself, but to fill it with a metal plug when it is his opponent's turn. These tricks, of course, can only be played when it is stipulated that the shooting be done with one bow and one arrow. The use of such practices makes the acceptance of any prize illegal because it is cheating and not permitted by the law.<sup>8</sup> An impertinent, hard-faced, and impudent character, however, can use such means to great effect without the application of any great skill.

The subject of sharp practices puts me in mind of the story of a Persian archer in Khwārizm (or, Khwārazm; Khwarezm) whose story is as follows. 'I had heard', he said, 'that an archer in Nishapur was shooting short flight arrows, so I went out and spent several days looking for him.' In the course of the search he suddenly came upon a man on horseback carrying a bowcase containing a bow and arrows. 'So we sat talking,' he went on, 'and the time for the mid-day prayer came round, so the man got up to perform his ablution before prayer.'<sup>9</sup> When he had gone I took a look inside the man's bowcase and was surprised to find that it contained some flight arrows measuring about six and a half fists (*qabḡahs*; i.e. about 21 in.) in length. Two fists were of reed (*qaṣab*), two of *khalanj* wood (Cornelian Cherry?), two of brazil-wood (*baqqam*), and the remaining half fist of *yāmūr*, or ibex horn. Having looked at them, I put them back and then found that there was also an arrow-guide (*mijrāt*) with them. When the man returned, I remarked "I suppose you are good at shooting short flight arrows?" "Yes," he replied, "with the aid of an arrow-guide (*majrā*)."<sup>10</sup> He then showed me his bow, and I found two beads of lead on his bow-string. "Shall I do you a good turn?" I asked. "Since you are so kind," he replied. So I said, "Let me then give you these twenty *dīnars* and this nag 'in exchange for your equipment' and you will return safe and sound, for I pity you arriving in Khwārizm with this collection of tackle! They will be up in arms against you and really put you through it." Whereupon he agreed to my suggestion and was delighted with me.<sup>11</sup>

This story is clear enough to require no long explanation. We shall come back to that later.

## COMMENT

### 1. Flight Shooting: General Considerations

Flight shooting is a sport in which the archer strives for maximum distance, accuracy being of minor importance. Maximum distance depends on the design of the arrow and its attainment of maximum initial velocity. The latter is, in turn, dependent upon the highest rate of recovery of which the flight shooter's bow is capable. Rate of recovery, i.e. the relative speed with which the bow's limbs spring back to assume the form that they had before the commencement of the draw, can, as Ṭaybughā correctly observes, be increased by shortening the working part of the limb. The point can be simply illustrated: if a short stick is bent and allowed to fly back, it will



obviously travel faster than a longer stick of the same section. Practical application of the concept by the bowyer is a problem requiring a study of advanced bow design—a subject outside our present field. The scientific principles involved have been examined by Klopsteg, who devotes to them a complete chapter of his study of the *Telhis*, pp. 141–66.

Also essential to good flight shooting is a fast draw combined with a skilful loose that will give the arrow a clean flight with minimal gadding or wagging, since any lateral movement on the part of an arrow will result in increased drag and reduced range. A follow-through properly executed with a thrust of the bow-hand against the grip at exactly the right moment will add several yards to the distance that would otherwise be achieved. The shooting technique demands the perfection of a rhythmic whole from beginning to end which can only be acquired after many months of practice.

Contrary to what the layman might suppose, flight shooting is not a simple matter, nor is it merely a question of equipment and physical strength. It is an art requiring of the experienced Bowman the exercise of considerable skill if he is to attain the extra few yards needed to give him victory over his equally experienced competitors. On the technique of flight shooting a volume could be written, but because of the scope and complexity of the subject we make no attempt to compress the details within the narrow confines of a page or so. Nor can we offer a satisfactory bibliography because the topic is one on which very little has so far been published. Most, if not all, archers acquire their knowledge of flight shooting by trial and error. Finally, a word of warning. From the point of view of design the requirements of target/war/hunting bows and their corresponding arrows differ from those of the bows and arrows of the flight shooter. The first are not infrequently confused with the second, and it should be noted that Klopsteg's observations on ballistics relate to arrows of the second, rather than the first, of these two distinct classes.

In the Western archer's mind flight shooting is associated with the Ottoman Turks, partly because of references to their feats in European sources dating from at least the eighteenth century, but more especially perhaps because of an acquaintance with Hansard and a direct or indirect knowledge of the writings of Muṣṭafā Kānī, Hein, Klopsteg, and Payne-Gallwey. Although Ottoman flight shooting is not our direct concern, it is not without interest or relevance to the present theme, and since Ottoman practice is comparatively well known and seems to have had certain affinities with that of the Mamelukes, it cannot be left out of account in the following paragraphs.

## 2. Aids to Flight Shooting

Flight shooters may, of course, use a full-length arrow. Greater distances, however, can be attained with a shorter arrow, and the Ottomans, who brought the sport to a high degree of perfection, used—in the nineteenth century at least—small barrelled arrows about 24 in. in length and only about 150 gr. in weight. To shoot such an arrow and at the same time bring the bow to full draw, some sort of aid is needed since the tip of the arrowhead must come well inside the bow. The Ottomans used a grooved horn shelf known as a *siper* (Pers. 'shield'), which was strapped to the wrist of the bow-hand (Fig. 40). The point of the arrow rested on the *siper* at full draw, and the groove guided it past the bow when the string was loosed. Hein, lacking practical knowledge of the bow and its accessories, did not fully understand the *siper*. For details the reader is therefore advised to consult Klopsteg, pp. 59–67, or failing that, to refer to the brief account given by Faris and Elmer in *Arab Archery*, pp. 174–75. Examples are preserved in Manchester Museum, Ingo Simon Collection, Nos. O.7739 and O.7740.

The *majrā* ('channel, guide') to which our author refers and which seems to have been synonymous with *mijrāt* was also designed to enable the shooter to draw his string further than the length of his arrow would otherwise permit. Used both by Arabs and Persians (e.g. *Arab Archery*, pp. 124 ff. and pp. 174–76), it was, in its simplest form, a slim, grooved channel of

wood as long as a normal arrow (Fig. 52) and was drawn with the short arrow inside the groove. When the archer loosed, the arrow alone was shot and the guide remained, giving the general effect of a crossbow. Arrow-guides were of various kinds as will be seen in Ch. 26.

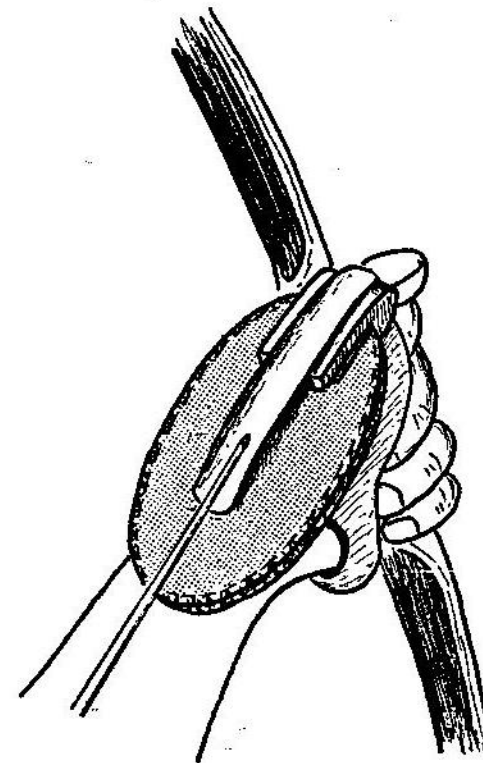


FIG. 40. THE TURKISH *Siper*

## 3. Behaviour of Flight Arrows

Great distances were achieved by Ottoman flight shooters (below, sect. 6), who owed their success not only to the design of their bows, but also to that of their arrows. Since we know of no study on the behaviour of flight arrows and as the subject is relevant to the sectional arrow described in the anecdote related in our text, we take up the point in some detail.

In air a missile will achieve its greatest range when it is projected at an angle of  $43\frac{1}{2}^\circ$  and strikes the ground at an angle of about  $54^\circ$ . Now, a normal target or war arrow has its centre of gravity (CG) 2–3 in. in front of its geometric centre. The centre of pressure (CP) is the point through which all upward forces may be considered to act, and with such arrows the CP is 2–3 in. behind the geometric centre, mainly because of the area of the fletchings. The distance between the CG and CP gives the righting-moment and, as this is relatively large, the long axis of the arrow remains virtually parallel to the flight path. During its flight the arrow pitches through about  $98^\circ$  from  $-44^\circ$  to  $+54^\circ$ , and its pitching-rate is the same as the rate of change of angle of the flight path.



Existing Ottoman flight arrows have their CG fractionally behind the geometric centre of the arrow, and, as a result of their small fletchings, the CP is moved forward and lies close to the CG (for detailed measurements, see F. W. Isles, 'Turkish Flight Arrows', in *JSAA*, vol. 4, 1961, pp. 25-28). Consequently, the righting-moment is reduced, and the pitching-rate of the flight arrow is slower than the rate of change of angle of the flight path. In this way a gliding effect is produced, and the flight arrow does not follow the parabola of a 'normal' missile.

Apart from this way of reducing the pitching-rate to obtain the desired effect, there is another approach to the problem. A sectional arrow may be used. In this case, the weight is concentrated as far as possible at each end of the arrow, and the ends are joined by the lightest available material. This increases the inertia of the arrow, and, provided that other factors are correctly related to it, a reduced pitching-rate again results. It is likely that the sectional arrow described in the text was of relatively heavy brazil-wood at the nock end, of reed or bamboo in the centre, and of Cornelian Cherry in the foreshaft. The ibex horn would be the material of which the head was made. This would stick into the ground at the end of the flight with little risk of damage unless a stone was struck.

All measurements in flight arrows are highly critical and do not appear ever to have been determined mathematically. Through the ages it has been entirely a matter of trial and error in an attempt to produce the most effective design, though it must be emphasized that, however effective the design of the arrow, a high degree of perfection in shooting technique is essential to launch it. The author is entirely right when he states that flight shooting reveals an archer's skill or lack of it.

Western archers interested in flight shooting have invariably followed the Ottoman design in the manufacture of their arrows, firstly, because many are still in existence so that their specifications are ascertainable, and secondly, because their value is well proven. To our knowledge no sectional *flight* arrow exists, and no thorough study has ever been made to ascertain the merits such an arrow may have. Some archers have tried arrows of this kind, but have discarded them as unsuccessful. Since the details of their construction are highly critical, the reason for their failure could well be that no one has yet succeeded in making one with the characteristics necessary for sustained flight, which, as we have seen, depends upon the correctness of pitching-rate. A careful, scientifically conducted series of tests could well provide interesting results even if only to prove that the Ottoman approach with which we are familiar was better.

#### 4. Atmospheric Conditions

Although accorded only a passing reference in our text, atmospheric conditions are a matter of considerable importance to the flight shooter. Shooting with the wind naturally reduces drag and is therefore desirable. If at all possible, a cross-wind should be avoided as it causes the arrow to fly at an angle, and drag is increased. Since damp air is denser than dry, the latter is obviously preferable, but whether it is given by a north, south, east, or west wind depends entirely on geographical situation. Finally, a completely calm atmosphere without turbulence at any altitude is the ideal. In the areas with which we are concerned all the conditions most favourable to flight shooting normally supervene in the early morning and the evening.

Some information on the subject of weather—*not* universally applicable in all details because of local climatic variations—may be derived both from *Arab Archery* (p. 120) and Muṣṭafā Kānī's *Tellīs* (*Isl.*, XV, pp. 279-80. Cf. Klopsteg, pp. 116-17). In the second of the two works attention is drawn to such factors as the direction and speed of wind, air currents, and general atmospheric considerations, and there is some mention of tests to establish their suitability for shooting. On the Ok Meydanı (below) wind directions accounted for the existence of seven main flight-shooting ranges which were used according to the wind prevailing at the time.

#### 5. Markers

From the earliest days of their rule the Ottomans were accustomed to hold flight-shooting tournaments on some suitable *maydān*, or field. To such an end an open area to the north of Istanbul was dedicated in perpetuity by decree of Muḥammad II (Mehmed, or Mehmet, reg. A.D. 1451-81) and took the name by which it is still known, viz. Ok Meydanı, 'Arrow Field'. In order to commemorate distance records, it is usual for the company of archers to erect at the end of the flight-course stone markers bearing some suitable inscription including the name of the archer and the distance covered. In each range a 'mother stone' marked the first record, in relation to which all subsequent records in that range were specified (cf. Klopsteg, pp. 117-18). In Istanbul as recently as 1964 some twenty or thirty specimens measuring on average between five and seven feet still survived on the Ok Meydanı (G. L. Anderson, 'Turkish Archery', *British Archer*, vol. 16, Dec.-Jan., 1964-5, pp. 150-51).

The widespread use of markers by the Turks is attested (Hein, *Isl.*, XV, pp. 244-45) and would seem to date at the very least from the first Mameluke period, for the *Maydān as-Sibāq* built in Cairo by Baybars I in 666/1267 as the *Maydān al-Qabaq* is almost certainly to be understood as a *flight-shooting field* and not as 'Hippodrome of the Races' as Ayalon supposes (*Scripta*, pp. 38-39). The special marble columns by which it was distinguished and which remained there until 780/1378—some forty years or so after it had fallen into disuse because of the gradual encroachment of buildings on its vast empty expanse—are more compatible with what we know of flight-shooting practice than with horse-racing, and 'flight-shooting markers' seems a much more appropriate translation of '*awāmid as-sibāq*' than Ayalon's 'Columns of Racing'. Lest such an interpretation be doubted, due account should be taken of literary evidence that in 702/1301-2 Amir Sayf ad-Dīn Baktūt in this very area established a flight-shooting record over a distance marked by two marble columns (D<sup>1</sup>, 90a; D<sup>2</sup>, 108a). If Ayalon has erred, his error is understandable since *sibāq* with the sense 'flight-shooting', which it indubitably has in the archer's vocabulary, is not recorded in the standard dictionaries.

#### 6. Flight-shooting Distances

The greatest recorded distance achieved with a hand bow is 972 yards. It was shot by the Ottoman sultan, Selim III, in 1798 and was witnessed by Sir Robert Ainslie, British Ambassador to the Porte. The distance is recorded as 1,400 Turkish pikes, and there is some controversy regarding the exact length of the measure used to determine it. It must, however, be conceded that, even if the smallest accredited equivalent is taken, 953 yards must be admitted (Klopsteg, p. 31; this author devotes a whole chapter to distance records, pp. 15-32). This compares with the modern world record shot in the U.S.A. by H. Drake in June 1967 which stands at 851 yds. 2 ft. 9 in.

These distances have been exceeded in the U.S.A. with the *foot bow*. With this bow the archer lies on his back, feet against the bow, and draws with both hands. In this way a very powerful bow can be used. In the 1966 California State Flight Shoot, Harry Drake shot 1,071 yards, which demonstrates that, given the right equipment, weather conditions, and skill, an arrow can indeed be projected over almost unbelievable distances.

Such ranges as these must not be confused with what could be achieved by the same technique in war. E. McEwen (U.K.) has recently demonstrated that a full-sized, light hunting arrow can be shot over 300 yards with a 50-lb. replica of a Turkish flight bow. We would therefore expect skilled archers, using stronger bows, to have been capable of putting down a harassing barrage at about 400 yards. There are three Turkish steel-headed arrows of the kind used for this purpose in Manchester Museum (Ingo Simon Collection, No. O.7723).

All old Turkish and modern Western records have been established with short flight arrows

shot by means of a *siper*, or extended arrow-shelf. Yet great distances have been covered with long arrows. The Cairene marble columns of which we have already spoken (above, p. 109) apparently recorded the following feat:

The amir Sayf ad-Dīn Baktūr shot here in the Hijrah year 702 [1301-2] in the presence of the Sultan's Viceroy, Chamberlains, a company of Amirs, and a crowd of spectators. Using a bow of 31 *rafts*, Damascus weight [126 lb.], whereof one limb was strengthened, and an arrow weighing 7½ *dirhams* [ca. 345 gr.] and two fingers short of a full length [ca. 28½ in. long], he covered 1,076 cubits, Cairo standard [636 yds.], at a time when there was no wind. Arghūn then shot the course and exceeded the distance, but it was disallowed because of the strength of the bow . . .

So far as we know at the time of writing, this distance is the longest ever shot with a long arrow.

There are two other records with which the distance may be compared. The first is known to us from a third century B.C. inscription from Olbia on the north coast of the Black Sea, now in Odessa Museum. It reads: 'I say that the famous Anaxagoras, son of Demagoras, shot 282 *orguias*' (D. J. F. Hill, 'Grecian and Other Bow-Shots', in *JSAI*, vol. 6, 1963, p. 30). This is a distance of about 564 yards. The second comes from 'The Stone of Jenghiz Khan', a Mongolian inscription now in the State Hermitage Museum at Leningrad. It records that in 1224 the Khan's nephew, Yisüngkä, shot an arrow over a distance of 335 *alda* (fathoms) (W. E. McLeod, 'The Range of the Ancient Bow', in *Phoenix*, vol. 19, 1965, p. 9). The length of an *alda* is controversial, but the distance achieved would appear to have been in the order of 600 yards.

Generally speaking, the best performance is obtained from a short bow when, as in the case of the flight bow, it is used with a light arrow projected at high velocity. A longbow, by contrast, is most effective when used with a heavy arrow discharged at a lower velocity.

#### 7. The Anecdote

The story of the Persian archer is not taken up later as promised. One's first reaction is to suppose that the man from Nishapur was using equipment that was not acceptable to 'orthodox' flight shooters. The point, however, would seem to be that an innocent archer carrying a set of the finest flight-shooting equipment that could be devised at the time was tricked into selling it. The purpose of his using an arrow-guide and sectional arrows will be clear from what we have already said in sections 2 and 3 above. It remains only to remark that although the two lead beads fitted to the bowstring would in fact fractionally retard it when loosed, both archers in question—and probably other contemporaries—were probably under the mistaken impression that a little added weight was an advantage in that it gave greater thrust to the arrow.

## CHAPTER 20

### THE LIST OF THIRTY-FOUR POINTS

Wherein Lie the Secrets of Archery  
As Noted by Certain Great Masters

'An archer does not merit the title and status of master (*ustādh*) until he is truly competent and has perfect control over such parts of the body as should be tensed, relaxed, or still, as the case may be; until he not only has a thorough knowledge of the faults caused by tensing parts that should be relaxed (*tashdīd al-layyin*) and relaxing parts that ought to be tensed (*taḥyīn al-mushaddad*) and allowing movement where stillness is called for (*taḥrīk as-sākin*), but is also fully acquainted with the injuries an archer can sustain together with their causes; until he can appreciate differences of stature, the structure of the limbs, and differences in their length; until he is quite familiar with techniques that can either make or mar a man's shooting, and is conversant with the differences of opinion held by authorities on these matters. In the various parts of the body there are thirty-four points to be considered.<sup>11</sup>

Of these, twenty are points of tension:

In the right arm there are eight:

1. The little finger;
2. The ring-finger;
3. The middle finger;
4. The thumb;
5. The wrist;<sup>2</sup>
6. The elbow;
7. The upper arm;
8. The muscle in the upper part of the forearm.

In the left arm there are six:<sup>3</sup>

1. The little finger;
2. The ring-finger;
3. The middle finger;
4. The wrist;
5. The elbow;
6. The muscle in the lower part of the forearm.

In the body there are six:

1. The right flank;
2. The right shoulder;
- 3 & 4. Each of the shoulder-blades;
5. The spinal column;
6. The belly.



*Eleven are points of relaxation:*

In the *right arm* there are *two*:

1. The index finger;
2. The middle sinew of the forearm.

In the *left arm* there are *three*:

1. The index finger;
2. The thumb;
3. The head of the forearm (i.e. the carpal, or wrist, end of the radius).

In the *body* there are *four*:

1. The left shoulder;
2. The left side;
3. The waist;
4. The neck.

In the *head* there are *two*:

- 1 & 2. The lips.

*Three are points of stillness:*

1. The heart;
- 2 & 3. The eyes.

If a state of relaxation supervenes in any point of tension, or a state of tension in any point of relaxation, the archer will find that certain faults and injuries<sup>4</sup> follow according to the nature of his error. Thus, if tension at any point in the left arm is allowed to lapse into relaxation, pain in the palm of the hand and blistering (*'agr*) of the fingers can result. Slashing of the bow-hand (*infītāq al-qabḍah*) and distressing contusion of the wrist (*taznīd*)<sup>5</sup> arise from the same fault which, apart from causing the bowstring to strike the wrist, also reduces the range of the arrow.

Should the thumb of the left hand be tensed, the proximal phalanx of the thumb will blister. If the index finger of this hand is tensed, the arrow will fly high and miss the mark—a good thing in flight shooting, but thoroughly bad in target shooting. If the left wrist is relaxed, splitting (*shaqq*) of the skin can occur between the thumb and index finger as well as blistering of the arrow-guide formed by the thumb and of the proximal phalanx of the thumb. The grip of the bow will also turn in the hand, and the bowstring twang to no purpose. If the left elbow is relaxed, twisting and tremor (*irtī'āsh*) of the forearm will result, the length of the draw will be reduced (i.e. when the arrow is supposedly at full draw), and traction will be poor. The left shoulder must be relaxed, for if it is tensed, it will move upwards, and the bowstring will strike it. This results in the arrow's slapping the arrow-pass (*tadmīk*) 'with consequent deflection', a wagging arrow (*la'b*), or breakage of the shaft at the fletching,<sup>6</sup> and causes the string to hit the tip of the thumb of the drawing hand.

As regards locking, relaxation of any part for which tension has been indicated can result in broken skin in the locking-fingers<sup>7</sup> and a bruise (*sawād*) on the inside of the thumb and cause the string to hit the tip of the thumb of the drawing hand.

If the right index finger (*shahādah*) is tensed, a bruise will come up on the inside of the thumb, blood will collect under the nail, and the nail will break. Loosing will not be easy, and the string will rap the end of the right index finger. If the right wrist is relaxed, pain will occur there, and traction will be poor.

If the right elbow is relaxed, creeping (*zaqq*) will result, the elbow will drop, and the arrow fly high (?; the contrary is true) and away from the mark. If the right upper arm is relaxed, the bowstring may come away from 'the base of' the nock,<sup>8</sup> the shaft will slap the arrow-pass

(*dimak*), the arrow gad at the end of its course, and the bowstring rap the forearm 'and chest. If the right shoulder is relaxed, the length of the draw will be shortened, accuracy diminished, and the bowstring will rap the chest'.<sup>9</sup> Other results will be a sluggish loose (*futūr al-īlāq*) and loss of range.

If the neck is tensed,<sup>10</sup> the effect will be tremor. If the lips are tense, there will be distortion of the archer's expression. The eyes should be still, for if they are strained, they will stray and go out of focus. The back must be straight and firm, for if it is relaxed, stooping (*inhinā'*) will result, traction will be poor, the bowstring will rap the chest, and the arrow will gad at the end of its course. If the left side is tensed, the arrow will fall short, and traction will be poor. If the belly is relaxed 'and allowed to protrude,' hernia (*infītāq*) can result. If the waist is tensed, there will be loss of range, the chest will protrude, and the string catch the archer's beard. The heart must be calm, for if it is preoccupied with anything but shooting, the whole operation will be labour in vain.

## COMMENT

Points of tension and relaxation are of vital importance to good shooting. The requirements vary with the archer's technique, which, in turn, varies with the purpose to which the bow is put. The style of shooting known as the *tension method* was that of the longbow both in the days when it was still a weapon of war and long after it had ceased to be such and archery had become a pastime. The emphasis lay on firmness in all actions and a tight grip on the bow (*Archery* (*Badminton*), Ch. xx, pp. 331-83). With the improvement of bow design a major change in technique followed the development of modern target bows, and the *relaxed method*, in which every possible tension was avoided, became the vogue. In particular, the archer was to grasp loosely, relax the wrist of his bow-hand, and keep his knees at ease. In more recent years, however, there has been a tendency to attach greater importance to tension. A straight wrist, for instance, is now widely favoured, and archers in general have adopted a *semi-tension method*. There are, of course, many individual variations (on which, see Elmer, *Target Archery*, pp. 415-21).

Contemporary shooting technique closely approximates to that advocated by Ṭaybughā. If we except the manner in which the drawing hand is applied to the string (above, p. xxv), the only major difference—for the present at least—is the grip on the bow. Pushing the bow away from them with the fork between thumb and index finger, many archers now shoot with an open hand and wear a strap on the wrist to prevent the bow from falling as each shot is completed.

In much the same way as Ṭaybughā, Muṣṭafā Kānī furnishes his readers with a list of thirty-four points requiring tension, relaxation, or stillness, as the case may be. Although strikingly similar to our author's list, it is by no means identical with it. It has been adapted to meet the needs of the Ottoman flight archer who not only used the *siper* (Fig. 40), but also built up the grip of his bow with a strip of wax-impregnated linen termed *mushamma'* (Klopsteg, pp. 71-73 and his fig. 35). Of these, the first required him to put a slight arch on his wrist as viewed from the side, while the second provided the additional support needed by the hand and wrist to maintain a correct and unvarying grip on the bow. Understandably, Muṣṭafā Kānī takes account of this and other factors and adapts his list of points accordingly. Two of his details may be singled out. Firstly, it should be noted that whereas it may be correct for a flight shooter to hold his jaw well into his left shoulder with neck tensed (*Isl.*, XV, p. 236), the same technique would be wholly incorrect in target shooting or on the battlefield. The second detail worthy of note is that Muṣṭafā Kānī extends his points of stillness to include the lungs. Correct breathing, of which Ṭaybughā surprisingly says nothing, is a very important point and applies to *all* forms of archery. Its importance was particularly recognized by the Japanese (Acker, *Japanese Archery*, pp. 42-48).

The present chapter and the next are closely related. Every archer will have experienced

certain inconsistencies developing from some kind of fault or will have sustained injuries—mostly minor—caused by some error in technique. Although he may well be aware that his shooting is marred by a fault, he may find it extremely difficult to determine its nature without the aid of a competent coach or some other person qualified to subject his every action to technical scrutiny. It is obviously of great value to the archer who knows that his technique is defective to be able to check the various possible causes against a simple list of the kind contained in our treatise. In this way he can be sure that nothing has been overlooked.

In *Arab Archery*, in which seven chapters (xxii–xxviii) are devoted to errors and their remedies, the subject is handled differently. A specific result of some fault, such as the string's hitting the forearm, is taken and its possible causes then discussed. Though perfectly adequate, the treatment is not as detailed or comprehensive as Ṭaybughā's, and there is little to be gained from an exhaustive comparison.

The MSS of groups CD offer a slightly different version from that in our text. The main difference is that the list embraces only thirty-two points. Taken as a whole, the differences are so slight as to be of little account.

## CHAPTER 21

### ON FAULTS AND INJURIES TO WHICH ARCHERS ARE EXPOSED

Injuries sustained by archers fall into five groups:

1. Rapping 'of parts of the body with the bowstring' (*tarq*);
2. Blistering (*aqr*);
3. Splitting 'of skin and nails' (*shaqq*);
4. Tremor (*irtī āsh*);
5. Blue bruising (*zurqah*).

*Rapping* occurs in eight places:

1. The wrist (left);
2. The upper arm (left);
3. The shoulder (left);
4. The cheek (right);
5. The chin;
6. The nipple (left);
7. The end of the right index finger;
8. The tip of the thumb (right).

*Blistering* occurs in five places:

1. The fingers of the bow-hand;
2. The arrow-guide 'formed by the thumb';
3. The distal phalanx of the thumb (right);
4. The 'lower' half of the distal phalanx<sup>1</sup> of the right index finger;
5. The base of the right index finger (i.e. just in front of the knuckle-joint).

*Splitting* occurs in four places:

1. Between the thumb and index finger of the left hand;
2. In the proximal phalanx of the thumb (left);
3. Down the thumb-nail (right);
4. Across the thumb-nail (right).

*Blue bruising* occurs in three places:

1. The tip of the right index finger;
2. 'The pad (*kulwah*) of the right thumb';<sup>2</sup>
3. Under the nail of the right index finger, the size of a lentil.



*Tremor occurs in four places:*

1. The right arm;
2. The left arm;
3. The entire body;
4. The head.

*Rapping of the 'left' wrist results from eight causes:*

1. Slackness of the grip-fingers;
2. Slackness of the wrist;
3. Protrusion of the shoulder;
4. The internal draw (below, p. 120);
5. Too long a bowstring;
6. Squatting obliquely in the case of an archer with a deep chest;
7. Too long an arrow;
8. Too strong a bow.

*Six faults and mishaps result from all this:*

1. Wagging of the arrow in flight;
2. Diminished accuracy;
3. Reduced effectiveness;
4. Loss of range;
5. A snapped bowstring;
6. A cut sleeve.

*Rapping of the 'left' upper arm arises from five errors:*

1. Inversion of the cupping-point (*inqilāb al-fiṣād*;<sup>3</sup> below, p. 120);
2. The internal draw;
3. Squatting obliquely;
4. Lifting the shoulders.

*Four faults can result from this:*

1. Low flight (*taṣwīb as-sahm*);
2. Diminished accuracy;
3. Loss of range;
4. Reduced effectiveness.

*Rapping of the 'left' shoulder arises from four causes:*

1. Overdrawing (by misjudgement where the archer's arrow is too long for his bow);
2. Protrusion of the shoulder;
3. Excessive obliqueness in posture;
4. Too strong a bow.

*Six results follow from this:*

1. Low flight;
2. A cut sleeve;
3. Slapping of the arrow-pass 'with consequent deflection' (*tadmik*);
4. A broken shaft;
5. A wagging arrow;
6. Diminished accuracy.

*Rapping of the right cheek arises from three errors:*

1. Bending the neck sideways;
2. Overdrawing (in the sense indicated above);
3. Squatting obliquely in the case of an archer with a short neck; for when such a person adopts this position and draws, he inclines his head, and the bowstring strikes his cheek, especially if he has a scanty beard. A short-necked person should not, therefore, sit obliquely (Ch. 22). A squatting position directly facing the mark is the only position suitable for such a person.<sup>4</sup>

*Rapping of the chin/beard arises from six errors:*

1. Squatting obliquely in the case of an archer with a short neck;
2. The internal draw;
3. Too long an arrow;
4. Tensing the neck;
5. Tensing the waist;
6. Too strong a bow.

*Rapping of the nipple arises from four causes:*

1. Squatting obliquely;
2. The internal draw<sup>1,5</sup>;
3. Close proximity of the bowstring to the chest;
4. Excessive dropping of the 'right' elbow.

*Rapping of the right index finger arises from two causes:*

1. Tensing it on the thumb at the draw;
2. Its being slack at the loose. Any person with long fingers should keep his right finger away from the bowstring (i.e. to the right of it).

*Rapping of the thumb arises from two faults:*

1. The tip of the thumb being held limply on the middle phalanx of the middle finger at the draw;
2. A sluggish loose.

*Blistering of the fingers of the left hand arises from four causes:*

1. Slackness of the grip-fingers;
2. Too thin a grip;
3. Grasping incorrectly;
4. The flesh on the palm gathering up under 'pressure from' the belly and the *matn*; for when one looses and follows through with a forward and downward thrust and the grip pinches<sup>6</sup> the flesh of one's fingers, it results in diminished accuracy, reduced effectiveness, and loss of range.

*Blistering of that part of the thumb which guides the arrow (majrā) arises from eight errors:*

1. Pinching the nock (*hhaṇq al-kāz*) and pressing too heavily on the nockpiece (*kabb 'alā l-fūq*; below, p. 120);
2. Downward displacement of the nocking-point;
3. Drawing upwards and loosing downwards;
4. Too wide a nock;
5. Too narrow a nock;

6. Too square a grasp (so that the wrist is brought too far round to the right) and tension of the thumb;
7. Predominance, and consequent distortion, of the leg of the bow (because of its greater strength);
8. A crooked arrow.<sup>7\*</sup>

*Splits across the thumb-nail arise from four causes:*

1. Having the thumb slack when drawing, and fastening the right index finger over its tip;
2. The tip of the thumb being off the middle finger;
3. Locking with the tip;
4. Releasing the thumb before the right index finger. This fault can be eliminated by loosing with the right index finger without opening the thumb 'until afterwards?'.<sup>1</sup>

*'Splits down the nail' arise from five causes:*

1. Opening the little finger;
2. Having nothing under the thumb to hold it in check;<sup>2</sup>
3. Freeing the bowstring under the distal phalanx of the thumb;
4. Fastening the tip of the right index finger on the thumb;
5. Twisting the side of the thumb upwards, thus causing wear and tear on the side of the nail with resultant splitting. The fault may be corrected by tensing the three appropriate fingers, placing the tip of the thumb on the middle phalanx of the middle finger where it should be held straight and tense, relaxing the right index finger, and releasing with the latter before the thumb.<sup>1</sup>

*Blue bruising of the pad of the thumb arises from two causes:*

1. Its being rapped by the bowstring;
2. Its being left too free.

*Blue bruising of the tip of the right index finger arises from the following cause:*

Loosing with the finger bent with the result that it is caught by the string when loosed. This fault can be eliminated by keeping the index finger outside (i.e. to the right of) the bowstring when locking.

*Blue bruising under the nail arises from four causes:*

1. Shortness of the fingers;
2. A relaxed thumb on the middle finger;
3. Putting only the very tip (*tatrif*) of the index finger on the thumb;
4. Tensing the index finger over the tip of the thumb.

*Tremor arises from two causes:*

1. Relaxation of the elbows and shoulder-blades;
2. Tension in the neck.

The elimination of all these faults and their attendant ills can be achieved by the application of reverse procedures. Thus, if tension in any part of the body is the cause of the trouble, relaxation is the remedy, and if relaxation is the cause, tension is the cure. If an oblique squatting position (*qu'ud at-tatrif*) is the cause, the mark should be faced directly. If too strong a bow is the cause, the archer must shoot a bow to match his capacity, and if an arrow is too long for him, he should draw only as much of it as his limbs will take, and so on.

There is no mystery about this sort of thing, and so, for the sake of brevity, we have not always

indicated the remedy for each fault as it has arisen. All an archer need do is to follow faithfully the advice contained in our poem (above, p. 4) since it incorporates all the good advice he needs, and those who turn to it for guidance and put its counsels into practice will acquire nothing but good habits and immunity from the faults and injuries mentioned above. I have in fact only dealt with the subject by way of supplementing my commentary.

## COMMENT

### 1. The List of Faults and Injuries

Dreary reading though it may be, a methodical list of faults and injuries such as that arranged above is useful to the archer who lacks the tutored eye of a master to spot the cause of some injury or misplaced shot. To check each of the possible causes of his trouble against the list would be a relatively simple task which could be followed by attempts to remedy the fault.

As in the case of the previous chapter, Muṣṭafā Kānī produces a list closely resembling that of Ṭaybughā, but, again, because of his preoccupation with Ottoman flight shooting and the need to take into account the use of the thumb-ring, *mushamma'*, and *siper*, his treatment of the subject does differ in certain respects (*Isl.*, XV, pp. 237-40). It might justly be argued that Ṭaybughā would have done well to comment here on the effects of ill-fitting thumb-guards, for although he himself would appear to have shot with a bare thumb (above, p. 34), he is clearly aware, as we have already seen in Ch. 6, that many archers need such protection. In CD the omission is in fact made good (C<sup>1</sup>, 65a-66a; C<sup>2</sup>, 104b-105b; C<sup>3</sup>, 54b-55b; D<sup>1</sup>, 47b-48a; D<sup>2</sup>, 71b). Here we are told that a guard that is too tight or has too long a lip will split the thumb-nail, and that when the thumb is bent, it will, if the guard is too tight, suffer constriction and go black, or its pad will turn blue, or else it will be rapped by the string.

### 2. Injuries to the Drawing Hand

Without complete mastery of the thumb-lock it is difficult to appreciate fully some of the finer points of a subject in which it is largely a question of fractional deviations in the relative positions of the thumb and index finger. There can nevertheless be no doubt that what suits one hand may not suit another, and that results are the only true criterion of right and wrong. When learning the Oriental technique, the archer must bear this in mind and patiently experiment until he finds by sheer trial and error the position most suited to his needs. What is clear and at the same time universally applicable is that the thumb must be firmly lodged against the middle phalanx of the middle finger. Otherwise, there will be—in the author's own words—'nothing under the thumb to hold it in check' (p. 118).

A fault liable to cause splits down the nail results from twisting the side of the thumb upwards (Fig. 41). With his thumb in this position the archer is also liable to pinch the nock of his arrow and allow his index finger to exert undue pressure on the tail. A number of illustrations which have so far appeared in various publications show thumb-locks that are faulty by Ṭaybughā's teaching. M. E. Elott, for instance, presents as the Korean lock what we style 'wrong' in our Fig. 41 ('Technique of the Oriental Release', *Archery*, Dec. 1962, p. 18). Since this author studied under a Korean instructor, it may well be that the Koreans' view on the subject differs from that of our author. Alternatively, it could be that the latter means not so much that the lock in question is wrong as that it is conducive to the commission of certain errors. Again, both Elott and R. Willcox curl the tip of the index finger around the thumb (Elott, *ibid.*, and R. Willcox, 'Something about the Thumb Ring', *TAM*, Nov. 1962, p. 16). In spite of our author's warning that it is a fault that will result in spasm (*kuzzāz*; above, p. 51), Willcox nevertheless appears to find it no impediment to successful shooting. Technically more orthodox by our standards, on the other



hand, is the lock illustrated by Faris and Elmer, though the position of the thumb-tip, which rests against the joint of the middle finger instead of the phalanx, leaves room for criticism. (Misinterpretation of the Arabic 'uqdah as 'joint', a sense which it usually has, may account for the error).

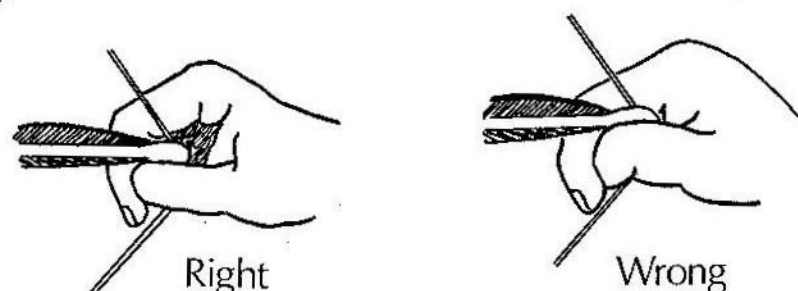


FIG. 41. TWISTING THE THUMB

### 3. 'Inversion of the Cupping-point'

This is clearly the fault whereby the left elbow, as viewed by the archer with arm outstretched, is allowed to twist round in an anti-clockwise direction. The result of the fault is that the point of the elbow drops from the horizontal, and the arm curves inwards towards the path of the string with the consequent danger of its being hit. The prominent vein (termed the 'basilic') which runs from the bend of the elbow upwards along the inner side of the upper arm may well burst open under the impact. The basilic vein is generally that opened for blood-letting, hence the reference to the 'cupping-point'.

### 4. The Internal Draw

Rapping, by which is meant the action of the bowstring in striking some part of the person, is caused by (a) the encroachment of any part of the body upon the path of the string, and (b) what the author terms the internal draw (*al-madd al-juwvānī*). The second of these two causes requires some explanation. What happens is that the archer, instead of drawing the string directly to his face, first draws it closely along the inside of his left arm and then sharply deflects the path of his drawing hand outwards across his face. With a tight grip such as he should have on the handle he is sure, in this event, to put a twist into his bow. Consequently, the string, when loosed, will not only travel forward, but it will also spring over to the left and thus be liable to strike the arm or wrist.

In passing we may mention that with the Mediterranean loose, or three-finger draw, used by most of the old European bowmen as well as by modern Western archers, the wrist is commonly struck. For this reason a bracer, or arm-guard, should always be worn as the arm may be lightly hit even when a shot is correctly executed. With the thumb-lock, on the other hand, a bracer is not needed since the arm is never struck unless there is some fault in technique.

### 5. Sounds Emitted by Equipment

The variant reading *taṣwīb as-sahm* ('emission of sound by the arrow') for our *taṣwīb as-sahm* (p. 116) poses the problem of deciding which of the two is more acceptable. *Prima facie*, the former seems preferable to the latter, especially since we would normally expect *taṣwīb as-sahm* to mean 'directing the arrow straight at the mark', a sense which it clearly cannot have in the

context. But what sounds are emitted by an arrow? There is only one sound, and that is produced when the shaftment strikes the arrow-pass as it leaves the bow, the cause being either the use of unsuitable or defective equipment, or an error on the part of the archer. More precisely, it is caused by 'twisting the grip on loosing, a bad grasp, pinching the nock' or by 'too big a loop, or a bad arrow that is defective either because it is too thin or of too weak a wood or roughly cut in the making' (C<sup>1</sup>, 66a-b; C<sup>2</sup>, 106a-b; C<sup>3</sup>, 55b-56a, etc.). Practical trials so far completed suggest that the archer's errors said by our author to result in *taṣwīb as-sahm* do not result in the emission of any sound, but rather in low flight. We therefore retain *taṣwīb* and take the expression to mean 'causing the arrow to fly low' (from lack of initial velocity) on the basis of the senses 'to lower', as of the head, and 'to descend' indicated for forms II and V respectively of the Arabic root from which *taṣwīb* derives.

### 6. 'Predominance' of the Lower Limb

'Predominance of the leg of the bow' (p. 118) is the best translation we can offer of the words *qiyām riḡl al-qaws*. It is a difficult expression with which Faris and Elmer had also to come to grips (*Arab Archery*, p. 72, n. 29). The sense, on the other hand, seems to be fairly clear. The implication is that the lower limb of the bow is the stronger. Under these circumstances the lower limb travels faster than the upper when the bow is loosed, and at the instant the arrow leaves the string the nock is too low in relation to the thumb of the bow-hand, thereby causing the shaft—propelled by uneven thrust—to rub too much against the thumb. A composite bow can develop such a fault even though both limbs were correctly balanced at the time of manufacture. It can be easily corrected by heat treatment (above, p. 99), as we have proved by experiment.

## CHAPTER 22

## ON ADJUSTMENTS REQUIRED BY DIFFERENT PHYSIQUES

Men vary in body and structure. They are of tall stature with long arms, long neck and big chest, or of short stature with short arms and short neck. Or, they may combine different characteristics of the two extremes. Thus a tall man might have long arms and a small chest, or short arms and a big chest, and so on, according to somatic differences which it would take too long to go into. Sizes, at any rate, do vary, and, since this is so, there are different methods of shooting;<sup>1</sup> for each of our predecessors in archery<sup>2</sup> took up whatever lay within his own physical capacity and made no attempt to perfect that of which he was incapable. Each of them, therefore, commended whatever was within his capacity and limits of attainment and regarded it as right, at the same time condemning all else.

Most masters (*ustādin*) hold that the tall man with all the perfect characteristics of such should grasp squarely because of the length of his fingers and the size of his grasp. It is the finest grasp. They say that everyone with a long arm-span, long neck, and slight beard should squat obliquely (*yaq'ud munharifan*) so as to set the target in line with his left shoulder and that he should grasp squarely. What the archer does in this case is to place the *matn* (here 'mid-line of the grip's dorsal surface'; above, p. 45) of his bow's grip in the middle crease of his little finger, ring-finger, and middle finger, and in the distal crease of his left index finger.<sup>3</sup> He then tucks the *ibranjak* (here, evidently, 'belly of the grip'; but see Glossary) in to a point the width of two fingers away from his wrist-bone, at the same time tensing the bottom three fingers and relaxing the other two. The index finger is then wrapped over the back of the grip (*matn*), and the thumb placed on top of it pressing squarely against the grip. Once in this position, the tip of the thumb should be neither above nor below the level of its own base. He next locks '69' and tenses the bottom three fingers of this hand, keeping the index finger outside (i.e. to the right of) the bowstring and placing the nock so that it is two-thirds of the way along the proximal phalanx of the index finger. Sighting outside the bow with both eyes together, he draws on the point where the tuft of hair grows between the lip and chin, and then right back to the lobe of the ear. 'This draw is the *misāh* (see Comment).'<sup>4</sup> They say this is the method of Abū Hāshim.

It is taught that a person with short arms and fingers, short neck, big beard, big chest, and fat hands should squat facing the mark squarely and grasp obliquely. What the archer does in the case of the oblique grasp is to place the *matn* of his grip in the proximal crease 'formed by the bottom three fingers' and the distal crease of the left index finger. He then tucks the *ibranjak* in to a point the width of one finger away from the wrist-bone. The rest of the procedure is as described in the case of the tall man, except that the tip of the right index finger is kept inside (i.e. to the left of) the string, the nock of the arrow resting at the bottom end of the proximal phalanx of the index finger. The archer then aims with both eyes inside the bow and draws on the cheek. This is the *bayād* (see Comment) because it is the opposite of that of the tall person.<sup>5</sup>

Now, a tall man with long fingers grasps squarely owing to the length of his fingers and the width of his hand, in order to prevent his finger tips from touching the heel of the hand. On

account of his long neck he squats obliquely, and because of the length of his right index finger he keeps it outside the bowstring. The short man, on the other hand, squats directly facing the mark because of his deep chest and short neck and grasps obliquely on account of his short fingers. He squats in the frontal position to avoid striking his beard with the bowstring, and he draws on his cheek because of the shortness of his neck. He looses without any downward and forward thrust as he follows through (Ch. 14) because his posture as he squats directly facing the mark is not consistent with such a movement. Once his arrow is drawn, his draw is *bayād* because of the shortness of his arm-span. For Jamshīd says in his book<sup>6</sup> that, as regards the grip, there are three positions (*manāzil*) 'for the arrowhead': the lesser, the greater, and the injurious (*bidāyah*, *nihāyah*, *nikāyah*, respectively; lit. 'initial, final and injurious points'). His maxim is, 'Give the tall man the lesser, which is the draw at its shortest (*awwal wafā*'), or 'wiping the fist' (*misāh*<sup>a</sup> *l-qabḍah*). Give the short man the greater, which is the *bayād*, or ultimate (*tāmm*)' (below). He allows the latter to let his elbow sink down.'<sup>7</sup> This is the method of Ṭāhir al-Balkhī.



FIG. 42. STANCE: OBLIQUE AND SQUARE

(a). Used by tall man.

(b). Used by short man.

The archer of medium build adopts an intermediate squatting position between the oblique and frontal so that he has the target in line with his collar-bone.<sup>8</sup> He also adopts a grasp that lies between the oblique and the square. What he does is to place the *matn* of the grip in the middle of the proximal phalanges<sup>9</sup> half-way between the middle and proximal creases. The *ibranjak* of his grip he places at a distance from the wrist-bone that would amount to the width of one and a half fingers. When nocking, he locks '69' on nock and string and allows the bowstring to bisect the end of the right index finger. He sights with the right eye inside the bow and the left outside, and then draws on his mouth right to the lobe of his ear, the draw in this case being termed *misāh bayād*. He follows through with a forward and downward thrust of the bow-hand and twists with the other, but in both cases executes only half the full movement. This, then, is the intermediate method, which is that of Ishāq ar-Raffā'.<sup>10</sup>

Masters of olden times are quoted as saying that a master (*ustād*) cannot be such until he can lengthen the short and shorten the long. Shortening the long (*taqṣīr at-tawīl*) means that the archer grasps squarely and, by so doing, shortens his fingers in such a way that their tips do not reach the heel of the hand.<sup>11</sup> Lengthening the short (*taṭwīl al-qasīr*)<sup>12</sup> means that he grasps obliquely and so lengthens his fingers to go round the grip in the appropriate manner. They likewise taught that the farthest point to which an archer should reach when drawing should be the point at which the distal phalanx of his right index finger comes to rest beneath the lobe of his right ear. When he looses and, bringing his right hand into operation, opens the right index finger, its nail should come to rest beneath the lobe of his ear. This goes for tall, short, and medium persons alike.

A person with a short neck should squat in the frontal position. The same applies to a person with a protrusive chest and, again, to a person with a big beard. Every person with any single one of these characteristics should face the mark directly whether squatting, standing, or riding. A person with a long neck, high, unprotrusive<sup>13</sup> chest and small beard should squat obliquely. The oblique position also applies to standing and riding. If a man's fingers are short and his palm



is long, he should square his palm and slant his fingers. If, on the other hand, his fingers are long and his palm is short, the palm should be slanted and his fingers squared.

There are also three positions (*manāzil*) on which to draw. The tall man should draw on the tuft of hair between his lower lip and chin, the short man on his cheek, and the man of medium build on his mouth. It has been explained that the limit to which the draw should be taken is marked by the lower extremity of the ear, which means to say that when one looses, the nail of the right index finger should lie beneath the lobe of the ear. This is the soundest pronouncement on the subject and a much-needed piece of advice which men will do well to heed, particularly those who are serious practitioners of the art and are called 'master'.<sup>14</sup>

Now, it is my humble opinion that since archery came into existence its essential purpose has been to inflict injury upon one's enemy, and the greater the power and strength of the bow and the longer the arrow, the greater the injury inflicted. It is our opinion then that if the archer takes up an oblique position (*inḥarafa*) with the mark in line with his left shoulder, he will develop more powerful traction since the joints of the left arm can be locked more or less in a straight line in the same horizontal plane with each bone supporting the other. The forearm will then be firm enough to take the weight of the bow, and it will accordingly attain its maximum power. Furthermore, if the draw is 'correctly'<sup>15</sup> executed from this position, a longer arrow can be used. To recapitulate: for the reasons we have explained the archer who uses this technique will not only shoot more powerfully than an opponent who does not, provided, of course, that both persons are equally strong, but he will also draw a longer arrow which will be more effective against an enemy adopting a different method.

The archer who, on the other hand, faces the mark directly—by which is meant one who puts his face squarely to the mark—will experience impairment of traction because when he comes to draw, he will bend his left arm in front of his face. His arm, therefore, will turn and come in upon itself and, in so doing, weaken, thereby impairing his traction and leaving him no alternative but to draw a short arrow. The result of all this will be a reduction of his effectiveness. An archer should, then, shoot according to the first technique if he can do so. The reason for this lies not only in the factors we have already mentioned as affecting the strength and power of the bow and the length of the arrow, but also in the fact that a combatant enters the fray with his left side

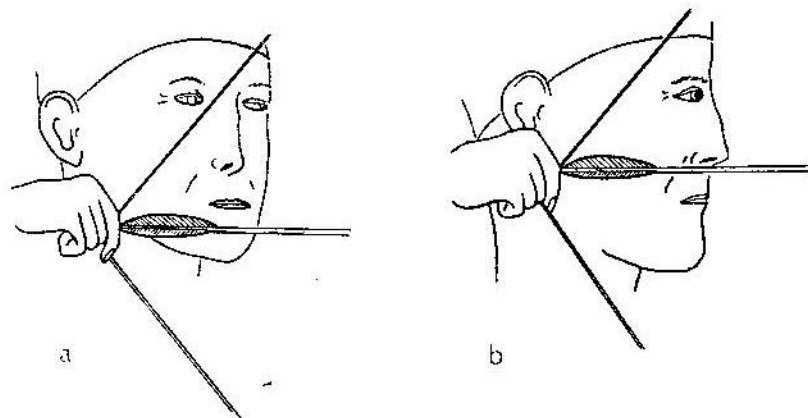


FIG. 43. DRAWING: OBLIQUE AND SQUARE  
(a). Tall man draws to point of jaw. Lock '69': square.  
(b). Short man draws to lobe of ear. Lock '69': oblique.

'because it enables him to shoot the enemy from under his shield without exposing himself to the foe'.<sup>16</sup> This way of shooting, however, can be difficult, and, in fact, cannot be practised<sup>17</sup> by persons with certain physical characteristics. This is especially true in the case of a man with a protrusive chest, short neck or big beard, 'for such a person must, as we have said, face the mark directly'. I myself have heard some archers condemn the technique and thoroughly disapprove of it on aesthetic grounds, saying that it is the Persian manner of shooting.<sup>18</sup> But to condemn it is very much a mistake on their part because the main object is not an elegant appearance but the effectiveness of the weapon in repelling the enemy.

The intermediate method gives much the same degree of effectiveness as the oblique and is universally acceptable.<sup>19</sup> The rule for its adherents will, then, be the intermediate, which conforms to the Apostle Muḥammad's dictum: 'In all things the best policy is the happy medium.'

It is my opinion that any man whose limbs are in due proportion, whose neck is long and supple, and whose chest is not protrusive, can exercise greater freedom of movement and action in shooting than anyone else. The closer he is to obliqueness, the stronger the bow he can draw and the longer the arrow. Any man with disproportionate members, no matter who he is, will fall short of perfection according to the measure of his disproportions. Exactly the same thing applies in the case of enterprise and intellectual capacity, both of which must be commensurate with physical potential. For a man of limited enterprise cannot equal a highly enterprising and intelligent individual. On the contrary, in nothing will he come anywhere near him, even though his members may perhaps be what they should.

Weapons of war must be exactly suited to the members of those who use them. Since this is so, the principle is all the more right and proper when applicable to the bow because of its proven superiority over all other weapons; for it is even as the Prophet said when bows were mentioned in his exalted presence, 'No weapon has ever done better (sc. for the cause of Islam) than the bow.' Any man of intelligence and experience, then, should have a bow to suit his limbs, as advised in our poem,<sup>20</sup> and the same applies to the arrow. If, for some reason, he cannot attain perfection he should endeavour to get as near to it as possible. Since a man cannot change the way in which human limbs are created, he should turn his attention to adapting his weapons to the requirements of the limbs which he has, because anything that is man-made can easily be altered. To have an archer adjust his weapons to suit his limbs is a more sensible and easier policy than to tax him beyond the capacity of his members. If a man has a large palm and long fingers, we tell him to grasp squarely to enable him to grip properly. If his fingers are too long,<sup>21</sup> we tell him to thicken the grip of his bow either by a fundamental structural alteration or by affixing a piece of leather as indicated earlier (p. 9). This is a more sensible course than to assume the difficult task of changing his natural grasp because of the slenderness of a bow's grip, which can be altered and adjusted, or even be entirely rebuilt. This is the easier and more profitable policy. A man with a small hand can be advised to adopt the reverse procedure. We tell him to grasp obliquely,<sup>22</sup> and if his fingers are short, we tell him to narrow the grip of his bow. To enable a man with a long and supple neck to sight correctly, we tell him to sight outside the bow and gauge in that position. We need press the point no further since we have already said enough to enable a man of sound understanding and good common sense to grasp our meaning.

## COMMENT

### 1. Basic Considerations

This useful chapter summarizes the teaching expounded earlier in the work and introduces the reader to certain important aspects of advanced technique. The novice, once having mastered the basic methods in which he has been trained, is ready to proceed to the development of an individual style of shooting. The pattern of progression is as valid today as it was in the time of



Ṭaybughā. When he first learns to shoot, the beginner experiences a sense of awkwardness and is more often than not confused by his attempts to memorize all the various details essential to sound performance. With practice most points become a matter of automatic behaviour, and when some degree of proficiency has been attained, he is almost sure to feel the need for certain minor variations. He should be encouraged to satisfy this need under the watchful eye of a competent master who will prevent him from developing some radical error which at a later stage it might be difficult to correct. A good master thoroughly familiar with all possible variations should quickly perceive his pupils' problems and advise them to take up certain styles calculated to bring them to a mastery of their art.

The need for variations arises almost entirely from the physical characteristics of the individual archer, and, as Ṭaybughā so rightly observes, no two men are exactly alike. Basically, it is not unreasonable to consider, as Ṭaybughā does, the two extremes, between which limits wide variations can be found.

## 2. The Draw

In shooting a bow the archer has what amounts to a foresight formed by the combination of the arrow's point and the side of the bow. The manner in which he uses this sight depends on whether he aims 'inside' the bow or 'outside', but in either case there is a definite object to be aligned with the target. A trained archer may not be conscious of what he is doing, and it may even be said that alignment of his sight should be a reflex operation. Since there is no backsight, it is essential, for the attainment of constant direction, that the tail of each and every arrow always be drawn to the same point. If the point is allowed to vary, the line of the arrow in relation to the line of sight will also vary, and shooting will of necessity be erratic.

The modern archer positively 'anchors'—to use the accepted technical term—his drawing hand either under his chin or against the side of his mouth according to his adopted technique. There are many variations, but what is essential and common to all is that the archer should feel his drawing hand firmly pressed into place in the chosen position. This method of anchoring is relatively modern and has been successfully developed over the last century or so. By contrast, there is the traditional Japanese technique whereby the drawing hand is brought back beyond the head and roughly above the point of the right shoulder. In this case there is no positive lodgment of the hand. A constant position can nevertheless be achieved by the shaft's lightly touching against the cheek, and with practice an unvarying length of draw is attainable. The Mameluke technique with which we are here concerned seems to be more akin to the Japanese than to that of the modern Western archer. In other words, there appears to be no anchor as understood by the latter. However, that may be, 'anchor' is a convenient term to apply to the position of the drawing hand at the moment of loosing, and for this reason we shall use it in the present context in that sense.

## 3. Anchoring

'Drawyng to the eare he [Homer] prayseth greatly, whereby men shoote both stronger and longer: drawynge therefore to the eare is better than to drawe at the breste . . . Holdynge must not be longe, for it bothe putteth a bowe in ieopardy, & also marreth a mans shoote . . . (Ascham, p. 105).

Drawing to the lobe of the ear is commended by the author of *Arab Archery* as a time-honoured practice compatible with accurate and effective shooting, and drawing to the white spot between the lobe of the ear and the beard is declared to be almost as good (p. 51). Neither of these choices, however, he regards as the best. On the contrary, he advocates drawing to the end of the right jaw-bone and running the arrow along the lips or moustaches.

Whatever the options open to the individual, there is one rule from which the archer should not depart if he is to draw a strong bow: he must not anchor at a point below the level of his shoulders. For military archery the ear has always been a favoured position. To draw to the ear does not necessarily imply that the hand should be in contact with it, but rather that it should be brought back as far as the limit set by the ear. Contact was not always made by the drawing hand, and, in fact, the anchor-point often lay below the lobe as it was obviously to do in the case of Ṭaybughā's tall man, whose shaft would be drawn at a level half-way between lip and chin until the drawing hand came as far back as the lobe of his ear. It is not stated that at this stage the shaft should lightly touch the face, or that some part of the drawing hand should be in contact with the jaw or neck. Nevertheless, something of the kind would seem to be a highly desirable, if not necessary, safeguard against any lateral variation in the position of the arrow's nock. It should also be noted that the tall man would need to have his head turned slightly to the right of his line of sight in order to shoot in comfort (Fig. 42a).

At the other extreme, the short man is advised to draw with the shaft at a level which would be roughly that of the tip of his nose. Since he is to stand or squat squarely, he can face the target directly, but this attitude will prevent him from setting his shoulders in line with the mark. It naturally follows that he must angle his left arm at the shoulder as he trains his bow on the target. Angling of the arm in this way will not only prevent him from exploiting his strength to the full as the tall man can do, but it will also affect his method of gripping the handle over and above the degree to which it is already affected by adjustments necessitated by the physical dimensions of his hand (Fig. 42b). For the rest, the anchor-point of his drawing hand will be on, or near, the lobe of his ear.

## 4. Terminology

The enigmatic vocabulary used to denote the various positions of the draw presents a problem to which the best solution seems to be that which we are about to propose. Based on a careful study of all relevant details known to us at the time of writing, it takes account not only of information contained in our Chapters 11 and 23, but also of data located as follows in CD: (i) C<sup>1</sup>, 44b; C<sup>2</sup>, 73a; C<sup>3</sup>, 36b; D<sup>1</sup>, 32a; D<sup>2</sup>, 59b; (ii) C<sup>1</sup>, 73a-b; C<sup>2</sup>, 116a-117a; C<sup>3</sup>, 61a-b; (iii) C<sup>1</sup>, 68a-69b; C<sup>2</sup>, 109a-111b; C<sup>3</sup>, 57a-58a; D<sup>1</sup>, 49a-51a; D<sup>2</sup>, 73a-74a.

The need for brevity precludes here the scrutiny of minutiae. Certain observations must, however, be made. Firstly, in certain fundamental respects the evidence of (i), into which textual corruption almost certainly enters, directly contradicts that of (ii), which more closely agrees with what our accepted text of the present chapter has to offer. Secondly, in one important respect, viz. the expression applicable to the draw prescribed for an archer of medium proportions, the evidence of (ii) is in conflict with that of (iii), and, in fact, the same discrepancy—*bayād* in the one case as against *sawād* in the other—will, upon comparison of the present chapter with the next, be found to exist in our own text. Thirdly and lastly, from the literature of which we have first-hand knowledge we can only conclude that certain archers or authors, or both, either used identical terms in different senses, or else misunderstood or misapplied their terminology, or give the appearance of having done so, because of changes in usage or extensions of meaning.

Whatever the uncertainties of interpretation in respect of particulars, it is our opinion that from a general standpoint there are two classes of terminology to be distinguished: (a) that pertaining to the position of the arrowhead in relation to the grip of the bow, viz. *bidāyah*, *kifāyah* (above, p. 57), *mihāyah*, *mikāyah*; (b) that bearing on the movement and position of the drawing hand in relation to the face, viz. (*al-*)*bayād*, (*as-*)*sawād*, *kashf* (*al-*)*bayād*, *m(V?)sāh al-qabḍah*/*(al-) bayād*/*(as-) sawād*.

A major hurdle in the way of our immediate disentanglement of this terminological skein proved to be the ambiguity of *qabḍah*, which *prima facie* could be taken in the context as (a) 'grip,



handle' of the bow; (b) 'bow-hand'; (c) 'drawing hand'. After the elimination, on technical grounds, of all but the last of these meanings, the next step was to determine the nature of the evident, but perplexing, contrast between *bayād* (lit. 'white, whiteness') and *sawād* (lit. 'black, blackness') which—again on technical grounds—we felt obliged to dissociate from the grip of the bow or the bow-hand in favour of the drawing hand or face. Since there is an obvious contrast between the 'clean' and bearded parts of the face, we finally decided that it was to these that our terms referred. The last major problem lay in *mVśāḥ*. The meaning of the root *msh* 'wipe, rub' being clear enough, it was a question of settling for one of three different MS readings, viz. *misāḥ*, *masāḥ*, or *massāḥ*, the last being least common. On a number of grounds we decided in favour of the first, which, by analogy with *kashf* in the expression *k. al-bayād* (ii, below), we take to be a verbal noun. In this verbal noun there inheres the idea of 'endeavouring to wipe one thing against another', and how it fits into the picture will be seen in the explanations we now offer:

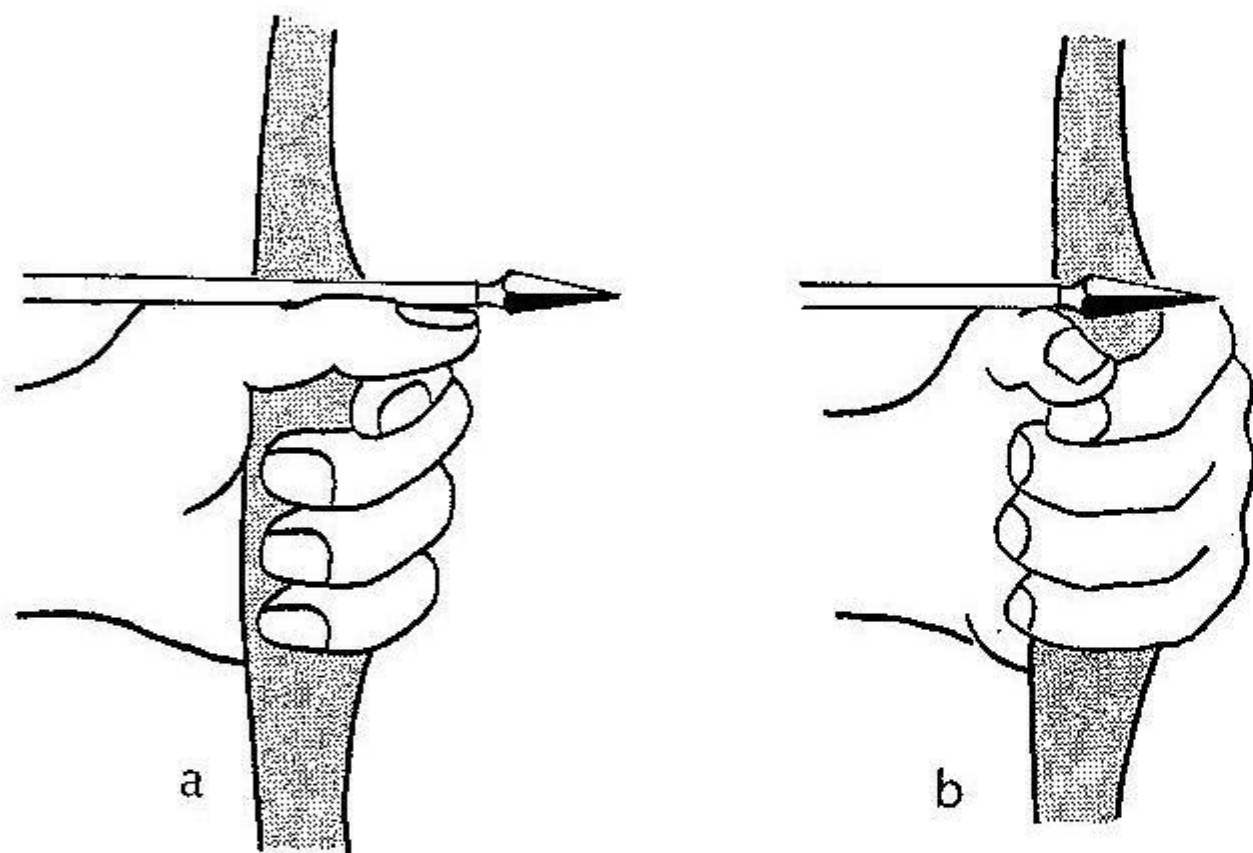


FIG. 44. GRASPS: SQUARE AND OBLIQUE

(a). Square. Arrowhead is *bidāyah*.

(b). Oblique. Arrowhead is *nihāyah*.

(i) The *tall man* draws his shaft on the tuft of hair between lip and chin, then passes his hand over his beard to reach the anchor-point below the ear at the angle of the jaw. His action in so doing is an attempt, against the pull of the bow, to wipe his drawing hand (*misāḥ* *l-qabḍah*) on his beard, or alternatively, to wipe his beard (*misāḥ* *s-sawād*) with his drawing hand. *Misāḥ* used absolutely would appear to be an abbreviated form of one or other of the two. At the other end of things the arrowhead is in the first position (*bidāyah*), safely projecting perhaps as much as two inches beyond the bow because of his use of the square grasp (Fig. 44a).

(ii) The *short man* draws on his cheek (*bayād*), then reaches back to his anchor-point marked by the lobe of his ear. His action in so doing is that of revealing his cheek, or the 'white' (*kashf* *l-bayād*). His arrowhead is in the ultimate position (*nihāyah*), or as far back as it can safely be drawn, since his use of the oblique grasp enables him to bring it on to the side of the bow's grip (Fig. 44b).

(iii) The *man of medium proportions* draws on his mouth, then runs his drawing hand back along a line half-way between the extremes to his anchor-point below the lobe of his ear. His action is that of endeavouring to wipe his cheek at the dividing line between beard and cheek (*misāḥ* *l-bayād*). It is true that we find the alternative expression *m. as-sawād*, the tall man's draw in this case usually being described as *bidāyah*. For this there could be several explanations, every one of which would be sheer hypothesis and make tedious reading. It is sufficient to say that *misāḥ* *l-bayād*, whether it be as suggested above or taken as a kind of compound expression incorporating *misāḥ* from (i) and *bayād* from (ii) above, makes perfectly good sense to us. As regards the arrowhead, it is in the position that may be described as 'just right' (*kifāyah*).

Finally, if any archer, whatever his proportions, exceeds the specified draw by reaching back beyond the lobe of his ear, his arrowhead may come inside the grip and be in a position to do him harm (*nikāyah*).

5. Table: Somatic Differences and Technique

	TALL	MEDIUM	SHORT
School:	Abū Hāshim	Ishāq	Tāhir
Posture:	Oblique	Intermediate	*Square
Grasp:	Square	Intermediate	Oblique
Lock:	Index finger outside string	String divides index finger	Tip of index finger inside string
Aim:	Outside bow	R. eye inside, l. eye outside bow	Inside bow
Drawing-point:	Between lip and chin	On mouth	On cheek
Term:	<i>Misāḥ</i> , <i>m. al-qabḍah</i> ( <i>m. as-sawād</i> )	<i>Misāḥ</i> ( <i>l-bayād</i> ) (Some: <i>m. as-sawād</i> )	<i>Bayād</i> , <i>kashf</i> ( <i>l-bayād</i> )
Position of arrowhead:	First i.e. <i>bidāyah</i> ('lesser')	Intermediate i.e. <i>kifāyah</i> ('standard')	Ultimate i.e. <i>nihāyah</i> ('greater')
Anchor-point:	Angle of jaw	Below lobe of ear	At lobe of ear

## CHAPTER 23

THE SYSTEMS OF THE GREAT MASTERS (A'IMMAH)  
OF ARCHERY<sup>1</sup>

i

The system of Abū Hāshim was as follows. When bracing the bow, he would put the *matn* of the grip in the middle of the left palm and place the *siyah* of the leg of his bow under the toes of his left foot. His right palm he would apply to the neck of the bow along with the bowstring and give one push so that the loop would fall into the nock. He would incline the bow on account of the slope of the neck (i.e. he held the bow at the slant and not vertically, the degree of inclination depending on the slope of the neck).<sup>2</sup>

He used the position of acute obliqueness so as to put the mark directly in line with his left shoulder and sighted with both eyes outside (i.e. to the left of) the bow, for he was tall of stature,<sup>3</sup> long-necked, long in the forearm, and long-fingered. He used the square grasp and, when gripping, would place the *matn* of the bow in the middle creases of the little finger, ring-finger, and middle finger of his left hand and in the distal crease of his index finger, with the *ibranjak* of the bow tucked into a point the width of two fingers away from his wrist-bone.

The nock (*fūq*) of the arrow he would place in the distal crease of his right index finger and middle finger and support the notch (*kāz*) with the pad of his thumb. He would push the shaft forward with his right hand and bring back his left so that nocking took place at a point between his 'left' nipple and his liver (i.e. in the area of the navel).<sup>4</sup> When locking, he would place the bowstring in the distal crease of his thumb and fasten his thumb on the middle finger. His right index finger would be loosely on the thumb with its tip outside (i.e. to the right of) the bowstring.

He would use the lesser draw (*wafā' bidāyah*) and draw the shaft on to the tuft of hair between his lips and chin, keeping all (i.e. hands, shoulders, and elbow) in a straight line in the same horizontal plane (*'alā khaṭṭ al-istiwā'*). Upon loosing, he would follow through with a forward and downward thrust of his bow hand and complete the movement by striking his shoulder-blade with the *siyah* of his bow (see frontispiece; the archer right centre has just completed the movement). By doing this an archer can determine the length of the bow 'in relation to the length of his arm'. With his right hand he would give a full twist (*farkah*; above, p. 66) so that his right index finger would come to rest beneath the lobe of the ear.

ii

Tāhir al-Balkhī's system was the reverse of Abū Hāshim's because he was short 'with a short arm-span',<sup>5</sup> short fingers, a plump hand, short neck, big beard, and wide chest. He squatted in the frontal position and placed the mark in line with his collar-bone, using the oblique grasp. The *matn* of his bow he set in the proximal crease of his little finger, ring-finger, and middle finger of the left hand and in the middle crease of the index finger, with the *ibranjak* of his bow tucked in to a point one finger's width away from his wrist-bone. When nocking, he would dispose the

nock of his arrow in the same manner as that already described above. When locking, he would place the bowstring in the distal crease of the right thumb and, having fastened the tip of the thumb on the middle finger, lay the index finger gently on the thumb with the finger-tip inside the bowstring. He would draw on to his cheek in the *wafā' bayād* position (p. 128) and hold his left hand still. He would bring his right thumb into a position beneath the lobe of his ear with his finger outside it (i.e. the lobe), and, had a drop of moisture dripped from the sky, it would not have gone down between<sup>6</sup> the thumb and right index finger. The loose was accomplished without formation of the crescent with thumb and index finger (*ṣahlil*; p. 64) or forward and downward thrust as he followed through. The movement would have been incompatible with his position directly facing the mark. Because of the shortness of his neck and the size of his beard, Tāhir sighted with both eyes together inside the bow.

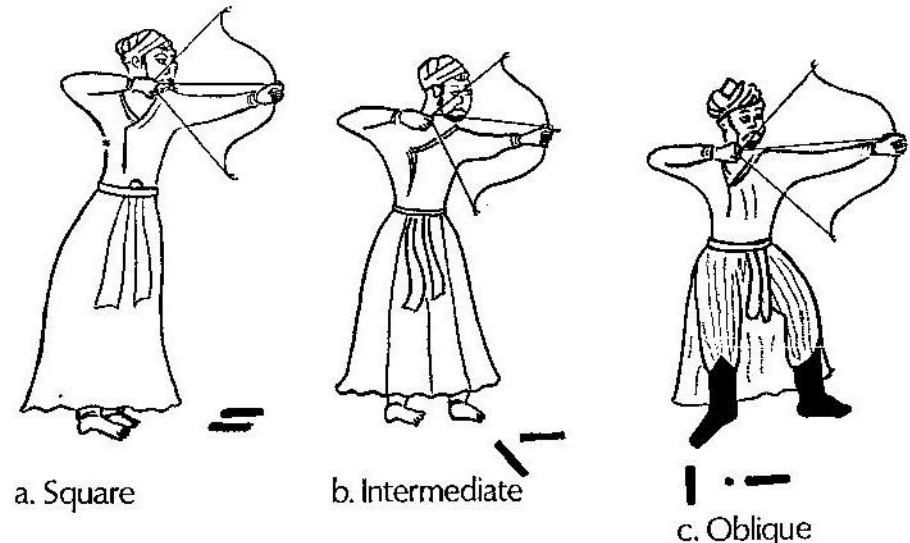


FIG. 45. METHODS OF THE MASTERS  
Copied from British Museum MS Or. 9838, fols. 16a-17a.

iii

The system of Ishāq ar-Raffā' was a compromise between the two methods already described, for he was of medium build and would squat in a position between that of acute obliqueness and the frontal. What he did was to bring the target 'in line with part of his collar-bone. When grasping, he would place the *matn* of the grip between the proximal and middle creases, right in the centre of the proximal phalanges at the base of the three lower fingers of his left hand, and in the distal crease of his index finger, tucking the *ibranjak* in to a point one and a half fingers away from the wrist-bone. He used to place the bowstring in the distal phalanx of the thumb and mount the right index finger gently on the thumb with its tip on the string itself, so that the line of the string would bisect the tip of the index finger. He would draw on his mouth and come to full draw in the *misāhā s-sawād* position (? *m. bayād*; above, p. 129). He would snatch<sup>8</sup> and with half the full movement follow through 'with a forward and downward thrust of the bow-hand' and half twist with the other to bring the finger-nail of the right index finger into position under the lobe of his ear.



Because of his desire to develop a suitable technique, at-Tabari 'who was trained in all three systems'<sup>9</sup> squatted in the same way as Ishāq, adopted Ṭāhir's grasp, braced and sighted after the fashion of Abū Hāshim, used a lock that was a compromise between that of Ṭāhir and that of Ishāq and drew on the mouth after the manner of Ishāq...<sup>10</sup> At-Tabari is the author of the *Kitāb al-īdāh* (for *K. al-wāḍih*, 'The Clear Book').

## COMMENT

### 1. The Schools of Archery

From a comparison of some of the more important treatises relevant to the subject it is apparent—and certain of our observations on preceding chapters will have led the reader to suspect as much—that, in Islamic archery literature generally, there are discrepant versions of the teachings of Abū Hāshim, Ṭāhir, and Ishāq. In particular, the account of their systems contained in the foregoing chapter is at variance with that of at-Tabari as transmitted in his *Kitāb al-wāḍih* (26a–46b; Ist., 19b–34b), which, incidentally, as the source of many of the ascriptions appearing in *Arab Archery*, accounts for some points of difference between that work and this.

Familiarity with the technical literature and an awareness of the Islamic predilection for a personal originator of almost any teaching or doctrine combine to make us highly sceptical of the authenticity of ascriptions which the absence of objective criteria makes it difficult or impossible to control. The emergence of personal schools of archery, we suspect, represents the organization of teaching into a coherent system, in which names enjoying the sanction of tradition are used either to legitimize current practice or to promulgate new methods. That Abū Hāshim, Ṭāhir, and Ishāq were historical persons, we have no reason to doubt, but whether any of them was the real originator of a technique or system, or merely the leading exponent of a technique or system as taught and practised in a given geographical area at a given time—and this is not unlikely—is just one of the questions for which we have, as yet, no positive answer.

In our treatise these three Great Masters emerge as ideal specimens of two physical extremes and a golden mean and, as such, seem no more than a methodological convenience for an exposition of the author's teaching. In the *Wāḍih*, on the other hand, it is deducible from the systems ascribed to them that none of them was a perfect example of such physical types. On this and other grounds it is legitimate to surmise that their somatic differences were not so absolute as portrayed in aftertimes and were indeed of less consequence than one might be led to suppose.

While physical characteristics are of evident importance to some facets of shooting technique—the nature of one's grasp, for instance—they are by no means the whole story. It must be remembered that from ancient times the archer in combat more often than not protected his person with armour which, to a greater or lesser degree according to its nature, added to his bulk or deprived him of the unrestricted use of his body, or both. To illustrate, let us consider the helmet. Many of the earlier surviving specimens of Turkish and Persian helmets are equipped with nasals, or nose-bars, that could be slid up or down in their fittings and locked in the desired position by means of a threaded bolt (Stone, *Glossary of Arms and Armor*, s.v. *Armor*, pp. 36–51, and figs. 50–58, 61–64). A nasal might extend down the face as far as the wearer's chin, and, when shooting a bow in an acutely oblique position like that of Abū Hāshim, the archer would not have been able to turn his head in comfort more than about forty-five degrees towards the target. If his drawing hand was in contact with the side of his face as he loosed, it is difficult to see how the string could avoid catching the nasal and ruining the shot, to say nothing of any other inconvenience or injury that might result if his head was turned too much. He might, of

course, remove the nasal or lock it in the raised position, but he could not always count on having the opportunity of doing so. Similar problems could obviously arise from the wearing of armour, be it plate or mail, and both the *Wāḍih* and *Arab Archery* leave us in no doubt that the Muslim archers of the Middle East recognized its importance as a factor in the choice of posture (e.g. *Wāḍih*, 34a–b, 39b–40a, 45b–46b; *Arab Archery*, pp. 81 ff.). Ṭāhir's adherents, we are told, rejected Abū Hāshim's position of acute obliqueness because of the string's liability to catch protrusive items of armour. To face the target directly, on the other hand, had in their view the advantage of eliminating this hazard and at the same time not restricting the archer to one coat of mail (*zardiyyah*). It did not, however, permit, as did Abū Hāshim's position, the use of the kind of shield with which Khorasanians were wont to protect themselves while actually shooting, nor did it admit of a powerful draw. Both these disadvantages could be overcome by the use of the intermediate position. In view of Ṭaybūghā's emphasis on archery in warfare it is surprising that he says nothing of such considerations, for they must have been of greater importance than physique as witness the fact that today most Western archers, regardless of build, stand sideways to the target.

With the crystallization of theoretical teaching into three systems at-Tabari, it would seem, came face to face with the obvious problem of the individual who fell neatly into none of the three stereotyped classes of physique for which the systems catered. His solution was simple and

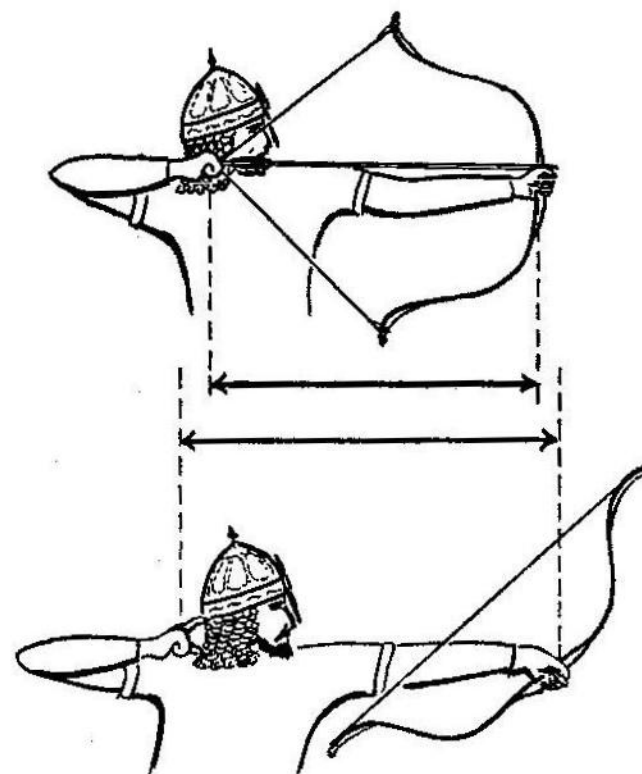


FIG. 46. SHOOTING WHEN WEARING A HELMET  
Note *tahil* and *khayrah*.

characteristic of the Islamic way of thinking. Skilfully avoiding innovation which could well discredit him, he reconciled the claims of individuality with those of 'orthodoxy' and tradition by the application of the eclectic principle. In so doing he satisfied an obvious need and set a useful example, thereby earning himself recognition as a Master—in the sense of founder of a school—in his own right.

The four schools, or systems (*madhāhib*), of archery based on allegiance to the teaching of a Master (*imām*) are strikingly reminiscent of the four orthodox schools (*madhāhib*) of Islamic law, each perpetuating the doctrine of a Master (*imām*) and his disciples. Since the systems of our text are, as already indicated, not those described by aṭ-Ṭabarī, we may well suspect that the respectable framework of orthodoxy underpinned by time-honoured names is being used as a cloak for the promulgation of what is either the author's own teaching or teachings reflecting current practice.

## 2. Aṭ-Ṭabarī's Technique

If we discount the misleading matter of discrepant ascriptions, the practice of aṭ-Ṭabarī as laconically recorded in our text does not, so far as the record goes, fundamentally diverge from that described in the *Wāḍih* (59a-62b; Ist., 45a-48b). The only major difference concerns his grasp on the bow which was, from what he himself says, intermediate and not oblique as stated above. Although the two MSS do not wholly agree, that of Istanbul being more corrupt than that of the British Museum, we nevertheless venture the following account of his methods:

'Whether standing or squatting, I prefer to take a slightly oblique position and set the target in line with my left eye. In this I follow the system of Ishāq ar-Raffā'. When bracing, the middle phalanges of my left index finger and middle finger are in contact with my right knee. When nocking, I first set the notches (*ḥalaq at-tafwīq/al-fuwāq*) of my arrows on the middle phalanx of my middle finger and firmly hold the bottom of the notches with the tips of my thumb and index finger. I next push the arrow sharply forward until the string strikes the base of my thumb and index finger without at any time allowing the shaft (*badan*) of my arrow to leave the string. Then, without looking, I bring the nock back, slip it on the string, and lock '63'. Lodging the string in the crease of my thumb, I have my index finger on top of the thumb and the string opposite the mid-point of the very tip of the index finger. In the lock, I have the cusps (*daffatāni*, sing. *daffah*) of the nock between the proximal phalanx and middle crease of my index finger. In this I follow the system of Ṭāhir al-Balkhī.

In grasping the bow, I set the *matn* (above, p. 45) of the grip between the crease formed at the base of the four fingers and the middle crease thereof. In this I follow the system of Abū Hāshim. The upper end of the grip's belly (*ibranjak*) I place between the two phalanges [*sic*; it must be 'joints'] of my thumb in conformity with Ṭāhir's teaching, and the lower part one finger's width from the wrist-bone in accordance with that of Ishāq.

When aiming, I displace the lower *siyah* to the right and bring it back to vertical with a twist of my forearm at the very moment I begin to draw, and in this I follow Ṭāhir. Using my bow-hand to focus, I direct the tip of my arrowhead (*ra's an-naṣl*) on to the centre of the mark. I aim with both eyes together outside the bow and, in sighting, I depend essentially on my right eye, though I use it in conjunction with my left. In this I follow Ishāq. I do not lower my left arm for short range, nor do I raise it for long. On the contrary, the proximal phalanx of my left thumb will be in line with the end of my shoulder throughout the draw and remain absolutely level, moving neither upwards for long range nor downwards for short.

In drawing, I execute one uninterrupted movement, as taught by Ṭāhir, and bring back my arrow directly in line with the parting dividing my lips with no deviation either upwards or downwards, as taught by Ishāq. When the arrowhead reaches the *ibranjak*, I pause for the count of one or two for as long as it takes [reading *bi-qadr* (Ist.) for *ba'd*] for the arrow to settle

and be trained on the mark. I then take my hand from the string to a point in line with my shoulder, and, at that very moment of loosing, I disengage with a twist of the hand (*farkah*) and without too sharp a pull on the string lest my index finger catch any part of the nock or shaft. I throw out my chest and left arm until the ends of my shoulder-blades meet. In this I follow Ṭāhir . . .'



## CHAPTER 24

### ON THE ARCHER'S NEED TO RECOGNIZE HIS FAULTS AND KNOW THE CORRECT USE OF HIS ARMS

The right arm is to archery what a leader is to men because it is the source of all the might and grace of an archer's shooting. Likewise, it is from this arm that his shooting derives its effectiveness and penetrative power. It must, therefore, be carefully watched. His left arm must also receive equal care and attention since this arm is to archery what a foundation is to a building. For, should an archer be ever so meticulous in his care for the right arm, but a little careless of the left, that small degree of carelessness would vitiate all his diligence in his care for the right. Conversely, should he be ever so meticulous in his care for the left arm and be a little careless of the right, that small degree of carelessness would, again, vitiate all his diligence in his care for the left. The reason for this is that if right and wrong are combined, the result is two wrongs. If the archer, therefore, detects any flaw or failing in his shooting, he should proceed to set things to rights by first examining his bow and arrows. Should he find in them any imperfection, he should not shoot with them until he has put them in order. If, on the other hand, he can find nothing wrong in that direction, he should consider his body and correct anything that may have gone wrong with it without his realizing.

One thing I have noticed in my own experience<sup>1</sup> is that some days an archer may shoot correctly with weapons and limbs alike in perfect shape, and yet, on others, find there are flaws and not much accuracy in his shooting. Again, on other days he will find that for no obvious reason he will achieve a higher standard of accuracy than that which it is in him, or within his usual power, to attain. 'I have gone into this point and often asked experts in archery, doctors of theology<sup>12</sup> and sages to tell me the reason for this, but have never had any explanation apart from that given me by a certain saintly person who observed, 'Don't you know that there are two kinds of day to Fate—one that is for you, and one that is against you?' I praised God and thanked the man for his explanation.

Overmuch shooting can sometimes stupefy an archer. What happens is that he goes on shooting for days without taking a single day off and then finds himself befuddled by it. He tries hard to achieve accuracy, but fails because he has used his limbs so much that fatigue and stiffness have set in, and he is overcome by a kind of boredom and irritation caused by a surfeit of shooting. For this malady I have never known any remedy other than shooting at neither target nor mark. What the archer should do in this case is to stand on a high place and shoot into the air, giving his eye and mind to what he is doing with his arms and not to any particular target. If he can take up flight shooting and compete with himself for distance, he will find it the best possible cure. He should carry on doing this for some days until he recovers his ability to aim, regains his accuracy, and gets rid of his mental confusion without any loss of practice. This piece of advice is an excellent tip for an archer who applies himself assiduously to target shooting. The best way, in fact, for a target shooter to practise is for him to shoot and rest on alternate days, for if he does so, he will not become dazed, fatigued, or bored, and he will continually improve in everything on which he expends his energies.

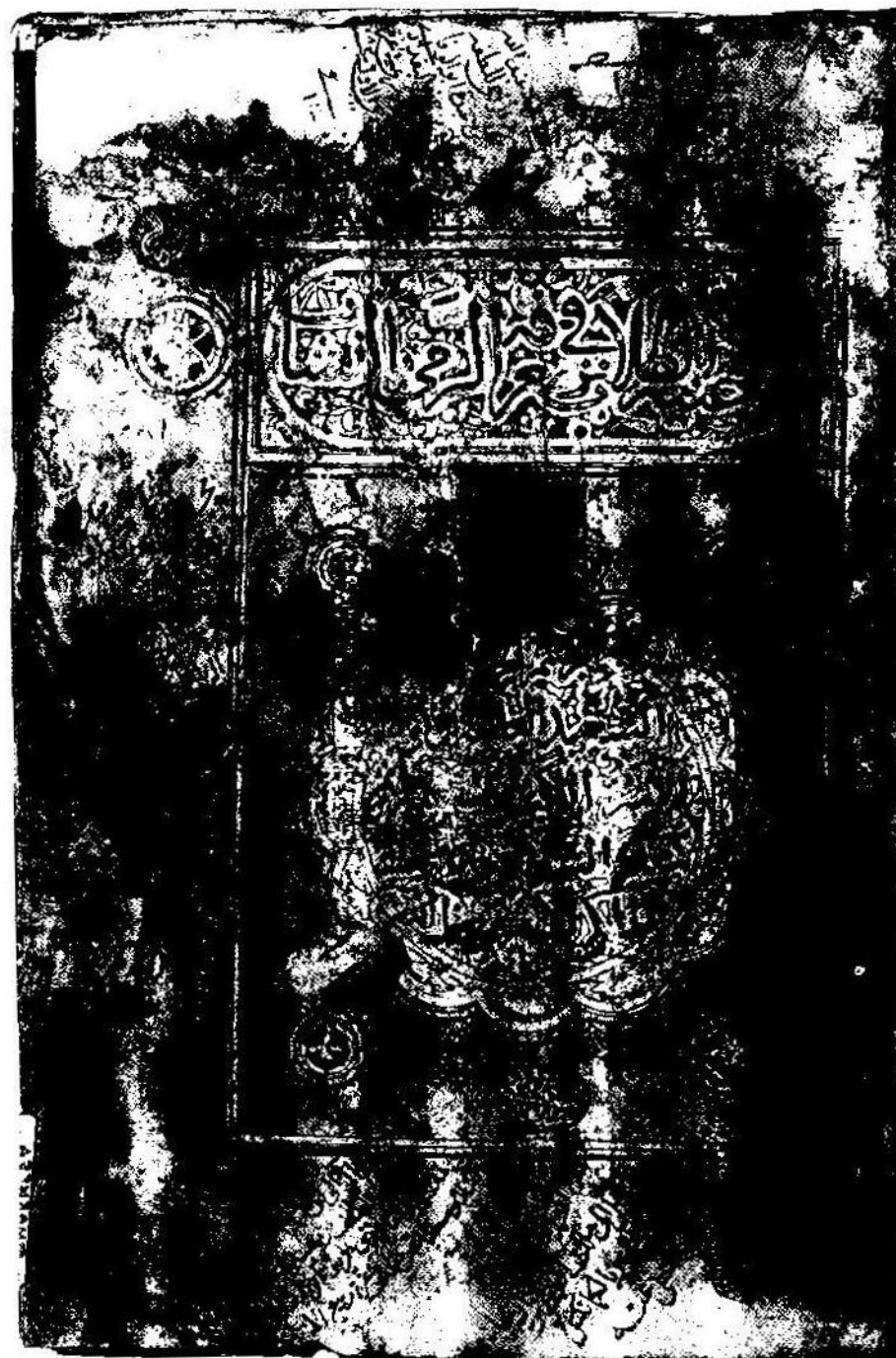
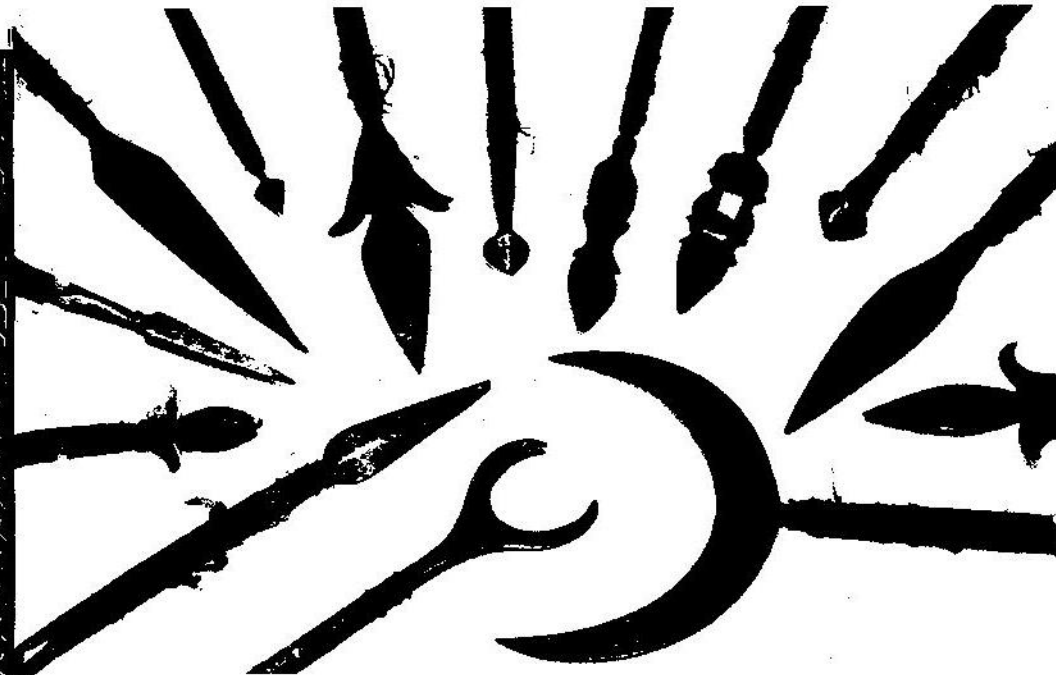


PLATE ONE Ornamental Bookplate.  
The inscription inside the medallion indicates that this  
copy of Tadhkirah was written in the year 1000.



PLATE FOUR Portrait of Hulagu.  
Detail from Persian miniature, early sixteenth century.  
Note length of bow and slight reflex in grip.

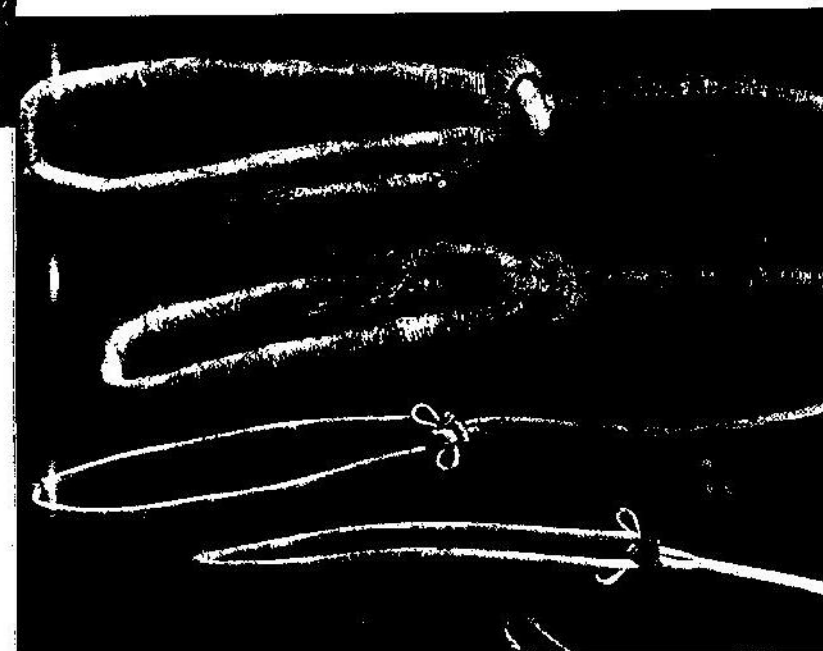
*British Museum, 1920-9-17-0130*



PLATES FIVE (below)  
& SIX (above)

#### Arrowheads.

A variety contained in a single quiver from India. The crescent heads were intended for shooting birds on the wing and were also used against unprotected troops. The blunt, conical heads were used in hunting birds and small animals in trees. Note the armour-piercing *yaghlīq* on the left-hand side (fourth from bottom).



#### Bowstring Loop Knots

Top: A massive Mongol bowstring for a very high bow made from a thin of a hemp-like vegetable fibre.

Centre: Sino-Tatar bowstring made from ramie with separate end loop. Where the knots rest on the string-bridges the string is bound with thin silver wire.

Bottom: String from Northern India. The skein is made from nine strands of twisted gut. The separate end loops (one only shown) are





British Museum (Natural History)

ATE SEVEN A Thumb-rings.

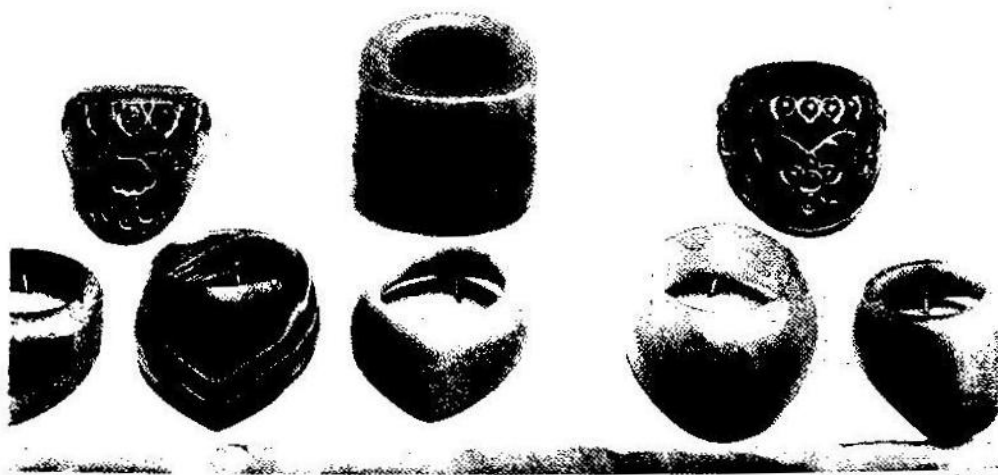
Persian—carnelian

Turkish—nephrite

Moghul—mocca stone

Persian—agate

Turkish—jasper



British Museum

TE SEVEN B Thumb-rings.

ove:

Moghul—ornamental  
white jade with jewels  
in gold inlay.

Chinese—jade

Moghul—ornamental  
white jade, rubies and  
emeralds in gold inlay.



British Museum

PLA'E EIGHT

The Draw of '69' and the Grip  
of '30'.  
Lokapala, or tomb figure, of  
eighth century from China shows  
how widespread were the  
techniques of the Eastern archers.

Reconstruction to show  
possible original  
appearance.



PLATE NINE A & B

**Gold Finger-tips.**

Phoenician, c. fifth century B.C. The Phoenicians used a two-finger draw, similar to what is now called the Flemish loose. The holes around the base suggest they were stitched to a glove or to thongs that led to a wrist strap. There is controversy over the use of these articles.

*From a Private Collection*



*Chester Beatty Library, MS 11*

PLATE TEN

**The Sasanid Khusraw Nushirvân Displaying his Prowess.**

Persian miniature, c. A.D. 1300, from a copy of the *Shâh Nâmeh*.



PLATE ELEVEN

**Mounted Archers Engaging Defenders on a Wall.**

Detail from MS Arab 161, fol. 112v, A.D. 1307-8. Note knotted reins in front of saddle.





PLATE TWELVE Mounted Archer.  
Detail from the battle between Alexander and Darius.  
Herat 1525. (Gift of Alexander Smith Cochran.) Note

Metropolitan Museum of Art, 15.227.7



PLATE THIRTEEN Sultan Murād II Shooting at the *Qabaq*.  
From MS dated between 1579 and 1585.

Topkapı Museum H.



PLATE FOURTEEN Mounted Archers.  
The right-hand archer is using the *jarmaki* technique.

Bibliothèque Nationale, MS. Ar. 2261, f. 14, recto



PLATE FIFTEEN Georgians Shooting at the Mast.  
From the original drawing by Father Castelli, c. 1630.

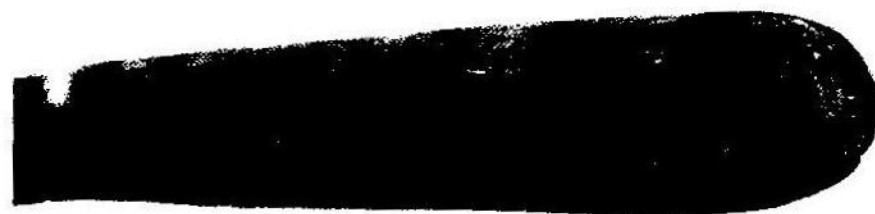
Biblioteca Comunale Palermo





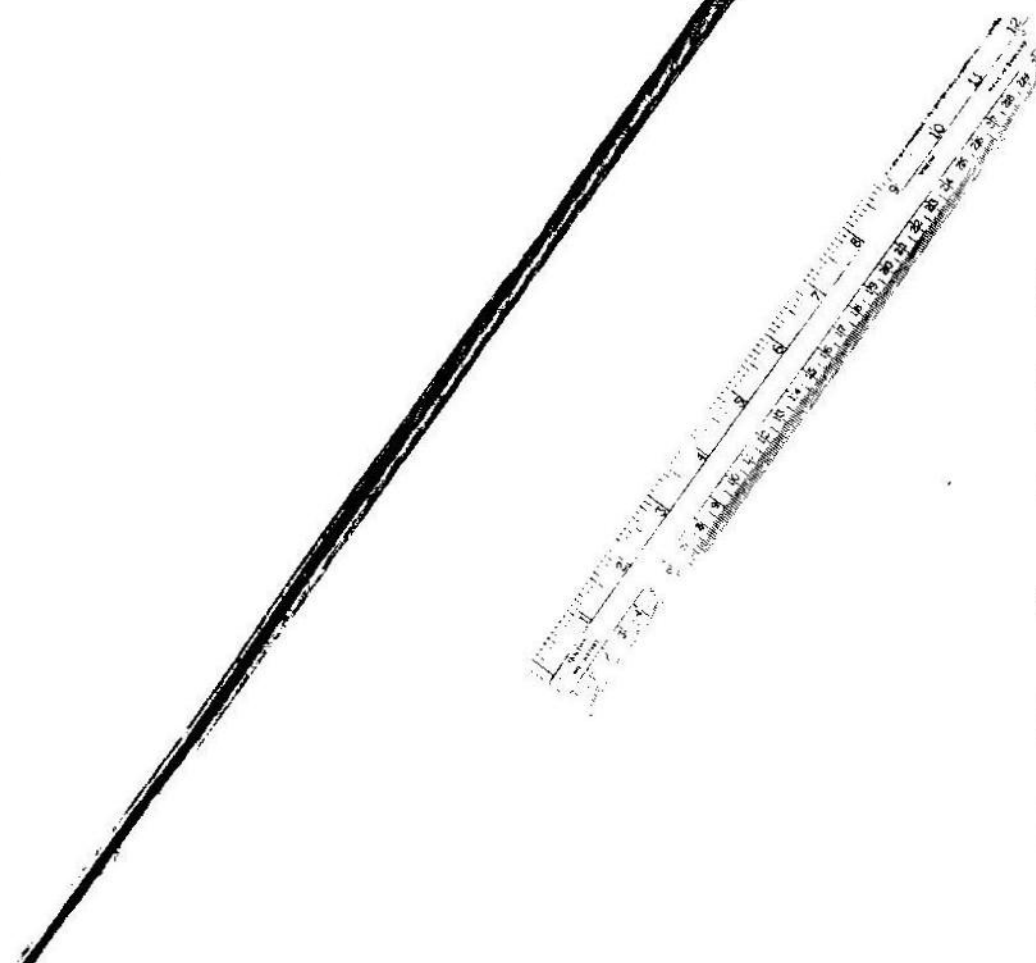
PLATE SIXTEEN Archers Attacking a Fort.  
Note positions of the draw. Two archers, lower right.

*British Museum, Add. 7591, fol. 11b*



*Ingo Simon Collection, Manchester Museum*

PLATE SEVENTEEN Korean Arrow-guide.  
Note holes for attaching a thong in the rear end.



## CHAPTER 25

### MISCELLANEOUS TECHNIQUES AND DEVICES

i

#### *On Shooting an Enemy in a Well*

The way to do this is to stand on the edge of the well as though you were standing to the mark and to draw as though you were shooting at that mark. When you come to the end of 'the first half of' your draw,<sup>1</sup> and your right hand is at your 'left'<sup>2</sup> shoulder, you tuck your head in under your right forearm, tilt your left arm downwards as you bring your arrow to 'full' draw, take aim, and shoot at him. Should he have any arrows and shoot at you, he will not hit you whereas *your* arrows will be right on target and finish him off. If he has a spear, he will certainly not hit you.<sup>3</sup>

ii

#### *On Shooting from the Top of a Fortress*

To shoot at someone moving round a fortress, aim in the same way as you would from the top of a well. Again, tuck your head under your right forearm and tilt your left arm downwards, take aim at your enemy, and shoot him. That is what you do if he is at the bottom of the fortress and shooting from beneath a shield. This can only be achieved by a great deal of practice and experience.

iii

#### *On Shooting a Horseman in Battle<sup>4</sup>*

To engage a horseman in a 'fixed'<sup>5</sup> head-on position, you should sight your bow-hand on the horse's forehead and shoot. If your arrow flies above the actual mark, it will strike the rider, while if it falls short, it will pierce the horse's chest. If your shooting is accurate, it will, of course, hit the animal's forehead. If you have a side view of him in a fixed position, you sight your hand on his buttock. If the arrow flies high, it will go into him, while if it falls short, it will pierce the horse's flank. If he is moving and going to ride past you, you shoot in front of him by the length of another horseman or slightly more according to the speed at which he is moving.

iv

#### *On Determining Whether an Arrow is Fast or Slow*

To do this, you stand still and aim at a mark sixty bows' distance away (about 75 yds.) and then shoot. From the moment the arrow leaves the bow till the time it drops at the mark you count. If, by then, you have counted six, your performance is average. If you count less, your shaft is fast; if you count more, it is slow.<sup>6\*</sup>

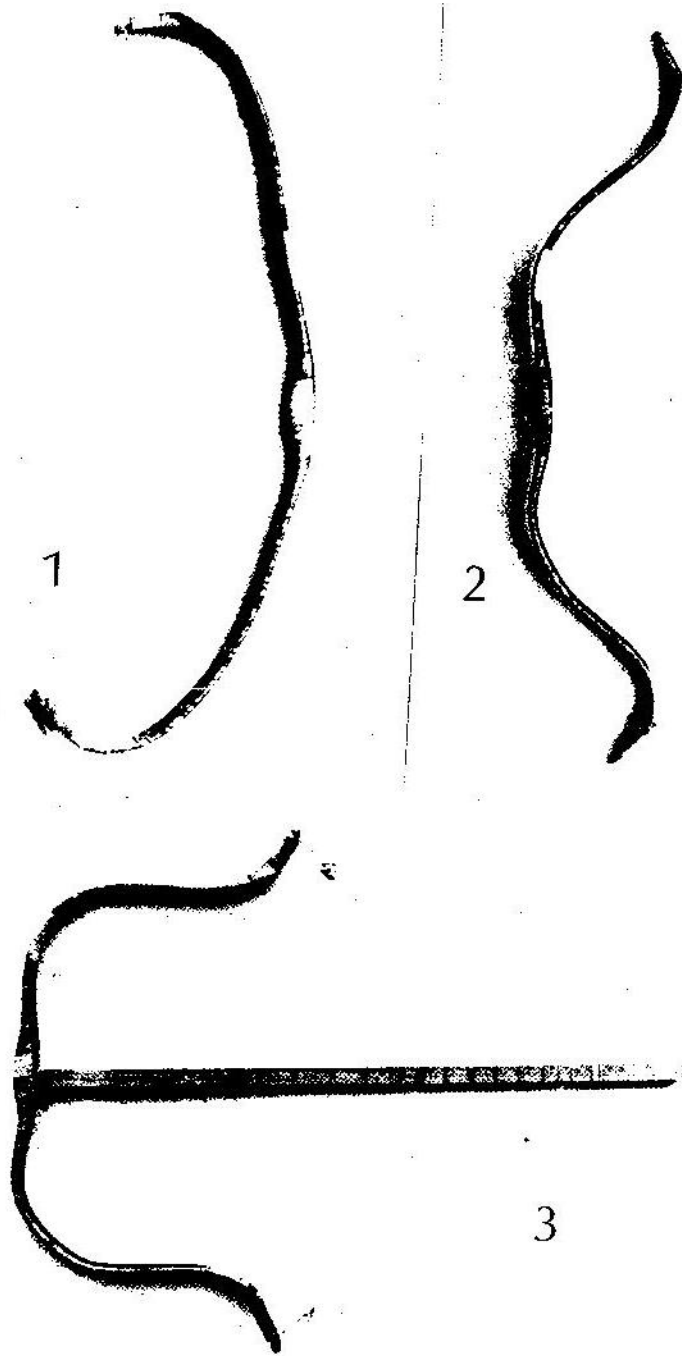


PLATE EIGHTEEN Reproduction of the 'Superb' by Edward McEwen.  
1. The unbraced bow. 2. Strung. 3. At full draw of



v

*On the Assessment of Grouping*

To discover how well he is grouping, an archer should set up an object five spans<sup>7</sup> in diameter<sup>1</sup> (about 38 in.) at sixty bows' distance and shoot. If he can concentrate his arrows in that object, his grouping is good.

vi

*On Ensuring a Low Trajectory*

For this purpose you take two staves, each of the height to which you can reach, and set them up five cubits apart across the centre of a short range (*ulki*; see Comment). You then take a rope, fasten it to them,<sup>8</sup> and shoot. If your arrows fly under the rope<sup>9</sup> to the mark, their trajectory is sufficiently low (*lāfi*), whereas if they go over it, their trajectory is too high (*murtafi*).

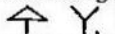
vii

*On Determining Dexterity*

Quickness and ease in using your hands are a commendable asset in battle. If you wish to determine your dexterity and rate of shooting, you take three arrows and stand and shoot over sixty bows' distance. If you can shoot the third and only see the dust of the first after that third arrow has already left your hand, you are fast enough. If you can't, you must practise holding the arrows all together between your fingers and shoot in this way. You keep on practising until you achieve your goal.

viii

*On the Razor-arrow (Sahm al-mūs)*

This is a battle stratagem. You get a war arrow and bore a hole down the centre of the notch (*kāz*).<sup>10\*</sup> You next get the smith to make you some small pieces of metal the size of the notch and on these you put an edge as fine as that of a razor. They should have a tang (*sīlān*) to fit the hole you have drilled in the notch of your arrow. They look like this:  You equip your quiver with a number of arrows of this type, and when you have a first-class archer to deal with, you get some eagle quills and, having cut them into lengths as long as the width of two fingers and split them down one side, you then fit them over the bowstring at the nocking-point and use them to shoot a razor-arrow at your archer. If he picks the arrow up and shoots it back at you, it will sever his bowstring and put a stop to his shooting. Whereupon, you can move in on him with all speed to do with him what you will. At the right time and place this is a handy device. (Fig. 47.)

ix

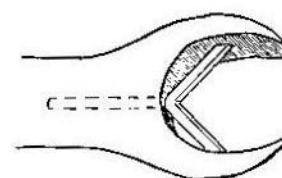
*On the Nockless Arrow*

To shoot nockless arrows at the enemy, you take a strong iron link (*zaradah*) and bind it into the bowstring. As for the arrows, you cut away the part containing the notch and thin down the end so that it will fit into the link on the string. You can then lock and shoot. If accurate, it will do its work. If not, you will very likely have shot an arrow which the enemy, if not acquainted with missiles of this type, will be unable to shoot back at you.

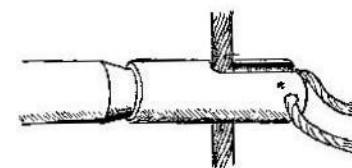
Some archers use loops of twine instead of<sup>11</sup> links—one for each arrow. In such a case the loop is folded in two around the bowstring and used to shoot a nockless arrow. This method is

not as obvious as the first because the ring flies off unobserved along with the arrow. (Fig. 47.) Others use a short tube (*julbah*) of iron, copper, or bone<sup>12</sup> just big enough to take arrow nocks and as long as the width of two fingers. One end should be stopped<sup>13\*</sup> and fitted with a silk tassel to keep it from slipping out of the drawing hand. The *julbah* is then slotted lengthwise as far as the half-way mark, the slot being just wide enough to take the bowstring. To use this device, they proceed as follows. First, the bowstring is inserted, then the nockpiece of the arrow is cut off, and the arrow placed in the *julbah*. The archer can then lock and shoot. It is a really cunning device. (Fig. 47.)

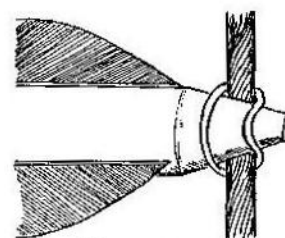
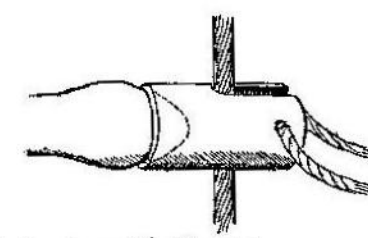
A *julbah* is also perfectly suitable for use with an arrow of the concealed razor type. You can split the nock and, having worked the razor into a two-edged blade like a spearhead, fit it down the centre of the fissure.<sup>14</sup> Once it has been inserted, the nock is bound back over it, and the arrow kept until needed. When the occasion arises, you can shoot it in a *julbah* without your bowstring's ever entering the notch. This is a far more effective arrow than the first in which the razor is fitted with a tang,<sup>15</sup> and it is less obvious to the enemy, for he will not detect the trick.



Razor Arrow



Julbah with Nockless Arrow

Nockless Arrow  
using cord loop

Julbah with Razor

FIG. 47. RAZOR- AND NOCKLESS ARROWS

x

*On Shooting Iron Pellets and the Incendiary Egg<sup>16\*</sup>*

These missiles form part of the repertory of devices that are of value in battle and siege operations. When the occasion demands, the pellets (*bunduq*) are heated to glowing point in a fire and used as incendiaries. Along with the pellet one uses other kinds of projectile made out of naphtha. Thus an egg may be drained and filled with resin or some naphtha compound which can then be ignited and shot either at the enemy himself or at some fortress in which bales of cotton have been used to block breaches,<sup>17</sup> such as we have heard was done at the siege of Acre (below, p. 143). To shoot flaming pellets on dark nights is one of the most effective stratagems

that can be used against an army. For this purpose a copper tube (*julbak*) 'expanding into an inverted cone' is used. One end of it should be a snug fit for an iron pellet, while the other, which is smaller (*sic*; 'bigger' is required), should be just big enough to take the egg funnelwise—for which purpose it is to be used. Both are mounted on the foreshaft like a scroll.<sup>18</sup> An arrow that is to be used in this way should not be fletched, but have a hole bored in it near the nock.<sup>19</sup> Through this hole a cord should be threaded with which to tie the arrow to the bowstring so that it cannot fly free when shot. With another cord the arrow is tied to the grip, but not so tightly that it will hold fast when shot. Some suitable packing is put into the tube to prevent the end of the arrow from being burned. (Fig. 48.) If the pellets are kept small and shot in this way they can be used to great effect against an enemy and be fatal to beasts of burden and persons not wearing armour.

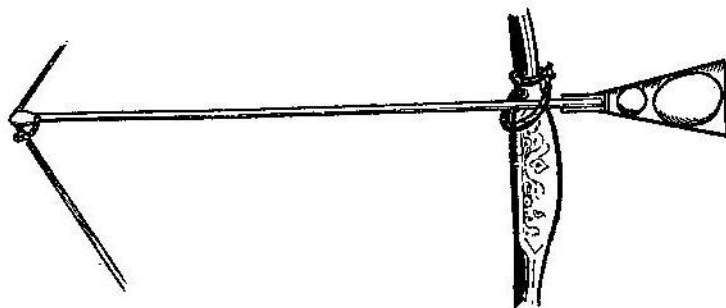


FIG. 48. EGG-AND-PELLET  
(The funnel is shown in cross-section.)

For shooting pellets one may also make a steel or copper guide (*mijrāt*) of a similar type to that called the 'king-guide' (Ch. 26 and Fig. 49) and fix copper tubing to the bowstring instead of the 'usual' leather band (*tasmā*) which is there.<sup>20\*</sup> It (?) is termed *maydānī*. If an iron striker just thick enough to ride down the guide and as long as the width of the archer's thumb can be made, all the better. To accommodate the bowstring, a hole of the same diameter should be drilled right through it. It is a well-tried and useful contrivance.

## COMMENT

### 1. Awkward Shots

Shooting from ground level at an enemy in a well is much the same as engaging a target in a comparable position from the top of a fortress. That the archer found himself more frequently in the second of the situations visualized by the author, we need hardly doubt. The need to shoot at a target immediately beneath the walls of a fortress could arise at any time during a siege, and fortresses were normally designed in such a way that archers could engage anyone at the foot of the walls from projecting towers. Where blind spots existed, however, the method indicated in the text—an extension of the *jarmakī* technique (p. 82)—could obviously be applied to great effect. To shoot a bow directly downwards and retain one's balance by any other normal means is almost impossible.

In circumstances such as those visualized it would, one may think, be easier to drop a rock or the like on one's foe, but it must be remembered that while many a warrior would have his bow with him and be in a position to take immediate action, he might lose precious moments in finding or handling a suitable stone.

### 2. Grouping of Arrows

In the literature and legends of many countries there are stories of almost incredible shots achieved by archers, and in modern times some remarkable shots have indeed been made. Such feats, however, may be regarded as isolated cases representing the perfect shot out of many thousands made. In our text, on the other hand, we have a rare and important guide to the standard of accuracy expected of every archer. He is required to group his arrows within a circle roughly 3 feet in diameter at 75 yards. The ability to do this with wooden shafts and without the aid of a sighting device such as can be fitted to a bow by the modern archer demands a very high standard of accuracy and bespeaks a well-trained and experienced bowman. It is nevertheless within the reach of anyone who will practise with diligence.

### 3. The 'Short Ulki'

In the absence of any explanation of the 'short *ulki*' it is essential first to determine the meaning of the noun. Registered by Dozy in his *Supplément* (s.v.), *ulki* is defined there as 'a kind of military exercise'. The definition could, and should, have been a little more precise, for Reinaud—Dozy's authority—although unable to determine the exact nature of what he took to be some form of military exercise, clearly appreciated that the word was connected with archery and leaves the impression that he thought it had to do with a target of some kind or other (op. cit., p. 221). That Reinaud was not far from the truth we can now confirm from the evidence of a passage in MSS of the C group in which we read: '... the full target (*al-hadaf at-tamām*) which is called the *ulki* in Turkish and is known as the long field (*al-maydān at-tawīl*) has a length of between 130 and 140 arm-spans, though it may sometimes be less ...' (C<sup>1</sup>, 146a; C<sup>2</sup>, 213b; C<sup>3</sup>, 72a). The *ulki*, then, was a target at a range of something in the order of 284–306 yards and possibly 284–328 yards, since the 'long field' with which it is said to have been synonymous is given elsewhere as between 130 and 150 arm-spans (C<sup>1</sup>, 29a; C<sup>2</sup>, 50a; C<sup>3</sup>, 21b; cf. D<sup>1</sup>, 21a; D<sup>2</sup>, 50a). It is almost certainly to be identified with the Turkish *ülkü* ('target, goal') which has been revived in the modern language in the sense of 'an ideal, something to aim at' (see Moran, *Turkish-English Dictionary*, s.v.).

The 'short *ulki*' must obviously have been a target at short range. How short it actually was we cannot say for certain, but, as we shall presently see, it could reasonably be considered to have been somewhere in the region of 75 yards.

### 4. Trajectory

The sections concerned with the height attained by an arrow on its way to the target and the time it should take to reach it are closely related and reflect a basically sound scientific approach to an important problem, however elementary the recommended methods of solving it may be.

In hunting or war a low trajectory is an advantage as the archer is less likely to miss the target through an error in his estimation of range. Should he overestimate his range, but shoot a fast and therefore low arrow, it would be very likely to hit the target striking high, whereas with the same degree of error a slow arrow describing a more pronounced curve would miss by passing over its target. Conversely, if its range is underestimated, a fast arrow may well hit low, while a slow one will strike the ground short of the target. A second advantage of the fast arrow over the slow is that the archer, when shooting at a moving target, can decrease the distance by which he needs to aim ahead of the mark. The less he has to anticipate his target, the more likely he is to hit. A shorter time of flight offers the additional advantage of diminishing the effect of any wind that may be present.

With a given bow, the heavier the arrow, the slower the flight, but the harder the striking power



by reason of its weight. A light arrow will fly faster and lower, but lack of weight may prevent effective penetration of armour or mail.

The method of assessing velocity by shooting under a rope stretched across the middle of the range is an important point which we have subjected to careful scrutiny. Unfortunately the range of the target is vague since we do not know for certain what meaning 'short *ulki*' had for Taybughā, but if it could be assumed to convey the same distance as that recommended for the dexterity and grouping tests (75 yds.), the resulting calculations are technically interesting.

There are a number of unknown factors, but if we start with a shaft of the standard length, a probable path of the arrow through the air can be predicted with reasonable accuracy (Klopsteg, *Archery: The Technical Side*, pp. 122-27 and 236-45). The height of the rope across the centre of the range would be about 8 feet (though we must allow for a margin on either side because the measurement is based on human stature which is variable). Given the data suggested, it will be found that a man, kneeling or squatting, must discharge his arrow at not less than 180 f.p.s. if it is to hit a target on the ground at 75 yards with a trajectory not exceeding 8 feet in height. The time of flight would be about  $1\frac{1}{2}$  seconds. This standard represents a minimum requirement, and adherence to it would ensure that bows of adequate power were used by archers for warfare. To us this seems the most practical explanation of the 'short *ulki*' test. The method would certainly afford a more accurate means of assessing flight than what amounts to a rough and ready calculation of time by counting between loose and hit.

#### 5. Dexterity and Rate of Shooting

In terms intelligible to the modern reader the standard of rapidity the author sets for the archer is the ability to discharge 3 arrows in about  $1\frac{1}{2}$  seconds. This is a fast time, and one's first reaction is surprise that such a high standard, which few, if any, Western bowmen of today could attain, should be expected of the general run of Mameluke archers. It is nevertheless an attainable standard as is evident from the achievement, in modern times, of Saxton Pope who did succeed on a number of occasions in shooting 7 arrows in 8 seconds (Elmer, *Target Archery*, pp. 428-30).

Accuracy naturally diminishes with increased speed, and field trials suggest that it is difficult to exceed 8 well-aimed shots per minute. Nevertheless, it cannot be doubted that Muslim archers could shoot at high speed and, given a large enough target, hit with all shots. During the Second Crusade William of Tyre, who must have been conversant with the performance of his own bowmen, remarked more than once on the dexterity of the enemy archers. 'The Saracen cavalry . . . began to shoot thicker and faster than one could believe possible' is a fairly typical comment of the period (Smail, *Crusading Warfare*, pp. 76-77 and nn. 8, 9).

In contemporary military science the rate of projection of missiles, when multiplied by their weight or explosive force, gives what is termed 'fire-power'. If we may be excused an anachronistic and, in the context an admittedly incongruous, use of words for a nevertheless legitimate purpose, the fire-power of a crossbow shooting  $2 \times 800$  gr. missiles per min. would be 1,600 gr. per min. and might be compared with that of a hand bow shooting  $8 \times 400$  gr., or 3,200 gr., per min. Fire-power combined with mobility is a point upon which modern military teaching lays great stress, and it is this combination that undoubtedly contributed to the effectiveness of Muslim horse-archers in their heyday.

That 3 arrows could in fact be regularly shot in about  $1\frac{1}{2}$  seconds we do not question; we only regret that we are not told exactly how the arrows should be held in order to shoot with such alacrity.

#### 6. Razor-arrows

In a medieval battle vast number of arrows would be shot, and archers naturally gathered all they could during a lull in readiness for further action. To deny the enemy the use of one's own

arrows while maintaining the ability to use those shot by him commends itself as a military tactic.

The effectiveness of the razor-arrow may be questioned since the average archer might reasonably be expected to examine any arrow he had picked up in order to ensure that it was sound before storing it in his quiver. Nevertheless, it is easy to visualize the odd occasion when such a device might be effective. For instance, an archer desperate for arrows in the heat of battle and harassed by some marksman from whom he could not allow his eyes to stray for more than a fleeting moment might be put out of action with a razor-arrow snatched up in haste.

#### 7. Nockless Arrows

In trials we have experienced some difficulty in retaining the nockless arrow firmly in the tube attached to the bowstring. With practice it might be possible to develop a surer hold. At all events, this kind of arrow commends itself as a more effective stratagem than the razor-arrow.

In *Arab Archery* (p. 133) we find mention of the ring fitted to the bowstring to take the tapered tail of an arrow, but nothing is said of either the *julbah* or the razor device. On the other hand, mention is made of another contrivance known as the *birin*. This was a ring loosely fitted to the string with a nail-like projection designed for insertion into a hole previously drilled into the tail of a nockless arrow, by which means it could then be shot.

#### 8. Incendiaries

In his treatment of the pellets and the egg the author has such difficulty with his Arabic that he fails to make himself completely clear, and the first few lines of the text admit of more than one interpretation. In our judgement, the idea he is trying to convey is that red- or white-hot pellets may be used alone, but that they are more effective if used in conjunction with some inflammable material. He then goes on to illustrate how this can best be done. By means of the funnel-shaped device that he describes, the narrow end of which evidently fitted over the fore-shaft of an arrow, the heated pellet and incendiary egg could be transformed into a blazing projectile when shot. The insertion of the pellet must, it seems to us, have preceded the insertion of the egg, the latter fitting into the *bigger* end. Hence our proposed emendation of the text. For this form of arson the archer would require the assistance of a loader.

We have found no reference other than that in our text to the firing of bales of cotton at either of the sieges of Acre. Which siege is intended is not specified, but we surmise that it is the second in 1291 in which Baybars al-Bunduqdārī deployed several hundred catapults and made extensive use of incendiary missiles. Since the Arabic text is corrupt and can be restored in two slightly different ways, it is difficult to decide whether the purpose of the bales was to stop a breach or to protect part of a wall or to barricade and reinforce. Certainly in medieval times a section of wall which showed signs of weakening under continued bombardment by catapults would often be padded with suitable material, such as cotton bales, which, hung from the battlements, helped to deaden the effect of the missiles. As this was a normal procedure on the part of defenders, the Crusaders may well have acted in this way at Acre even if the fact is not mentioned by contemporary historians. It is equally reasonable to assume that the bow, using the means described, provided a simple and practical method of destroying this improvised protection.

In history, bows have regularly been used to project incendiaries. One method of doing this was to shoot an inflammable liquid at the target which could be ignited when struck by a white-hot arrowhead. Another was to launch a shaft carrying a burning substance lit before shooting. Once a fire had been started, of course, its intensity could be increased by projecting more fuel into the flames. It is obvious that in siege warfare engines capable of hurling relatively large quantities of combustible material would be far more effective than bows. On the other hand, to deploy catapults for action would take time, and, where a quick attack aided by conflagration

might carry the enemy's defences, the bow would commend itself as the more suitable instrument. Surprisingly, perhaps, Taybughā does not make the point, nor does he take the matter of incendiaries any further.

The whole problem of incendiary material has been discussed at length by J. R. Partington in his *History of Greek Fire and Gunpowder* (Cambridge, 1960). In Ch. V he covers those used in Muslim lands, including those offered by Marḍī at-Ṭarsūsī (cf. Cahen, *BEO*, XII, pp. 145ff.). The various recommendations include a mixture suitable for projection in an egg-shell and compounded of sandarac, 'water of sulphur, that is, naphtha' and colophonium (p. 198). ('Water of sulphur' would appear to have been a distilled petroleum.)

For incendiary arrows sulphur and resins mixed with some binding agent such as pulverized straw formed a substance that could be lit and shot at a target. One device mentioned in *Arab Archery*, p. 134, is a spindle-shaped arrowhead made of a number of tubes which united at their ends to form a hollow head resembling women's spindles. The shaft fitted into a cylindrical projection, and the head could be filled with straw and cotton saturated with tar. A more fanciful recipe consisted of otter fat, black sulphur, bdellium gum, pith of fresh cherry seeds, and quick-lime, all of which were ground and kneaded with pure oil of balsam. For further details on the incendiary arrow throughout the ages the reader will find it useful to consult 'The Incendiary Arrow, 480 B.C. to A.D. 1941', (symposium), *JSA*, vol. 3, 1960, pp. 22-24.

Such short tests as we have been able to carry out on mixtures recommended in medieval sources show that, although they burn steadily when lit, it is difficult to prevent them from blowing out when shot.

## CHAPTER 26

### ON SHOOTING WITH AN ARROW-GUIDE (MIJRĀT)

There are many kinds of arrow-guide. Although originally designed for older men who were past drawing strong bows and shooting long arrows, guides (*majrāt*) have truly considerable advantages. In the first place they enable anyone using darts (*nabl*) to carry with him a greater number of missiles—twice as many indeed—than he would be capable of carrying if he were using ordinary long arrows. Another advantage they have is that an enemy, if attacked with darts, will not see them and dodge in the same way as he might if long arrows are used.<sup>1</sup> Yet another advantage is that darts strike home more quickly than long arrows, for they have a longer range (see Comment). Finally, the enemy cannot make use of darts or shoot them back as he may well do to great effect if long arrows are used.

Among the different types of guide there are the 'dart' (*nabl*), the 'pen' (*qalam*), the 'commander's' (*asbāsālārī*), the 'locust' (*jarād*), and the 'Bayram Shāh'. The safest and most convenient from the archer's point of view is that called the 'king-guide' (*shāh majrā*). This is the one that 'is slotted down the middle and'<sup>2</sup> covers both darts and bowstring, for which reason it is called the 'sultan of arrow-guides'.<sup>3</sup> It is used in the following manner. You first pass the bowstring right through the guide and brace the bow, which now supports the guide. After putting the guide to the nocking-point in the same way as you would nock long arrows set in the centre of the bow (*kabid al-qaws*), you slip your dart through the slot (*shaqq*) right into the guide

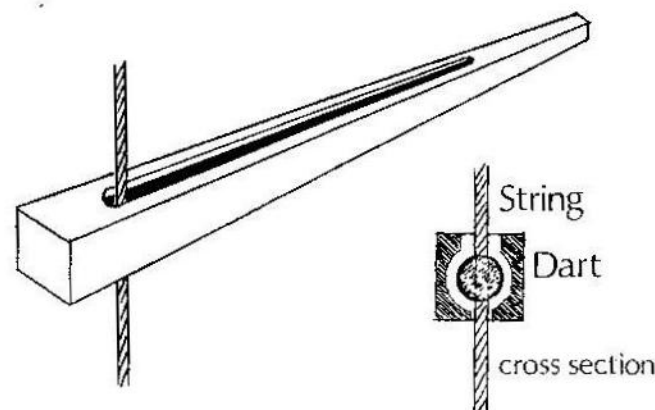


FIG. 49. THE *Shāh Majrā* (OR *Mijrāt*)

The slot at the top must be wide enough to admit the dart. The outer form could be rounded.



(Fig. 49). The tassel at the end of the guide goes between the ring-finger and middle finger. You now lock on the guide as you would if using long arrows. You also draw and loose in the same way, except that the left arm is held firm like a stock. Nor do you follow through with a forward and downward thrust of the bow-hand as you would if shooting long arrows; you execute only half the movement.<sup>4</sup> This is a point to watch. You should also guard against bringing the guide to full draw and cocking the thumb in front of your darts. Past masters in the art of shooting with guides can, and do, follow through with a forward and downward thrust of the bow-hand, and they also rest the guide on the left forearm. This is an excellent and more effective way of shooting, but the trouble is that it can do harm to a person who does not know how to apply it properly; for, should the guide slip, it may injure the fingers of his bow-hand (*qubbād*) and put him out of action.

Next there is the 'long-nosed arrow-guide' (*mijrāt al-khurṭūm*). This is made of a single length of wood hollowed out (*munahhar*) on one side into a groove big enough to accommodate darts. At one end of it there is a projection (*khurṭūm*, 'proboscis') of horn designed to hold the darts in place (Fig. 50). To shoot with it, you first insert the bowstring between the horn and the wood of the guide, take the dart, and fit its nock to the string. To nock the dart in the guide, you close the little finger, ring-finger, and part of the middle finger, and then grip the dart 'between the thumb<sup>15</sup> and middle finger and the end of the right index finger which is left open. The head of the dart should be near the end of the right index finger with the long horn nose pressing on the guide. You then nock and shoot in the manner already described.

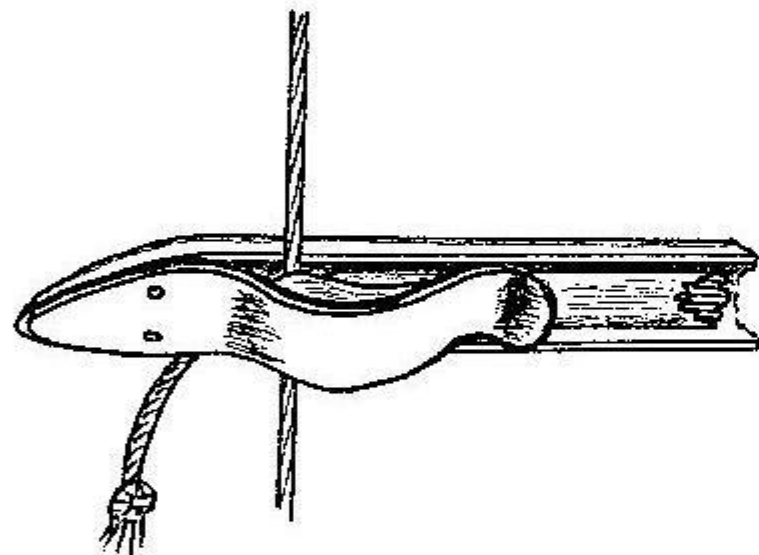


FIG. 50. 'LONG-NOSED' GUIDE

Archers also use an arrow-guide called the 'stirrup' (*mijrāt ar-rikāb*) which has a hand-grip of iron<sup>6</sup> and a nut like that of a *jarkh* (above, p. xxxii). It is also known as the 'Maghrebi' because it was invented in the Maghreb (i.e. N.W. Africa). Although an excellent device, it is difficult to master, is liable to go wrong, and is heavy (Fig. 51). It is nevertheless possible for an archer to develop the strength of his grasp without undue strain on his muscles,<sup>7</sup> so that he can use a guide of this kind with any bow he can pull, even though it were 100 *raṭls* (above, p. 88.) 'For such a person<sup>1</sup> it has proved one of the best and most effective field weapons, 'and if once he can handle it<sup>1</sup>, the archer will find it not only easier to use but also immeasurably more effective than all other kinds of guide.<sup>8</sup> It is difficult to make, but I have developed a modified form and made it the 'king-guide' (*shāh mijrāt*), of which name it is more worthy than the original guide of that name because it allows more rapid shooting than its predecessor, gives greater striking power, permits the use of a more powerful bow, and is an easier and less troublesome weapon for the user. If an archer knows how to handle it properly, he will, by the mere fact of using the weapon,

outstrip any archer shooting long arrows both in number of shots and in respect of distance. I have in fact shot six darts<sup>9</sup> with the aid of this device, as against five long arrows shot by an archer in the usual manner. My aim in designing it was to enable the user to shoot *jarkh* bolts back at the enemy and do twice as much damage as the *jarkh*, even though the *jarkh* might be two *qinṭārs* Damascus weight (about 814 lb.). Failure to achieve this purpose is indicative of bad shooting, incompetence, and witlessness.

To use the guide, the archer first grasps the handle with the index finger, middle finger and ring-finger, and, if the handle is big enough to take it, the little finger as well. He next presses the trigger (*miftāḥ*, 'key') with his thumb, and with the head of the bolts opens the nut (*jawzah*) that is fitted in the guide for catching the string so as to allow the latter to enter its holder (*bayr*). He then sets the guide in the nocking position so that he can see the string correctly housed (*fi baytihi*), locked, and held by the nut. Then, taking his thumb off the trigger, he proceeds to draw, having first nocked the bolt in the manner previously described. Once at full draw, he presses the trigger strongly with the thumb and looses, but in so doing does not follow through with any forward and downward movement of the bow-hand. Before letting go of the guide he sets it once more to the nocking-point of his bowstring, takes another bolt, and nocks it. He may shoot in this way as much as he wishes, but the resetting of the string in the nut should follow quickly

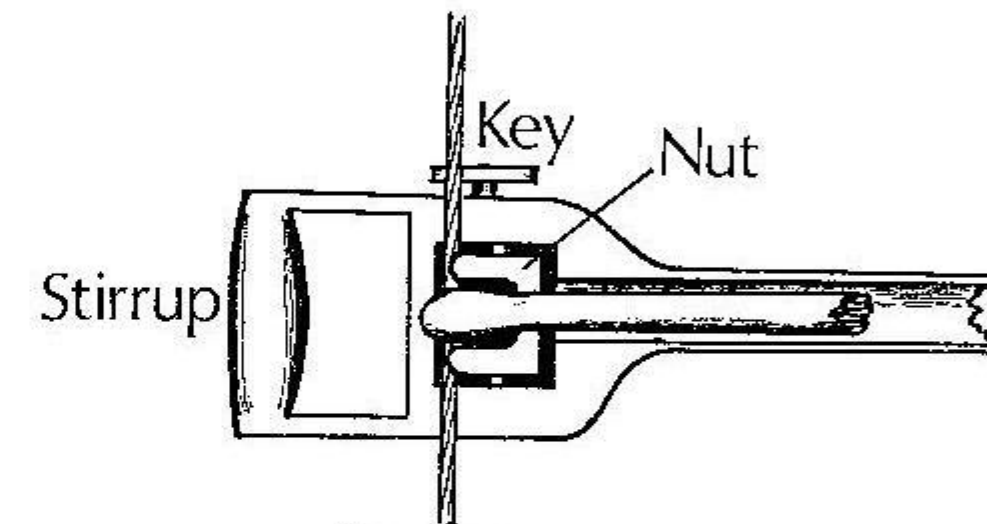


FIG. 51. A STIRRUP-GUIDE  
Details of mechanism are not known.

upon discharge. When he has finished shooting, the archer presses the trigger with his thumb and returns the nut to the same position as before shooting. Great care should be taken not to forget, otherwise the guide will be put out of action and rendered unserviceable. Once this happens it will only work again after being unscrewed and repaired—a difficult task for anyone not familiar with the procedure.

If you have mastered the art of following through with a forward and downward movement of the bow hand, you may use the technique, but do be on your guard, when shooting with guides, against raising the end of your thumb after completing the draw. The same rule applies when shooting with long arrows. Finally, don't twist the guide when drawing. It should be as straight as a die at the source of traction right from the moment you start to pull until the very moment you loose.<sup>10</sup>

## COMMENT

### 1. General

Basically, the arrow-guide is a simple piece of equipment designed to enable the archer to draw an arrow inside the bow and therefore shoot arrows or darts that would otherwise be too short



for his draw. Faris and Elmer, who were the first in modern times to discuss the nature of this interesting device, rightly consider it to be 'one of the most important discoveries in modern toxophilic research' (*Arab Archery*, p. 174).

There is more than one explanation of its origin. The author of *Arab Archery*—after at-Tabari—favours the view that it was invented by 'the Moslems' when driven, while fighting 'the Turks', to devise some method of suppressing the enemy's devastating practice of returning spent arrows (p. 124). Others ascribe its invention to the Persians who, after adopting the technique of shooting from the oblique and more effective position in order to overcome the strength of Turkish shields, were obliged to use longer arrows and therefore 'for the use of old men and youngsters . . . unable to effect the long and hard draws resulting from the very long arrows, evolved shooting with the *husbān* and *dawdan* arrows; thereby bringing up the driving force of their shots to a par with the shots of the strong men who could draw a long arrow to the

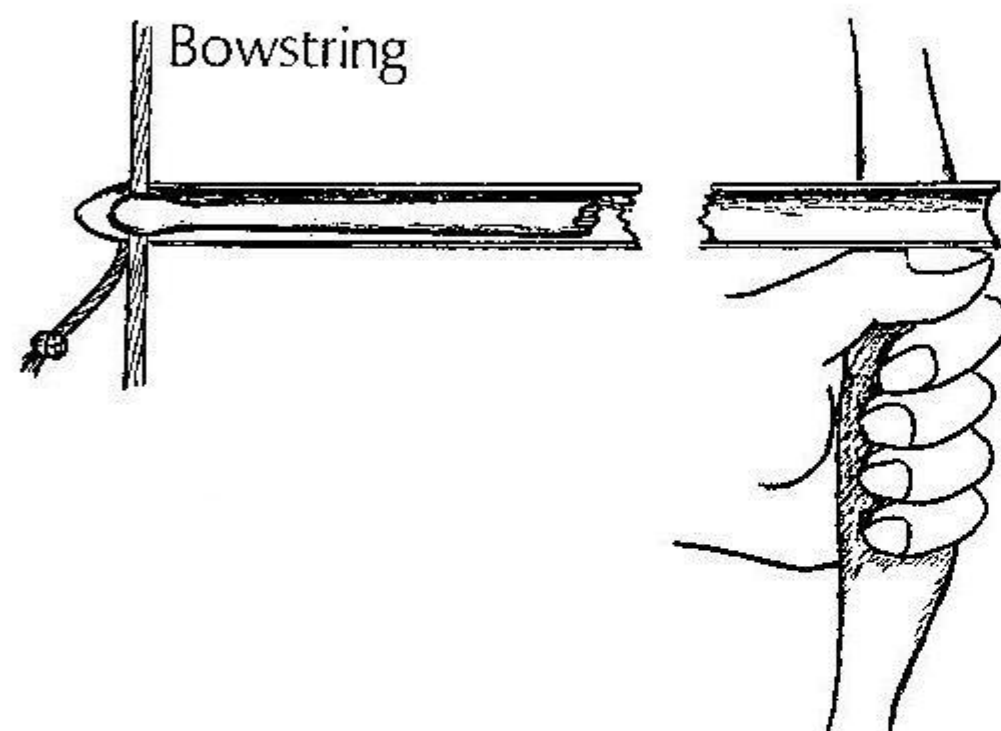
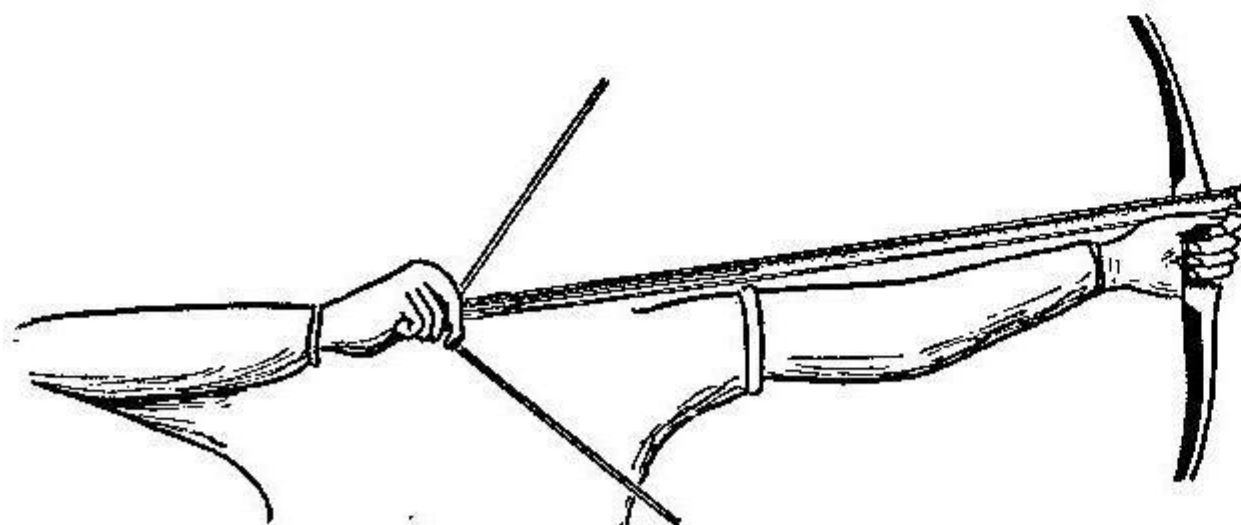


FIG. 52. THE ARROW-GUIDE (*Majrā*, or *Mijrāt*)

- (a). The dart in position on the string is shown without fletchings for clarity. Crushing of the feathers would be of little consequence as they would spring back when the dart was shot.



(b). The arrow-guide at full draw.

full limit' (ibid., pp. 124-25). These and other views which need not be considered here recur in technical literature.

Darts for use with arrow-guides varied in length according to type (above, p. 29), and for some we can offer approximate lengths. These are (a) *husbān*: about 15 in.; (b) *dawdan* (? or *dūdānī*): about 10 in.; (c) *jarād*: from 7½ in. to 2½ in.; (d) *ʿuṣfūrī*: as in the preceding (though not according to *Arab Archery*, p. 129, in which it does not exceed 3 in.). At first sight one is apt to suppose that even the longest dart must have been much lighter than the normal arrow by reason of its shorter shaft. Taybughā offers no details on this aspect of the problem, but in *Arab Archery* we read: 'The kind of wood suitable for these arrows is heavy, hard, and strong. Likewise, the arrowheads should be heavy as light ones are worthless . . . Such arrows should weigh ten *dirhams* each [about 480 gr.] . . . The *ʿuṣfūrī*, on the other hand, should weigh three *dirhams* [about 145 gr.], perhaps even less, and be of very thick wood' (pp. 129-30). If we compare these weights with those of normal arrows shown on p. 30, the war dart may only have weighed 100 gr. less than a long arrow used with the same bow. The difference in weight, therefore, was probably not as great as one might at first suppose. That it nevertheless existed, on the other hand, is inferable from the statement that 'darts strike home more quickly than long arrows, for they have a longer range' (p. 145). An increase in speed and range suggests (a) a higher initial velocity consistent with the performance of the lighter missile if shot from the same bow as one that is heavier, and (b) a slight reduction in surface drag resulting from the shorter shaft of the dart.

It is difficult to say precisely how much truth there is in the assertion that darts would not be seen and avoided in the same way as ordinary arrows. Admittedly, a smaller missile would be a little less conspicuous, and its higher velocity would allow less time for evasion or deflexion with a shield. The most important advantage, however, would undoubtedly lie in the archer's ability to carry twice as many darts as ordinary arrows. In long-range combat he would obviously be out of action as soon as he had expended the contents of his quiver, and it might take him a little time to replenish it from the supply-train or gather spent arrows shot by the enemy. The more he could conveniently carry with him, therefore, the better.

The archer using a simple guide could quickly change to normal arrows whenever he wished. In this connexion it is worth noting that in existing Chinese quivers, for instance, there are often as many as four compartments to accommodate different types of arrow. Although we ourselves have found no mention of any similar practice among archers of the Middle East, we do not discount the possibility of its existence.

## 2. Some Forms of Arrow-guide

We know of no surviving example of a Middle Eastern guide. The Koreans, however, used the same device, and a good Korean specimen is included in the Ingo Simon Collection, Manchester Museum, No. O.7728 (Pl. 17). Made from a length of bamboo about ½ in. in diameter, it is 28½ in. long. Viewed in cross-section, it is slightly more than semicircular, and at the rear end there are, as can be seen in the plate, two holes through which a cord or thong was threaded for retaining in the archer's drawing hand. This article represents the guide in its most simple form. How it was arranged and held can be seen in Fig. 52. Locking in the usual way on both guide and dart, the archer drew both items together. When the string was loosed, the dart was driven down the guide which remained in the drawn position, held by the cord in the fingers of the right hand.

According to *Arab Archery*, there were four kinds of guide: square, round, hexagonal, and octagonal (p. 126). How these compared, or whether they corresponded, with the first five listed by Taybughā, it is impossible to say. That known as the 'pen' may have been so called because of its appearance, for we learn from *Arab Archery* that 'the end of the guide which is



toward the bowstring at the time of shooting should be slightly thinner than the other end and should also be pointed like a pen' (ibid.). The shape of the rear end of the Korean guide could be roughly described in the same terms. Some clue to the nature of the *jarād*, or 'locust', may, we suspect, be contained in Mardi's description of the *husbān*, or 'hailstone' (Cahen, *BEO*, XII, pp. 132-33). The latter was a tubular device accommodating a horn runner with stud-like projections riding in a slot on one side (Fig. 53). Its missiles whose description agrees with that given elsewhere of 'locusts' (like 'hailstones', a descriptive term from which the guide in each case takes its name) were the length of the little finger. A number of them could be loaded, one after the other, through a hole near the rear end of the guide, which thus amounted to a breech-loading dart projector. When loosed, the runner ejected the darts, which, once discharged, we are told, scattered 'like locusts'. Although small, light missiles of this kind can have had little penetrative power, we can imagine their nuisance value as a means of harassing unprotected horses or men.

### 3. The 'King-guide'

The original form of the 'king-guide' as described in our text is reasonably clear (Fig. 49). It was a tubular piece of equipment slotted on opposite sides. The slot in what would be the upper surface when the guide was in use had to be wide enough to admit a dart. That in the lower surface, on the other hand, needed only to be of sufficient width to permit the bowstring free passage.

Two objections can be seen to this sort of contrivance. Firstly, the string must surely have rubbed against the side of the slot through which it ran, with consequent reduction of efficiency arising from friction. Secondly, the fact that the string was threaded through the guide means that, to shoot long arrows, the bow would need to be unstrung to permit removal of the guide.

The modified 'king-guide' evidently combined the idea of the original with that of the 'stirrup' variety (Fig. 51). It appears to have been a slotted tube of the kind indicated above. Built into the stock of the guide at the rear end was a nut of the same form as that used in crossbows, but no doubt smaller. A trigger mechanism was incorporated, but we are forced to conclude that its design was faulty because of the trouble that could result if the archer failed to reset the nut after use. We offer no suggestions about the possible ways in which the mechanism might have operated since they would of necessity be so conjectural as to be of no real value.

The stirrup which was incorporated in the modified 'king-guide' would have permitted a more

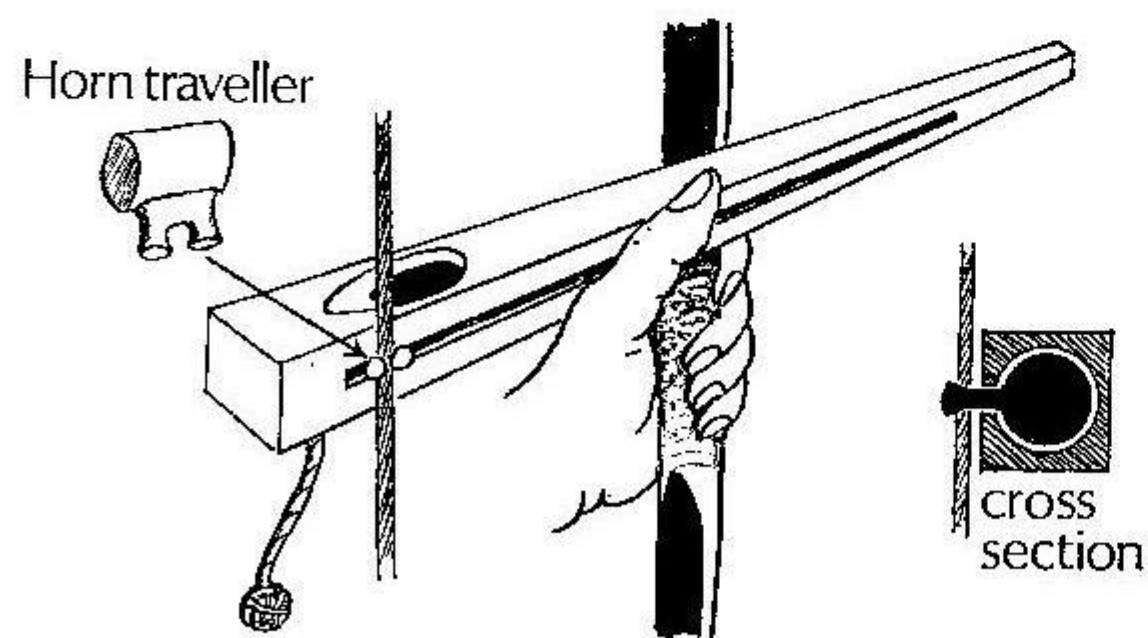


FIG. 53. THE SLOTTED GUIDE

powerful draw than any that could be achieved with the thumb, but the claim that it could do twice as much damage as the *jarkh* must be taken with a grain of salt. That it was effective for shooting *jarkh* bolts if handled by persons not guilty of 'bad shooting, incompetence, and witlessness' is probably nearer the truth.

### 4. An Experimental Guide

In the course of many experiments conducted both by ourselves and others the most effective guide of which we have had experience is one constructed by E. G. Heath whose interest and assistance we gratefully acknowledge. Made from well-seasoned beech, it is 31 in. long and rectangular in cross-section. The internal width of the channel is  $\frac{1}{2}$  in. and its depth a little less than  $\frac{1}{2}$  in. Practical experience has proved the measurements adequate. The rear end tapers 'like a pen', and a cord is fitted  $1\frac{1}{2}$  in. from the tip. In accordance with one of the methods advocated in *Arab Archery* (p. 126) the cord is tied to a ring which fits on the ring finger during shooting.

In using the guide we also followed advice contained in *Arab Archery* regarding the fletching of the 15-in. darts, viz. 'There should be two side feathers just outside the groove of the guide at the pen-shaped end, and a "male-feather" (*dhakar*) in the hollow' (p. 130). Although, in locking, the male-feather is crushed as a result of pressure against the shaft from the middle phalanx of the index finger of the drawing hand, there are no adverse effects since the vane springs back undamaged as soon as the dart is discharged.

## CHAPTER 27

ON THE PROCEDURES, CONDUCT, AND PRINCIPLES  
TO BE OBSERVED BY A NOVICE<sup>1</sup>

## i

'Mark and carefully retain the fundamentals as expounded in our work, for practice will prove then to be sound. If you are wise, you will practise patiently and persistently, for anything hard can become easy with practice. Furthermore, before you try for marksmanship and take up wagering, aspire to mastery of the draw and accuracy in range and elevation.'<sup>2</sup> This advice is intended to encourage the novice (*tālib*), firstly, to apply himself to learning, secondly, to acquire a thorough grasp of the fundamentals of archery and the technique of perfect shooting by dint of hard and regular practice, and thirdly, to aspire to mastery of the draw until it is so impressed upon his limbs that he will infringe none of the fundamental rules when shooting. All this can only be attained by patience, perseverance, and much regular practice, which must be acquired before he tries for marksmanship and wagering; for if the novice is bent on shooting a marksman's arrow he will fail to notice that he is unconsciously infringing the fundamental rules of his art.

The first thing that a learner should do is to take a light bow of the kind termed *kabbād*,<sup>3</sup> grasp it, and draw with the three appropriate fingers for some days until he can apply the correct grasp. He should next lock his fingers on the bowstring without using an arrow and draw for a time until he is able to lock correctly and can thus grasp, lock, and draw to the best of his physical ability. When he has succeeded in this, he should, for some days, nock an arrow and bring it to full draw without shooting. He should then lock on the string without an arrow and loose an uncharged string, practising this for a time until he can release correctly. In his next stage he should nock what is known as a *jarrām*, 'or unfletched arrow,'<sup>4</sup> and draw and release it at a practice drum (*battīyyah*; below, p. 156). He should do this for quite a time, and, once able to shoot correctly, progress to a bow 'a little'<sup>5</sup> more powerful than the one he has been shooting and again shoot at the practice drum for some days. Every few days he should take a more powerful bow until he has worked through five successive bows, each stronger than the one before, and the fifth most powerful of all.

Once he has acquired control and developed a natural proficiency in shooting, he should begin to bend powerful bows that are as strong as he can possibly handle and continue shooting at the practice drum night and day with different bows. When he can shoot correctly and his limbs are steady and firm,<sup>6</sup> 'he can then go out into the field'<sup>7</sup> and shoot at the butt for some days without using any mark, all the time watching where his arrows fall. Once he can do correctly all that he has set out to do, he should next go out into the desert and shoot into the great void, again without any mark, all the time watching the flight of his arrows through the air. When he can see that his arrows do not flirt, but pass properly through the air in even flight, he should, after mastering all this, shoot at a mark on his own and persevere until he attains a high proportion of accurate shots.

During all this training he should go and consult master archers and show them how he shoots, asking them to point out his faults and how to eliminate them.<sup>8</sup> He should regularly watch how first-class bowmen shoot without taking part himself and endeavour to assimilate good points either from what he himself can see to be good performance or from their own conversation. These he should put into practice on his own, and when he has acquired mastery and considers his shooting to be as perfect as that of other archers, and when this view is confirmed by what full-fledged archers 'who have seen his shooting'<sup>9</sup> have to say about him, he may join them. In his conversation<sup>10</sup> with such persons he should be polite and gracious, adopting an attitude of self-abasement and humility, and should shoot with them as they deem appropriate until he becomes conversant with their customs and drill.<sup>11</sup> During this time, furthermore, he should seek useful advice from persons he considers qualified to give it. When he outclasses someone else, he should not exalt himself above that person nor despise him nor provoke him, but rather make modesty his rule and observe silence and good manners. Finally, hard and regular practice is as a religious bounden duty to be performed by every archer whether he be a teacher (*mu'allim*) or learner (*muta'allim*).<sup>12</sup>

## ii

It is established in authentic tradition<sup>13</sup> that the Prophet said, 'The angels attend no human sport save archery.' Archers should therefore be aware of the exalted station of the angels who attend them and should rank them as guests and respect them, for the Prophet said, 'If a man believe in God and the Last Day, let him do honour to his guest.' Going to the shooting range (*marmā*), then, should be regarded by the archer as going to the mosque, and he should consider those with whom he consorts there as leaders of men and persons of the highest standing. Likewise, he should think of his training in archery as training in religious knowledge. He should therefore make a practice of first performing a lesser ablution<sup>14</sup> and set about his business, praising God with tongue and heart as he makes for one of the gardens of Paradise with the peace of God upon him and with dignity of bearing. When he reaches his destination (i.e. the range), he should enter politely, greeting all those present with the words, 'Peace be upon you!' He would do well also to perform two *rak'ahs*<sup>15</sup> in an act of worship. It is not a matter of saluting the actual place, but rather a key to safe-keeping, success, and accurate shooting; for if proceedings are opened with an act of worship, they will be worthy of a happy issue and will be blessed with God's good direction and success. The archer should next say a private prayer and ask God—exalted be He—for good direction and right guidance, for it is an established tradition that the Prophet said, 'Alī,<sup>16</sup> ask God for guidance and good direction, and, in asking for guidance, remember to ask that you be guided in the right path, and, in asking for good direction, remember to ask that the arrow be well directed to the mark.'

The next step is for the archer to take out his bow and arrows, examine them, and see what choice shooting demands. Tightening his belt, he then prepares himself for shooting, and, when his turn comes round, rises, tucks up his sleeve if it is too ample,<sup>17</sup> and gathers his skirt into his belt if it is hanging down<sup>18</sup> and utters the invocation, 'In the name of God.'<sup>19</sup> He then takes his arrows in his right hand and his bow in his left and stations himself in his proper place in a polite, calm, and dignified manner, at the same time lowering his eyes in modest silence, moving gracefully and easily, and praying God to grant him power, might, and accuracy. He next places his arrows in his waist-belt, takes out the first arrow, examines it, spins it on the nail of the middle finger in between the ends of the left index finger and thumb (above, p. 30), nocks it gracefully without looking at the operation, and then shoots in the manner already described. When the arrow leaves the centre of the bow, he should follow it with his eyes to the point of descent and, if it hits the mark, praise God and show Him gratitude. If he misses, he should reflect on the reason for his failure and earnestly try to eradicate the fault which caused him to miss.



## iii

Every time the archer shoots he should invoke God—exalted be He—with the words, 'In the name of God' and, whenever he makes a hit, he should praise Him to whom belongs all power and glory. He should regard accurate shooting as proceeding from the bounty of God—exalted be He—and the divine guidance and assistance. If he misses, he should not become exasperated or despair of God's refreshing justice, nor should he revile himself or his bow or his arrows. To do so is to commit an outrage and a violation of all that is just because a man who behaves in this way in his ignorance attributes his failure to those persons and things to which no blame attaches. Those who do this sort of thing, therefore, will incur the rancour of both angels and mankind and sin to no avail.<sup>20</sup> Anger is, furthermore, the chief cause of low scoring.

It should be realized that we learn by our mistakes. It is related of a certain great man of wisdom and learning that he once scored a victory on some particular point, and all present applauded him with cries of 'Well done!' 'And by God,' said he, 'they had no sooner applauded than I blushed for shame at such-and-such a mistake I had once made in the same matter!'

Do beware of impairing your own ability by seeing another hit the mark when you yourself have failed to make the same grade, for there is no question here of any deficiency. No, deficiency, all deficiency in fact, is a matter of being incapable of aspiring to reach the highest level and attain your objective. Do not tell yourself, therefore, that you cannot attain what others have achieved, for anyone who says this betrays the fact that he is a failure who cannot succeed and has lost all ambition. It is upon aspirations that men depend for achievement. In the two collections of authentic traditions of the Prophet<sup>21</sup> it is reported that he said, 'The believer who is strong is better in the sight of God and dearer to Him than the believer who is weak.' In every righteous enterprise, therefore, strive after that which will avail you, ask God for succour, and do not flag. On this very point one poet says:

'If the qualities of a man arouse your admiration, then be him,  
And you yourself will soon display those same qualities that you admire in him.  
To generous and noble deeds there is none to bar your way, if only you approach them.'

Another poet says:

'It (sc. defeat) surely must not cause you to despair  
Of preparing for another fight, for glory comes by stages and degrees;  
The spear's cane shaft whose height you have beheld grows slowly, climbing joint by joint.'

## iv

While shooting is taking place, the archer should not look too much at his companion nor disturb him nor distract him with anything such as conversation or the like. Neither should he reproach him for his mistakes nor laugh at him, for if a man abuse a brother Muslim for some mishap, the same will be visited upon himself. There is indeed a plain and authentic tradition that the Prophet said, 'Do not abuse your brother, for God will deliver him and visit you yourself with affliction.' The archer, and indeed any other Muslim and believer, must concern himself only with his own faults. Praise God, then, and do not grudge your brother archer his successful shooting nor make his achievement seem paltry in his eyes. You should not say, 'A good shot for one who is no archer!' nor again, 'A lucky shot!' This kind of behaviour is that of low and ignorant people who know nothing of life and have no practical experience of men and affairs.

An archer's next step in his training must be to familiarize himself with the faults that bowmen experience in the matter of aim, hands and arms, alignment, loosing, and locking, and to acquire a knowledge of defects in bows and arrows and an ability to distinguish good from bad. He should

know how to heat a bow (above, p. 99) and how to adjust and repair it, how to straighten his arrows and correct the curve of his bow, and how to knot his bowstrings. He should also know how to eradicate a fault if one occurs and know the reason for the fault. When<sup>22</sup> he has a knowledge, mastery, and understanding of such matters as well as skill and proficiency in shooting, and then, acquiring familiarity with the rules of wagering and legitimate shooting, is able to distinguish between what is permissible and what is not, is familiar with competition shooting and the rules and regulations for other archery contests—when, I say, he has a knowledge, mastery, and understanding of such matters, a man is then a full-fledged archer and can take his place as such among his fellows and share their fortunes and misfortunes. But even so, he will still not have a complete grasp of all there is to know about shooting, and he will never be too old to learn. Authorities on archery say that, no matter how much knowledge of the art of shooting a man may acquire and no matter how long he lives, he will not achieve complete mastery.

## COMMENT

## 1. The Training of an Archer

An important part of Muṣṭafā Kānī's manual is devoted to a description of the guild of Turkish archers, the conduct of its business, the acceptance of novices, rules of practice, and ethics (Hein, *Isl.*, XV, pp. 241 ff. Cf. Klopsteg, pp. 106 ff.). It is regrettable that nothing wholly comparable is contained in our treatise, for the rules of practice and ethical standards expounded in the above chapter and the one that is to follow are discernibly associated with some system of professional organization similar in kind to that described by G. Baer in his analysis of guild structure in seventeenth-century Egypt (*Egyptian Guilds*, pp. 49 ff.). There we encounter a hierarchy of masters, master-apprentices, and ordinary apprentices, all subject to the authority of a leading member, or *shaykh*, and enjoying the spiritual patronage of some venerated personage often belonging to the generation of the Prophet.

Within this hierarchical system the first step of the apprentice (*ṭālib*, *muta'allim*, *mubtadi*) was to attach himself to his occupational group by establishing a personal relationship with a master (*ustā*, or *ustādh*, *mu'allim*, *munta(h)i*) whose business it would be to instruct him in the secrets of the craft and the traditions, rituals, and religious ceremonies peculiar to his group. After an initial period of probation the novice entered into a covenant (*ahd*) with his master who bound him by oath to the observance of certain duties (cf. that described below, p. 157). His ordinary apprenticeship served, he qualified in due course for guild membership as master-apprentice, or journeyman. The next and, for most ordinary members the final, step was the attainment of a licence (*ijāzah*) to practise as a master. On each of the four occasions mentioned formal proceedings with prayers and a greater or lesser degree of ritual were held in the presence of officers or members of the guild (*ikhwān*, 'brethren').

To judge from all that is inferable from the sources available to us, the career of a Mameluke archer, *mutatis mutandis*, followed a similar kind of course within the same kind of institutional framework, though there are indications that it was not as rigid or elaborate as some may care to think.

## 2. Rules of Practice

Most contemporary Western instructors would approve the principles of training advocated in the text. At the heart of the matter is the concept that the beginner should learn to use a bow without actually discharging an arrow so that, undistracted by the behaviour of the missile, he may concentrate on handling the weapon in the approved manner. Only after the attainment of reasonable proficiency in this respect should he be allowed to shoot arrows.

When the shooting stage is reached, there is much merit in discouraging the use of a target until

the pupil has learned to group his arrows to the best of his ability. Good grouping will indicate that he has achieved a consistent technique—the essence of good shooting—and is ready to attempt the relatively simple step of placing a group around the centre of a target.

The *battiyyah*, or practice drum, according to Reinaud, was a kind of barrel covered at one end with a cow hide so as to give a target face and mounted at breast-height on a four-legged stand (JA, 1848, pp. 218–19). A stuffed bag or sack (*torba*) similarly mounted and angled at about 44° is mentioned by Muṣṭafā Kānī as a training device for flight shooting (Hein, *Isl.*, XV, pp. 255–56, figs. 37 and 38. Cf. Klopsteg, pp. 112–13 and fig 42). The diameter of the drum is not given, but we conjecture that it was on the small side with a diameter of 2 feet or so.

### 3. Ethics and Courtesy

Quite apart from drill, discipline, and orderliness, the commendable theme of politeness and good manners seems to have attached itself to archery from the earliest times. The motto of the Grand National Archery Society, viz. 'Union, True Heart, and Courtesy', echoes the spirit of a Chinese poem dating from the second or third century B.C.:

Clout and pin-hole are marked, already is hung  
The shooting-target, where with bow in hand  
And arrows under arm  
Each archer does obeisance to each,  
Willing to yield his rights of precedence.

(‘The Great Summons’, Waley, *Chinese Poems*, p. 42.)

The standards of conduct laid down in our text are ageless and, religious aspects apart, are as closely followed today as they must have been a thousand years ago.

### 4. The *Ghunyah* and a Passage in Al-Jabartī's ‘*Ajā’ib*’

Between the code of ethics and behaviour communicated by our author and that laid down in an *ijāzah*, or licence, granted to a Cairene *bowyer* of the eighteenth century there is a striking similarity which will not elude those intimately acquainted with al-Jabartī's chronicle, ‘*Ajā’ib al-āthār*’, in which the second is recorded (Cairo edn., A.H. 1322, II, pp. 227–30. Cf. Baer, op. cit., pp. 52–53). In tone and phraseology the text of the Egyptian *ijāzah* is, as a whole, so reminiscent of Ṭaybughā's treatise that there can be little doubt that the latter is the source of its inspiration. By comparison with examples of *ijāzahs* known to us from our manuscript sources, that quoted by al-Jabartī is an elaborate affair and cannot be regarded as typical of the period which directly concerns us. It does, however, testify to the currency and authority of Ṭaybughā's work.

## CHAPTER 28

### ON THE DUTIES AND QUALITIES OF A MASTER AND TEACHER

A teacher's first duty is to exercise power of discernment. By this we mean that he will need, firstly, to determine a person's physical capacity in the light of the fact that there are different somatic types and that some people have longer or shorter limbs than others, and, secondly, to detect a pupil's natural intelligence or obtuseness and his ability, or lack of it, to assimilate what he is taught.

His next step will be to subject the novice to a religious test if he is an adult; for if he is a boy the permission of his parents<sup>1</sup> will be required. Once he is satisfied that he is a Muslim, he should extract from him an undertaking that he will shoot no other Muslim, nor any non-Muslim enjoying treaty rights, nor any dog, nor any four-footed animal, except in hunting or unless it be something which must of necessity be destroyed, nor anything that will involve him in an act of injustice. Once he is sure that his pupil will accept all these conditions and is satisfied with his religious qualifications, he should take him and endeavour to instruct him according to the requirements of his physique as indicated above and should counsel him once he is sure that he is worthy of instruction. For it has been transmitted from an authoritative source that to withhold learning from one who is worthy of it is not lawful. Such a one must be granted a share thereof as of right, especially if he appreciates the value of learning, longs for it, and seeks God's good pleasure and not vainglory and vanity. In this connexion experts on archery quote religious scholars as their authority for the maxim: ‘Neither withhold advantage from those who are worthy of it, and thereby do them wrong, nor grant it to those who are unworthy and, thus squandering it, do advantage wrong.’

As to a master's duties, he should train his pupils, bring them together in unity and concord, spur them on to work, reprimand them only in private, and labour to the end that they may strive to learn and ever<sup>2</sup> reverence the place dedicated to archery, wherein none should be allowed to utter any profanity, inasmuch as it is a place of worship, and places of worship belong to God.

Proceedings should be opened with the formula ‘In the name of God’. Upon loosing, the formula ‘God is greatest’ should be pronounced, and, after that, God's blessing upon the Messenger of God, his family, and his Companions<sup>3</sup> should be invoked. Where it is merited, the master should compliment a shooter to encourage him. He should teach his pupils all that is good and at the same time restrain them from all that is bad.

A master should be taciturn and of dignified bearing and commanding presence, yet not haughty. He should be stable and patient and not too hasty with his answers. All kinds of learning may be observed in all mankind, and there is no one who does not have some share in God's bounty. It is desirable that a master should have the strength of an elephant, the spring of a lion, the boldness of a leopard, and the cunning of a fox; that he should have for his colleagues the affection that a dog has for its master;<sup>4</sup> that he should exercise the patience of a cat. He should make the sword his companion, the lance his friend, the shield his fortress, the dagger his secret weapon. He should display great tolerance and be indulgent. The beginning of all things is piety,



which is a man's capital stock.<sup>5</sup> These, then, are some of the qualities which a teaching master should possess.

As regards the qualities required of a novice, some of these have already been mentioned. The foundations upon which they all rest are humility, hearing attentively and obeying that which is

pleasing to God Almighty and His Messenger —  
may God bless him, his house  
and his Companions,  
and grant them  
peace !



## APPENDIX I

### WEIGHTS AND MEASURES

In the course of Islamic history the values of units of measurement used in the Near and Middle East have varied according to time and place. Some impression of the difficulties created in consequence may be formed from a perusal of the Appendix to *Arab Archery*, in which it can be seen that measurements furnished by the Arabic original left Faris and Elmer groping for equivalents (sects. 2, 6, 7, 11, 12, 13, respectively pp. 159-60, 165-66, 166, 172-74). The general mensural problem is aggravated by the fact that an author writing in one part of the Muslim world will, without acknowledgement, commonly quote, say, from earlier works originating in other parts and, in so doing, transmit specifications expressed in terms identical in form with, but in value different from, those used in his own area and period. In determining the equivalents of units mentioned in the present work we have had the benefit of the unstinted advice of a noted authority in the field, Professor Walther Hinz of the University of Göttingen, author of *Islamische Masse und Gewichte* (Leiden, 1955) and contributor of the article on the cubit in the new edition of the *Encyclopaedia of Islām* (s.v. *Dhira'*). We gratefully acknowledge his assistance.

Fortunately for us, Taybughā does define his cubit as 'the carpenter's cubit, that is to say, the Hashimī cubit' (p. 8). This statement in itself poses a problem since we know of no carpenter's cubit that is the same as the Hashimite. However that may be, we have taken the latter as the basis of conversion with a value of 66.5 cm., or 26.18 in., though it must be noted that it varied between limits of 66.81 cm. and 66.27 cm. As for the *qirāṭ*, there were 24 to the cubit.

The *raṭl* of Damascus was constant at 600 *dirhams*, of which the exact equivalent is 1.85 kg., or 4.07 lb. avoirdupois. The weight of the Damascus *dirham* was therefore 3.086 grams, or 47.6 grains.

Having established these equivalents for weights given in the early part of the *Ghunyah*, we subsequently found mention of a bow of 100 *raṭls* (Ch. 16, p. 86), or 407 lb. Since a bow of this weight is well beyond the limit of human strength it became evident to us that the expression '100 *raṭls*' was either a figure of speech or quoted from some other source (see p. 88). If the second of these alternatives is the explanation, the bow of 100 *raṭls* is in all probability that which is frequently linked in Arabic archery literature with the name of Ṭāhir al-Balkhī, and the unit is almost certainly Iraqi. To the Iraqi *raṭl* there were either 128.4 *dirhams* or 130 *dirhams*, and, since the *dirham* equivalent is 3.125 grams, or 48.2 grains, the second figure—130, to which we incline—gives a *raṭl* equivalent of 406.25 grains, or 14.3 oz.

All other problems apart, we must not lose sight of the hazard—encountered in some MSS—of copyists' interpolations which introduce standards other than those intended. Thus, for instance, it does not follow that, because a text reads 'x *raṭls* Damascus weight', the author wrote the words 'Damascus weight'. The copyist, once conditioned to this qualification, may have continued to add it where the author deliberately omitted it. We have personally encountered this kind of interpolation and warn against uncritical acceptance of specifications occurring in Arabic sources.

The following table summarizes the values offered by us for weights and measures in the Middle East during the fourteenth century:

Damascus, or Syrian, measure		
Cubit	66.5 cm.	26.18 in.
<i>Qirāṭ</i>	2.77 cm.	1.09 in. (for practical purposes 1.1 in.)
<i>Raṭl</i>	1850.0 grams	4.07 lb.
<i>Dirham</i>	3.086 grams	47.6 grains
Baghdad, or Iraqi, measure		
Cubit	49.875 cm.	19.63 in.
<i>Raṭl</i>	406.25 grams	14.3 oz.
<i>Dirham</i>	3.125 grams	48.2 grains
Cairo, or Egyptian, measure		
Cubit	54.04 cm.	21.28 in.
<i>Raṭl</i>	437.5 grams	15.4 oz.
<i>Dirham</i>	3.125 grams	48.2 grains

## NOTE:

100 *raṭls* = 1 *qinṭār*  
12 *ūqiyyahs* = 1 *raṭl*

The *fist*, the *finger*, and the *arm-span* were canonically standardized at 8.312 cm. (3.272 in.), 2.078 cm. (0.818 in.), and 199.5 cm., or almost 2 metres (2.188 yds.). We find these equivalents quite acceptable, but are by no means convinced that archers adhered exactly to such measures. Certain indications in technical literature suggest that rule of thumb was not unusual. Furthermore, we do not know for sure that the canonical arm-span (4 Iraqi cubits) was that of the Mameluke archers in Syria. As regards the *span*, many dictionaries give an equivalent of 9 in., but it may be concluded from p. 29 that if the length of an arrow is 30 in., the span would be 7½ in. As Elmer, a physician, points out, the average man cannot—he presumably means without undue strain and stretch—span much more than 8 in., whatever may be said to the contrary (*Arab Archery*, p. 159).

One final word: where conversions are given in the text, we avoid unrealistic numbers of decimal points and offer the nearest practical equivalents.

## APPENDIX 2

## THE BOW: TERMINOLOGY

In CD the various parts of a composite bow are named (C<sup>1</sup>, 21b–22b; C<sup>2</sup>, 39b–40b; C<sup>3</sup>, 15a–16a; D<sup>1</sup>, 16a–17a; D<sup>2</sup>, 46a–b). Many terms date from a very much earlier period than that to which the *Ghuniyah* belongs, and we cannot be certain that all were in use in the fourteenth century. The following translation is based on C<sup>1</sup> with emendations from other MSS where the text is corrupt:

‘A bow has five members (*awṣāl*): two limbs, two *siyahs*, and a grip. It has four joints (*maḥāṣil*): two at the junctures between the *siyahs* and the limbs and two at the juncture between the limbs and the grip. It has an upper section which is the one nearer the sky (i.e. when the bow is held correctly in a vertical position). Extending from the tip of the upper *siyah* to a point one finger’s width within the grip, it is called the shooting limb (*bayt ar-ramy*) because the centre which it marks (sc. at the point where it ends on the bow) is the point which the arrow passes when shot.<sup>a</sup> The remaining limb is termed the dropping-limb (*bayt al-isqāt*) or the descending-limb (*bayt al-ḥaṭṭ*) because it drops earthward when shot.<sup>b</sup>

As regards the names of the various parts of the bow, the place into which the loop (*urwah*) of the bowstring fits is called the nock (*farā*). It is also termed by the Arabs *kuṣr* (‘notch’) and by some *ḥijr* (‘lap, bosom’). The curved extremities are called *siyahs*. The *siyah* is also called by the Arabs *ḡufr* (‘finger-nail’) or *uṣṭūr* (‘sparrow, peg’), or *fawq* (‘tip, point’), or *qalansuwah* (‘tall cap’).<sup>c</sup> The eminence on which the knot of the bowstring rests when the bow is strung is termed *‘aqabah* (‘acclivity’).<sup>d</sup> The Arabs also call it *uṭrah* (‘cuticle’). The section from the base of the *siyah* to the grip is called *bayt* (‘house’, i.e. the limb).<sup>e</sup> The Persians call it *dustār*. The juncture between the *siyah* and the limb is called *rukbah* (‘knee’). The *daffatā l-fūq* are the ends of the limbs at the base of the grip. The point which the arrow passes when shot is termed *kabid al-qaws* (‘liver, centre, of the bow’), or *dimah*, or *niyāt* (‘heart’). The *ibranjak* is a piece of wood in the inner surface (*wajh*) of the grip at the point where the horn strips meet. The bone which covers the handle is called *ḥudūd*.<sup>f</sup> When a bow reverts to its reflexed position by turning backwards, it is said to be *mu‘ajjah*, that is to say, ‘reverted’ (*rāji‘ah*). This term is used if the bow is relaxed (*maḥṭūqah*, i.e. unbraced). When it goes back upon its belly (i.e. to the braced position) this action is called *inḥinā* (‘bending over’).<sup>g</sup>

- The centre of the bow is taken to mark the end of the upper limb, which, it will be recalled, is longer than the lower. The explanation of the ‘shooting limb’ in *Arab Archery*, p. 14, is that the upper limb is so called ‘because it accounts for most of the shooting’. It is less satisfactory than the one we have here.
- D: ‘it is called *bayt ḥaṭṭ al-watr*’, i.e. the limb from which the string is removed, presumably when one unbraces. C’s explanation is based, it seems, on a misunderstanding of the meanings of *ḥaṭṭ* and *isqāt* in this context.
- In *Arab Archery*, p. 15, the *ḡifr* (*ḡufr*), or *uṣṭūr*, is given as the part between the nock and the



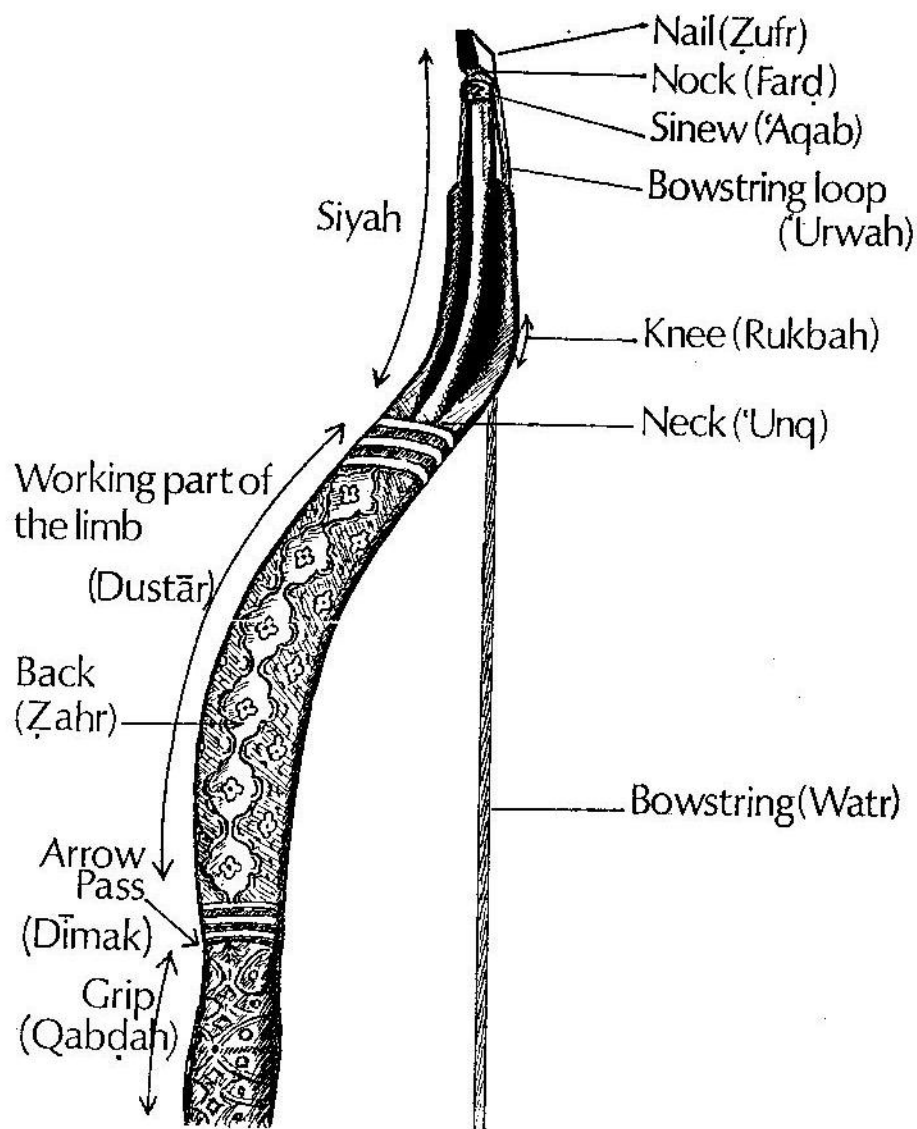


FIG. 54. THE BOW: TERMINOLOGY

The upper, or 'shooting', limb (*bayt ar-ramy*) of a composite bow from India. Cf. Ṭaybughā's terms in Fig 5.

extremity of the *siyah*. In the *Mukhaṣṣaṣ*, VI, 43, it is given as the part extending from beyond the place where the string is knotted to the end of the bow. These definitions are more appropriate than those given here.

- d. In *Arab Archery*, p. 15, this term is taken to mean 'string-stopper', but there is nothing in the Arabic to justify such a translation. The word could mean a 'sinew-binding', however.
- e. Hence *bayt* can mean *either* the entire limb, including the *siyah*, *or* only the working part of the limb.
- f. This expression normally means 'cusps of the nock' of an arrow. Perhaps we should read *farq* 'division' for *fūq*, translating as 'the sides of the division', i.e. of the splice. The term *daffah* also occurs in *Arab Archery*, p. 15, where it is said that 'The end of each arm adjacent to the grip, where flexibility begins, is called a *daffah*'.
- g. The reading *ḥudūd* is uncertain. The same sentence occurs in *Arab Archery*, p. 15, where it has been read as *khudrud*. No bone covering has been found in the handle of any extant Oriental composite, but such a feature does occur in Avar and Magyar types up to the tenth century A.D.
- h. The English-speaking archer would term this 'following the string'.

## APPENDIX 3

## ARROWS: TERMINOLOGY

In CD various kinds and different parts of arrows are named as indicated below (see C<sup>1</sup>, 34a-b; C<sup>2</sup>, 57a-b; C<sup>3</sup>, 26b-27a; D<sup>1</sup>, 19b-20a; D<sup>2</sup>, 49a, 53b). It should not be assumed without further investigation that all the terms are known to Taybughā or that they were used by contemporary archers since it seems likely that most of them were introduced into CD from much earlier sources. Similar data are offered in *Arab Archery*, Ch. xxxvii, pp. 103 ff., but the reader should note: (i) that not all terms mentioned there occur in CD; (ii) that certain definitions differ; (iii) that not all the terms transmitted by *Arab Archery* are accurate. See also *Tabṣīrah*, 94b-95b.

Texts (emended where necessary):

[*Nushshāb* is a collective term applied to arrows complete with wood, fletchings, and head. Each type has a name of its own. The singular of *nushshāb* is *nushshābah*. *Nushshāb* are also called *sihām* (sing. *sahm*), a term covering arrows of all kinds. The wood is called *qidh*, the head *naṣl*, the fletchings *qudhadh*, of which the singular is *qudhadah*. The *fūq* is the nock into which the string fits and which is called *kāz* in Turkish.]

[C: The bulges on each side of the nock are called *sharkhāni* (sing. *sharkh*). The nock sinew is called *uṭrah* ('frame, cuticle') by the Arabs, and the part from the base of the nock to the place where the fletchings begin is termed *farāwān* (? : *farāzān*).<sup>a</sup>

The fine part on which the feathers are set is called *ḥaqw* ('waist'),<sup>b</sup> and the thread that is laid over the end of them is called *sharījah*.<sup>c</sup> The portion of the arrow which runs from below the fletchings to the middle of the shaft is called the *matn* ('body, main part')<sup>d</sup> or *kulyatāni* ('kidneys'),<sup>e</sup> this portion being the thickest part of it. From this portion to the arrowhead there is what is termed the *ṣadr* ('breast'), or foreshaft.<sup>f</sup> The sinews at the arrowhead are known as *riṣāf* (sing. *raṣafah*).<sup>g</sup>

[D: The socket (*madkhal*) of the arrowhead is the front end, or head (*ra's*), of the arrow.<sup>h</sup>]

[C: Areas of sinew and the base of the fletchings should be elegantly painted with sandarac and a fine thread wrapped over them—that is to say, the fletchings. This treatment will protect them against rain.]

[D: There are various types of arrow. These include the *yāṣij*, the *mishqaṣ*,<sup>i</sup> which has a long head, the *yaghliq* for war, the *mayḍāni* for target-shooting competitions (*al-munādalah fī l-ahdāf*), the flight arrow (*sabqī*), the butt arrow (*amājī*), and the cylindrical (? : *ṭūmār*).<sup>j</sup> The *sbkā* (?)<sup>k</sup> is an arrow with a ring (*ḥalqaḥ*) at the end, while the *kāz* is the *mī'rād 'uṣfūrī* which flies crosswise.<sup>l</sup> *Nabl* is a term applied to long<sup>m</sup> arrows and to short, of which there are various types such as the *qalam*, *jarād*, *ḥusbān*, and *dūdāni*.

[C: The *mīsrā'* is a long arrow with four feathers; the *ḥaṣwah* is an arrow the size of a span;<sup>n</sup> the *raḥb*<sup>o</sup> is a huge arrow with plenty of iron in it; the *mī'balah*<sup>p</sup> is an arrow with a broad head.]

a. The term is almost certainly Persian and most probably *farāzān* meaning 'the rearmost part' (cf. *pishān*, 'the most forward part' of anything). On *farāz* 'space above a thing', see Redhouse, *Lexicon*, s.v.

- b. Not *ḥafw* as in *Arab Archery*, p. 103. See, *inter alia*, *Mukhaṣṣaṣ*, VI, p. 55.  
 c. In the *Mukhaṣṣaṣ*, VI, p. 55, *sharījah* is defined as 'the sinew with which the fletchings are attached'. The sinew which was placed over the heads of the fletchings was termed *kizāmāh* (ibid.). By the ends of the fletchings are meant the ends nearest to the nock. The heads of the fletchings were those nearest to the arrowhead or those parts which were located where the *ḥaqw* began, working from the arrowhead upwards.  
 d. In *Arab Archery*, p. 103, the *matn* is defined as the foreshaft. The definition given in Redhouse, *Lexicon*, s.v., is precisely the same as that which we are given here: 'The part of the shaft of an arrow from the middle of its length to where the feathers begin.'  
 e. Assuming that the reading is correct, it is hard to see why this part was so called unless it was

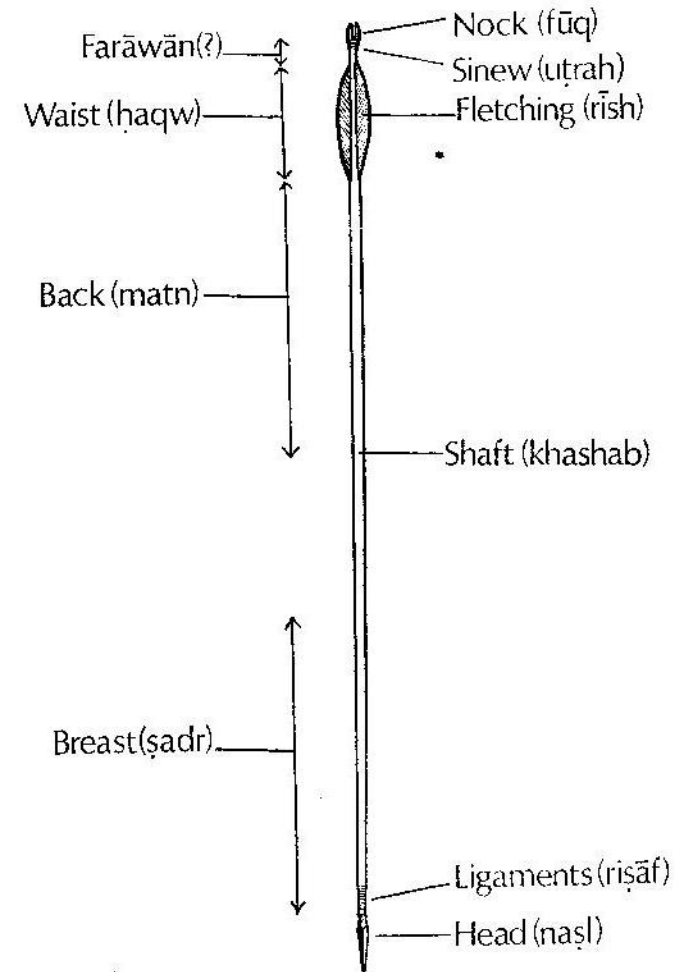


FIG. 55. PARTS OF AN ARROW



- because of its thickness which would make the shaft, when viewed longitudinally, appear to bulge slightly on either side.
- f. According to *Arab Archery*, p. 103, the breast is that part which runs from the shaftment to the middle of the shaft. This does not appear to have been the case, for we read in the *Mukhaṣṣaṣ*, VI, 54: 'The *zāfirah* [not *wāfirah* as in *Arab Archery*] is that part of the shaft which comes below the fletchings. The part which runs below that to the middle towards the thin portion of it is the breast, but the term "breast" has begun to be applied only to that part of the shaft which comes next to the arrowhead because it is to the fore when it is shot. The rear of the shaft which comes next to the nock is termed '*ajz*.' In Arabic the term *ṣadr* is regularly applied to the front part of a thing. In the *Munjid*, s.v., the *zāfirah* is more closely defined as the part which—working from the arrowhead—the third of the shaft adjacent to the arrowhead.
  - g. *Mukhaṣṣaṣ*, VI, p. 55: 'The *riṣāf* are the sinews located above the socket.'
  - h. The socket is called *ru'z* (ibid. Cf. *Arab Archery*, p. 103).
  - i. Defined by one source as any arrowhead in which there is a prominent ridge on a flat surface.
  - j. What this was is not entirely clear. It is mentioned by Ṭaybughā (p. 77) as being most suitable for gourd shooting.
  - k. The word is not vocalized and therefore difficult to transcribe.
  - l. *Mi'rāḍ* is defined by Redhouse, *Lexicon*, s.v., as a 'headless and featherless arrow-shaft that often strikes sideways or with its middle part'. It is, however, described in the *Nihāyah* as follows: 'This type of arrow leaves the bow and flies sideways on to the mark. It will pass nothing without hitting it. I will describe its appearance and how it works... You take a shaft and plane it down. The nock should be very thin. It (the shaft?) should gradually thicken until it reaches the shaftment and then thin out towards the end. It should next be fletched with three feathers, one of which should be bigger than the other two. Now shoot it, and it will fly sideways. If it does not, you can take it that the nock is too light. Drill a hole in it then, and fill it with lead. Shoot it again, and you will find that it flies transversely. The advantage of this type of arrow lies in its use against birds. It will pass no bird without hitting it' (pp. 83-84). Arrows from Sind intended for use in this way may be seen in the Ingo Simon Collection, Manchester Museum, No. O.7720.
  - m. Not by Ṭaybughā.
  - n. According to the *Mukhaṣṣaṣ*, VI, p. 51, it was a cubit.
  - o. As applied to arrowheads, this term indicated a thin, fine head (ibid., p. 58).
  - p. Defined as a 'long, broad, arrowhead' from which the arrow took its name (ibid.). According to one of Ibn Sidah's authorities, it was like a javelin-, or spear-head, while according to another, it was a head without a raised central ridge that was absolutely flat and smooth.

## APPENDIX 4

### FINGER-RECKONING

In the Middle East and throughout the Arab world, there existed a system whereby numbers could be indicated by the positioning, or flexures, of the fingers. The subject is treated in some detail in J. Rushka's 'Arabische Texte über das Fingerrechnen', *Isl.*, X, 1920, pp. 87-119, *Arab Archery*, pp. 19-23, and *ET* s.v. *Ḥisāb al-'aql*.

The system permitted numbers to be conveyed by the use of one hand only, where the middle, ring-, and little fingers were used to indicate the numbers from 1 to 9, and the thumb and index finger to show the tens. From the point of view of the archer the various locks and grasps could easily be communicated in terms of this system. Unfortunately, as already indicated in Ch. 10, the method used by Ṭaybughā differs in certain details from that shown in *Arab Archery* and introduces an element of confusion, mainly as regards the two most important locks of '63' and '69'.

In *Arab Archery* there is a detailed description of the methods of indicating numbers from 1 to 100, which is all that concerns the archer. Figs. 56 and 57 are based on this information, modified by the assertion of Ṭaybughā that in indicating 9 the tips of the fingers were to be turned in to the palm. It would follow from this that the same principle also applied to 7 and 8.

Whatever the system, the locks or grasps referred to in our text can be reconstructed without much difficulty. We must point out, however, that in *Arab Archery*, p. 21, the illustration said to indicate 20 does in fact indicate 25.

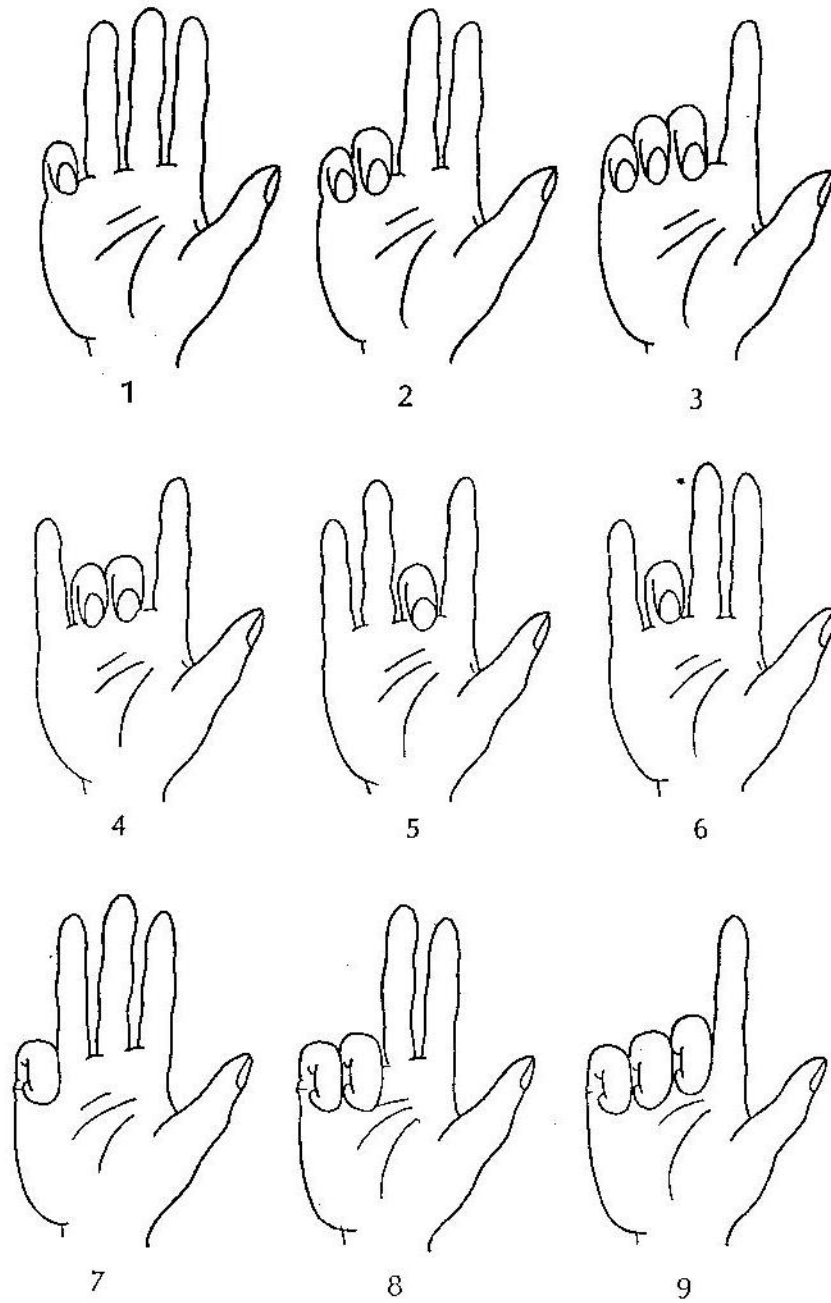


FIG. 56. FINGER-RECKONING, 1 TO 9

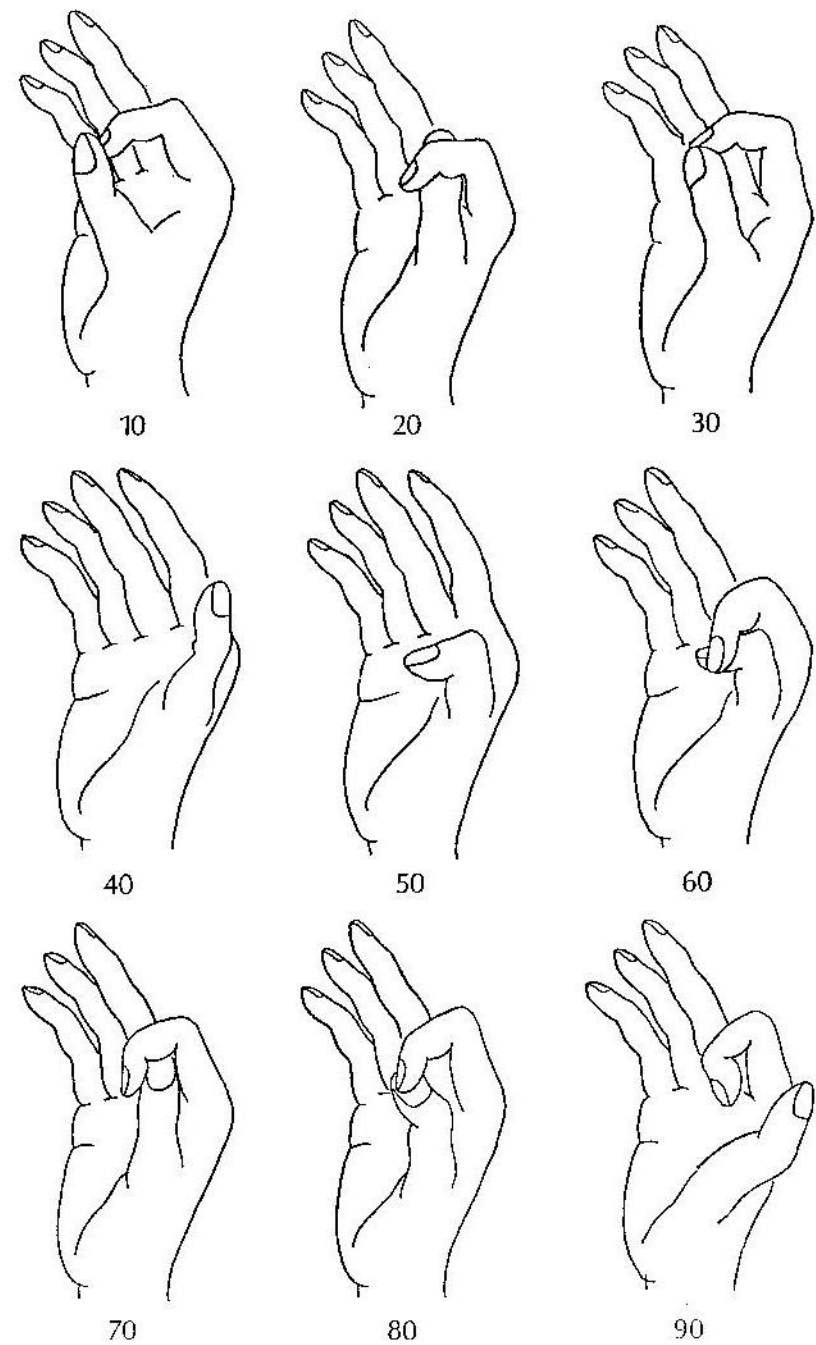


FIG. 57. FINGER-RECKONING, (TENS) 10 TO 90



Plate 18 (1) shows the bow in the shape to which it settled after reasonable use. It had, of course, been reflexed into a complete circle during the final stages of manufacture. In (2) we see the bow strung and ready for use. It has a pleasing appearance, and we may observe that it is often the case that if a bow looks well, its design is good. In (3) the bow is shown on a tiller at the full draw of 30 in. It should be noted that a correctly designed bow at full draw should have a string at right-angles to the ear so that maximum advantage may be taken of the leverage afforded by the *siyah*.

We express our sincere thanks to Mr. McEwen for his interest and trouble in producing this excellent reconstruction.

## APPENDIX 5

## THE RECONSTRUCTION OF TAYBUGHĀ'S BOW

The bow specified by our author in Chapter 3 is of considerable interest because its dimensions do not agree with those of any other composite bow of which we have knowledge. In the history of the Middle East successive waves of invaders, intruders, and immigrants from Central Asia have introduced different kinds of bow. The forms of ancient types from the twenty-third century B.C. to the sixth century B.C. have been well presented by Yigael Yadin in his *Art of Warfare in Biblical Lands* (1963), but no one has yet fully pieced together the subsequent history of the bow in that area up to more recent times as far as available specimens in museums and private collections permit.

Henry Balfour in his illustration 'Morphological Classification of the Composite Bow' (*JRAI*, LI, 1921, p. 309, Fig. 17) does show a relationship between the various forms, but without any detailed measurements which might enable us to check one type against another. In attempting to reconstruct his researches and supply missing data we have been greatly hampered by lack of access to some of the weapons he had found. Certain important private collections have been broken up and sold, with the result that we do not know what has become of various rare examples of earlier bows. There are, therefore, wide gaps in our knowledge. This being so, we need not explain the importance of unearthing the dimensions of a hitherto unknown form of composite.

Our bow may directly descend from some particular Central Asian type, though we have no direct evidence to support the hypothesis. Equally, it may have been developed under any, or many, of a variety of influences that had accumulated there from Ayyūbid to Mameluke times or even earlier. If pressed to relate it to any known form of composite, we would suggest that its resemblance to a Sino-Tartar (see Fig. 2b,c) with shortened ears is the closest conceivable, and this is as far as we can go.

From the somewhat scanty information available in the *Ghuniyah* Edward McEwen graciously undertook to attempt a reconstruction for us. In so doing he followed the Ottoman practice of hollowing the horn slightly and then made the wooden core—of maple—correspondingly convex. Both surfaces were deeply scored to give greater purchase to the glue. The grip section was made from a piece of oak and the ears from beech strengthened with inserts of horn. The veneer applied to the sinew backing was taken from the inner bark of white poplar. One unknown factor proved to be the amount of reflex allowed in the grip. An interesting point which emerged from the reconstruction was that when a string of the specified length (p. 21 above) was fitted, the resultant bracing height was  $7\frac{1}{4}$  in. It was found, however, that the reflex could be reduced, as also the angle of the *siyah* in relation to the working part of the limb, to achieve the same result. Which form was the original, we cannot say, and it is doubtful whether the problem, like that of the grip, will ever be resolved with any certainty.

Despite the short *siyahs*, the bow is of an efficient design and well suited to hunting or warfare as we have proved in field trials. With a weight of about 50 lb. at full draw it shot a 30-in. arrow over a distance of 285 yards. This is a satisfactory performance by any standards.

## APPENDIX 6

## QABAQ AND QIGHAJ

(a) *Qabaq*. From the text it will be gathered that *qabaq*-shooting consisted in shooting from horseback at an elevated mark affixed to the top of a mast. From the name of the exercise (Turk. *qabāq/kabak*, 'gourd') we can take it that the mark was originally a gourd, but, as we have observed (p. 77), the term was subsequently applied to targets of a different and often more sophisticated nature, such as containers for doves.

From the part, originally consisting of the gourd, the use of the term *qabaq* seems to have been transferred to the whole, consisting of the mast together with its mounted target, and to have been replaced in the sense of 'gourd' by the Arabic equivalent *qar'ah*. Such at any rate is the impression to be gained from the Mameluke historian, Abu l-Mahāsīn Ibn Taghribirdi (1409-1410?-1470), son of a most distinguished commander-in-chief, whose word in this matter can be wholly relied upon (*an-Nujūm az-zāhirah*, Cairo edn., VIII, p. 6). According to this author the *qabaq* was a long pole surmounted by a gourd (*qar'ah*) which served as the horse archer's 'pigeon-box' target. Successful shooting would earn an archer not only a befitting robe of honour, but also the precious 'cage'—if we may call it such.

A different definition is given by an equally famous Mameluke historian, al-Maqrīzī (1346-1442), who was, however, likely to be less well informed on the matter. His understanding of the term *qabaq* was a high mast surmounted by a wooden ring, or hoop, through which archers shot at a target. Whether his archers were mounted or not is uncertain, for on this point his text is ambiguous in that a verb (*waqafa*) is used which may mean either 'to stand' or 'to come to a halt', irrespective of whether the subject is mounted or on foot (*Khīṭat*, III, p. 180). Moreover, we cannot exclude the possibility that a simple textual corruption obscures the function of *waqafa* as a mere verb of duration or continuity (see Latham, *BSOAS*, XXXII, 1969, pp. 259-60). Whatever the truth of the matter, al-Maqrīzī's reference to the substitution of the mast and gourd by a spear and hoop for training purposes induces the speculation whether he did not confuse a means of practice with *qabaq*-shooting proper. Alternatively, it may be that in addition to its particular and restricted sense the expression '*qabaq*-shooting' was also used in a looser and more general sense. Indeed, in the opening paragraph of our chapter the expression does occur with the extended meaning 'shooting at an elevated target', albeit that 'from horseback' is implicit.

(b) *Qighaj*. According to glosses in CD (see references, p. 77), the term derives from a Turkish word meaning 'slant, slanting, inclined, sloping, oblique' (*ta'rib* [sic], *muwarrab*, *mā'il*). If it is justifiable, as it would appear, to associate the borrowing with the Turkish *kığaç* in the sense 'slope of a roof' or 'out of true' (Radloff, II, col. 692), then the spelling *qayghaj* or *qighaj* which occur in a number of MSS, including the early B<sup>2</sup>, are preferable from the point of view of phonetic transcription to *qayqaj* or *qiqaj*. Reinaud, transliterating only from consonants, renders the term *kycadj* (i.e. *qiqaj*) and he may not be unjustified, for *ky-kaj* is encountered in Lady Sheil's *Glimpses of Life and Manners in Persia* (London, 1856, p. 78). At all events, there is nothing

unusual about the shift gh (ğ) > q, which is a common enough feature even in the dialects of nomadic Arabs.

Whether the word as we have it is intended to describe the action of shooting in an inclined plane or the position of the archer when making the shot, or, less probably, the angle at which the target was set, is debatable. If we accept the first possibility, the term is presumably intended to convey the notion that the shot is not made in a horizontal plane. Neither, of course, is the shot so made in the case of the gourd, but since shooting downwards from horseback at a target at ground level is of greater practical importance, it is likely to have antedated gourd-shooting and therefore established a prior claim to the name. However that may be, what is fairly certain is that its original meaning was gradually lost, for in a number of manuscript sources of our acquaintance the grammatical treatment of the word and context suggest that it denoted some kind of target. Reinaud also formed this impression and from the evidence at his disposal inclined to the view that it was a butt made of a wicker basket filled with sand (*ibid.*, p. 221). The explanation that springs most readily to mind is one of semantic development; it is easy to see how *qighaj* by analogy with *qabaq* could come to denote the target and, equally, how '*qighaj*-shooting' acquired the looser and more general sense given in our text of 'shooting downwards from horseback'. It is less easy to explain Morier's understanding of the term in nineteenth-century Persia (*Second Journey through Persia*, London, 1818, p. 169). The description that he gives in this connexion is that of an exercise in which one group of horsemen in simulated flight before another suddenly turn their heads and with agility transfix their pursuers.

The practical value of shooting at a ground target from horseback is obvious and it is almost otiose to point out its application to the needs of hunting and warfare.



## GUIDE TO ENGLISH TECHNICAL TERMINOLOGY

In the following list of *selected* words and phrases we are mainly concerned to furnish the non-specialist with simple explanations of the principal technical terms to be encountered in this book. It should be noted that we are not in all cases in absolute agreement with Elmer whose comprehensive glossary in *Target Archery* (pp. 482-524) we nevertheless recommend as an authoritative source.

- ANCHOR, v.: to lodge the drawing hand in a firm and constant position at full draw so as to ensure accuracy of aim.
- ANCHOR-POINT: point on the body, usually part of the face, where the drawing hand is lodged at full draw.
- ARM: (of the bow) upper limb.
- ARROW, *Parts of*: BREAST, FLETCHING, FOOT, FORESHAFT, HEAD, HEEL, NOCK, SHAFT/STILE, SHAFTMENT, qq.v.
- ARROW-GUIDE: device by which short arrows or darts may be shot from inside the grip of a full-drawn bow of greater draught than that otherwise permitted by the length of the missiles.
- ARROWHEAD: striking end of an arrow made of a piece of hard material fitted separately to the front of a shaft.
- ARROW-PASS: the point at the top of a bow's grip against which the arrow rests when nocked and in place for shooting.
- BACK, n.: convex surface of a braced bow.
- BACKED: (bow) having material attached to its back so as to strengthen it or improve cast.
- BARRELLED: (arrow) tapering from the centre towards each end.
- BELLY: concave surface of a braced bow.
- BELT-AND-CLAW: see DRAWING-STRAP.
- BLUNT: (arrowhead) having a blunt, flat tip, designed to prevent penetration.
- BOLT: short, and usually heavy, arrow for use with a crossbow. See also QUARREL.
- Bow, *Parts of*: BACK, BELLY, LIMB, NECK, NOCK, TIP, qq.v.
- BOW-CASE: holder, usually of leather, in which a bow is carried.
- BOW-HAND/ARM: hand/arm which holds the bow's grip when shooting (*left* in the case of a right-handed archer).
- BOW-WEIGHT: see DRAW-WEIGHT.
- BRACE, v.: to fit the string to a flexed bow; *synon.* with STRING.
- BRACING-BOARD: device to facilitate the bracing of strong or difficult bows.
- BRACING HEIGHT: see HEIGHT OF A BOWSTRING.
- BREAST: (of an arrow) the shaft immediately in front of the feathers or fletching, but *on the sense in Arabic*, see Glossary s.v. ŞADR.
- BREASTED: (arrow) thickest at the breast. *On the sense in Arabic* see Glossary s.v. MUŞADDAR.
- BROADHEAD: flat, pointed arrowhead with sharp edges.

- CAST: capacity of a bow to discharge its missile.
- CLEAN: (the loose) characterized by correct disengagement of the thumb from the bowstring so that the passage of the latter is in no way obstructed or retarded.
- COMPOSITE: bow, the construction of which is based on the union of *different* materials. The Asiatic composite was formed of horn and sinew bonded with glue on a wooden core.
- CREEP: slight nosing forward of the arrow at full draw just before the loose.
- CROSSBOW: bow fitted to a stock and drawn by the archer, with or without mechanical assistance, but held and released by a mechanism.
- DART: 1. arrow used with an arrow-guide; 2. short arrow-like missile.
- DRAUGHT: (of bow, arrow) amount or length drawn.
- DRAW, v.: to pull back the string of a bow, usually for the purpose of shooting it.
- DRAW, n.: 1. act, manner, technique, of drawing; 2. distance between the back of a bow and its string at the moment of shooting.
- DRAW-WEIGHT: force in pounds required to draw a bow to the length of its appropriate arrow.
- DRAWING HAND/ARM: hand/arm which draws the bowstring (*right* in the case of a right-handed archer).
- DRAWING-STRAP: looped strap with a two-hooked claw; it is normally belted around the waist to enable one to draw the string of certain types of crossbow. (See Fig. 29.)
- EAR: the rod-like tip of an Oriental bow containing the nock. It is *not* synonymous with *niyah* since it does not apply to the ridged portion, but it is often used loosely as such.
- FISHER LOOSE: three-finger lock with string held obliquely.
- FLETCHING: 1. feathers, or vanes, attached to an arrow's shaft to enable it to fly steadily and head first; 2. feather, or vane, used for this purpose.
- FLIGHT ARROW: arrow designed for flight shooting, q.v.
- FLIGHT BOW: bow designed to impart the highest possible velocity to an arrow for the purpose of achieving the greatest possible distance.
- FLIGHT SHOOTING: shooting for the purpose of attaining the greatest possible distance with an arrow.
- FLIRT: to jump suddenly from the correct line of flight (arrow).
- FOLLOW THROUGH, v.: to continue the act and tension of shooting from the moment the arrow leaves the string until it has sped. (See pp. 68-70.)
- FOOT: (of arrow shaft) the few inches or so adjacent to the head.
- FORESHAFT: front half of an arrow's shaft.
- FULL DRAW: normal maximum length to which an arrow is drawn in its appropriate bow.
- GAD: to fly erratically, unsteadily, as a result of some fault in equipment or technique (arrow).
- GRASP: see GRIP, 2 and 3, and remark in parenthesis.
- GRIP: 1. handle of bow; 2. grasp of bow-hand on handle; 3. manner of grasping the handle. (Because of the danger of ambiguity we tend to avoid the use of the word in senses 2 and 3.)
- GROUP, v.: to place arrows close together in a target.
- GUIDE: see ARROW-GUIDE.
- HAND BOW: bow drawn, held, and released entirely by the strength of the archer (as distinct from a crossbow, for instance).
- HANDLE: part of the bow grasped by the hand during shooting, grip.
- HEAD: see ARROWHEAD.
- HEAVY: (bow) having a relatively high weight. See DRAW-WEIGHT.
- HEEL: (of an arrow) that section of the shaft which lies between the rear end of the fletching and the beginning of the nock.
- HEIGHT OF A BOWSTRING: the distance between the grip and string of a braced bow.
- HOLD, v.: to pause at full draw before releasing.

- KNEE:** the relatively sharp recurve in the ridged section of the *siyah* found in certain types of Oriental bow.
- LEG:** (of the bow) lower limb.
- LIGHT:** (bow) having a relatively low weight. See **DRAW-WEIGHT**.
- LIMB:** that part of a bow which extends from the grip to the tip, there being two limbs distinguished as 'upper' and 'lower'.
- LOCK:** 1. the manner in which the thumb and/or fingers are applied to the bowstring in order to draw the bow; 2. (of a crossbow) the mechanism which holds the draw-string and releases it when the trigger is operated.
- LONGBOW:** the traditional old English wooden bow of 6 ft. or more in length. N.B. 'long bow' in Arabic denotes a bow which shoots full-length arrows (see Glossary s.v. *SAHM ṬAWIL*).
- LOOSE, n.:** act of releasing a drawn bowstring. N.B.: the word is often, but erroneously, used to denote the *lock*, q.v.
- LOOSE, v.:** to release a drawn bowstring.
- MEDITERRANEAN LOOSE:** the European lock in which the first three finger-tips lie on the string with the nock between the first and second.
- NECK:** see Glossary s.v. 'UNQ.
- NOCK, n.:** 1. (of a bow) the notch in the tip into which the loop of the string fits; 2. (of an arrow) the notch in the rear end into which the bowstring fits.
- NOCK, v.:** to fit an arrow on to the string.
- NOCKPIECE:** section of hard material containing the notch which is separately fitted to the butt of an arrow's shaft.
- NOCKING-POINT:** point on the bowstring where the arrow should be nocked.
- NUT:** (of a crossbow) rotating cylindrical device extensively found in the stocks of crossbows. One part of the circumference is shaped to hold the drawn string, and an opposite part notched to take the sere of the trigger mechanism. (See Fig. 4.)
- QUARREL:** heavy bolt for a crossbow, having, as a rule, a head that is square or triangular in cross-section and a tip which, when viewed from the side, presents the shape of a roughly equilateral triangle; there are a number of kinds.
- RATE OF RECOVERY:** see **RECOVERY**.
- RECOVER, intrans. v.:** 1. (limbs of a drawn bow) to spring back into the position occupied before the draw; 2. (limbs of a bow unbraced after use) to regain the reflexed form which they had before bracing.
- RECOVERY, RATE OF RECOVERY:** time taken by a bow to recover.
- RECURVE, n.:** (in a bow) curvature in the opposite direction to that taken by the drawn bow. Usually it denotes the end of a limb where the recurve can be either rigid or 'working' i.e. losing some of its bend when the bow is drawn.
- RECURVED:** curving in the opposite direction to that taken by the drawn bow.
- REFLEX:** (in the working part of the limb and/or grip of a bow) curvature in the opposite direction to that to which the bow is flexed for bracing. It is seen in the unstrung bow.
- SELF BOW:** bow made of a single stave of wood.
- SHAFT:** main body of an arrow.
- SHAFTMENT:** [Anglo-Saxon: *sceaft* (shaft) + *mund* (hand)] that part of an arrow's shaft to which the fletchings are fitted.
- SHARP:** (the loose) clean and quick without loss of tension caused by creep.
- SIYAH:** see Glossary s.v.
- SLASH, v.:** to accomplish a swift, uninterrupted, and clean loose.
- SLUGGISH:** (the loose) dead, i.e. slow with possible loss of tension.
- SNATCH:** to increase the draw as the loose is made. (*In T's vocabulary: to accomplish the loose with a brief pause immediately followed by an imperceptible snatch as one comes to full draw.*)

- STELE:** synonym with **SHAFT**, q.v.
- STRING:** synonym with **BRACE**, q.v.
- TANG:** (of an arrowhead) the 'tongue', i.e. shank for insertion into the shaft.
- TARGET:** a bounded surface serving as a mark at which to shoot.
- TARGET HEAD:** head used for target shooting, ogival or triangular in silhouette, circular or polygonal in cross-section.
- TARGET SPOT:** any specified point on a target face which the archer aims to hit.
- TILLER, n.:** wooden stave used by a bowyer, one end of which is hollowed to fit against the grip of a bow, while notches cut into the surface of the stave permit the string to be drawn and held at varying distances, so that the form and curvature of the bow may be studied. (See Plate 18.)
- TILLERING:** process of adjusting, with the aid of a tiller, the width and thickness of the limbs of a bow so that the correct curvature and balance may be achieved when the bow is drawn.
- TIP:** (of a bow) extremity.
- WAR HEAD:** arrowhead for use in war; commonly a triangular spike, square or triangular in cross-section.
- WEIGH, trans. v.:** to ascertain the draw-weight of a bow.
- WEIGHT:** see **DRAW-WEIGHT**.
- WORKING (PART OF THE) LIMB:** that section of a bow's limb which takes the bend when the bow is drawn (as opposed to the *siyah*, which remains rigid).



## ARABIC-ENGLISH GLOSSARY

This glossary is principally intended to supply definitions which are valid for our text, and, in the interests of simplicity and economy of space, it is only in exceptional cases that reference is made to any additional or different meaning(s) which a given term may have elsewhere in archery literature.

Attention is drawn to the following points:

- (i) For the benefit of non-Arabists the terms are arranged alphabetically, not according to roots. In a few cases where vowels are uncertain we have had to supply them on the basis of our own judgement.
- (ii) Because they are of special interest to the archer a small proportion of terms from other sources are incorporated. These are marked with an asterisk (\*).
- (iii) The language from which a term, if not of Arabic origin, is borrowed or derived is indicated in square brackets [ ]. Details are only given where the etymology will not be obvious to the orientalist or differs from that given elsewhere.
- (iv) The term 'bow' is to be taken as meaning 'COMPOSITE bow' unless there is any indication to the contrary.
- (v) Left-handed archers should exercise caution where mention is made of 'left' and 'right'.

## ABBREVIATIONS

adj.	adjective	Pers.	Persian
advbl.	adverbial	phr.	phrase
Ar.	Arabic	pl.	plural
coll.	collective	prep.	preposition
compar.	comparative	q.v.	quod vide (which, see)
descr.	described, description	sing.	singular
disc'd	discussed	s.v.	sub verbo (under the word)
disc'n	discussion	synon.	synonymous
fem.	feminine	ṭ	Ṭaybughā
fr.	from	tr.	transitive
intr.	intransitive	Turk.	Turkish
masc.	masculine	v.	verb
n.	noun	v.n.	verbal noun
opp.	opposite	w. ref. to	with reference to

ADĀRA: 1. to flex (the limbs of a bow to brace it); 2. to spin (an arrow horizontally on the finger-nails to test its shaft for trueness; see p. 30).

AFLATA: 1. to loose, release (an arrow); by the end of the fourteenth century the use of the v. in this sense was probably an archaism in Egypt and Syria; Ṭ's v. is almost invariably AṬLAQA; 2. to slip (the reins of one's horse when shooting or about to shoot).

AḤWAL: 'askant, squint-eyed', a method of binocular aiming (pp. 58, 61).

A'IMMAH: see IMĀM.

AJRĀ: 'to run' an arrow over some part of the thumb of the drawing hand (so as to give the arrow a natural guide (*majrā*) along which to travel at the loose).

AKHAFFA R-RIJL: to take one's weight off the [left] foot (in the flight shooting stance).

AKḤṬĀ'A: to miss the mark.

AKTĀF (?): see p. 26 & disc'n, p. 32.

'ALĀMAH: mark at which to shoot.

'ĀLI: 'high', deep (fletchings w. ref. to their extension outward from the shaftment); opp. LĀṬI'.

AMĀJ [Pers.]: butt.

AMĀJYYAH, pl. AMĀJYYĀT: butt arrow.

'AMŪD: stock (of a crossbow).

ANGUSHTVĀN: see KUSHTUWĀN (fr. ANKUSHTUWĀN).

ANKĀ: 1. to inflict injury (mortal or otherwise), hence 2. to be effective (arrow, bow, etc.) for the purpose intended, irrespective of the nature of that purpose, which need not—as in flight shooting, for instance—entail any intent to kill or injure.

'AQAB: 'sinew', the sinew backing (of a bow).

'AQADA (v.n. 'AQD): 1. to knot (a bowstring); 2. to reckon, compute, numbers by means of finger flexures (Appendix 4, Figs. 56, 57); 3. to arrange as in reckoning (the fingers and thumb of one hand when grasping an arrow, securing it against the grip of the bow when nocking, etc.); 4. to lock, put a lock on (the bowstring ('ALĀ L-WATR) for the purpose of drawing it); used in conjunction with a numeral to indicate exact position of the fingers, e.g. 'A. TIS'AH WA-SITTĪN to lock '69'. (See Ch. 10.)

AQĀMA: (in bracing a highly reflexed bow) 'to straighten', by retraction of the *siyahs* from the reflexed position, the working parts of the limbs prior to flexing.

'AQARA (v.n. 'AQR): to blister, cause blistering (an arrow to the thumb or index finger, a grip to the bow hand).

'AQD: 1. — (pl. 'UQŪD): the lock, kind of lock, locking; see 'AQADA 4. & Ch. 10; kinds of lock explained in the *Ghuniyah* are: AL-'A. AL-BAHRĀMĪ, Bahrām's lock (p. 53); — AL-KHUṢRAWĀNĪ, Chosroes' lock (p. 53); 'A. AL-LUZŪM, the clinging lock (used to hold the shaft against the grip of the bow when nocking, p. 53); — AR-RADĪF, the pillion lock (p. 53); — AṢ-ṢAQĀLIBAH, the Slav lock (p. 53); — THALĀTHAH WA-SITTĪN, the lock of '63' (pp. 53, 54); — TIS'AH WA-SITTĪN, the lock of '69' (ibid.), etc. 2. the fingers of the drawing hand when locked on the string; 3. linear measure of very short (3 in. or less), but indeterminate, length.

'AQQABA: to back with sinew (a bow).

'ARIP: 'broad', not cylindrical (*mudawwar*), but characterized by broad lateral surfaces (a bow's grip; p. 8).

ARKHĀ: to relax (tr.), hold loosely and without tension (any part of the body which should not be tensed in shooting).

AṢĀBA: to hit (the mark), shoot accurately.

ASBAQ (compar. adj.): giving greater range (fletchings to arrows). Cf. SIBĀQ.

ASBĀSALĀRĪ [Pers.]: 'commander's', name of an undefined type of arrow-guide.

AṬLAQA: 1. to loose, release (an arrow, dart, bolt, etc.); N.B. Ṭ rarely uses AFLATA, q.v.; 2. (of a horse) to give it its head.

AṬRAD LI-S-SAHM: improving cast (a bowstring, thumb-guard, etc.). The use of this expression (compounded of compar. adj. of ṬĀRID, prep., and n.) is very common.

\*AWĀMĪD AS-SIBĀQ: flight-shooting markers (p. 109).

\*AWṢĀL (pl.): the different sections from which the framework of the bow is formed (limbs, *siyah*, grip). (See Appendix 2.)

- AWTARA: to brace, string (a bow). N.B.: *not* synon. with WATARA (see MAWTÜR).
- AWWAL WAFĀ': see WAFĀ'.
- AYMAN: 'right-handed', fletching with a natural curve to the right when viewed from the nock (Fig. 16). N.B.: in English practice T's right-handed feather would be described as left-handed because of the different angle from which it would be viewed.
- AYSAR: 'left-handed', opp. AYMAN, q.v.
- BĀ', pl. BĀ'ĀT: span of the outstretched arms, arm-span (almost 2 metres. See Appendix 1).
- BADAN: 1. thickest part (of an arrowhead, shaft, etc.); 2. stele, shaft (of an arrow, bolt, etc.).
- \*BADDADA: opp. JAMA'A, q.v. (*Wādīh*, fo. 32a).
- BAHRĀMĪ: see 'AQD 1.
- BANDŪQ: undefined type of crossbow.
- BAQQAM: brazil-wood.
- BAQS: boxwood.
- BARŞAQ: see BARSHAQ.
- BARSHAQ (on various spellings, etc., see Ch. 17, n. 16) [Pers.]: a device for strengthening a point of weakness in the limb of a bow to make bracing possible. It appears to have been a 'strap, cord', possibly tied, or otherwise formed, into a loop, which could thus be slipped over the *siyah* and in some way tightened. (See pp. 93, 99.)
- BATĪ (for BATĪ'): 'slow', an arrow failing to traverse about 75 yds. in less than 1½ sec. (see Ch. 25, sect. 4 & n. 6); B. AL-IṬLĀQ: giving a slow loose (lock on a bowstring).
- BATN, pl. BUTŪN: 1. (of a bow) the belly, i.e. its concave surface when braced; 2. (of a feather) the ventral surface.
- BATTIYYAH: a practice 'drum' used by the archer in training (disc'd, p. 156).
- BAYĀP: used absolutely (e.g. p. 122) or in advbl. phrases KASHF\* L-B. (p. 128, etc.) and WAFĀ'A B. (p. 131) w. ref. to the attainment of maximum draught by an archer using a full-length arrow with the 'greater draw' (NIHĀYAH, q.v.); the term is fully disc'd, pp. 127-29; B. AR-RIJL: instep.
- BAYRAM SHĀH [Pers.]: 'King Bayram', name of an undefined type of arrow-guide.
- BAYT: 1. — (pl. BUYŪT), limb of a bow (cf. Pers. *khāne-ye kamān* 'house of the bow', i.e. limb); AL-B. AL-A'LĀ, or B. AL-YAD, or B. AR-RAMY: the upper limb, as opposed to AL-B. AL-ASFAL, or B. AR-RIJL (or \*B. AL-HAṬT, B. AL-ISQĀT; see Appendix 2); the lower limb; AL-B. AD-PA'IF: 'the weak(er) limb', said of the upper limb because, being the longer, it takes more bend than the lower, which is accordingly AL-B. ASH-SHADĪD: 'the strong(er) limb' (the term may, of course, refer to either limb if it is to be taken in its literal sense); 2. 'house', holder in the nut of a crossbow for catching the string.
- \*BAZLAH: socketed head (? of a crossbow bolt; p. 30).
- BIDĀYAH: the first ('starting point') of three possible positions for the arrowhead at full draw, being that which affords its user minimum draught (disc'd, pp. 127-29). Used absolutely, it is synon. with WAFĀ' B. which may conveniently be translated as the 'lesser' draw.
- BIRJĀS [Pers.]: a ring or hoop mounted on a spear for use in lance exercises. Under certain circumstances it may also have served as a target for archers in training. (See pp. 76, 83-84.)
- \*BIRŪN: a ring with a nail-like projection for shooting nockless arrows. (See p. 143.)
- BUNDUQ: pellet, ball (shot from a bow by one means or another).
- CHANGAL-I BĀZ (? spelled *jinkilbāz* [Pers.]): 'falcon's talons', manner of grasping, used in flight shooting (Fig. 20; p. 44; disc'd, p. 46).
- CHILLAH [Pers. with Ar. spellings *jilā*, *jilā*, *chulā*, etc.]: bowstring of silk twisted lengthwise from new, wound silk of high quality.
- DAF'AH: cast (of a bow). See also ATRAD and TĀRID.
- \*DAFFAH: 'side', that part of the bow's limb which lies next to the grip; DAFFATĀ L-FŪQ: the

- cusps of the nock; on the occurrence of the same expression (?) w. ref. to the bow, see Appendix 2, note f.
- DĀKHIL, DĀKHILI: see NAZAR.
- \*DASTGĀH [Pers.]: basically, a kind of slotted board used to adjust a bow to its proper curvature. (See Klopsteg, Fig. 22.)
- DAWARĀN: 1. act of turning, whence ḤASAN AD-D.: rotating evenly (arrows when spun to test for trueness, see p. 30); 2. (of a bow) act of springing back into its unbraced or undrawn position, whence SUR'AT AD-D.: speed of recovery.
- \*DAWDAN: (spelling—which is that given in *Arab Archery*—and etymology are uncertain, but it is possible that the word is *dūdan* fr. Pers. *dū* 'two' + *-dān* 'receptacle', the reference being to some form of arrow-guide capable of projecting two darts simultaneously. Cf. *dūdāni*, p. 29): name of a class of darts for use with an arrow-guide measuring about 10 in.
- DESTGĀH: see DASTGĀH.
- DHANAB, pl. ADHNĀB: tail-feathers (used in fletching).
- DHIRĀ': cubit, whence DH. AL-'AMAL AN-NAJJĀRĪ, or DH. AL-'AMAL LI-N-NAJJĀRĪN, 'the carpenters' cubit', said by T to be synon. with ADH-DH. AL-HĀSHIMĪ, 'the Hāshimī cubit', a linear measure of 26.18 in. (66.5 cm.). (See Appendix 1.)
- DHĀN: (in manufacture) the process of painting the finished bow.
- DĪMAK [Pers. 'little face?'] (or DAYMAK?): arrow-pass.
- DIRHAM BI-D-DIMISHQĪ: 'dirham, Damascus weight', a weight of 47.6 grains (3.086 grams). (See Appendix 1.)
- \*DŪDĀNĪ: see s.v. DAWDAN and p. 29.
- DUSTĀR [possibly fr. Pers. *andākh* (>*andāsh*?) + *-tār* 'that which throws, shoots'; cf. loss of *an-* in *kushtuwān*, q.v.]: 1. the working part of the limb of a bow (Fig. 5 & p. 11); D. AR-RIJL: the lower *d.*; D. AL-YAD: the upper *d.*; 2. loosely, the limb of a bow.
- FAHLAH (fr. *fahl* 'stallion, champion', the fem. being best explained by assimilation to fem. n. *qaws*, 'bow'): 'superb', name of a Syrian war bow said by T to have been the best available in his day.
- FAKAKA: 1. to twist (the grip in loosing, arrow-guide in drawing, etc.); 2. to accomplish the loose with a *farkah*, q.v.
- FARD: nock of a bow.
- FARKAH: a 'twist' of the drawing hand executed at the loose so as to sweep the index finger clear of the string (explanation, p. 66).
- \*FATHAH, FATHAH BI-SH-SHAMĀL: a form of follow-through (Ch. 14) consisting in a stable forward movement of the bow hand as arms and chest are spread at the loose. (See p. 41.)
- FAWWAQ: to nock an arrow.
- \*FILQ: a bow consisting of a single stave split lengthwise and spliced. (See p. 10.)
- FŪQ, pl. FUWĀQ: nock of an arrow; synon. with KĀZ (q.v.) except where it is necessary to differentiate between the nockpiece and the nock, in which case T clearly uses F. for the former and K. for the latter.
- FUTŪR AL-IṬLĀQ: sluggish loose.
- GHAMAZA: to exert pressure on (the nock of an arrow in locking).
- GHARAD: 1. target; loosely used as a synonym of *'alāmah* or *hadaf*; 2. target spot as opposed to target face (*hadaf*), the latter being the whole of which the former is part.
- GHIẒLĀN: 'gazelles', name of an unidentified type of fletchings (p. 26; disc'd, p. 32).
- HADAF, pl. AHDĀF: 1. target; 2. target face (as opposed to the target spot, *gharad*); 3. \*AL-H. AT-TAMĀM: 'the full target', a target at long range (284-328 yds.?). (See p. 141.)
- HĀDD AN-NAFĀH BI-L-IṬLĀQ: having a sharp, clean, loose (flight) archer. (See Ch. 19, n. 6.)
- HADĪD: 1. armour; 2. (coll., sing. HADĪDAH) arrowhead.
- HĀLĀ: to be slender, thin (arrow, shaft).



- HALĀWAT AL-JADHB:** 'pleasantness afforded by drawing', that quality in a bow which enables the user to draw it without strain or discomfort.
- HALLALA:** to form a crescent near the ear with the thumb and finger of the drawing hand as a sequence to disengagement at the loose. (See pp. 64, 131 & frontispiece.)
- HALQAḤ:** 1. 'curve' to which a bow is bent in manufacture (p. 8) or in bracing; 2. — (pl. **HALQAṬ:** a loop of twine, used when folded in two around a bowstring as a holder from which to shoot a nockless arrow; 3. \* — (pl. **HALAQ**) the rounded notch in the nockpiece of an arrow. (See p. 24 & Fig. 15.)
- HARBī:** designed, or intended, for use in war, battle (arrowheads, arrows, bows, techniques, etc.).
- HARBIYYĀT:** war arrows.
- HARRAFA:** to put, hold, in an oblique position (the fingers when locking, gripping the bow; the body when addressing oneself to the target).
- HĀSHMī:** see **DHIRĀ'**.
- HAṬṬA:** to unbrace.
- HAṬṬA MIN DAF'AT AL-QAWS:** to reduce the cast of a bow.
- HAWWALA:** to sight, aim, by the 'askant' method. See **AḤWAL**.
- HAYDARī (?)**: if a correct reading, the name of an unidentified type of arrowhead (see Ch. 5, n. 9). In the context the process of elimination leads us to suspect a hunting type, possibly a broadhead, in which case **H** could be a copyist's error for *janwārī* 'animal' [adj. fr. Pers. *jānvar* + -ī], i.e. for use against animals.
- HAYL:** 1. the strength required of an archer to draw a bow; 2. draw-weight (of a bow; see p. xxv).
- HAZM:** (in manufacture) process of *binding* the horn lining to the wooden core of the bow after the two have been glued together and before the application of sinew to the back.
- HAZZ:** 1. the skin crease on the palmar surface of a finger- or thumb-joint; **AL-Ḥ. AL-AWWAL:** the 'first crease', between the base of the finger and the palm, being the metacarpophalangeal crease (in our terminology, the *proximal*); — **ATH-THĀNī:** the 'second crease', the proximal interphalangeal crease (in our terminology, the *middle*); — **AL-ĀKHIR:** the 'last crease', the distal interphalangeal crease (in our terminology, the *distal*); 2. the transverse line formed by the juxtaposition, at corresponding levels, of two or more such creases.
- \***HUSBĀN** (coll.): 1. 'hailstones' (?), name of darts about 15 in. long; 2. a kind of arrow-guide for the projection of such darts; see p. 150.
- IBRANJAK** (\*also **IBRANJAQ**; **IFRANJAK** in the *Wādiḥ*) [Pers. *abranjan* + -ak 'little bracelet']: 1. a roughly semicircular strip, or sliver, of hard material (hardwood, bone, etc.) running round the belly of a bow's grip and filling the gap left in manufacture between the upper and lower sections of horn lining (see p. 14); it is the Turk. *chelik*; 2. loosely, the belly of the grip.
- \***IDRĀR:** act of spinning an arrow horizontally on the finger-nails to test its shaft for trueness. (See p. 30.)
- IDṬARABA:** 1. to flirt (intr. v., an arrow); 2. to go out of control (a bow when loosed); 3. 1. **FI JARYIHī:** to gallop uncollectedly (a horse).
- IFLĀT:** act of loosing, the loose. See **AFLATA**, 1 & **AṬLAQA**, 1.
- \***IFRANJAK:** see **IBRANJAK**.
- \***IJĀZAH:** licence to practise as a master archer (pp. 155, 156).
- IKHLĀṢ:** (of a bowstring) act of giving a clean loose.
- IKHTALASA:** to snatch, use the snatched loose. N.B.: **T**'s snatched loose (*mukhtalas*) differs from that of Muṣṭafā Kānī (*ikhtilās*). (See detailed disc'n, pp. 66-67.)
- IKHTIYĀRī:** eclectic (an archer who, following at-Ṭabarī, did not adhere exclusively to any one

- of the three accepted systems of archery (see Ch. 23), but selected from their teachings those best suited to his physical needs).
- IMĀM**, pl. **A'IMMAH:** in the *Ghuryah*, an *imām* of archery is the supposed founder of a system of shooting. On the four accepted systems, see Ch. 23.
- IMTATṬA:** to stretch (intr. v., a bowstring under the tension of a braced bow).
- INFĀDH:** penetrative power (of arrow, arrowhead, etc.).
- INFITĀQ:** 1. 1. **AL-'AQD:** breaking of the skin on the fingers of the drawing hand; 2. 1. **AL-QABDAH:** slashing sustained by the fingers of the bow-hand (from the string); 3. 1. **AL-BATN:** hernia, rupture.
- INḤARAFĀ:** to assume an oblique position (an archer addressing himself to the mark). (See p. 102.)
- INḤINĀ':** 1. stooping posture resulting from failure to hold the back straight and firm; 2. \*the state, condition, of a bow when braced. (See Appendix 2.)
- INQLĀB:** 1. 1. **AL-QAWS:** the sudden and violent accidental reversion of a bow to its unbraced state; 2. 1. **AL-FIṢĀD:** 'inversion of the cupping-point', the fault of allowing the left elbow to curve inwards towards the path of the string (disc'd, p. 120); on variants, etc., see Ch. 21, n. 3.
- \***INTIṢĀB:** act of standing to the mark (**ILĀ L-'ALĀMAH**), as opposed to squatting, kneeling, etc. (See p. 102.)
- IQLĀB AL-QAWS:** act of swivelling the bow in the hand in an anti-clockwise direction so that the archer may draw the string from behind the neck on the outside of his arm.
- IṢĀBAH:** accurate shooting, accuracy.
- ISHĀRAH:** mark at which to shoot.
- ISHTADDA:** (w. ref. to shooting technique) to be tensed, be in a state of tension (a part of the body).
- IṢLĀH:** 1. 1. **AL-JAWZAH:** act of resetting the nut of a crossbow after shooting; 2. 1. **AL-QAWS:** adjustment of the bow by correction of distortions of the limbs.
- ISTAWFĀ:** 1. 1. **AS-SAHM:** to bring one's arrow to full draw; 1. **TAMĀM AS-SAHM:** to bring one's arrow to its absolute limit at full draw; 2. to come to full draw (archer); 1. **BI-L-WAFĀ' AT-TAMĀM:** to attain maximum draught at full draw.
- ISTIFĀ':** v.n. of **ISTAWFĀ**, q.v.
- ISTIWĀ':** (of the lock on the string) the state of being straight, as opposed to oblique. (See Fig. 22a.)
- IṬAMADA:** 1. to aim, take aim ('**ALĀ at**); infrequently used by **T** whose regular term is **NAZARA**, q.v.; 2. 1. '**ALĀ R-RIJL:** to put one's weight on the [right] foot (in the flight shooting stance).
- ITĀR:** act of bracing a bow.
- IṬIMĀD:** v.n. of **IṬAMADA**, q.v.
- IṬLĀQ** (v.n. of **AṬLAQA**): 1. act of loosing, releasing (an arrow), the loose; 1. **AS-SUKŪN:** the held loose, otherwise termed **SĀKIN**, q.v.; **SALĀMAT AL-I.** 'sound quality of the loose', i.e. a clean loose; 2. — (pl. **IṬLĀQĀT**): manner, way, of shooting.
- JABBĀDH:** drawing-strap (Fig. 29).
- JADHABA:** to draw (a bow). **T** has a marked tendency to use this v. in contexts in which he is not primarily concerned with shooting, but with the testing of equipment, questions of traction, etc. (cf. **JARRA** & **NAZA'A**). See **MADDA**.
- JALASA** (v.n. **JULŪS**): to adopt a squatting, or half-kneeling, half-squatting, position (*jalsah*), from which to shoot.
- JALSAH:** 'seat', squatting or kneeling posture adopted by the archer in addressing himself to the mark. On \***J. AL-HĀRIB**, **J. AL-MUTHĀQIF**, **J. MURABBA'AH**, etc., see pp. 102-3.
- JAM'** (also **JAMī'**) (v.n. of **JAMA'A**): grouping, good grouping (of arrows in a target). (See p. 156.)
- JANWĀRī (?)**: see **HAYDARī**.

- JARĀD (coll.): 1. 'Locusts', name of a class of darts for use with arrow-guide and ranging from  $2\frac{1}{2}$  in. to  $7\frac{1}{2}$  in. in length; 2. name of an arrow-guide (from which, presumably, the latter were shot).
- JARKH [Pers. *charkh*]: a type of crossbow fitted with a stirrup (in A<sup>1</sup>a only; in all other MSS *jarkh* is replaced by *qaws ar-rjl*, 'crossbow'; see p. 19). Although the connexion with the basic meaning of the Pers. *charkh*, 'wheel', has puzzled scholars (see Huuri, *Gesch.*, pp. 94-95), it should be noted that one simple method of drawing a medieval crossbow consisted in using a straightforward pulley mechanism which entailed the use of a small wheel (Fig. 11).
- JARMAKĪ (?) [Ar. adj. in -ī fr. Turk. adj. *çarpık* (>*jarbak*) 'awry?']: name of a form of shooting from horseback in which the archer, having the bowstring on the inside or outside of his bow-arm, anchors in the nape of the neck. See pp. 75, 82.
- JARR (v.n. of JARRA): 1. act of drawing a bow, arrow, etc.; see JARRA; 2. draught (MIN AS-SAHM, permitted by the arrow).
- JARRA: to draw a bow, arrow, etc.; mainly used by T where the effort of drawing or pulling (e.g. in bracing) or some mechanical aspect of traction is in issue (cf. JADHABA and NAZA'A). See MADDA.
- JARRĀM: an unfletched practice arrow used by a novice (and others?).
- JATĪ'AH: see KHATĪ'AH.
- JAWALĀN: (of a horse) wheeling, turning (to left or right, especially at the end of a straight course covered at speed as in the *maydān*).
- JAWMAKĪ (?): see JARMAKĪ.
- JAWZAH: nut of a crossbow which holds the string at full draw until the release mechanism is operated; JAWZAT AL-'AMŪD: stock-nut.
- JILĀ, JILĀ: see CHILLAH.
- JINKILBĀZ: see CHANGAL-I BĀZ.
- \*JITA'AH: see KHATĪ'AH.
- JULBAH: 1. a short tubular socket devised as a detachable nock for the shooting of nockless arrows (p. 139 & Fig. 47); 2. a funnel-like incendiary device fitted by its tubular end over the foreshaft of an arrow from which heated or blazing missiles could be flung (p. 140 & Fig. 48); 3. a short length of tubing used to protect or reinforce the string of a bow from which pellets were shot by means of a tubular guide.
- JULŪS: v.n. of JALASA, q.v.
- KABBA: to press (the archer with his right index finger against ('ALĀ) the side of the nock when locking).
- KABBĀD: light practice arrow used by a novice.
- KABID AL-QAWS: 'heart, centre, of the bow', evidently, the arrow-pass. (See Appendix 2.)
- KAMINDĀN, KAMINDĀNAH [Pers.]: bowcase (T's regular term is *tirkāsh*).
- KANĀR [Pers.]: the dividing edge separating the back of the bow from the belly. (See Fig. 54.)
- KASHF<sup>a</sup> (L-)BAYĀP (advbl. plur.): (w. ref. to an arrow at full draw) to the limit of the 'greater draw' (on which, see BAYĀP and NIHĀYAH).
- KAYYAZA: to nock an arrow.
- KĀZ, pl. KĀZĀT [Turk.]: nock of an arrow; synonym with *fūq*, except where there is need to distinguish between nockpiece and nock, in which case T clearly uses *fūq* for the former and K. for the latter.
- KHĀM [Pers.]: 1. raw (silk); 2. unbored (that part of the tang's socket in the arrow-shaft which is not prepared prior to the fitting of the arrowhead); 3. unfinished (bow in manufacture when ready to be strung for shaping to the desired curvature, but not yet veneered and painted).
- KHANQ: act of pinching the nock of an arrow (in the fork of the index finger and thumb when locking). (See Fig. 41.)
- KHĀRIJ: see NAZAR.

- KHARKUMĀN [Pers. *khār* + *kamān*?]: bracing-board.
- KHART (?): an unidentified type, or quality, of arrow. (See Ch. 5, n. 6.)
- KHARTŪM, KHURTŪM: a long horn clip fitting over the nut of a crossbow.
- KHASHAB (coll. 'wood'): 1. (of the bow) wooden core (as opposed to sinew backing and horn lining); 2. (of the arrow) shaft; 3. (of the *qabaq*, q.v.) mast.
- KHASHIN: thick (bowstring).
- KHAṬĀ'I: 'Cathayan', a highly durable kind of bowstring made of raw, wound silk and glue and taking its name from Cathay.
- KHAṬARA: to follow through with a *khatah*, q.v.
- KHATĪ'AH (JATĪ'AH; \*JITA'AH, KHĪTA'AH, erroneously): archer's thumbstall. (In T's day the term was an archaism.)
- KHAṬRAH: a form of follow-through executed with a forward and downward thrust of the bow-hand and thus characterized by limited forward rotation of the bow from the wrist. (See Ch. 14 & Fig. 46.)
- KHAṬT AL-ISTIWĀ': the horizontal plane in which the archer's fists, arms, and shoulders are supposed to be aligned as he stands to the target.
- KHAṬTĀF: claw (of a drawing-strap).
- \*KHĪTA'AH: see KHATĪ'AH.
- KHUS(Ş)RAWĀNĪ: see 'AQD 1.
- KIFĀYAH: of three possible positions for the arrowhead at full draw, that which lies between BIDĀYAH (q.v.) affording minimum draught, and NIHĀYAH (q.v.), affording maximum draught.
- KULLĀB: hook (of the claw of a drawing-strap).
- \*KUSHTIBĀN, — UBĀN, KUSTIBĀN, — UBĀN: see KUSHTUWĀN.
- KUSHTUWĀN, pl. KUSHTUWĀNĀT (other forms as indicated above) [Pers. *angushtvān*]: 1. archer's thumb-guard (leather); see pp. 34-35 & Fig. 17; 2. archer's drawing-ring (bone, horn, metal, etc.); see pp. 34-36 & Plate 7.
- KUZZĀZ: spasm of the end of the right index finger resulting from its being bent too far around the thumb during the lock. (See p. 51.)
- LA'ABA (v.n. LA'B): to wag (intr. v., an arrow).
- LA'B AL-UKRAH: polo.
- LAKZAH: a 'punch' to the rear with the right elbow at the instant of loosing. (See p. 65.)
- LAQSHAH: name of an unidentified type of Maghrebi crossbow.
- LAṬĀ': low trajectory (of an arrow).
- LĀṬĪ (for LĀṬĪ'): 1. 'low', shallow (fletchings w. ref. to their extension outward from the shaft); opp. 'ALĪ; 2. having a low trajectory (arrows); opp. MURTAṬĪ.
- LAYY AL-QAWS ḤALQAT<sup>a</sup>: (in manufacture) process of adjusting the unfinished bow to the desired curvature after its first bracing.
- LAYYIN: 1. pliable (fletchings); 2. 'gentle', light (a bow); a light bow to a male adult would not exceed 30 lb., though it could be as low as 15 lb.; for a boy aged 7-8 it would possibly be 10-15 lb.; 3. having a draw-weight no greater than that to which the archer is accustomed (a bow); 4. relaxed (w. ref. to points of relaxation, i.e. those parts of the body which the archer must not tense when shooting).
- LIḤĀM (masc. sing.): horn lining (of the belly of the bow).
- LUZŪM: see 'AQD AL-LUZŪM.
- MADD (v.n. of MADDA): the act of drawing a loaded bow with the intention of shooting, the draw (see MADDA); AL-M. AL-JUWWĀNĪ: the 'internal' draw, i.e. the act of drawing the string closely along the inside of the left arm and then sharply deflecting the path of the drawing hand across the face (see p. 120); AL-M. AT-TAMĀM, AL-M. AT-TĀMM: the completed draw; see also s.v. WAFĀ'.



- MADDA:** to draw in the sense indicated s.v. **MADD**. It is worth noting that where the emphasis lies on drawing from the point of view of testing a bow or considering problems of traction, **Ṭ** tends to use some other term such as **JADHABA**, **JARRA**, etc.; **M. S-SAHM ZĀ'ID<sup>an</sup>**: to overdraw.
- MAFRŪK:** 'twisted', said of the loose, meaning most probably that it was accomplished with a **FARKAH**, q.v. (See disc'n, pp. 66-67.) **N.B.**: the term does not have the same technical sense as in *Arab Archery* or the *Telhis* (under the form *meḥrūk*).
- MAFTŪL:** twisted (feathers out of alignment on the shaftment of an arrow).
- MAHBAS** (? for **MĪHBAS**): a 'retainer', i.e. a kind of ring worn on the ring-finger to enable the archer to retain his reins while shooting. (See disc'n, p. 80.)
- MAḤTŪT:** unbraced (bow).
- MAJĪD**, pl. **MAJĪDŪN:** a first-class shot, marksman (adj. qualifying **RĀMĪ**, pl. **RUMĀT**).
- \*MAJMŪ'**: well grouped (arrows in a target).
- MAJRĀ:** 1. **AL-M. MIN AL-IBHĀM:** that part of the thumb which forms the natural support and guide along which the arrow will travel when loosed; 2. — (pl. **MAJĀRĪ**): arrow-guide, a device initially designed as a means of shooting short arrows; in its simplest form it was a slim grooved, channel of wood as long as a full-length arrow along which a short arrow could be drawn inside the grip of the bow (Fig. 52; p. 148). Various kinds of guide were developed on this basic principle (see Ch. 26). See **MĪJRĀT**.
- MAKYŪL** (?): said of fletchings. (See disc'n, p. 32.)
- MANĀZIL** (pl.): 1. the three positions which the arrowhead may occupy in relation to the grip, according to the somatic type of the archer (see pp. 123, 127 ff.); 2. the three positions on the face to which the archer—again, according to somatic type—may draw (see pp. 124, 127 ff.).
- MAQBAḌ:** 1. — (pl. **MAQĀBĪḌ**): the handle, grip (of a bow); rarely used by **Ṭ**, who prefers **QABḌAH**, q.v.; 2. that portion of the handle which is gripped by the little finger, ring-finger, and middle finger.
- MARMĀ:** a shooting range.
- MASĪR AS-SAHM:** range attained by an arrow.
- MASKAH:** the particular manner in which an arrow is taken up, grasped, removed from the quiver, etc., prior to nocking. **N.B.**: grasping in this sense is not covered by **QABḌAH**, which relates only to the bow.
- \*MAṢNŪ'AH:** a composite bow. (See p. 10.)
- MATN:** 1. the body, main portion, of the dorsal surface of the bow's handle to which the fingers of the bow hand do not, or should not extend (disc'd, p. 45); 2. the spine, or mid-line, running down the *matn* so defined; 3. loosely, the back of the grip; \*4. that part of an arrow which runs from below the fletchings to the middle of the shaft.
- MAWDI' AT-TAFWĪQ:** the nocking-point (on a bowstring).
- MAWTŪR:** having the bowstring in place (the nock of an unbraced bow). **N.B.**: it does not mean 'braced'.
- MAYDĀN**, pl. **MAYĀDĪN** (or colloquially, **MAWĀDĪN**): a field, or ground, set aside for military training, exercises, displays, etc.; \***AL-M. AT-TAWĪL:** long-range target (284-328 yds.). (See p. 141.)
- MAYDĀNĪ:** 'for shooting in the *maydān*', adj. used to distinguish (a) the target arrow from the war arrow, the flight arrow, etc.; (b) the head of the target arrow from the warhead, etc. The head appears to have been circular in cross-section and it would have been tapered to a point. (See p. 26.)
- MAYDĀNIYYAH**, pl. **MAYDĀNIYYĀT:** a *maydānī* arrow; the pl. is synon. with **NUSHSHĀB MAYDĀNĪ**. (See p. 28.)
- \*MEFRŪK:** see **MAFRŪK**.
- MIFTĀḤ:** trigger (of a crossbow).

- MĪJRĀT**, pl. **MAJĀRĪ:** arrow-guide; to all intents and purposes synon. with **MAJRĀ**, q.v., though it seems possible that the latter applied to the simpler forms of guide and **M.** to more elaborate devices such as the **M. AL-KHURṬŪM** ('long-nosed' arrow-guide; Fig. 50, descr. p. 146) or **M. AR-RIKĀB** (stirrup-guide; Fig. 51, descr. pp. 146-47), etc.
- MISĀḤ** (vocalization uncertain): **M. (AL-) BAYĀḌ / (AS-) SAWĀD / AL-QABḌAH**. On the problems presented by these terms, see pp. 127-29.
- MU'AKHKHAR AL-'AYN:** exterior angle of the eye.
- MU'ALLIM:** synon. with **USTĀD**, q.v.
- \*MU'AQQAB:** backed, or bound, with sinew (not 'reinforced', *Arab Archery*, p. 10). (See p. 10.)
- MUṬṬARIB:** said of an arrow that flirts. See **IPṬARABA**.
- MUḤARRIF:** having, or putting (oneself, one's grip on the bow) in the oblique position. See **HARRAFA**.
- MUKHTALAS:** 'snatched', name given to a form of loose (descr. p. 64; disc'd, pp. 66-67).
- MUKHULAH:** an undefined type of crossbow.
- MUNAHHAR** (or **MUNHAR?**): scooped, hollowed out (side of bow's grip to provide finger holds, piece of wood to form an arrow-guide).
- MUNFAṢILAH** (sc. *qaws*): 'comprising separate elements fitted together', almost certainly the old Arabian composite bow; said to be synon. with **WĀṢṬIYYAH**, q.v.
- MUNḤARIF:** oblique (stance), sideways (posture). (See p. 102.)
- MUNKĪ:** 1. deadly, injurious; 2. effective. See **ANKĀ**.
- MUQADDAM AL-'AYN:** interior angle of the eye.
- MURABBA':** 1. square in cross-section (an arrowhead, such as the pyramidal); 2. applied squarely, square (grasp on the bow's handle, as opposed to the oblique; Fig. 44; see p. 45); 3. \*square to, directly facing, the target (a squatting position, *jalsah*; see p. 103).
- MURABBI':** 1. sitting in a cross-legged position (archer to brace a bow); 2. having, or putting (one's grasp on the bow handle) in the square position; **QABAḌA M.:** to use the square grasp; 3. sitting, squatting, squarely to the target.
- \*MURAKKABAH:** composite bow.
- MURAYYASH:** fletched (an arrow).
- MURRĀN:** *Cornus mas* (wood used in old Beduin Arab bows and said to be synon. with *shawḥaf*).
- MURTAḤI':** having a high trajectory (arrow); opp. **LĀṬI'**.
- MURTAKHĪ:** 'loose, slack', not bent to the bridle (a horse's neck).
- MUṢADDAR:** thick in the foreshaft (*sadr*). **N.B.**: the meaning is different from that given in *Arab Archery*, p. 106, where this term is rendered 'barrelled' and denotes two kinds of arrow: (a) that of which the first third is thin, the second thick, and the final third thin like the first; (b) that of which the first half is thin and the second thick as far as the fletching. **Ṭ** leaves no doubt as to the meaning it had for him (p. 24).
- MUSHADDAD:** 1. tensed (finger on the grip); 2. pressed against ('**ALĀ**') the bow's grip (finger).
- \*MUSHAMMA':** a piece of wax-impregnated linen applied by the Ottoman flight shooter to the grip of his bow as an aid to his grasp. (See p. 113.)
- MUṢIB:** hitting the mark, accurate (arrow); synon. with **ṢĀ'IB**.
- MUSTA'AN:** 'aid', a folded strap fitted to the end of a horse-archer's reins to enable him to keep them securely in his right hand (descr. p. 72; disc'd, p. 79).
- MUSTALQI':** fr. *istalqā* 'to throw oneself back, fall back, lie down', this participial adj. is used to denote a quality or characteristic required in the limbs of a flight bow (p. 6) and could refer either to their resilience or to the shape of the limbs. If the latter is intended, it is difficult to determine the exact sense. Since the limbs of a flight bow should take the greatest bend close to the grip, they could be regarded as easily and markedly 'falling back' towards the archer at the draw.

- MUSTAMIR: straight (flight of an arrow).  
 MUSTAWĪ: 'straight', accomplished without the use of the 'twist' (*farkah*, q.v.), (disengagement of the drawing hand at the loose); M. AN-NAHT: 'straight hewn', having a uniform thickness from end to end (an arrow).  
 MUTA'ALLIM: apprentice (archer).  
 MUTARRAF: 'done with the tip', a faulty lock in which the index finger, instead of being lodged on the base of the thumb-nail, is set on the tip of the thumb.  
 MUTAWAJJIH: facing squarely, directly (as opposed to turning sideways), being in, or adopting, the frontal (as opposed to oblique) position (the archer in addressing himself to the mark; see pp. 101-2); cf. MUWAJJIH; opp. MUHARRIF.  
 MUTAWASSIT: 1. medium (physique); 2. intermediate (a shooting position which is a compromise between the frontal and oblique).  
 MUTHALLATH: triangular in cross-section (arrowhead).  
 MUWAJJIH: adopting, being in, the frontal position. The word is more usual than, but virtually synon. with, MUTAWAJJIH, q.v.  
 NAB': *Grewia poplifolia* (not *Chadara tenax*), name of a wood used by the Arabs from early times for self bows.  
 NABL (coll.), sing. NABLAH: 1. darts designed to be shot from a hand bow with the aid of an arrow-guide; 2. crossbow bolts. N.B.: unless he quotes, T does not use the term at all to denote ordinary arrows.  
 NADAB: a matched set or arrows (almost certainly not less than six, and probably as many as twenty-four).  
 NAFPAH: 'shake-off', a snap of the finger and thumb of the drawing hand giving a fast, clean, loose.  
 NAŞL, pl. NUŞUL: arrowhead; NUŞUL AL-AHDĀF, sing. NAŞL AL-HADAF: target heads.  
 NAZA'A: 1. to flex (a bow to brace it); 2. to draw (a bow to acquire or prove one's ability to handle it, practise one's aim, etc. without actually shooting or making shooting the primary aim (cf. JADHABA and JARRA). See MADDA.  
 NAZAR (v.n. of NAZARA, q.v.): act of sighting, aiming; AN-N. AD-DĀKHIL, or MIN DĀKHIL: internal sighting, sighting from inside the bow (see NAZARA); AN-N. AL-KHĀRIJ, or MIN KHĀRIJ: external sighting outside the bow (see NAZARA).  
 NAZARA: to sight, aim, take aim (ILĀ at): T's almost exclusive use of this term in preference to the more usual *i'tamada* of earlier and more conventional authors is striking and suggests that the latter was an archaism in his day and area; N. MIN DĀKHIL AL-QAWS: to sight, aim, from inside the bow (p. 62) by aligning the arrowhead with the mark and training one's sight on it along the shaft, thereby directing the line of vision from the left of the drawn string to the right of the grip and causing it to pass between bow and string (Fig. 24); N. MIN KHĀRIJ AL-QAWS: to sight, aim, from outside the bow (p. 61) by training one's sight on the mark along the back of the bow hand, the line of vision thereby running from the left of the string to the left of the grip without passing through the bow and the string (Fig. 24); N. BI-QISMAT AL-'AYNAYN: to sight, aim, with split vision (p. 62), by training the right eye on the mark along the shaft and the left along the back of the bow-hand.  
 NIĤĀYAH: of three possible positions for the arrowhead at full draw, that consistent with the maximum draught. Used absolutely, it is synon. with WAFĀ' N., which may be conveniently translated as the 'greater draw' (disc'd, pp. 127-29).  
 NIKĀYAH: 1. injury, mortal or otherwise, caused by an arrow; 2. striking power (of bow, arrow, etc.); 3. effectiveness (of an arrow, weapon, etc.) for the purpose intended. See ANKĀ.  
 NŪR: (of the eyes) line of vision.  
 NUSHSHĀB (coll., sing. NUSHSHĀBAH): arrows as opposed to darts and bolts. N. ṬAWĪL: ditto (see ṬAWĪL, 1, and SAHM ṬAWĪL).

- QA'ADA (v.n. QU'UD): synon. with JALASA, q.v.  
 QA'ADA: to set in true (the *siyahs* of a bow after bracing to correct lateral distortion).  
 QABADA (v.n. QABD): to grip, grasp (a bow, in the sense of arranging the fingers and thumb around its grip, or handle, in the manner in which they are to be disposed when shooting).  
 QABAQ [Turk. *kabak* 'gourd']: 1. principally, an elevated target, such as a gourd or suitable substitute, affixed to the top of a mast as a mark for horse-archers (detailed disc'n, pp. 77-78 & Appendix 6); RAMY AL-Q.: 1. military exercise in which horse-archers shot at the kind of target indicated; 2. the act, technique, of shooting upwards (from horseback as in the exercise); opp. QIGHAJ, q.v.  
 QABDAH: 1. — (pl. QABDĀT, QIBĀD): grasp, mode of gripping a bow: see QABADA; 2. bow-hand; 3. fist of either hand; 4. muscle under tension in the forearm; 5. linear measure of about 3½ in.; 6. — (pl. QIBĀD): grip, handle of a bow. See also MAQBAD.  
 \*QAFALA: to lock, put a lock on (the bowstring ('ALĀ L-WATR) for the purpose of drawing it). See 'AQADA, 4 and p. 54.  
 \*QAPLAH: lock (of the drawing hand on the bowstring). See pp. 40-41, 54.  
 QĀLAB, QĀLIB: 1. shape, contour (of an arrow shaft); Q. ASH-SHA'IRAH: the barley grain line (of arrow in which the shaft is thicker in the middle than at the ends (Fig. 14)); Q. ASH-SHAM'AH: the candle-form (of arrow in which the shaft tapers from the head to the base of the nock (Fig. 14)); the latter is said to be MUŞADDAR, q.v.; 2. a former (for pressing a bow into shape).  
 QALAM: 'Pen', 1. name of a type of crossbow bolt; 2. name of a type of arrow-guide (used, presumably, to shoot the latter, or so named because of its shape; see pp. 149-50).  
 QARQAL (most frequently pointed QIRQIL): brigandine.  
 QAŞİR: short (arrows); explanation s.v. SAHM; TAQŞİR AL-Q.: see TAQŞİR; TAṬWĪL AL-Q.: see TAṬWĪL.  
 QAWS, pl. QISIYY, also AQWĀS: bow; Q. AL-JARKH: see JARKH; Q. AR-RIJL: crossbow (see p. 18); Q. AS-SABQ, Q. AS-SIBĀQ: flight bow; Q. AL-YAD: hand bow (used in cases where it is necessary to differentiate between the ordinary bow and the crossbow). See also s.v. HĪJĀZIYYAH, MAŞNŪ'AH, MUNFAŞILAH, MURAKKABAH, WĀSITIYYAH.  
 QIGHAJ, QIQAJ [Turk. *kığaç* 'slope']: *inter alia* (detailed disc'n, pp. 78-79 & Appendix 6) RAMY AL-Q. denotes: 1. a military exercise in which horse-archers shot at a butt or other ground target along a line of flight parallel to the left thigh; 2. the act, technique, of shooting downwards at any angle.  
 QIRĀṬ: linear measure of about 1.1 in. (See Appendix 1.)  
 QIYĀM: stance, standing position from which to shoot (as opposed to JULŪS, QU'UD, q.v.); Q. RIJL AL-QAWS: a fault in a bow wherein the strength of the lower limb is greater than that of the upper (disc'd, p. 121).  
 QUBBĀD (sing. QĀBID?): fingers of the bow-hand with which the handle of the bow is gripped (in T the little finger, ring-finger, and middle finger).  
 QU'UD: v.n. of QA'ADA, q.v.  
 RADIF: see 'AQD.  
 RAF': (in manufacture) process of *reflexing* the rudimentary bow consisting of the wooden core and horn lining. (See pp. 8, 13.)  
 RĀHAH: centre of the palm (*kaff*).  
 RAJAHA: to be rigid, inflexible (the handle, grip, of a bow).  
 \*RĀJĪ': (intr.) recovering, having recovered (a bow in its unbraced form or reverting thereto).  
 RAMĀ (v.n. RAMY): to shoot ('ALĀ, 'AN QAWS, a bow).  
 RĀMĪ, pl. RUMĀT: archer.  
 RAMY: shooting, archery (often R. BI-N-NUSHSHĀB); R. AL-AHDĀF: target shooting; R. AS-SABQ, R. AS-SIBĀQ: flight shooting. See also s.v. QABAQ, QIGHAJ.



- RAMYAH: a shot.  
 RĀQID: held in a horizontal position (a bow); opp. WĀQIF.  
 RAQIQ: tapered to a point (arrowhead).  
 RAQQAQA: to bring to a point, taper (an arrowhead).  
 RA'S: 1. tip, point (of an arrowhead); 2. head (of a bolt).  
 RASHQ: a bout of arrows (in target shooting an agreed number of arrows shot by each competitor before recovery for shooting a second, or more, times).  
 RAṬL: a weight, in Syria of T's day, of 4.07 lb. (1850 grams). For other standards, see Appendix 1.  
 RAYYASHA: to fletch (an arrow).  
 RIJL: lower limb (of a bow). For synonyms, see s.v. BAYT, DUSTĀR.  
 \*RIKĀB: used absolutely for QAWS AR-R. See pp. 19, 29, 88.  
 RIMĀYAH: R. BI-S-SIHĀM: archery (for which the usual term in the *Ghunyah* is RAMY, q.v.).  
 RISH, (coll.) pl. RISHĀT: fletchings.  
 RUJŪ' (also RAJŪ'): recovery (of a bow); SARĪ' AR-R: having speed of recovery (a bow).  
 RUṬBAH: suppleness (in a bow).  
 SABBĀBAH: the left index finger (almost invariably in the *Ghunyah*, quotations excepted).  
 SĀBAQA: to engage in flight shooting. See SIBĀQ and Ch. 20 for details.  
 SABQ (v.n. of SĀBAQA): flight shooting; synon., for all practical purposes, with SIBĀQ, q.v.; hence QISIYY AS-S.: bows for flight shooting, flight bows, etc.  
 SABQIYYAH, pl. SABQIYYĀT: flight arrow. See detailed study, pp. 105-10.  
 ŠADR: foreshaft (of an arrow). N.B.: not the part from the shaftment to the middle of the shaft as in *Arab Archery*, p. 103.  
 ŠAFĪHAH, pl. ŠAFĀ'ĪH: lamina (of a brigandine).  
 SAHM: 1. — (pl. SIHĀM): arrow; S. TAMĀM: a full-length arrow (30 in. in the case of the *maydānī* and slightly less than 29 in. in the case of the war arrow); S. ṬAWĪL: 'long arrow', arrow designed for normal use with a standard hand bow and so called where there is need to distinguish from S. QĀŠĪR, 'short arrow', i.e. any arrow or similar missile such as a dart or bolt designed to be drawn and shot from inside the grip by means of an arrow-guide; S. AL-MŪS: razor arrow (so called from a razor edge concealed in the nock (Fig. 47; descr. p. 138, disc'd, p. 142); S. AS-SIBĀQ: flight arrow (synon. with SABQIYYAH). 2. \*shaft (of a bolt); 3. lathe, prod (?; of a crossbow). (See Ch. 4, n. 8.)  
 ŠĀ'IB, pl. ŠAWĀ'IB: an arrow that hits the mark, marksman's arrow, accurate shot.  
 ŠĀ'ID: side of a stirrup.  
 SAKANA (intr. v.): to hold (by pausing at the draw immediately prior to loosing). See SĀKIN, 2.  
 SAKHKHANA: to apply heat treatment (to a bow). See TASKHĪN.  
 SĀKIN: 1. immobile, still (w. ref. to *points of stillness*, i.e. those parts of the body which the archer must keep absolutely motionless when shooting); 2. held (describing a form of loose in which the archer pauses, or holds, at full draw before releasing; descr. p. 64; disc'd, p. 66).  
 SAKKANA (tr. v.): to hold (synon., for all practical purposes, with SAKANA, q.v.).  
 SALĀMAH: 1. S. AL-ITLĀQ: 'soundness of the loose', i.e. a clean loose; 2. S. AL-QAWS: 'soundness of the bow', i.e. the absence of any danger of its springing violently back into its reflexed position (on which, see INQILĀB).  
 SALAS: S. AL-JADHB: 'smoothness of drawing', that quality in a bow which affords the user a smooth draw.  
 ŠALĪB: heavy (w. ref. to draw weight, a bow); opp. LAYYIN.  
 SARĪ': S. AR-RUJŪ': see RAJA'A; S. AT-TARJĪH: see TARJĪH.  
 SAṬ': (of a bowstring) the act of lashing (a part of the body, as a result of faulty shooting technique).

- SAWĀD: 1. black discoloration, severe bruise (caused by injury arising from faulty shooting technique); 2. beard (?) in the expression MISĀH\* SAWĀD (see p. 128).  
 SAWQ: the act of galloping, charging (a horse).  
 SAYSARAH (or SISARAH?) [Pers. ?]: in the contexts in which it occurs S. seems to indicate some kind of protective covering; hence we suggest: 1. protective covering, probably of leather (see p. 94), to safeguard the loop of the bowstring against chafe at the point where the loop fits into the bow's nock (p. 20); we know of such a covering on a Persian (eighteenth-century?) bowstring; 2. the lip of a leather thumb-guard protecting the pad of the thumb (p. 34).  
 SHADDA: 1. to tense (parts of the body); 2. to apply, exert, pressure (to, on ('ALĀ) part of a bow, arrow, etc.).  
 SHADDADA: to tense (parts of the body).  
 SHADĪD: 1. powerful, heavy (a bow); opp. LAYYIN; 2. tensed (w. ref. to *points of tension*, i.e. those parts of the body which the archer must tense when shooting); opp. LAYYIN.  
 SHAHĀDAH: the right index finger.  
 SHĀH MIJRĀT: 'King-Guide', name of an elaborate type of arrow-guide (Fig. 49; detailed disc'n, pp. 150-51).  
 SHA'IRAH: see QĀLAB.  
 SHAM'AH: see QĀLAB.  
 SHAQQ: 1. — (pl. SHUQŪQ): splitting, split (of skin or nails as a result of injury caused by faulty shooting technique); 2. slot (in a cylindrical arrow-guide; see p. 145).  
 \*SHARĪJ: a self bow consisting of a single split lengthwise. (See p. 10.)  
 SHARRĀBAH: tassel (fitted to an arrow-guide, a JULBAH, q.v., or similar aid, to prevent it from falling out of the hand at the loose).  
 SHAWHAT: a wood said to be the same as *Cornus mas*.  
 SHIBR: span, linear measure of—in our view—about 7½ in. (See p. 29.)  
 SIBĀQ (v.n. of SĀBAQA): flight shooting (in which archers compete for distance); used either absolutely or in the full expression RAMY AS-S. 'ALĀ BU'D AL-MASĀFAH. S. and SABQ are, for most purposes, synonymous. Inherent in the root SBQ is the notion of getting ahead, and, in the sphere of archery, it has reference not to speed, as in racing (also S.), but to distance. Strictly speaking, S. differs from SABQ in that the latter means purely and simply 'getting in front of', while S. brings out the competitive element, 'competing with another/others in an attempt to outdistance him/them', or the like. See Ch. 19 for full explanation of flight shooting.  
 ŠIHĪAT AL-'AMAL: faultless technique (in shooting).  
 SİLĀN (consistently pointed as SAYALĀN, probably as a pseudo-correction): tang of an arrow-head.  
 \*SIPER [Pers.]: 'shield', a grooved horn shelf, or guide, strapped to the hand of an Ottoman flight shooter, to enable him safely to bring his arrow well inside the grip. (See p. 106.)  
 SIRIPSĀR [Pers. *sar afsār*, 'head-stall']: martingale (disc'd, p. 79).  
 SISARAH: see SAYSARAH.  
 SIYAH, pl. SIYĀT (consistently pointed as SIYYAH, -ĀT): (of the limb of a bow) the relatively inflexible extremity which serves as a lever during the draw (Fig. 7; pp. xxviii-ix); AS-S. AL-'ULYĀ, S. AL-YAD: the upper *siyah*, that of the upper limb; AS-S. AS-SUFLĀ, S. AR-RIJL: the lower *siyah*, that of the lower limb.  
 SUKŪN (v.n. of SAKANA): 1. the act of holding (see SĀKIN, 2); ITLĀQ AS-S.: the held loose (see SĀKIN, 2); 2. state of stillness (in parts of the body; see SĀKIN, 1).  
 SU'UD AS-SAHM: the angle of ascent of an arrow.  
 \*TABDĪD: bad grouping (of arrows in a target); opp. JAM'.  
 TADMĪK: (of an arrow leaving the bow at the loose) the act of slapping the arrow-pass (DĪMAK) with consequent deflection.

- TAFWĪQ:** the act of nocking an arrow; **MAWDI'** AT-T.: the nocking-point (on the bowstring).  
**TAHARRAKA:** to gad, fly erratically (an arrow).  
**TAHLIL:** v.n. of **HALLALA**, q.v.  
**TAHRĪF:** 1. v.n. of **ḤARRAFA**, q.v.; 2. (used absolutely w. ref. to the way in which the archer addresses himself to the target) the sideways, or oblique, position, e.g. **QU'UD** AT-T. the act of squatting in the oblique position. (See p. 122 and Fig. 42 (stance).)  
**ṬALQ** (v.n. of **ṬALAQA**): synon. with **ṬLĀQ**, q.v., the latter representing, presumably, strict literary usage and the former the colloquial.  
**TAMĀM:** see **SAHM**.  
**TAMṬĪT:** the act, process of stretching (the bowstring in the last stage of its manufacture so as to prevent stretch on the braced bow).  
**TANQIL:** act of cantering (a horse).  
**ṬAQĀT** (pl.): (?) that portion of the bow which consists of 'layers' (of sinew, horn, etc.), i.e. all but the *siyah*.  
**TAQS:** yew.  
**TAQŠĪR AL-QAŠĪR:** 'shortening the short', (w. ref. to the lock, p. 53) slight retraction, from the recommended normal position, of the distal phalanx of the thumb as it rests beneath the index finger; cf. **TAQŠĪR AT-ṬAWĪL** which is illustrated in Fig. 21e.  
**TAQŠĪR AT-ṬAWĪL:** 'shortening the long' 1. (w. ref. to the lock, p. 53) slight retraction, from the recommended normal position, of the index finger as it rests on the distal phalanx of the thumb (see Fig. 21, comparing (e) with (a)); 2. (w. ref. to the bow-hand, p. 123) slight retraction of the fingers to allow the archer to grasp squarely as he would certainly wish to if, for instance, the grip of a bow were too thin for his normal grasp.  
**TARAF AZ-ZIND:** see **ZIND**.  
**TARAJJAHA:** to outclass ('ALĀ; a competitor in shooting).  
**TARAKKABA:** to be composite (a bow), be composed of (MIN).  
**TARBI'**: opp. of **TAHRĪF**, q.v., and, w. ref. to the way in which the archer addresses himself to the target, synon. with **TAWJĪH**, q.v., though much less common.  
**\*TARDĪF:** synon. with **RADĪF** in the phr. 'AQD AR-RADĪF. See 'AQD.  
**ṬARID LI-S-AHM:** giving, resulting in, good cast (use of a particular technique, item of equipment, etc.).  
**TARJĪH** (v.n. of **RAJJAHA**, to cause to outweigh): **SARĪ** AT-T., said of a bow, means that it has speed of recovery, i.e. it is quick (*sarī*) to make its limbs 'outweigh', or overcome, the pull exerted during the draw and, by springing forward in the direction of their natural pull, regain the position they had before the braced bow was drawn.  
**ṬARQ** (v.n. of **ṬARAQA**): (w. ref. to the action of the bowstring) rapping (of fingers, etc. as a result of faulty technique).  
**TASKHĪN:** the application of heat treatment (to a bow). Full details, pp. 99-100.  
**ṬASMĀ** [Pers. *tāsmah*]: leather band (on bowstring to protect the nocking point? See p. 140).  
**TAŠWIB** (?) AS-SAHM: the act of causing an arrow to fly too low (?). See detailed disc'n, p. 120.  
**TATRĪF:** (w. ref. to the lock) the act of putting only the tip of the right index finger on the distal phalanx of the thumb (see **MUTARRAF**). This action amounts to excessive 'shortening of the long' (see **TAQŠĪR AT-ṬAWĪL**).  
**TATWĪL AL-QAŠĪR:** 'lengthening the short', 1. (w. ref. to the lock, p. 53) slight projection, beyond the normal recommended position, of the thumb as it rests beneath the index finger (cf. **TAQŠĪR AL-QAŠĪR** and **TAQŠĪR AT-ṬAWĪL**); 2. (w. ref. to the bow hand, p. 123) slight extension of the fingers to allow the archer to use the oblique grasp; opp. **TAQŠĪR AT-ṬAWĪL**, q.v.  
**TATWĪL AT-ṬAWĪL:** 'lengthening the long', (w. ref. to the lock, p. 53) slight projection, beyond the normal recommended position, of the index finger as it rests on the thumb with the result that the middle phalanx of the finger lies wholly on the thumb-nail.

- TATWĪZ:** (in manufacture) the process of veneering the bow with *tūz* [Pers.], or bark, prior to finishing with paint.  
**TAWAJJAHA:** to face (ILĀ towards, the mark) squarely, directly (as opposed to adopting the sideways position). (See p. 102.)  
**TAWAJJUḤ** (v.n. of **TAWAJJAHA**): the frontal, directly facing (as opposed to sideways), position (see p. 102); synon. with **TAWJĪH** and, more rarely, **TARBI'**.  
**ṬAWĪL:** used absolutely to denote 1. long arrow(s) (see **SAHM**); 2. bow for shooting the latter; 3. the index finger of the drawing hand (see **TAQŠĪR**); 4. the fingers of the bow-hand (see **TAQŠĪR AT-T.**).  
**TAWJĪH** (v.n. of **WAJJAHA**): the frontal position (adopted by the archer in addressing himself to the target); used absolutely; synon. with **TAWAJJUḤ**, q.v.  
**TAWQI'** (?) AL-LIḤĀM: (in manufacture of the bow) an expression which, on the basis of context, etc., would appear to denote the process of fitting (in sense of shaping and adjusting) the horn lining (*liḥām*) to the wooden core with which it is to be bonded to form the belly of the finished weapon. It would be attractive to read *tawqī'*, 'grafting', for *tawqī'* of the MSS, but we see technical objections. *Liḥām* admits of no doubt; it occurs in many works with the sense indicated.  
**\*TAZLĪQ:** act of following through by causing or allowing the bow-hand to go forward in a smooth gliding movement.  
**TAZNID:** distressing contusion of the wrist (?) or, the fault of striking the wrist. (See Ch. 20, n. 5.)  
**THABATA:** to settle to the string ('ALA L-WATR; bow after bracing).  
**THĀBIT:** settled (bow to the string).  
**TIRKĀSH** [Pers.]: quiver, bowcase.  
**ULKĪ** [Turk. *ülkü*, 'target']: \*a target at long range (130-150 arm-spans). In our *Ghunyah* the term is qualified in the expression **AL-U. AL-QAŠĪR** which we take on empirical grounds to be a short-range target in the order of 75-80 yds. (See disc'n, p. 141.)  
**'UNQ**, pl. **A'NĀQ:** (of the bow's limb) the 'neck', that point at the end of the working limb where the *siyah* (q.v.) begins, or, in other words, the root of the *siyah*. (See Fig. 5.)  
**'UQDAH**, pl. **'UQAD:** 1. (of the finger) phalanx (*not* joint, *mifṣal*); 2. protuberance, meaning, in the expression 'U. AL-AṢĀBI', the knuckles.  
**ŪQIYYAH:** a weight of  $\frac{1}{12}$  of a **RAṬL**, q.v.  
**'URWAH:** loop (of a bowstring).  
**USTĀD**, pl. **USTĀDŪN:** a master (archer, bowyer, in the hierarchy of professional organization; see pp. 123, 155).  
**WAFĀ':** 1. the completed draw; w. **BAYĀP** and w. **NIḤĀYAH:** the greater draw, i.e. the longest possible; w. **BIDĀYAH** (defined as **AWWAL** w.): the 'lesser draw', i.e. the shortest possible (full details, pp. 127 ff.); 2. (of an arrow) the draught at full draw; w. **TĀMM/TAMĀM:** maximum attainable draught; 3. (of an archer) the length of reach at full draw.  
**WAJH:** the belly (of a bow or its grip); synon. w. **BAṬN**, q.v.; opp. **ZAHR**.  
**WĀQIF:** held in a vertical position (a bow); opp. **RĀQID**.  
**WĀSIṬIYYAH** (*not* 'from *Wāṣit*'): the intermediate bow—probably so called from the point of view of construction and relative proportions—which we take to be the old Arabian composite (see p. 10); said to be synon. with **MUNFAṢILAH**.  
**WATR**, pl. **AWTĀR:** bowstring; w. **AS-SIBĀQ:** string for use with a flight bow.  
**WAZANA:** 1. to determine the draw weight (of a bow held in position by a peg, weights being attached to its string); 2. to find the centre of gravity (of an arrow); 3. to gauge elevation and direction (when aiming).  
**WĀZANA:** to balance (an arrow to find its centre of gravity).  
**WAZN:** v.n. of **WAZANA**, 3.



- WAZN, pl. AWZĀN: 1. weight (of arrows, in usual sense of mass); 2. the centre of gravity (of an arrow); 3. v.n. of WAZANA 3.
- YAD: 1. (of the body) arm (as opposed to hand, *kaff*); 2. the upper limb (of a bow). For synonyms, see BAYT.
- YAGHLIQ [Turk. ? *yağır*, 'enemy' + *-lik*?]: war arrow (details, pp. 25, 28 & Appendix 2).
- YĀMŪR: ibex horn.
- YĀSIJ [Pers.]: type of arrow with a sharp head, possibly a broadhead.
- ẒAHR, pl. ẒUHŪR: 1. (of a bow) the back, i.e. its convex surface when braced; 2. (of a feather) the dorsal side, i.e. its outer surface; 3. (of the dorsal surface of the bow's grip) the spine, i.e. the longitudinal line dividing the surface.
- ZANBŪRAK [Pers. 'little wasp']: undefined type of crossbow. See pp. 8, 19.
- ZAQQ: creep, or nosing forward of an arrow at full draw.
- ZARADAH: metal link (bound into the bowstring for the purpose of shooting nockless arrows).
- ZINAH: v.n. of WAZANA, 1.
- ZIND: the meaning normally given in the Arabic dictionaries is 'wrist', but the anatomical area to which z. is applied is much wider, it seems, than that covered by the Engl. term, for references in the text show that it extends from the carpal end of the radius (A'LĀ Z-Z.) across the wrist-joint (AṢL AZ-Z.) right down to the heel of the hand (ṬARAF AZ-Z.). Very often used absolutely to denote the latter, it is apt to mislead.
- ZURQAH: light bruise, blueness, caused by bruising.

## NOTES AND REFERENCES

## MANUSCRIPTS

In the introduction we have described the British Museum codex on which this work is based and, in general terms, defined and discussed the various groups of MSS used to control, correct, or otherwise improve the text and add to our knowledge of its subject matter. Restricting ourselves to bare essentials, we now give particulars about individual MSS, the groups into which we have placed them, and the meaning of the symbols by which we refer to them. Further information about them can be found in sources indicated in parentheses following the indication of date, and, in the case of the Istanbul MSS, the reader should consult Ritter, *Isl.*, XVIII, 1929, pp. 137 ff.

Before proceeding to details we draw special attention to the following point: in the case of groups A, C, and D, the unqualified use of the letter assigned to the group indicates that it denotes all MSS within that group. Its meaning in the case of the B group will be explained when we come to it.

## A

- A<sup>1</sup>: British Museum, Add. 23489. No date, but probably early fifteenth century, if not end of fourteenth. (*Catalogus codicum manuscriptorum orientalium* . . . Pars secunda . . ., Londini, 1846 (-1871), pp. 667-68. For descriptions, etc., see also above, pp. xxxv-vi.)
- A<sup>2</sup>: Cambridge University Library, MS Qq. 240 (7). Date: 886/1481. (E. G. Browne, *A Hand-List of the Muhammadan Manuscripts*, etc., Cambridge, 1900, p. 127.) This is a badly written and defective copy, apparently transcribed from the same source as A<sup>1</sup> and frequently more word-perfect, but containing more or less the same lacunae as their common source. It becomes very defective towards the end.

## a

- a: Istanbul, Aya Sofya, 2902 mük. [=bis]. Date: 802/1400. (Ritter, op. cit., p. 139. See also above, p. xxxvii.)

## B

To save space we quote only the two main representatives of this group (see B, below) unless there is complete unanimity in all MSS or unless there is some special reason for doing otherwise (e.g. because B<sup>1</sup> is at variance with B<sup>2</sup>). It should be noted that, unlike A, C, and D, B does not denote all MSS of the group. This is either so termed or, where appropriate, indicated by Bb. The following expedients are adopted:

B denotes B<sup>1</sup>B<sup>2</sup>

b ,, b<sup>1</sup>b<sup>2</sup>b<sup>3</sup>b<sup>4</sup> (abbr. b<sup>1-4</sup>)

- B<sup>1</sup>: Istanbul, Aya Sofya, 4193. Date: 795/1393. (Ritter, op. cit., p. 138.) Described as a commentary on the poem *Ghanyat al-Murānī*, it is attributed to a Shaykh Ibn Abi Hajalah. It may well be that this is the name of the person who corrected and revised Taybughā's text.
- B<sup>2</sup>: Paris, Bibliothèque Nationale, Arabe 6,160. Date: 799/1397. (G. Vajda, *Index général des manuscrits arabes*, etc., Paris, 1953, p. 577.) Not, in general, as accurate as B<sup>1</sup>. There are two paginations; that executed in occidental numerals is followed.
- b<sup>1</sup>: Istanbul, Aya Sofya, 4320. Date: 864/1459-60. (Ritter, op. cit., p. 138.) Our microfilm copy which comes to an abrupt end at folio 60a is apparently incomplete, but on this point we can supply no further information.
- b<sup>2</sup>: Istanbul, Aya Sofya, 3800. No date, but probably fifteenth century. (Ritter, op. cit., p. 137.)
- b<sup>3</sup>: Cambridge University Library, MS Qq. 178(8). Date: 1174/1759-60. (Browne, op. cit., p. 127.) Has close affinities with b<sup>1</sup>.
- b<sup>4</sup>: Istanbul, Aya Sofya, 4198 (from folio 89b). Date: 873/1469. (Ritter, op. cit., p. 138.) Close affinities with B<sup>2</sup>.

## b

- b: Leiden, Bibliotheek der Rijksuniversiteit, Cod. Or. 74. No date, but probably post-sixteenth century. (*Catalogus Codicum Orientalium*, etc., III, Lugd.-Bat., 1865.)

## C

- C<sup>1</sup>: Istanbul, Topkapı Sarayı Müzesi Kütüphanesi, III. Ahmet: 2608. Date: 805/1403. (Ritter, op. cit., p. 139, under Seraib. 2608.)

- C<sup>2</sup>: British Museum, Or. 1358. No date, but probably post-sixteenth century. (C. Rieu, *Supplement to the Catalogue of Arabic Manuscripts*, London, 1894, p. 557.)  
 C<sup>3</sup>: Paris, Bibliothèque Nationale, Arabe 2,833. No date, but probably post-sixteenth century. (Vajda, op. cit., p. 454.)

## D

- D<sup>1</sup>: Istanbul, Aya Sofya, 3314. No date, but probably fifteenth or sixteenth century. (Ritter, op. cit., p. 140.)  
 D<sup>2</sup>: Oxford, Bodleian Library, MS Huntington 208. No date, but probably post-sixteenth century. (J. Uri, *Bibliothecae Bodleianae Codicum Manuscriptorum Orientalium . . . Pars Prima*, Oxonii, 1787, p. 103.)

## THE DOXOLOGY

2b-3a

Cf. A<sup>2</sup>, 1a-2b; a, 1b-2a; B<sup>1</sup>, 1b-2a; B<sup>2</sup>, 4b-5a; b<sup>1</sup>, 1b; b<sup>2</sup>, 1b-2b; b<sup>3</sup>, 1a-2a; b<sup>4</sup>, 89b; b, lacking.

1. This invocation as it stands is peculiar to A<sup>1</sup> and is probably the scribe's.
2. A<sup>1</sup>, et al., supplying a lacuna caused by a hole in A<sup>1</sup>, fo. 2.
3. Vocalizing as *yusta'fā bihi al-wiyar* 'l-islām wa-yustawilā (A<sup>2</sup>, et al.).
4. *Al-bādī'ah* (Aa). B: *al-jāmī'ah*.
5. Reading *al-'itrah* (B) for *al-'itrah*.

## CHAPTER 1

3a-10b

Cf. A<sup>2</sup>, 2b-12b; a, 2a-9b; B<sup>1</sup>, 2a-7b; B<sup>2</sup>, 5a-10a; b<sup>1</sup>, 1b-5b; b<sup>2</sup>, 2b-11b; b<sup>3</sup>, 2a-5b; b<sup>4</sup>, 89b-93a; b, 1b-4a. In the various MSS there are textual differences which cannot be discussed here.

1. For the Muslim, archery, like all human activity, must be motivated by religion. Hence, in order to serve the ends of his Islamic conscience a religious case is shaped in support of word and deed. Material similar to, and in some cases identical with, that presented by our author is to be found in other treatises. Cf., for example, *Arab Archery*, pp. 3-9, 24-25; Hein, *Isl.*, XIV, 1925, pp. 294, 300, 303, 312-13, 317, 319-29. Cf. Klopsteg, pp. 12-13 114-16.
2. We omit several lines of unimportant subject matter. At this point in A<sup>1</sup> a lacuna begins, which ends only at what in A<sup>1</sup> is v. 23 of the poem.

## CHAPTER 2

19a-20a

Cf. A<sup>2</sup>, 23a-24a; a, 11b-12a; B<sup>1</sup>, 15b-16a; B<sup>2</sup>, 17a, 14b (folios disarranged); b<sup>1</sup>, 10a-11a; b<sup>2</sup>, 24a-25b; b<sup>3</sup>, 9b-10b; b<sup>4</sup>, 97b-98a; b, 7b-8b.

1. These five points are not expressly stated, but implied in the verse with which the commentary is opened in our text. As in A<sup>2</sup>a, the opening is abrupt. In all other MSS the commentary is more smoothly introduced with subject matter of a little more general nature.

## CHAPTER 3

20a-25b

Cf. A<sup>2</sup>, 24a-31b; a, 12a-17a; B<sup>1</sup>, 16b-20b; B<sup>2</sup>, 14b-15b, 17a-20a (folios disarranged); b<sup>1</sup>, 11a-13b; b<sup>2</sup>, 25b-31b; b<sup>3</sup>, 10b-12b; b<sup>4</sup>, 98a-100a; b, 8b-11a.

1. Cf. *Mukhaṣṣas*, VI, p. 38.
2. Conjectural translation of *tāgāt* ('layers, strands') whose meaning in this context is not entirely clear. It may mean the laminated section of the bow which lies between the two *siyahs*, consisting of the two *dustārs* (see Glossary) and the grip.
3. Cf. *Arab Archery*, p. 13.
4. See *ibid.*, p. 83, n. 35. Faris and Elmer take the significance of 'power' (*quwwah*) and 'strength' (*shiddah*) to be, respectively, length of cast and force of impact, but from Taybughā's introduction (p. 3) it would seem that if there is in fact any difference in meaning, it is that *quwwah* relates to the potential of the bow proper and *shiddah* to that of the bowstring. If this is the case, he is not always consistent in his use of the terms.
5. According to CD (e.g. C<sup>2</sup>, 38a; D<sup>2</sup>, 45b), gluing and binding were winter processes, reflexing being carried out in the spring. Climatic differences probably account for the discrepancy.
6. Cf. CD.
7. B.
8. The flight bow, being more delicate than the war bow, needs special care when flexed for bracing. Both limbs must be bent equally and together. This point is not mentioned in Ch. 17 (on bracing).
9. Some information on Oriental crossbows and arbalests may be derived from Reinaud, *JA*, 1848, pp. 211-18; Huuri, *Gesch.*, and Cahen, *BEO*, XII, pp. 129-34 and pp. 151-54.

10. According to D, the hand bow is preferable because it has the support of Prophetic tradition, combines lightness with rapid shooting and effectiveness, and is the weapon of kings. The crossbow, on the other hand, is simpler to use and is more serviceable in fortresses and in ships, where it can stand up to the damp salt air—presumably if constructed as indicated in our text.
11. Reading *dūna ḥaylīhi*, not *dūna ḥilāh*, both of which are contemplated by our scribe (A<sup>1</sup>, 25a, line 5).

## CHAPTER 4

25b-29a

Cf. A<sup>1</sup>, 31b-36b; a, 17a-20a; B<sup>1</sup>, 20b-24a; B<sup>2</sup>, 20a-22a; b<sup>1</sup>, 13b-15b; b<sup>2</sup>, 31b-36a; b<sup>3</sup>, 12b-14b; b<sup>4</sup>, 100a-101b; b, 11a-13a.

- On bowstrings, see also Hein, *Isl.*, XV, pp. 1-8, Klopsteg, pp. 54-59, and *Arab Archery*, pp. 94-102.
1. The reading of *a*, supplying, in our view, a lacuna in A which in the absence of this one word reads 'it is called "the Persian"'. In other MSS *chillah* is either spelled differently (e.g. B<sup>2</sup>b<sup>1</sup>: *jilā*) or has been corrupted.
  2. From the text it is not clear whether glue was used in the Persian string. It is certainly not mentioned, and in *a* there is no mention of glue in connexion with either string. Cathayan string is there said to be 'made of raw, wound silk with a little wax' (17a). This reading, however, is exceptional. Some form of binding agent would certainly be needed, be it glue or wax, or, as in the case of Ottoman and Sino-Tatar strings, thread or twine bound around the strands, otherwise the string would become inextricably tangled when removed from the bow.
  3. 'A thin string is better for the flight bow because it increases cast . . . but it requires mastery of shooting, for unless the loose is clean, the arrow will flit and lose range' (Klopsteg, p. 55. Cf. Hein, *Isl.*, XV, p. 3).
  4. Reading *yusaddā* (B) for *yushaddā* (A<sup>1</sup>, 26b, line 6).
  5. According to C, the *raṭls* were held in a container of some kind or other and hung from the string by a hook. Before each extra *raṭl* was added the hook and container were removed.
  6. Cf. D.
  7. The material is given in *aC* as hemp (cf. D) or linen.
  8. Reading *wa-s-sahm khams al-watr* (aB) for *wa-s-sahm khams bi-l-watr* (A<sup>1</sup>, 27b, line 2). The A text is clearly corrupt and should be restored by reference to a. 'Arrow' as a translation of *sahm* is here technically inappropriate. The word can mean 'grave' and in this context it must denote what is nowadays termed the 'prod', i.e. the stave or lathe which constitutes the actual bow as opposed to the stock (*amūd*).
  9. In B, et al., '*wa-s-sahm . . . al-watr*' is not immediately followed by a description of the method determining the length of the crossbow string, which is deferred until the end of the chapter and is phrased somewhat differently: 'The way to determine the length of the string for a *jarḥ* and similar weapons is to ascertain first the length of the bow from nock to nock . . . and then to fix two pegs into a wall, putting a distance equivalent to five times the length of the bow between the two. You next twist the resulting string lengthwise in the appropriate manner into four strands and knot the two loops at each end.' Cf. a, 18b.
  10. Reading *asaddū* (or, perhaps, *ahdā*) for *asdā* (A<sup>1</sup>, 27b, line 8) and *ashdā* (A<sup>2</sup>) and various other corrupt readings in other MSS.
  11. B.
  12. B.
  13. The text of A<sup>1</sup> (29a, lines 5-6) is corrupt by reason of a lacuna. The sense, however, can be restored by reference to B, et al.

## CHAPTER 5

29a-36a

Cf. A<sup>2</sup>, 36b-45b; a, 20a-25a; B<sup>1</sup>, 24a-29b; B<sup>2</sup>, 22a-26a; b<sup>1</sup>, 15b-19a; b<sup>2</sup>, 36a-43b; b<sup>3</sup>, 14b-17b; b<sup>4</sup>, 101b-104b; b, 13a-16a.

On Turkish arrows, see Hein, *Isl.*, XV, pp. 26-53, and Klopsteg, pp. 74-85 and index. In making comparisons it should be borne in mind that Muṣṭafā Kānī is primarily concerned with flight shooting, in which requirements are different from those imposed by other kinds of shooting. Useful information may also be derived from *Arab Archery*, pp. 103-16 and index under 'arrows', 'feathers', etc.

1. Reading *an-nushshāb* (B) for the corrupt *as-siyāt* (A<sup>1</sup>, 29a, last line).
2. C.
3. Reading *naṣlihi* (A<sup>2</sup>, a, et al.) for *aṣlihi* (A<sup>1</sup>, 29b, line 3).
4. B.
5. CD.
6. The reading *khari* is uncertain. Even if correct, it is of doubtful meaning. Taking into account the meanings of the Arabic root *kh r ḥ* and its derivatives, we suggest that it means either conical arrows tapering from fletchings to head or arrows having the required length, but not breadth.
7. D.
8. The same story with less detail is told in *Arab Archery*, p. 101.
9. The meaning of *ḥaydari* is not explained in any source known to us. It is clearly an adjective from *ḥaydar*, one of which is 'lion'. It may therefore designate a type of hunting head, in which case it may have been a broadhead, which is most suitable for this purpose. As Taybughā is interested essentially in military archery, it is understandable that he should dismiss such a head as inferior. *Ḥaydar*, apart from being a proper name ('Ali, understandable that he should dismiss such a head as inferior. *Ḥaydar*, apart from being a proper name ('Ali, the son-in-law of the Prophet, was so called) may mean: (a) short, small made; (b) hard. We should not, on the



- other hand, exclude the possibility of textual corruption. Could it be that we have to do with *jamwari* from Pers. *jāwār* 'Ar. adjectival -i 'pertaining to animals'? In the Arabic script the word could easily be mistaken for the more familiar *ḥayṭ* 'tail'.
10. According to C. the heads of butt arrows (*amāḥiyyāt*) were square (*'alā t-tarbi'*), the interpretation of which is uncertain. We suggest that bluntness is implied.
  11. On the *qarḡal*, see Mayer, *Mamluk Costume*, p. 40. On the lamine (*ṣafā'ih*), see *ibid.*, p. 37, n. 8.
  12. According to CD, it is the tang, and not the head, to which Taybughā refers here. Our text makes sound, clear sense as it stands, however. What is meant is that the complete head—which includes the tang—must be evenly balanced about its longitudinal axis.
  13. D.
  14. For details of the operation, see *Arab Archery*, p. 109.
  15. D. Here a long head is recommended for armour-piercing purposes. It should not, however, be too long as it will then be weak. It is added that the shorter the arrowhead, the more firmly it will sit in the arrow, especially if it has a long tang.
  16. In CD there is a warning against allowing the head to absorb too much water when tempering. Over-quenching could in fact make the steel brittle.
  17. The reading of A<sup>1</sup> (32a, line 6) is *at-ta'āliq ash-sh'f* (V?)<sup>1</sup>. None of our MSS offers a reading that is really intelligible to us. We conjecture *ta'āliq* (or, less probably, *ta'ālif*) *as-suft* (or, *as-sift*) 'appendages (or, "encasings") of the shoulder (or, "upper part")'.
  18. In C it is stated that it should not exceed one Syrian *ūqiyyah* (5.43 oz.) in weight. This is too heavy for practical purposes.
  19. The reading of A<sup>1</sup>, 32b, line 7, is *al-makyūl wa-huwa l-aktāf*. The reading of B, 14b, viz. *al-makīlāt wa-huwa l-akuff*, suggests that we should read *al-makyūl wa-huwa l-akuff*, which is virtually what we find in B<sup>2</sup>, 24a. The problem is discussed in detail on p. 32.
  20. Not in this context synonymous with *asra'*. The reference is to flight shooting (*sibāq*) where the aim is to outstrip a competitor in point of distance.
  21. Reading *al-fūq* for *al-farq* (A<sup>1</sup>, 33a, line 4).
  22. Cf. *Arab Archery*, p. 113: 'Experts, however, leave the end toward the nock untrimmed and trim closely the end toward the arrowhead. This type of trimming is called the martin trim, because it is shaped like the wings of a martin.'
  23. When the fletchings are back to back or belly to belly the arrow is termed in Arabic *luḡḡāb*. If they are correctly arranged, it is termed *lu'ām*.
  24. There is a lacuna in A<sup>1</sup>, 33b, line 3. Between *al-murayyash bi-sh-shamāl* and *al-ayman* supply *yaṭīb ayman al-hadaf wa-ahsā' dhālika* from A<sup>2</sup>a.
  25. We challenge the accuracy of this view, preferring CD's: 'The further the fletchings from the nock, the better the cast, whereas the nearer they are, the truer the course.'
  26. In CD it is recommended that soft feathers be used for summer shooting and hard ones for winter and damp conditions.
  27. *Nibāl*, pl. of *nabl*. Elsewhere our author uses this word in the sense of 'dart' or 'bolt', but here he is quoting a North African writer who probably used a different vocabulary. It should also be noted that the feathers are here named right-handed or left-handed according to the principle observed in England. Quotation from a North African writer is no doubt responsible for Taybughā's apparent self-contradiction.
  28. In CD it is specified that in this case the feathers are those of the *yāsij* arrow (see Glossary).
  29. CD: 'because of their straightness'.
  30. Reading *ikhtalafa aḡwāl ar-rumāt* (B) for the corrupt *ikh. miqdār ar-r.* (A<sup>1</sup>, 34a, line 6).
  31. The author expresses himself badly in Arabic, but other MSS show that this is the sense. In D a rule of thumb is given: 'To form a rough idea of the correct length of an arrow, the arrowhead may be put under the archer's armpit. What he then does is to stretch out his arm along the arrow, and if the middle finger reaches the end of the nock it is right for size.'
  32. Specified as Egypt and Syria in a. Cf. also CD.
  33. CD.
  34. CD.
  35. D<sup>2</sup>.
  36. D<sup>2</sup>.
  37. The precise nature of this device is uncertain. It would appear to have been some kind of crossbow so far as the present context is concerned. According to Dozy, *Suppl.*, II, 447, it was originally an 'espèce de baliste, de catapulte, destinée à lancer des pierres, le feu grégeois, ou d'autres projectiles'. The name was later applied to some sort of firearm. See *EP*<sup>2</sup>, art. Bārūd, sect. iii.
  38. Reading *lānu kamun mithl kamun* for . . . *kunon . . . kunun* (A<sup>1</sup>, 35b, line 8). On *kamun* in the sense of 'quantity', see Redhouse, *Lexicon*, s.v.

## CHAPTER 6

36a-37a

Cf. A<sup>2</sup>, 45b-47a; a, 25a-26a; B<sup>1</sup>, 29b-30b; B<sup>2</sup>, 26a-27a; b<sup>1</sup>, 19a-b; b<sup>2</sup>, 44a-45a; b<sup>3</sup>, 17b-18a; b<sup>4</sup>, 104b-105a; b, 16a-b.

On thumb-guards, see also *Arab Archery*, pp. 123-24. On the Turkish drawing-ring or thumb-ring, see Hein, *Isl.*, XV, pp. 18-22 and Klopsteg, pp. 67-70.

1. An alternative arabicized form of this word is *kushtubān/kustubān*. It is found in CD and is commonly encountered in Arabic works on archery. Cf. *Arab Archery*, p. 123.
2. More properly *angushṭāneh* (which form is in fact given in B<sup>2</sup>, et al.). An alternative form is *angushtāneh*, which is commonly used, for instance, in north India.
3. Cf. *Mukhaṣṣaṣ*, VI, 69 and Hein, *ibid.*, p. 22. The form *khayṭa'ah* given in *Arab Archery*, p. 123, would appear to be incorrect.
4. By this he may mean a kind of leather lining. Cf. *Arab Archery*, p. 123.
5. Cf. CD.
6. In CD the horn of the *ayyil* is specified in the verse preceding the commentary, but in which sense *ayyil* is to be taken we cannot be sure, for the word may mean 'mountain goat', 'antelope', 'wild ox', etc. according to the time and place in question.
7. CD: 'or copper'.
8. Literally, 'if God makes it easy for him'. Taybughā tends to use this expression in connexion with anything he can do himself.
9. CD: 'It should not be so big that it can move around, nor yet so small that it will pinch the thumb.'
10. Reading *anfadh* (A<sup>2</sup>, B<sup>1</sup>, et al.) for *anfād* (A<sup>1</sup>, 37a, line 4). The root *n f dh* is not normally used by our author in connexion with accuracy, but on technical grounds it is difficult to understand how in this context it can express any other idea. Cf. *Arab Archery*, p. 124.

## CHAPTER 7

37a-38b

Cf. A<sup>2</sup>, 47a-49a; a, 26a-27b; B<sup>1</sup>, 30b-31b; B<sup>2</sup>, 26b-27b; b<sup>1</sup>, 19b-20b; b<sup>2</sup>, 45a-47a; b<sup>3</sup>, 18a-b; b<sup>4</sup>, 105a-b; b, 16a-b. See also Hein, *Isl.*, XIV, 330-31, *Arab Archery*, pp. 16-18, and *Wādīh*, 22a (notes 2 and 3 below).

1. This heading is lacking in Aa, but in Bb it introduces the portion immediately following the end of our second paragraph: 'There are differences of opinion . . .'
2. The term used by Taybughā is *ustādīn* (sic) which, strictly speaking means nothing more than 'master archers', but, as we shall see later, Abū Hāshim, Ṭāhir, Ishāq, and sometimes aṭ-Ṭabari, tend to be designated 'the Imams' (see Ch. 23. Cf. *Wādīh*, 22a). Hence our translation 'Great Masters'.
3. These are not to be confused with the *arkān*, or 'pillars', of archery (see Ch. 2). The *uṣūl* are discussed at length by aṭ-Ṭabari (*Wādīh*, 23a-26a).
4. See *Arab Archery*, p. 16, n. 13.

## CHAPTER 8

38b-42a

Cf. A<sup>2</sup>, 49a-53b; a, 27b-30b; B<sup>1</sup>, 31b-34b; B<sup>2</sup>, 27b-29b; b<sup>1</sup>, 20b-22b; b<sup>2</sup>, 47a-51b; b<sup>3</sup>, 18b-20b; b<sup>4</sup>, 105b-107a; b, 17b-19b.

The various aspects of technique discussed in this and the following seven chapters are dealt with differently by different authors. We shall refer the reader to some of the more important sources which may be consulted on the points under discussion, but it should be borne in mind that comparisons should be avoided, and no attempt should be made to resolve discrepancies. Different bows were used at different periods and for different purposes.

See *Arab Archery*, pp. 46-49; Hein, *Isl.*, XV, pp. 61-64; Klopsteg, pp. 91-94; cf. *Tabṣīrah*, 47b-50a; *Wādīh*, 29b-30b, 37a, 43a-b, and 47a-49b.

1. Reading *matn* (aB, et al.) for *batn* (A<sup>1</sup>, 39a, last line).
2. b, 18a: 'a piece of leather . . . or a calf's tail'. Cf. *Arab Archery*, p. 48: 'a piece of rag or tape'.
3. C adds: 'They say that if the left index finger is tensed on the grip, the arrow will drop beyond the mark, which is a good thing in flight shooting.' Cf. D.
4. CD.
5. D. Cf. C.
6. In B, et al., the text is worded a little differently, but the sense is the same.

## CHAPTER 9

42a-43b

Cf. A<sup>2</sup>, 53b-56a; a, 30b-32a; B<sup>1</sup>, 34b-36a; B<sup>2</sup>, 29b-31a; b<sup>1</sup>, 22b-23a; b<sup>2</sup>, 51b-53b; b<sup>3</sup>, 20b-21a; b<sup>4</sup>, 107a-108a; b, 19b-20a.

See *Arab Archery*, pp. 40-42, Hein, *Isl.*, XV, pp. 67-68, Klopsteg, pp. 96-97; cf. *Tabṣīrah*, 50b-59a; *Wādīh*, 28b, 36b, 42b, etc.

1. CD.
2. Implied in A, but expressed in most other MSS.

3. D. In these two MSS the archer is at this point directed next to strike the shaft against the grip and to catch it with his left index finger and thumb. Cf. C.  
 4. CD. Cf. *Arab Archery*, p. 41.  
 5. C<sup>1</sup> D.  
 6. See *ET*<sup>2</sup>, art. Bihzād, Plate XXXIV, in which King Dārā is seen nocking on horseback. It will be noted that he is not looking at his arrow, but straight ahead.

## CHAPTER 10

44a-47a

- Cf. A<sup>1</sup>, 56a-60a; a, 32b-35b; B<sup>1</sup>, 36a-39a; B<sup>2</sup>, 31a-33a; b<sup>1</sup>, 23b-25a; b<sup>2</sup>, 53b-58a; b<sup>3</sup>, 21a-22b; b<sup>4</sup>, 108a-109b; b, 20b-22a.  
 See *Arab Archery*, pp. 19-23, 43-46; Hein, *Isl.*, XV, pp. 64-68; Klopsteg, pp. 94-96; cf. *Tabṣīrah*, 59a-64a; *Wāḍih*, 28b-29b, 36a, 43a; *Nihāyah*, pp. 64-65.  
 1. In CD precisely the opposite view is taken.  
 2. In all other MSS the sentence ends at 'lock'. Our author does not express himself clearly, and the translation could well be, 'This is the correct way to form the lock of '69' upon which archers are agreed.'  
 3. Reading *al-watr* (A<sup>2</sup>, et al.) for the corrupt *al-qates* (A<sup>1</sup>, 44b, line 8).  
 4. CD.  
 5. B. A: *ṣahr*.  
 6. CD.  
 7. Cf. *Arab Archery*, p. 45. In speaking of this type of lock and that immediately following, our author is quoting from another source. This much is clear from the change in style and vocabulary. Particularly striking is his use of *sabbābah*, which is used here to denote the right index finger which Ṭaybughā regularly terms *shahādah*.  
 8. Reading *lā ḥaṣṣ* (aB) for the corrupt *yulāḥiṣ* (A<sup>1</sup>, 46a, last line).  
 9. According to *Arab Archery*, p. 45, this was a Greek draw.  
 10. In the *Nihāyah*, Ch. ix, p. 65, this method is attributed to Ardashīr I.

## CHAPTER 11

47a-49a

- Cf. A<sup>1</sup>, 60a-62b; a, 35b-37b; B<sup>1</sup>, 39b-40b; B<sup>2</sup>, 33a-34a; b<sup>1</sup>, 25a-26a; b<sup>2</sup>, 58a-60b; b<sup>3</sup>, 22b-23b; b<sup>4</sup>, 109b-110a; b, 22a-23a.  
 See Hein, *Isl.*, XV, p. 70; Klopsteg, p. 99. In other works the draw is treated somewhat differently (e.g. *Arab Archery*, pp. 49-52) and to draw comparisons would serve no useful purpose.  
 In CD the text of this chapter markedly diverges in certain respects from that upon which our translation is based. Both groups offer what we take to be modified and expanded versions of our author's text. Technically, they have no place within the framework of the present treatise and for the most part should be disregarded.  
 1. D: 'The archer will also present a good appearance if he has his right elbow well out from his side and keeps his left as firm and stable as a pillar.'  
 2. 767-820. Famous Islamic jurist after whom one of the four orthodox schools of law is named.  
 3. Died A.H. 50 or 55 (670-71 or 674-5). One of the earliest converts to Islam, Sa'd took part in the battle of Badr, the first great battle of Muḥammad's career (624), and in all subsequent encounters. He commanded at the great battle of al-Qādisiyyah (636) which broke the power of the Persian empire. Traditional sources make much of the fact that he was the first to strike a blow for Islam. At some point in Islamic history, which we have not been able to determine with any certainty, his name began to be associated with archery, and he finally emerged as the 'patron saint' of the craft (see Hein, *Isl.*, XIV, p. 327; *ibid.*, XV, p. 249; Klopsteg, p. 109; Baer, *Guilds*, p. 52, n. 19).  
 4. Reading *tadmik* (aB) for *tadmīd* (A<sup>1</sup>, 47b, line 8).  
 5. Reading *khariq* (A<sup>2</sup>, et al.) for *ḥanaq* (A<sup>1</sup>, 47b line 9).  
 6. Cf. Hein, *Isl.*, XV, p. 70; Klopsteg, p. 99.  
 7. Cf. *Tabṣīrah*, 95b; *Wāḍih*, 53b-55b; *Nihāyah*, Ch. xii, p. 76.  
 8. The reading *al-Fazārī* (A<sup>1</sup>, 49a, first line) would connect this person with the North Arabian tribe *Fazārāh* and provide an easy reading. It is corrupt and should be emended to *al-Farāwī*. 'Abd ar-Rahmān al-Farāwī was one of al-Ṭabarī's teachers and is mentioned as such by his pupil in the *Wāḍih* (58a-b; *Isl.*, 44a-b). Although the name is corrupt in both these MSS—as presumably also in Berlin 5539, for Hein calls him al-Fazārī (*Isl.*, XIV, p. 300)—there can be no doubt that his name is as stated by us, since we are specifically told in our MSS that it derives from the name of a place on the marches of Khorasan in territory 'contiguous with the land of the Turks'. The place in question is undoubtedly Farāvah, originally a frontier station (*ribāṭ*) and now Kızıl Arvat in Turkmenistan on the Transcaspian railway. In spelling the name of the man 'al-Qarāwī' and that of the place 'Qarāwah', the scribe of the *Wāḍih*, *Isl.*, is only one diacritical point away from accuracy. Al-Ṭabarī speaks of his mentor in glowing terms as an unrivalled master who instructed him in the teachings of Ṭāhir's school. In the absence of precise dates, we can say only that he flourished at some period during the thirteenth century.  
 9. Whether these form part of what al-Farāwī said is not clear.

## CHAPTER 12

49a-52b

- Cf. A<sup>1</sup>, 62b-67a; a, 37b-41a; B<sup>1</sup>, 40b-44a; B<sup>2</sup>, 34a-36b; b<sup>1</sup>, 26a-28a; b<sup>2</sup>, 60b-65b; b<sup>3</sup>, 23b-25b; b<sup>4</sup>, 110a-112a; b, 23a-25a.  
 See also *Arab Archery*, pp. 52-58; Hein, *Isl.*, XV, pp. 73-76. Important sections on aiming are to be found in *Tabṣīrah*, 65a-72b; *Wāḍih*, 30b, 37a, 43b-44a, etc.  
 1. Reading *al-gharaḍ* (a, A<sup>2</sup>, B, et al.) for *al-faraḍ* (A<sup>1</sup>, 49a, last line).  
 2. Cf. *Arab Archery*, p. 55. Ascham recommends the use of lights to correct a bad habit which some archers have of looking at the shaft: 'If a man would leaue to look at his shafte, and learne to loke at his marke, he maye vse this waye . . . Let him take his bowe on the nyght, and shoot it at .ii. lightes, and there he shall be compelled to looke alwayes at his marke, & neuer at his shafte' (p. 118).  
 3. CD.  
 4. CD.

## CHAPTER 13

52b-55a

- Cf. A<sup>1</sup>, 67a-70a; a, 41a-43a; B<sup>1</sup>, 44b-46b; B<sup>2</sup>, 36b-38a; b<sup>1</sup>, 28a-29b; b<sup>2</sup>, 65b-68b; b<sup>3</sup>, 25b-26b; b<sup>4</sup>, 112a-113a; b, 25a-26b.  
 See also *Arab Archery*, pp. 58-62; Hein, *Isl.*, XV, pp. 70-72; Klopsteg, pp. 99-100; cf. *Tabṣīrah*, 72b-75a; *Wāḍih*, 31a-b, 37b-38a.  
 1. Defined in C as 'half a fēt or slightly less'.  
 2. D: 'It is preferable to the snatched loose because it results in greater accuracy and better grouping as well as a sounder flight from the bow. It is the first type of loose to be learned by a beginner.' Cf. C.  
 3. Presumably, the grandson of the Prophet, A.H. 3-49 (624/5-669/70).  
 4. That is, presumably, at the beginning of the nocking process when the shaft would be placed against the grip before being pushed forward to bring the nock on to the string. Muṣṭafā Kānī simply says that this religious formula (below, Ch. 27, p. 153, n. 19) was to be pronounced as the archer was nocking (Hein, *Isl.*, XV, p. 69; Klopsteg, p. 98).  
 5. 'Allāh akbar.' This religious formula—called the *takbīr*—is recited at the opening of ritual worship during which it occurs frequently.  
 6. We have been unable to identify this person.  
 7. Possibly Abū l-'Abbās, the first Abbasid caliph (750-54), who was commonly so styled.  
 8. Hein, *ibid.*; Klopsteg, p. 99. The utterances are common religious formulae.  
 9. A necessary expansion of the Arabic text based on (i) experiment and observation, and (ii) the addition of 'simultaneously with the loose' in CD.  
 10. D: '... bringing it right back until the ends of the shoulder-blades meet. It is a good method which will increase cast and assist the arms to launch the arrow on its way . . .'  
 11. D.  
 12. In CD the following additional information is of interest: 'If it should happen that the arrow gets stuck in the grip either because it is too short, or because the bow has been overdrawn, the arrow will break upon release and injure the archer. He should, therefore, in such an eventuality draw back even further and either take the arrow between his teeth or push it away with his beard.' (C<sup>1</sup>, 51a; C<sup>2</sup>, 83a-b; C<sup>3</sup>, 42b-43a; cf. D<sup>1</sup>, 38a, D<sup>2</sup>, 64a-b); 'Some archers, upon loosing, retain the position of their hands and arms in the same vertical and horizontal planes as in the draw so that neither the left hand nor the right moves outwards, upwards, or downwards. This loose is called the *mustawī*. Used by the Chosroes and the Wāsītis, it is said to give a more accurate arrow. Others clench their fingers upon loosing in the same way as one would in punching. Others again loose in this way, but open the index finger as soon as the arrow leaves the bow. In both the hand should be held steady behind the ear.' (D<sup>1</sup>, 38a-b; D<sup>2</sup>, 64a.)

## CHAPTER 14

55a-56a

- Cf. A<sup>1</sup>, 70a-71b; a, 43a-44b; B<sup>1</sup>, 46b-47b; B<sup>2</sup>, 38a-39a; b<sup>1</sup>, 29b-30a; b<sup>2</sup>, 68b-70a; b<sup>3</sup>, 26b-27a; b<sup>4</sup>, 113a-b; b, 26b-27a.  
 The kind of follow-through described by Ṭaybughā is not mentioned in the other works which we have consulted.  
 1. In CD the action is simply defined as 'thrusting the bow forward with the left hand', but the complete definition is as we indicate.  
 2. C: 'thrusting the grip of the bow downwards'.  
 3. B (in B<sup>2</sup> read *li-ṣawt* for *ka-ṣawt*).  
 4. a, supplying a lacuna in A (A<sup>1</sup>, 56a, line 3, after *as-sahm*).  
 5. D.



## CHAPTER 15

61b-74a

- Cf. A<sup>2</sup>, 79a-97b; a, 48b-60a; B<sup>1</sup>, 47b-59a; B<sup>2</sup>, 39a-47b; b<sup>1</sup>, 30a-36b; b<sup>2</sup>, 70a-85b; b<sup>3</sup>, 27a-34a; b<sup>4</sup>, 113b-119b; b, 27a-34a. N.B.: as this section is lacking in C<sup>2</sup>, the symbol C below denotes only C<sup>1-2</sup>.
1. In speaking of 'Turks', Taybughā is probably thinking of the early Mamelukes of the so-called Bahri period (1250-1382) whose government, established by Turkish slave troops from the Kipchak steppe, is commonly termed 'the Turkish State'. As regards the term *fursān* ('horsemen', sing. *fāris*), there is no satisfactory equivalent in English, and we are often obliged to render the term periphrastically, as in this case. See n. 3 below.
  2. B.
  3. 'Art and manners of the mounted warrior' is a translation of *furūsiyyah*. It is a difficult term to translate since it embraces not only—though primarily in the technical terminology of the Mameluke period—a mastery of equitation with proficiency in military techniques and physical exercises, but also certain moral qualities, such as courage and magnanimity, which were ideally supposed to characterize a *fāris*. We deliberately avoid the use of the term 'knight' in translating the latter because of its connotations for the English reader. For further details see Ayalon in *EF*, s.v. and *Scripta*, IX, pp. 34-37.
  4. 'Companions of the Prophet' is the technical designation of the personal friends of Muhammad, later extended to embrace any Muslim who had ever seen him (see *EF*, art. *Ṣaḥāba*). To believe that they were perfect exponents of *furūsiyyah* in the sense intended in the context is totally unrealistic. In the author's mind is a picture of two golden ages of military prowess: that of the early Islamic conquests and that of the establishment of Mameluke power. In both cases he mistakenly believes that similar ends were achieved by the same technical means, and in characteristic Muslim fashion paints the Companions in ideal colours.
  5. It is interesting to note that no mention of the Prophet in this connexion is made in any other MS but A<sup>1</sup>.
  6. The translation of the next few lines depends on correct interpretation of the author's intention. As their content is of no technical importance, we omit them.
  7. aB.
  8. Reading either *ar-rikāb dāriyah* (aB<sup>1</sup>, et al.) or *ar-rikābdāriyah* (B<sup>1</sup>b<sup>1</sup>, et al.) for the corrupt *ar-rikāb dā'irah* (A<sup>1</sup>, 63b, line 6).
  9. Our interpretation is based on information in CD.
  10. a.
  11. B.
  12. Reading *jarr al-qaws* (B) for the misplaced *ka-n-nisr . . . wa-ghayrihimā l-qaws* (A<sup>1</sup>, 67a, lines 4-5).
  13. B.
  14. B.
  15. B.
  16. These last seven words translate *bi-ta'amm<sup>n</sup> wa-ikhlaṣ<sup>n</sup> min al-watr* (A<sup>1</sup>, 67b, line 8). *Bi-ta'amm<sup>n</sup>* may imply holding after the draw and before the loose, for in a (55a) the same word is used to explain precisely that concept.
  17. B<sup>1</sup>, et al.
  18. In A<sup>1</sup>, 68b, line 3, *al-a'lā* and *yadihi bi-l-qaws* must be transposed.
  19. CD: 'with the arrowhead over the horse's right ear'. In a it is the lower, not the upper, limb that must be set obliquely over the horse's neck, a method which is given as an alternative in Bb<sup>6</sup>C.
  20. In CD a range of ten cubits is given as the best for this position.
  21. This manoeuvre required the rider to modify his seat by setting the upper right thigh on the saddle and turning his left thigh to accord with the change in position (CD).
  22. a adds: 'for so long as it takes to count three or less to allow the limbs to settle'.
  23. a adds: 'To do this he sets the inside of his fist centrally over the highest part of his horse's croup.'
  24. B adds: 'Against the horseman in your rear you also have the possibility of two other kinds of shot between the upward and downward directions (i.e. presumably, more or less horizontal shot from the bow in an oblique position and another from the bow in a vertical position) which brings the number to six.' Cf. b<sup>6</sup>C. In a the text is confused and bewildering: 'that is, up and down on both sides of the horse. There will then be four shots: two from the middle (*an al-wasaf*) up and down, and two from the left side . . .'. The passage as a whole is problematical. One element of confusion almost certainly resides in the word *asir* 'difficult' (last word in our paragraph) which at some stage has been misread as *ashar* 'ten', suggesting in the Arabic that there are ten kinds of shot. Attempts then seem to have been made to bring the number of alternatives as near to ten as possible!
  25. Only one according to a.
  26. B.
  27. B.
  28. In B, et al. it is the right hand and not the left forearm that is to be placed in the nape. 'Right' may well have been intended since Taybughā, possibly left-handed himself, makes this kind of mistake elsewhere. That the text is intelligible as it stands, however, is clear from CD: 'What the archer does (sc. in order to nock and lock) is to place his left hand together with the bow at the nape between his head and neck and then to nock on his right shoulder and lock, etc.' We are further informed: 'You may nock the arrow with the reins held in your left hand. You then raise both arms, tuck your head under the right forearm and shoot.'
  29. Reading *farasihi* (aB) for *qawsihi* (A<sup>1</sup>, 71a, line 7).
  30. B.
  31. B.

32. Reading *al-khashabah* (B, et al.) for *al-janb* (A<sup>1</sup>, 72a, line 4) which is an obvious corruption of *khashab*.
33. B.
34. a: 'His Excellency (*al-maḥarr*) the late Sayf ad-Din Azdamur, the Treasurer, Viceroy of Tripoli'; B<sup>1</sup>b: 'the late Azdamur, the Treasurer of the Viceroy of Tripoli'. We have found no record of any Azdamur who governed Tripoli between A.H. 770 (1368-9), the date at which Taybughā completed his poem (though not his commentary; see Introduction) and A.H. 799 (1397), the year of our earliest datable MS, in which he is described as such. If the person in question was in fact Viceroy of Tripoli, Azdamur may be a textual corruption of Aydamur, who ruled in that capacity about 1371-2 (Sobernheim, *Matériaux*, 2<sup>e</sup> partie, pp. 118-19). The latter, however, is styled *datādar* ('Keeper of the Inkwell'), not *khaṣnadār* ('Treasurer'). The reading of a probably refers to a viceroy appointed in A.H. 880 (1475-6) (*ibid.*, pp. 57-58, 129-30), which, since it is too late for our present purpose, is useful only for estimating the date of the MS.
35. The holder of a Mameluke office introduced by Baybars (Ayalon, *BSOAS*, XVI, 1954, p. 69). Originally recruited—during the Circassian period, at any rate—from military amirs of the second or third class, this officer was charged with responsibility for the game-bird enclosures and the royal hunt (see Popper, *Egypt and Syria*, p. 94).
36. In our text the plea for God's mercy (*tarḥim*) which usually follows the mention of a deceased person includes the horse. If the fact is at all significant, it would seem to indicate the horse archer's attachment to his mount. In all other MSS, the *tarḥim* is restricted to the person. It is probably a case of deliberate correction prompted by religious susceptibility.
37. B.
38. B.
39. B.
40. Reading *at-taḥṣiq* for *at-tawṣiq* (A<sup>1</sup>, 74a, line 2).
41. B.
42. a: '120 arm-spans'.

## CHAPTER 16

74a-75b

A<sup>2</sup>, lacking. Cf. a, 60a-61a; B<sup>1</sup>, 102a-104a; B<sup>2</sup>, 77a-78a; b<sup>1</sup>, 142a-144b; b<sup>2</sup>, 57b-58a; b<sup>3</sup>, 141b-142b; b, 60a-61a. Our microfilm of b<sup>1</sup> (above, p. 195) does not include this portion.

1. This chapter poses various problems. We confine ourselves to noting:
  - (a) that it is completely lacking in A<sup>2</sup>;
  - (b) in a it is placed between the sections on mounted archery and bracing;
  - (c) in Bb<sup>6</sup> it forms the second part of a short and, in many ways, obscure section on the shooting of crossbows; it concludes that part of the work dealing with archery proper (as opposed to the legal discourse on shooting); it is headed 'On Shooting the Crossbow on Horseback' and begins as follows:
 

'The purpose of the stirrup on a crossbow is to enable the archer to draw it on horseback by using a drawing-strap in the usual manner . . .'
2. B.
3. B. Our text is less explicit.
4. B.
5. In a this weight—mentioned here for the first and only time—is stated simply as 100 *raṭls*.
6. Literally, 'the long bow', i.e. the normal hand bow which shoots full length arrows. For obvious reasons we avoid rendering it as 'long bow'.

## CHAPTER 17

75b-82a

Cf. A<sup>2</sup>, 97b-99a (containing only the section on bracing on horseback); a, 61a-67b; B<sup>1</sup>, 59a-66b; B<sup>2</sup>, 47b-52b; b<sup>1</sup>, 37a-41b; b<sup>2</sup>, 85b-95b; b<sup>3</sup>, 34a-38a; b<sup>4</sup>, 119b-123b; b, 34a-39a.

1. B (reading *hina* for *hata* in B<sup>1</sup>).
2. In B the instructions are somewhat differently expressed: the archer is to have the back of the grip towards his forearm and the belly towards his finger-ends.
3. In the Arabic 'the nock in the neck of the bow'.
4. a.
5. a adds: 'or the *dustār*'.
6. B.
7. Adopting the most explicit version contained in B<sup>1</sup>b<sup>1-2</sup>. Cf. also B<sup>1</sup>b<sup>6</sup>.
8. Reading *haylihi* (aB<sup>1</sup>) for *hilah* (A<sup>1</sup>, 77b, line 8).
9. B: 'to cool and settle'. Correction by heat is evidently assumed.
10. Reading *yitir<sup>n</sup>hā* (B<sup>1</sup>b<sup>1</sup>) for *yū<sup>n</sup>athir<sup>n</sup>hu* (A<sup>1</sup>, 77b, line 10).
11. b.
12. By another method not indicated in Aa the mounted archer could brace from either right or left by lodging the neck of the lower limb beneath the stirrup-leather (B, et al.).

13. This is unquestionably the sense of the ungrammatical *hādhihi ṣ-ṣifātū ih-thalāthah* (A<sup>2</sup>) which reflects a colloquialism (cf. *ba'di yomayn talāta* 'in a few days' time'). Given the context, *hādhihi ṣ-ṣifāt ath-thalāthah* (A<sup>1</sup>, 79a, line 8) is unacceptable and has led to all kinds of confusion in other MSS.
14. At this point *a* goes on: 'flexes the bow with both hands together and braces. This method is more suited to a highly reflexed bow. If unsuccessful with it, he should set the grip evenly under both knees and proceed to flex with both hands together'. In this way the obscurity of this sentence which has led to confusion in other MSS is dispelled.
15. B.
16. See Dozy, *Suppl.*, I, 860. From the Persian *barshak*, this word occurs in the MSS with different spellings and vocalizations, e.g. *barshaq*, *barṣaq*, *baghsaq*, *baghsaq*, etc.
17. B.
18. B.
19. B.
20. The term *saysarah* is lacking in Bbb. These MSS merely indicate that the loops should be made of bowstring or leather after the fashion of the loop of a string.
21. B—in preference to 'as you would in drawing the stirrup crossbow' (A<sup>1</sup>, 81b, line 3).
22. B.

## CHAPTER 18

82a–83b

Cf. A<sup>1</sup>, 99a–100a is incomplete (see n. 2 below); a, 68a–69a; B<sup>1</sup>, 66b–67b; B<sup>2</sup>, 52b–53b; b<sup>1</sup>, 41b–42a; b<sup>2</sup>, 95b–97a; b<sup>3</sup>, 38a–39a; b<sup>4</sup>, 123b–124b; b, 38b–39a.

1. B, supplying a lacuna in A between *al-'alāmāh* (A<sup>1</sup>, 82b, line 8) and *tujāh* (line 9).
2. *al-wuṣūf* (B: *al-qiyām*) *al-harbi*. This section is lacking in A<sup>2</sup> which goes straight on to flight shooting.
3. Reading *az-zaḥawān* (B<sup>1</sup>, et al.) for *ar-raghawān* (A<sup>1</sup>, 83a, line 5).
4. Conjecturing *at-turi* for *al-qawis* (A<sup>1</sup>, 83a, line 8) in spite of the unanimity of all MSS.

## CHAPTER 19

83b–86b

Cf. A<sup>2</sup>, 100a–104a; a, 69a–71b; B<sup>1</sup>, 67b–70b; B<sup>2</sup>, 53b–55b; b<sup>1</sup>, 42b–44a; b<sup>2</sup>, 97a–101a; b<sup>3</sup>, 39a–40b; b<sup>4</sup>, 124b–126a; b, 39a–40b.

1. Literally, 'quick to return' (sc. to its reflexed shape.) A bow reverting to its unbraced form is described as 'returning to its back' (*rāji'ah nahṣu' zahrahā*; see Glossary).
2. B.
3. B.
4. The Arabic of this sentence presents difficulty. The term translated as 'elevated object' is *karakab*, the usual meaning of which is 'star'. It is so understood in B, et al., but we reject this sense on scientific grounds in favour of some such meaning as is given in Dozy, *Suppl.*, s.v.: 'chambre haute, chambre qui est en haut de la maison, du palais'. As regards the sentence as a whole, the import is in no doubt. The archer is advised to select a high point and to stand at such a distance from it that it is at 45° to his horizontal line of sight. In this way he could be sure of his elevation.
5. B.
6. *Hād an-naḥḥah bi-l-iqlāq* 'having a sharp, clean loose' (i.e. disengaging swiftly and cleanly with a smart snap of the fingers) is the reading of Aa. Bbb (the corrupt B<sup>1</sup>b<sup>2</sup> excepted) offer the easier reading *nahḥah* for *naḥḥah*, but see Glossary.
7. A<sup>1</sup>aB: 'brethren' (*ikhwān* for *ansāb*) (A<sup>1</sup>, 85a, last line).
8. B adds: 'where a Muslim is concerned'.
9. Ablution before prayers is strictly enjoined in the Koran. The worshipper is required to wash his face, hands, and arms to the elbows, and to wipe his head and feet to the ankles. This is the lesser ablution (*wuḍū'*) as opposed to the greater (*ghusl*), in which the body is washed completely after major pollutions. Since the narrator was not at prayer, we can conclude that he was either a non-Muslim or was irreligious.

## CHAPTER 20

86b–88b

Cf. A<sup>1</sup>, 104a–107a; a, 72a–74a; B<sup>1</sup>, 77a–79a; B<sup>2</sup>, 60a–61b; b<sup>1</sup>, 48a–49b; b<sup>2</sup>, 109b–112b; b<sup>3</sup>, 44b–46a; b<sup>4</sup>, 129b–130b; b, 44b–45b.

1. B.
2. Literally, 'upper part of the *zind*'. The term *zind* is—in the present work, at least—of much wider application than the English 'wrist', by which it is usually rendered. It covers that part of the hand below the wrist-joint. The upper part must, therefore, be what we would loosely term the wrist. This view is confirmed by CD, in which the precise point is specified as the carpal end of the radius.

3. Seven are actually listed in the text. The one excluded from our list is the fist, for if the three fingers are tensed, it follows that the fist will also be tensed. It is worth noting that Muṣṭafā Kānī also excludes the fist (*Isl.*, XV, p. 235).
4. *'ilal wa-uyūb*. It is almost certain that *'ilal* is intended to mean 'injuries' and not 'defects'. Cf. Muṣṭafā Kānī's *'illet ve-uyūb* which Hein, from his translation 'faults', evidently regards as synonymous (*Isl.*, XV, p. 237).
5. Aa. B: *tarbid*; b<sup>1</sup>: *tarbid*; b<sup>2</sup>: *tazyid*. Other MSS in b are either not vocalized or illegible. The reading of Aa is most likely correct, the words immediately following *taznid* (sc. *wa-darb li-z-zind*) being intended to explain it (A<sup>1</sup>, 87a, line 9). More than once the author uses *wa* ('and') in the explanatory sense of 'or'.
6. In A *min mawḍi'* *r-rish* should follow *kasarahu* (A<sup>1</sup>, 87b, line 8) and *al-ibhām min mawḍi'* *r-rish* be deleted from the first line of the next folio (88a).
7. *al-'aqd*, or less probably, *al-'uqad* 'the phalanges'.
8. The MSS are divided between *fūq* 'nock' and *mufawwaq* meaning, presumably, 'the point in the nock against which the string should be lodged'. The latter permits an interpretation consistent with the facts of practical experience.
9. aB.
10. b<sup>2</sup>-<sup>3</sup>b. AB read 'is relaxed'.

## CHAPTER 21

88b–92a

Cf. A<sup>1</sup>, 107a–112a; a, 74a–77b; B<sup>1</sup>, 79a–82b; B<sup>2</sup>, 61b–64a; b<sup>1</sup>, 49b–51b; b<sup>2</sup>, 112b–117b; b<sup>3</sup>, 46a–47b; b<sup>4</sup>, 130b–132a; b, 45b–48b.

1. Aa. Bb: 'proximal'; b: 'inside of the middle phalanx'.
2. aB.
3. *a* for the corrupt *infilāt al-fiṣād* (A<sup>1</sup>, 89b, line 6; A<sup>2</sup>). It may well be that the word *mawḍi'* has dropped out before *al-fiṣād*, for in B<sup>1</sup>b<sup>1</sup>-<sup>2</sup> the reading is *infilāt mawḍi' l-fiṣādah* (in B<sup>2</sup>b<sup>2</sup> the last word is read as *ḥisādah*).
4. Supplying *illā* after *dhāhika* (A<sup>1</sup>, 90a, line 6) from aB, et al.
5. aB<sup>1</sup>b<sup>1</sup>-<sup>2</sup>, supplying a lacuna between *al-madd al-juwānī* and *wa-min laṣq* (A<sup>1</sup>, 90, line 8).
6. Reading *qaraṣa* (A<sup>1</sup>aB<sup>2</sup>, et al.) for *fard* (A<sup>1</sup>, 90b, line 7).
7. In b there is additional material on (i) blistering of the distal phalanx of the thumb arising from tension of the thumb in drawing or a split in the thumb caused by the side of the handle, and (ii) blistering of the middle phalanx of the right index finger, caused by the thumb's rubbing against the right index finger, a relaxed thumb, shooting with a copper thumb-ring, and failure to unfold the index finger at the loose.
8. This section, which is lacking in Aa, is supplied from Bbb. Our rendering is based on b<sup>2</sup>b<sup>2</sup> in which there is least textual corruption.
9. Meaning, presumably, that the thumb is not lodged firmly on the middle finger.

## CHAPTER 22

92a–97b

Cf. A<sup>1</sup>, 112a–113a (incomplete); a, 77b–83a; B<sup>1</sup>, 82b–88a; B<sup>2</sup>, 64a–68a; b<sup>1</sup>, 51b–55a; b<sup>2</sup>, 117b–125a; b<sup>3</sup>, 47b–51a; b<sup>4</sup>, 132a–135a; b, 48b–52a.

1. Reading *fi r-rimāyah* (aB<sup>2</sup>, et al.) for *fi z-ziyādah* (A<sup>1</sup>, 92a, line 7).
2. Reading *min ar-rumāt* (B, et al.) for *fi z-ziyādah* (A<sup>1</sup>, 92a, line 8).
3. A<sup>1</sup>, 92b, line 4: 'right index finger'. So also Bbb (b<sup>2</sup> excepted).
4. aB.
5. This remark seems to imply that the expression for the tall man's draw was, or included, the term *sawād* ('black') as opposed to *bayāḍ* ('white'). See our discussion of these terms, pp. 127–29.
6. To which writer and book our author refers, we do not know. Jamshīd is, it is well known, an Iranian name.
7. Contrary to recognized teaching.
8. In explanation the author equates *tarḥawwah* ('clavicle') with *kursū* which usually means the carpal end of the ulna—a sense which it cannot have in this context.
9. The author's Arabic is poor, and the words translated as 'proximal phalanges' are wrongly pointed. We must read *al-'uqad al-uwal* (*al-ūlā*).
10. A<sup>1</sup>, 94a, last line: 'Ismā'il ar-Raffā', which is a patent error. A<sup>2</sup> begins with our sentence immediately following 'ar-Raffā' (112a).
11. Reading *zind* (aB) for *waṭr* (A).
12. For the obviously corrupt *taḥṣir aṭ-ṭawil* (A<sup>1</sup>, 94b, line 3).
13. AaBb: 'prorusive', which appears to be a slip on the part of the author (see p. 116, line 12). We emend.
14. At this point A<sup>2</sup> (113a) passes to the section on the Great Masters (our Ch. 23).
15. B.
16. B.
17. Reading *al-ityān* (aB, et al.) for *al-iṭṭar* (A<sup>1</sup>, 96a, line 4).
18. *a* adds: 'and is a plebeian way of shooting'.
19. Reading *yaḥūl bi-ṣ-ṣiḥḥat'hi* (aB) for *y. naḥḥat'hu* (A<sup>1</sup>, 96a, line 9).
20. v. 38 (12b). Cf. Ch. 3, p. 9.



21. Reading *fa-in xādat aṣābi*<sup>u</sup>hu (B) for *fa-in xāda iṣābat*<sup>u</sup>hu (A<sup>1</sup>, 97a, line 8).  
 22. ABbb: 'squarely', which must be erroneous since it conflicts with all the evidence of the chapter. We emend.

## CHAPTER 23

106a-108a

- Cf. A<sup>2</sup>, 113a-116a; a, 91b-93b; B<sup>1</sup>, 97b-99b; B<sup>2</sup>, 74a-75b; b<sup>1</sup>, 60a (microfilm incomplete); b<sup>2</sup>, 136a-139a; b<sup>3</sup>, 55a-56a; b<sup>4</sup>, 139b-140b; b, 57a-58b.  
 1. For the sake of convenience this section is taken out of the sequence in which it is placed in A<sup>1</sup>, *et al.* (but not A<sup>2</sup>, which, to all intents and purposes, offers the same arrangement as that adopted here).  
 2. In the Arabic text this first paragraph of ours is preceded by our second. We transpose in the interests of a more natural order.  
 3. Delete *wa-in* before *kāna* (A<sup>1</sup>, 106a, line 3).  
 4. Explanation based on *Wāḍih*, 28a.  
 5. B.  
 6. Reading *min bayn* (B, *et al.*) for *min lin* (A<sup>1</sup>, 107a, line 7) which is not, however, impossible since 'relaxation' of the thumb and index finger would allow water to seep down.  
 7. Reading *gharaḍ* for *farad* (A<sup>1</sup>, 107a, last line).  
 8. b adds: 'so that the black would be revealed'.  
 9. B.  
 10. The next eleven words defeat us. They read: 'Aṭ-Tabarī shot after the manner of Abū Hāshim "bi-l-ghilmāniyyah", after the manner of Ṭāhir and Abū (sic) Ishāq "bi-l-fā'idah (or ? : bi-l-qā'idah)". Perhaps *ghilmāniyyah* and *fā'idah* (or *qā'idah*) are types of bow.'

## CHAPTER 24

97b-99a

- A<sup>2</sup>, lacking. Cf. a, 83a-84b; B<sup>1</sup>, 89a-b; B<sup>2</sup>, 68a-69a; b<sup>1</sup>, 55a-56a; b<sup>2</sup>, 125a-126b; b<sup>3</sup>, 51a-51b; b<sup>4</sup>, 135a-135b; b, 52a-b.  
 1. The text is corrupt. In A<sup>1</sup> (98a) delete the last four words of line 6 and the first of line 7 and read: *fi ba'di l-ayyām* after *ṣaḥiḥan* (line 6, sixth word).  
 2. aB. There is a lacuna in A<sup>1</sup> (98a, last line).

## CHAPTER 25

99a-103a

- A<sup>2</sup>, lacking except for the section on the razor-arrow, 118b-120a; Cf. a, 84b-88b; B<sup>1</sup>, 89b-93a; B<sup>2</sup>, 69a-71a; b<sup>1</sup>, 56a-60a; b<sup>2</sup>, 136a-137b; b<sup>3</sup>, 51b-53b; b<sup>4</sup>, 136a-137b; b, 53a-57a.  
 1. The Arabic reads: 'to the end of your draw'. It is quite clear, however, that the interpretation of these words is as we indicate.  
 2. B.  
 3. What seems to be implied is that if the archer is fully prepared to shoot before leaning over the edge of the wall, he will expose himself for such a fleeting moment that the enemy will be left no time to draw back and shoot.  
 4. Cf. *Tabīrah*, 75b-76a.  
 5. B<sup>2</sup>.  
 6. The average time of flight at this range would be under two seconds. The rate of counting must, therefore, be fairly fast.  
 7. Reading *ashbār* (aB) for *ashyā* (A<sup>1</sup>, 100a, line 6).  
 8. Reading *tashudd*<sup>u</sup> *fiḥimā ḥabal*<sup>u</sup> (a. Cf. B, *et al.*) for *tashudd*<sup>u</sup>hu *fiḥimā* (A<sup>1</sup>, 100a, last line).  
 9. Reading *al-ḥabal* (aB) for *al-jabal* (A<sup>1</sup>, 100a, last line).  
 10. In this section and the next a distinction is made between the nock (*fūq*) as a section of the arrow and the nock as the notch (*kūz*) into which the string fits.  
 11. Reading *uṣad*<sup>a</sup> (aB) for *'ard*<sup>a</sup> (A<sup>1</sup>, 101b, line 1).  
 12. B.  
 13. Reading *masdūd* (B) for *mashdūd* (A<sup>1</sup>, 101b, line 5). A somewhat different version is offered in B, *et al.*, which at this juncture continues: 'It is then slotted lengthwise as far as two-thirds of its length, the slot being just big enough to take the bowstring. At the stopped end is fitted a tassel of silk or cord so that it can be held (between the middle finger?) and ring-finger. The device is used as follows. You slip the *ḡubah* on to the bowstring, place the nock in the *ḡubah*, lock, and shoot.'  
 14. If the nock was split accurately down the centre at right-angles to the notch, the razor inserted, and the tail of the shaft bound with sinew up to the base of the notch, the nock would not be very much weakened.  
 15. Or, perhaps: 'whose nock has been removed'. The Arabic is ambiguous.

16. In Bbb this section follows that dealing with arrow-guides (our Ch. 26), which is placed immediately after that on nockless arrows. Both in content and presentation the version contained in these MSS differs from ours. Because of textual corruption and certain differences in wording in the various MSS the following rendering is based on a composite text:

## On Shooting Iron Pellets with a Hand Bow

For this purpose you use a tube (*ḡubah*) of iron or copper big enough to take the pellets. This tube should have a tang (*silān*) like an arrowhead and be mounted on an unfletched arrow. You drill a hole in the shaft near the place where the fletchings are fitted (b: 'below the nock') into which you can insert something to hold the arrow to the bowstring so that it will not fly when shot. With another cord you attach the arrow to the grip, but not so tightly that it will not allow the arrow free movement (b: 'when drawn'). To shoot, you nock the arrow, secure it to the string, put the pellet in the tube, lock, and shoot without following through with any forward and downward movement of the left arm. This technique is of great value in battles and sieges because the archer can heat the iron pellets in the fire and shoot them to ignite anything he may choose, such as bales of cotton used to barricade points that have been breached by a mangonel, and so on. It can also be used for shooting birds and other creatures with clay pellets. If small pellets are used, they can be employed to wound beasts of burden and unprotected men... For the purpose of shooting pellets, an arrow-guide has been designed after the style of the king-guide, complete with a cylindrical ejector (*midfa' mudawwar*) which is fitted on to the string. The pellets are then inserted and shot. Iron pellets heated to a glow and shot into the midst of troops is a spectacular stratagem in battle. The technique can be used for business or pleasure. You can also use a tube big enough to take a hen's egg, which you can then shoot. This is a cunning stunt. If you like, you can drain the egg, fill it with resin, and launch it at your enemy. It is a very useful means of firing ships and the like. You can also fill the egg with quick-lime and shoot it into the enemy's face, or else you can pack it with resin or some resin compound or pitch, and so on. Special crossbow arrows can also be used for the same purpose...

17. Reading *khurribat* (a) for the meaningless *jurribat* (A<sup>1</sup>, 102a, line 7).  
 18. The idea seems to be that the end by which this device was fitted to the shaft formed a tight-fitting tubular socket.  
 19. Reading *fūq* for *farq* (A<sup>1</sup>, 102b, line 3).  
 20. Bowstrings are often bound at the nocking-point to withstand the chafe of the nock. There is no mention of such a practice in our treatise, but this does not exclude the possibility of its existence. Whether the leather band referred to was fitted only to strings intended for use with a guide of the type described, we cannot say.

## CHAPTER 26

103a-105b

- A<sup>2</sup>, lacking. Cf. a, 89a-91b; B<sup>1</sup>, 93a-96b; B<sup>2</sup>, 71a-73a; b<sup>1</sup>, 58a-59b; b<sup>2</sup>, 131a-135a; b<sup>3</sup>, 53b-54b; b<sup>4</sup>, 137b-139b; b, 55a-56b.  
 1. Reading *kamā yarā* (aB) for *kamā yamil*<sup>u</sup> 'an (A<sup>1</sup>, 103a, lines 7-8).  
 2. B.  
 3. Presumably the guide is conceived as a protective cover comparable to a sultan, who, according to a common Islamic concept, covers his subjects with the shade of his protection.  
 4. Reading *khayrah* (B<sup>1</sup>b<sup>1-2</sup>) for *ṭilāq* (A<sup>1</sup>, 103b, line 9).  
 5. aB. Lacking in A.  
 6. B<sup>1</sup>b<sup>1-2</sup> add: 'or copper'.  
 7. *Qad sahhala llāh<sup>u</sup> iḥkām<sup>a</sup> l-ḡubdah wa-qumwat<sup>a</sup>hā wa-takhfif<sup>a</sup> l-'adal<sup>a</sup> wa-shiddat<sup>a</sup>hā* (A<sup>1</sup>, 104b, lines 3-4). In aBbb this sentence, in which there are mistakes of spelling and pointing, is misunderstood.  
 8. Conjectural interpretation. If translated literally, the author contradicts himself by declaring that the guide previously described as difficult is 'easier to use... than all other kinds'.  
 9. Reading *sitar nibāl* (B) for *sitar<sup>a</sup> bi-thalāth* (A<sup>1</sup>, 105a, line 2).  
 10. In B, *et al.* this chapter is followed by a section on shooting pellets with a crossbow. (In B<sup>2</sup> the heading is incorrect.)

## CHAPTER 27

56a-61b

- Cf. A<sup>2</sup>, 71b-79a; a, 44b-48b; B<sup>1</sup>, 70b-77a; B<sup>2</sup>, 55b-59a; b<sup>1</sup>, 44a-47a; b<sup>2</sup>, 101a-107b; b<sup>3</sup>, 40b-43b; b<sup>4</sup>, 126a-128b; b, 40b-43b.  
 1. Misplaced in Aa between the sections on the follow-through and mounted archery (Ch. 14 and 15). In its original position it probably followed the section on flight shooting (Ch. 19), as it does in Bbb. Its place in our sequence has been determined by our inference that it was originally intended as a conclusion (see next note). Its connexion with Ch. 28 is close, and a natural sequence is broken if the two are separated. The connexion is recognized in Bbb in which no break in sequence occurs.  
 2. There is a lacuna in A, which should be supplied on the indication of aBbb by verses corresponding in A<sup>1</sup> to vv. 137-9 (18b, lines 5-7) of the poem. Their place and role in the poem determine the place of this section in our sequence of chapters.

Muṣṭafā Kānī's *keṭāde*, the Turkish form of what is to all intents and purposes the same word (Hein, *Isl.*, XV, p. 251; Klopsteg, pp. 110, 181).

4. B.
5. B.
6. *Thabat*, B, *et al.*: *ṭubī* 'at' are conditioned', or perhaps *ṭubbi* 'at' 'trained'.
7. a.
8. B, *et al.* present a slightly different version, according to which the beginner should from the outset be apprenticed to a master (*ustādh*), for he must have a mentor (*shaykh*) to guide him. Should he fail to find one, he can then consult authorities on archery (*ʿulamāʾ ar-ramy*, etc.).
9. B.
10. Or, according to a, 'in his relations with'.
11. In B the second half of the sentence reads: 'and shoot with them according to the way in which he sees them shoot without interfering with them until he is conversant with their wont, their technicalities, and their drill'.
12. For *mutaʿallim* and *muʿallim* the terms *mubtadi* and *muntahi* are substituted in B, *et al.*
13. In the course of this chapter the author adduces several sayings attributed to the Prophet, to which, in the interests of economy of space, we do not attach references. While some can be traced either in one or other of the two most authoritative collections of tradition—*assembled* by al-Bukhārī (d. 870) and Muslim (d. 875)—or in the works of other important compilers, such as an-Nasāʾī (d. 915) or Ibn Mājah (d. 836), others can not. In any case, even the best sources are no guarantee of authenticity.
14. See Ch. 19, n. 9.
15. A *raḳʿah* is a devotional exercise in Muslim ritual prayer, consisting of seven movements with appropriate recitations. Described in the simplest terms, it is a bending of the trunk from the upright position followed by two prostrations. At each of the five set times of daily prayer the act of worship consists of a fixed number of *raḳʿahs*.
16. Cousin and son-in-law of Muḥammad (d. 660).
17. B: 'tucks up his sleeves if they are too long'.
18. Reading *sābilan* (B<sup>1</sup>b<sup>1-2</sup>) for *sāliman* (A<sup>1</sup>, 59a, line 1).
19. A religious formula termed the *basmalah* and used by Muslims at the beginning of any important act to invoke God's blessing upon it.
20. In B, *et al.* this theologically distasteful asseveration has been toned down, and the modified text merely reads: '... will become the object of hatred and contempt'.
21. Ar. *ʿaṣ-ṣaḥīḥayn*, by which one usually understands the works of al-Bukhārī and Muslim (above, n. 13). Muslim and Ibn Mājah, however, are the sources for the tradition in question.
22. In A the text is corrupt. After *ḥadatha* (A<sup>1</sup>, 61a, line 6), we must delete *wa* and supply the words *wa-yaʿrifu min ayyi wajhiḥ ḥadatha fa-idhā* (B<sup>1</sup>b<sup>1-2</sup>).

## CHAPTER 28

108a-109a

Cf. A<sup>1</sup>, 116a-118b; a, lacking; B<sup>1</sup>, 75b-77a; B<sup>2</sup>, 59a-60a; b<sup>1</sup>, 47a-48a; b<sup>2</sup>, 107b-109b; b<sup>3</sup>, 43b-44b; b<sup>4</sup>, 128b-129b; b, 43b-44b.

1. So A, but B: 'father'. In Islamic law the latter is correct. By 'boy' is meant a boy below the age of puberty.
2. Reading *yukthirū min ihtirām* (B<sup>2</sup>) for *yukthira*... (A<sup>1</sup>, 108b, line 7).
3. In B, *et al.* these five words are omitted for some reason—possibly religious—that is not entirely clear.
4. In B, *et al.* there is no mention of the dog. No urban Muslim Arab would welcome comparison with an animal that is regarded as unclean by orthodox Islam.
5. B offers one or two extra lines, the content of which is of no great importance.

Accoutrements, horse archer's, 71 ff., 79 f.

Accuracy: a pillar of archery, 5; affected by arrow, xxix by bracing height, 23, 98, by thumb-guard, 36, by loose, 65 f., 201 nn. 2<sup>1</sup>, 12, by faults, 112 f., 116 f., by increased rate of shooting, 142.

'Aid', horse-archer's, 71 f., 79 f.

Aim (-ing): 58-63; a fundamental, 40 f.; synonymous with sighting, 40; see also sighting.

'Ajā'ib al-āthār (al-Jabart), 156.

Anchor-point, anchoring (defined), 126 f., 174; see draw, drawing.

Arab Archery, xxxiii f., xxxix, & *passim* (quoted).

Archers and archery: in East, West, xxv, & *passim*; Andalusian, 9, 103; Arab, xxiii, 6, 10, 53, 106; Chinese, 149, 156; Egyptian, 103; English, xxxii, 31; Japanese, 55, 57, 62, 65; Khorasanian, xxiii, 6, 17, 39, 103, 133; Korean, 119, 149 f.; Maghrebi, 8 f., 146; Mameluke, *passim*; Middle Eastern, *passim*; Ottoman (flight), xxxiii, 29, 67, 106 ff.; Parthian xxv, 78; Persian, 6, 17, 20, 37-40, 55, 62, 78, 102, 105 f., 125, 148; Syrian xl, n. 13, & *passim*; Tatar, 78; Turkish (other than Ottoman flight), Turkmens, xxiii, 6, 17, 26, 34, 39 f., 44, 47 f., 77 f., 83, 148; mounted, see horse-archers; see also archery.

Archer's licence, 155 f.

Archer's ring, see thumb-ring.

Archery: technical introduction, xxiv-xxxi; Muslim literature on, xxxii-iv; and Islam and/or Prophet, 3, 37, 64 f., 125, 153 ff., 196, n. 1<sup>1</sup>, 201 nn. 5 & 8, 202 n. 4; pillars of 5, 199 n. 3<sup>1</sup>; superiority of, 5; fundamentals, 40 f.; Great Masters of, xxxiv, 37-40, 130-35, 199

## INDEX OF SUBJECTS

(including titles of treatises, &c.)

n.2<sup>1</sup>; on horseback, 71-89 (see also horse-archers); miscellaneous techniques, &c., 137-44; schools, systems of, 130-35; training in, 136, 152 ff.; conduct, courtesy, ethics in, 152-58; professional organization in, 155.

Arm (of bow), 174.

Arm-span (measure), 160.

Armour: shooting in, 107, 132 f.; laminae of, 26, 198 n. 11.

ARROW(S): 24-33, 104-108, 164-66, 174 ff., 190, 197, & *passim*; see also bolts, darts.

Balance, 27 ff., 107.

Behaviour and performance: with thumb-lock xxv & Fig. 1; affected by their thickness, thinness, 28, by their heaviness, lightness, 141 f., by size of nock, 24, by atmospheric conditions, 108; breakage, 104, 112; slapping of arrow-pass, 56, 112, 116, 121; deflection, 56, 65 f., 68, 116; spin, 32; steady flight, 66; flitting, 20, 55, 66, 175, 197 n. 3<sup>1</sup>; gadding, 106, 113, 175; wagging, 106, 112, 116; trajectory, 138, 141 f., faults causing gain in height, 112, loss of range, 67, 112 f., 116 f., low flight, 69, 112, 116, 121; increased penetrative power from loose, 66; velocity, 26, 53, 55, 65 f., 105, 137, 141 f.; when overdrawn, 33; range of target/war arrows, 30, of flight arrows, 104, 109 f.

Feathers/fletchings: 26 f., 31 f.; parts of, 32 (Fig. 16); kinds, 26 f.; eagle, vulture, 26, 31; secondaries, 26; tail-feathers, wing-pinions, 26 f., 31; left-handed, right-handed, 26, 31 f., 198 n. 27; soft, hard, 198 n. 26; light, 27; cutting, 26; martinetrim, 32, 198 n. 22; shapes, 26, 32; size, 26; low, 24; high, long, short, 26;

number, 26, 32, 164; preparation and fixing, 31; position, 26 f., 164, 198 n. 25; spiralling, 27, 32; back to back, belly to belly, 198 n. 23; on flight arrows, 26; on *yāsij* arrows, 198 n. 28; and wind, 27.

Grouping in target: 10, 21, 26, 105, 138, 141 (test for), 156, 175.

Handling: taking hold of, by 'pen' method, 47 f., by Turkish method, 47 f., (73); removal from quiver on horseback, 73; supporting at grip, 47 ff., pinching nock, 117, 119, 121.

Head: 25 f. & Fig. 15, 31, Pl. 6; armour-piercing, 25 f., 31, 198 nn. 15 & 18; blunt, 29, 174, 198 n. 10; bodkin, 31; broad-head, 26, 31, 197 n. 9<sup>1</sup>; butt (*amāji*), 29, 77, 179, 198 n. 10; chisel-head, 26, 31; flight, 108; hunting (*ḥaydarijjanwari*?), 26, 31, 197 n. 9<sup>1</sup>; for *jarkh*, 28; for *mukhlah*, 28; olive-shaped, 26, 31; rounded, 26; 'square', 25, 28; target (*maydāni*), 26, 28; 'triangular', 25, 28; war (*harbi*, *yaghliq*), 28, 31, (Turkish), 26, 109; tempering, 26, 198 n. 16; tang, 26, 198 n. 15; mounting, 26; behaviour and performance of heavy, light, large, 25, 28.

Length: how to ascertain, 27, 33, 56, 198 n. 31; of *maydāni* 'full-length', 27, 33; of flight arrow, 105, 110.

Nock: 25 & Fig. 15, 164 f. & Fig. 55, & *passim*; terminology (*kāz* 'nock', *fūq* 'nockpiece'), 117, 138, 181, 184, 206 n. 10<sup>1</sup>; size, 24, 27 f., 32 f., in *maydāni* and *qishaj* arrows, 33; not to be shortened to suit lock, 53; pinching of, 117, 119, 121.

Parts of, and nomenclature: 164-166, 174.



- ARROW(S): cont.**  
 Shaft: terminology, 164 ff.; basic requirements, xxix; of target arrows, 24, 28 f.; of flight arrows, 108; shape (barley-grain, candle-form, straight-hewn), 24 & Fig. 14, 188 f.; spinning test, 30; crooked, 118; thin, weak, rough, 121; head socket, 164 f., painting of sinew areas, 164.  
 Types: 164 f.; barrelled, 174; butt (*anāji*), 29, 164; cylindrical (*jūmār*), 77, 164; flight (*sabqī*, *sahm as-sibāq*), 26, 29, 104-108, 190; 'full-length' (*tamām*), 27, 190; hunting (*haydarī* *jawāri*?), 29; *haywāh*, 164; incendiary, 143 f.; *jarkh*, 27 f.; *kāz*, 164; *khari* (?), 24, 197 n.6; long (*javāl*), 24, 28 ff., 145 f., 147, 190; *mī'balah*, *mī'rād* 'us'fūrī, *mishqāq*, *mistrā*, 164; nockless 138 f., 142; practice (unfletched '*jarrām*'), 152, 184; *rahb*, 164; razor (*sahm al-mūs*), 138 f., 142 f., 190, 206 n. 14; *sbkā* (?), 164; sect onal, 105, 107 f.; short (*qurī*), 24, 29 f., 105, 109, 190 (see also dart); for gourd-shooting (*qabaq*), 77; for shooting 'at the slant' (*qighaj*), 77; target (*maydānī*), 25 ff.; war (*harbī*, *yaghliq*), 25 f., 28; *yāsij*, 77, 164, 198 n. 28.  
 Weight: target/war arrows, 30 f.; flight arrows, 104, 110.  
 Arrow-guides: 28, 105, 106 f., 140, 145-51 & Figs. 49-53, 174; origins, 148; types: 'Bayram Shāh', 145, 'commander's' (*asbāsālārī*), 'dart' (*nabl*), 'hailstone' (*husbān*), hexagonal, 145, 149, 'king-guide' (*shāh majrā* [*mijrāt*]), 145 f., 150 f.; Korean, 149 f. & Pl. 17, 'locust' (*jarād*), 145, 150, 'long-nosed', 146, Maghrebi, 146, octagonal, 149, 'pen' (*qalam*), 145, 149 f., round, square, 149, 'stirrup-guide' (*nnjrat ar-rikāb*), 146, 150 f., Turkish flight shooter's (*siper*), 106 f. & Fig. 40, 110, 113, 119; on missiles see darts.  
 Arrowhead, see arrows.  
 Arrow-pass: 49, 174; slapped by arrow, 56, 112, 121.  
 Atmospheric conditions, see flight shooting.  
 Back (of bow), xxv f., 174, & *passim*.  
 Backed, see bow.  
 Baghdad weight, 30, 160.  
 Bamboo in flight arrow, 108.  
 Bark (bow venter), xxvi.  
 Barrelled, see arrow.  
 Belly (of bow), xxvi, 174, & *passim*.  
 Belt-and-claw, see crossbow.  
 Birjās, 76, 83 f., 180.  
 Bolts (for crossbows): 19, 25, 27 f., 29-30, 174; balance in, 30; kinds, 29; length, 30; weight of head in, 30; socketed head, 30.  
 Bone: in arrows, xxiii; in thumb-guards, 34; in crossbow stock-nut, 88; in bow handles, 161, 163; in string-bridges, 12.  
 BOW(S): xxiv-xxxi, 6-19, & *passim*; see also bracing height, cast, crossbow(s), discharge velocity, draught, draw-weight, recovery.  
 Backed, xxv, 6, 10; Hejazi, 10.  
 Composite, xxvi ff., 6 ff., 175, & *passim*.  
 Construction, 11-16, & Figs. 7-10.  
 Dimensions, comparative: 16 f.  
 Distortions and their corrections: 99 f., 118, 121; a fundamental, 37; heat treatment, 91, 99, 121, 203 n. 9.  
 Length, 16 f.  
 Measuring, mode of, 17, 22.  
 Painting and varnishing, xxvi, 8, 15, 16.  
 Parts and nomenclature: 7 (Fig. 5) 8, 11 f. & Fig. 7, 90, 161 f. & Fig. 54, 174; see also arrow-pass, back, belly, *dustār*, grip, *ibranjak*, neck, *siyah*.  
 Reflex (-ed): xxvii, 13, 204 n. 14; grip, 15.  
 Syrian Mameluke (Taybughā's *fahlah*): 7 ff.; manufacture, parts, specifications, &c. 8, 12, 196 n. 5; time taken to make 15 f., dimensions analysed, 16 f.; reconstruction, 170 f., Pl. 18.  
 Types (by function): flight, 6, 8, 17 f., 104, 110, 196 n. 8, 197 n. 3; practice (*kabbād*), 152; war/target, xxxix, 18, & *passim*; (by region): Arabian, 10; Asiatic, 54, 175, & *passim*; Avar, 163; Bashkir, 17; Hejazi 'intermediate', 10; Indian, xxvi (Fig. 2a), xxix (Fig. 2d), 11, 17; Iraqi, 17; Khorasanian, 6, 17, 60; Magyar, 163; Manchu, xxvii (Fig. 2b), xxix; Middle Eastern, 45, & *passim*; Mongolian, xxviii f., & Fig. 2c; Persian, xi n. 13 (Sasanid design in Syria), 6, 10 f., 11, 15, 17; Sino-Tatar, xxvii ff., & Figs. 2b & c, 11; Syrian Mameluke, see above; Turkish (including Ottoman flight), 10 f., 14 f., 17, 155.  
 Hand: 6; merits and otherwise as opposed to crossbow, xxxi f., 197 n. 10.  
 Hejazi (*filq*, *sharij*, &c.), 10 f.  
 Munfaṣilah: 6.  
 Self: xxv f., 176; Arab, 6, 10 f.  
 Veneering, xxvi, 8, 15.  
 Wāsiṭiyyah, 6, 10, 193.  
 Waterproofing, 15 f.  
 Weighing, 20 f. & Fig. 21; see also draw-weight.  
 Bowcase, 20, 174.  
 Bowstring, see string.  
 Bow-weight, see draw-weight.  
 Bowyers: Cairene, 156; Turkish, 16.  
 Boxwood (in crossbow), 8.  
 Bracer, 120.  
 Bracing, 8, 90-100; a fundamental or not, 37, 41, 90; methods: concealed, 96; military, 90 f. & Fig. 31; pressure, 96; sleeve, 97; 'of the archers', 97; 'of the fleeing archer', 96; 'of the lone archer', 97; 'of the wounded archer', 96; on horseback, 91 f. & Fig. 32, 97; in squatting position, 92 f. & Fig. 33, 204 n. 14; in water, 94, 96 f., with drawing-strap, 94 f. & Fig. 37, 204 n. 20; with assistants, 92 f. & Fig. 34; of flight bow, 8; of stiff bow 94 f. & Fig. 36, Abū Hāshim's, 130; at-Tabari's, 132; aids to: former (*qālab*), 91, bracing-board (*kharkumān*), 93 f. & Fig. 35, 98 f., strap (*barshaq*), 93, 99.  
 Bracing-board, see above.  
 Bracing-height, 22 f., 98, 175.  
 Brazil-wood, 105, 108.  
 Breast (of arrow), 174.  
 Brigandine, 26, 198 n. 11.  
 Broadhead, 174; see also arrow.  
 Bundiq, 19, 139 f.; see also pellets.  
 Butts, 79.  
 Cairo weight, 160.  
 Cast (of bow): xxv, xxvii, 175, 196 n. 4; effects of string on, 20 f., 197 n. 3, of loops on, 22, of fletchings on, 27, of thumb-guard on, 34, of string position on, 53, of follow-through on, 68, 201 n. 10; in flight bow, 197 n. 3.  
 Cathayan, see strings.  
 Chadara tenax (wood), 188.  
 Clench, 40 f.; see also locking.  
 Climate, effects of: on bows, 17, 94, 197 n. 10, on their manufacture, 196 n. 5, on fletchings, 198 n. 26; see also atmospheric conditions.  
 Composite, see bows, crossbows.  
 Conduct (of archers), 152-58.  
 Copper: in arrow-guide, 140, 207 n. 6; in thumb-ring, 199 n. 7, 205 n. 7.  
 Core (of composites), 11 f.  
 Cornelian Cherry (wood), 108.  
 Cormus mas (wood), 6.  
 Counting, finger-, 51 ff.  
 Creep (-ing), see draw.  
 Crescent (formation in drawing hand at loose), 64, 131.  
 Crossbow(s): xxx ff. & Figs. 3 & 4, 6, 18 f. & Fig. 11, 29 f., 85 ff. & Fig. 30, 196 n. 9; merits and otherwise, xxxi f., 9, 89, 197 n. 10; construction: composite, xxxii, 19, wooden, 8, 18 f.; string, 21, 197 n. 7; mechanism and operation: nut, xxxii (Fig. 4), 24, 86, 88 f., clip, 86 (Fig. 30), spring, 89, trigger, 88 f., self-cocking, 86, 89, belt-and-claw, 85 & Fig. 29, 88 f.; types: 'aqār, 29 f., *bandūq*, 8, 19 f., *jarkh*, 8, 19, 88, 184, *laqshah* (Maghrebi), 8, 19, *inukhulāh*, 28, 198 n. 37, naval, 8 f., 19, 197 n. 10, *rikāb* (stirrup), 29 f., 85 ff., 184, *zanburak*, 8, 19.  
 Crossbow-makers, xxiv.  
 Cubit, 159 f., & *passim*.  
 Cupping-point, 116, 120.  
 Damascus weight, 160.  
 Darts: types and sizes (*dawdan* *dūdānī*, *husbān*, *jarād*, *usfūrī*), 29, 148 ff.; weight, 149; weight of head, 28; balance, 27 f.; range and use in warfare, 29, 150; their advantages, 145 ff.  
 Devices, 137 ff. (razor-, nockless arrows, incendiaries, &c.).  
 Dirham, 159 f., & *passim*.  
 Discharge velocity (of bow), xxxix, 18; and bracing height, 23.  
 Distances (flight shooting), 109 f.; see also range.  
 Distortions (in bows), see bow.  
 Draught (bow/arrow), 44, 46, 56 f., 66, 175; see also draw, drawing.  
 Draw (see also, draught, drawing): full (*waṣā*), 20, 57, 175, & *passim*; 'greater' (*w. nihāyah*, *haskf bayāḍ*), 20, 57, 104, 123, 129, 129, 131 ff., 193; 'lesser' (*w. bidāyah*), 57, 123, 129 ff., 193; 'standard' (*kifāyah*), 57, 129; 'internal', 116 f., 120, 185; length of, 27, 116 f.; creep (-ing), 57, 67, 112, 175, 194; 'snatching', 67; Abū Hāshim's, 130; Tāhīr's, Ishāq's, 131; at-Tabari's, 132, 134.  
 Drawing: xxv, 56-57, 64, 66 f.; a fundamental, 37, 40 f., with thumb-ring/guard, 36; methods xxv, 57; anchor-points and terminology, 122 ff., in military archery, 127; and posture, 102, 124; elbows in, 56 f., 112, 120, 200 n. 1; with arrow-guide, 146 f., 148 (Fig. 52b); with crossbow, 85 f.; in flight shooting, 44, 46, 104; on horseback, 73, 75, 83, 202 n. 28; see also overdraw.  
 Drawing-ring, see thumb-ring.  
 Drawing-strap, 85 & Fig. 29.  
 Draw-weight: xxv, xxviii, xxxi, 175; to ascertain, 20 f., 197 n. 5; related to arrows and range, 30.  
 'Dropping limb', 161.  
 Dustār, 8, 11 ff., 16 ff., 104, 161 f., & *passim*.  
 Egg-and-pellet device, 139 f. & Fig. 48, 207 n. 16.  
 Equitation, 71 f.  
 Farkah, see loose.  
 Faults and remedies, &c., 33, 66f., 111-21, 136, 199 n. 3, 205 n. 7.  
 Feathers, see arrows.  
 Finger (measure), 160.  
 Finger-reckoning, 167-69, Figs. 56 & 57.  
 Fire-power, 142.  
 Fisher loose, 54 f., 175.  
 Fist (measure), 160.  
 Fletchings, see arrows.  
 Flight shooting: xxxiii, 29, 104-10, 113; Ottoman, xxxiii, 29, 106 ff., 113, 119; in Cairo, 109 f.; with thumb-ring, 36; grasp, 44 & Fig. 20, 46, 199 n. 3; position, stance, elevation, draw, 104; lock, 105; loose, 64, 66 f., 105; follow-through, 106; advantages and otherwise of, 105; aids, 106, 110, 113; training device, 156; atmospheric conditions, 105, 108; markers, 109; distances (Egypt, Turkey, U.S.A.), 109 f., cheating, 105; see also arrows, bows.  
 Follow-through: 41, 68-70, 135, 146, 201 n. 10, Figs. 26 & 46; *fahlah bi-sh-shamāl*, 41; *khafrah*, 68 ff., 123, 130 f., of Abū Hāshim, Tāhīr, Ishāq, 130 f.; half-*khafrah*, 123, with arrow-guide, 146; on horseback, 73.  
 Former (*qālab*), 91.  
 Fortress, shooting from top of, 137, 140.  
 Furūsiyyah, 202 n. 3.  
 Ghunyah, see under *kitāb*.  
 Ghunyat al-murāmi, xxxvi.  
 Glue: in bows, xxvi, 6, 11 ff., 17; in strings, xxxi, 20, 197 n. 2.  
 Gourd-shooting, see *qabaq*.  
 Grasp (-ing): 42-46, 69 f., a fundamental, 37, 40 f.; oblique, 43 & Fig. 19, 46, 122 ff., 128 f. & Fig. 44, 130 ff.; square, 43 & Fig. 19, 45, 118, 122, 124 f., 128 f. & Fig. 44, 130; intermediate, 43 & Fig. 19, 46, 129; grasp of '13', of '30', 44, of '99', 43; in flight shooting ('falcon's talons') 44 & Fig. 20, 46; 'shortening the long', 'lengthening the short', 123; and the *khafrah* follow-through, 69 f. & Fig. 26; for long, short men, 128 f., for medium, 129; and Abū Hāshim, Tāhīr, Ishāq, 130 f., at-Tabari, 132, 134.  
 Great Masters (of archery), xxxiv, 37-40, 199 n. 2; on fundamentals, 40 f., their systems, 130-35.  
 Grewia poplifolia (wood), 6.  
 Grip (of composite bow): 8 f., 11 f., 16 ff., & *passim*; inspection and adjustment of, 9, 43 f., 125, 199 n. 2; *matn* of, 42 ff.; bone in, 161, 163; see also handle.  
 Grip (of hand on bow), see grasp (-ing).  
 Grouping, see arrows.  
 Guige, 102.  
 Gum arabic (in strings), 22.  
 Handle (of bow); 6, 11, 15, 45; see also grip.  
 Hāshimi cubit, 8, 159.  
 Heat treatment (of bows), see bows.  
 Helmets: Turkish and Persian, 132; and posture, 132 & Fig. 46.  
 Hemp (in crossbow string), 197 n. 7.  
 Hide (in strings), 22.  
 Horn: (in bows): Arab, 6, 10, composite, xxvi, 11, 13 f., Iraqi, 17, ears of Persian and Turkish, 15; in clip/spring of crossbow, 86, 89, 146; in sectional arrow, 105, 108; in *siper*, 106; in thumb-guards, 34, 199 n. 6; in string-bridges, 12.  
 Horse-archers: xxxiii, xxv, xxxix, 71-89; their dexterity, 78; their effectiveness, 142; accoutrements, 71 f., 79 ff.; mode of bracing, 91 f. & Fig. 32, 97, 203 n. 12; their use of crossbow, 85 ff.; their forms of shooting: 80-82 & Fig. 28, 202 n. 24, to fore, 73 ff., 80, to rear, 74 f. & Fig. 27, 80, 202 n. 24, downward, 73 f., 79 f., horizontally, 74, 79, 80, upward 74 ff., 80, 'at a slant' (*qighaj*), 71, 73 ff., 78 f., 80 ff., 172 f., 'gourd' (*qabaq*), 71, 73, ff., 77 f., 80, 172 f., from back of neck (*jarmakt*), 75, 80, 82 f., from under horse's neck, 75, 80; see also *jarmakt*, *qabaq*-shooting, *qighaj*-shooting.  
 Horse-hair (bowstrings), 22.  
 Ibranjah, 14 f. & Fig. 9, & *passim*.  
 Imams of archery, see Great Masters.  
 Incendiary devices, 139 f., 143 f., 207 n. 16.  
 Injuries (to archer from self) and causes, xxix, 33, 43 f., 51, 65, 90, 99, 111-21, 146, 201 n. 12, 205 n. 7.  
 Ivory (in crossbow nut), 88.



- Jarmaki*: etymology, 82; technique, 75, 83, Pl.14, 202 n.28; its advantages, 140.
- Julbah* devices, 139 f. & Fig. 47, 206 n.13, 207 n.16.
- Khatrah*, see follow-through.
- Khorasanian weight, 88.
- Kitāb ghurayāt al-tullāb*, xxv ff., — *al-idāh*, 132, — *al-makhzūn*, 83, — *al-mukhaṣṣaṣ*, 10 & *passim* (quoted), — *al-waḍīh*, xxxiv, xxxix, & *passim* (quoted); see also Bibliography.
- Knots (of bowstring), see string.
- Lance, 71 f.
- Lathe (of crossbow), xxxii; in relation to string, 21.
- Leather: on bow's grip, 9, 43; in strings, xxix, 22, at nocking-point, 140; in thumb-guards, 34 ff.
- Linen (in crossbow string), 197 n.7<sup>1</sup>.
- Lock(s): '20', 55; '22', 52 f. & Fig. 22; '23', 55; '24', 54 f.; '30', '37', 55; '38', 49; '63', '69', 51 ff. & Fig. 22, 122 f., 167; '72', 54; '73', 53 f.; '83', 54; straight, oblique, 52 f. & Fig. 22, 55; 'clinging', 53; 'pillion' 52 f. & Fig. 22, 55; three-finger, 55, 102, 120; four-finger, 53; pre-Islamic Arab, 53; Korean, 119 f., Sasanid, 53 (Fig. 23); of Bahārām, Chosroes, 52 ff. & Fig. 22; of Abū Hāshim, Ishāq, Tāhir, 130 ff., of at-Tabarī, 132, 134; see also loose (=lock).
- Locking: xxv, 51-55; a fundamental, 37, 40; arrow against grip, 47 ff.; spasm in, 51; string position in, 55; pinching nock, 56, 117, 119, 121; with arrow-guide, 146, 149; see also lock, loose, release, thumb-lock.
- Longbow, xxv, 110, 113, 176.
- Longbowmen, xxxii.
- Loops, see string.
- Loose (loosing, release): 64-67, 176; a fundamental, 37, 40 f.; essentials, 65; clean, 55, 105, 204 n.6; consistent, 36, 55; fast, 53; slow, sluggish, 53, 65; 'held' (*sākhā*), 64, 66 f., 201 n.2<sup>1</sup>; 'outstretched' (*mutamattif*), 66 f., sharp, 65, 105, 204 n.6<sup>1</sup>; 'snatched' (*mukhtalas*), 64, 66 f., 201 n.2<sup>1</sup>; 'sprung', 66; straight (*mutawī*), 66; cause of variations, 65; and lock, 65; creep, 'forward loose', 67; disengagement with 'twist' (*farkah*), 64, 66 f., 130; with 'crescent' (*tahīl*), 64, 131; with 'backward punch', 65, 67, 201 n.10; in combat, 64 f.; in target shooting, 64, 66 f., 105.
- Loose (=lock): Fisher 54 f.; Flemish, 54; Mediterranean, 54 f., 120; see also Mongolian release.
- Mace, 71 f.
- Majrā*, see arrow-guide.
- Martingale, 71 f.; in shooting under horse's neck, 75; nature of, 79.
- Mast, shooting at, see qabaq-shooting.
- Matn*, see grip.
- Maydān*, xxiv, 28, 109; — *al-qabaq*, — *as-sibāq*, 109.
- Maydānī*, see arrows.
- Mediterranean loose, see loose.
- Mukhaṣṣaṣ*, see under *kitāb*.
- Mushamma'*, 113, 119.
- Nab'* (wood), 6, 188.
- Neck (of bow): 7 (Fig. 5), 8, 17, 193.
- Nihāyah* (*Nihāyat as-su'*), xxxiv, & *passim* (quoted).
- Nock: see arrows.
- Nocking: 47-50, 56, 200 nn.3<sup>1</sup> & 6<sup>1</sup>, & *passim*; a fundamental, 37, 40 f.; 'clinging lock' in, 47; insertion of string, 49; position of nock against fingers, 49; methods of Abū Hāshim, Tāhir, Ishāq, 130 ff., at-Tabarī, 134; with arrow-guide, 145 ff.; on horseback, 200 n.6<sup>1</sup>, 202 n.28.
- Nocking-point, see string.
- Novice, conduct of, &c., 152-158.
- Orange (wood), 8.
- Overdrawing, 33, 46, 201 n.12.
- Pellets: iron 139 f., 143, 207 n.16; clay, 207 n.16.
- Posture: oblique, 124 f., 129 ff., 134; square/frontal, 124 f., 129; intermediate, 125, 129; of Abū Hāshim, Tāhir, Ishāq, 130 f., of at-Tabarī, 132, 134; and drawing, 124 f. & Fig. 43; and helmets, armour, shields, 101 f., 125, 132 f.; see also seat, stance.
- Practice bag (*torba*), in flight shooting, 156; — drum (*battiyah*), 152, 156.
- Pulley, to assess draw-weight, 20 f.
- Qabaq* (gourd) -shooting: 71 ff., 77 f., 80 f., Plates 13-15; origins and purpose, 78; under Mamelukes, 77 f., Persians, Turks, 78; requirements in horse for, 76; state, orientation, and division of field for, 76 f.; nature and range of target, 77 f., 172; height of mast, 78; arrow used 77; hazards, 76; tactics, 76 f., aids to practice in, 76; over-shooting mark, 74; see also horse-archers, *jarmaki*.
- Qighaj/qigaj*-shooting ('at a slant'): 71, 73 ff., 77, 78 f., 81 f., 172-73, Pl.10; origins and purpose, 79, 173; etymology, 172 f., nature of target, 79, 172 f., arrow used, 77; for details in common with *qabaq*-shooting, see s.v.
- Qintār*, 160.
- Qigaj*, see *qighaj*.
- Qirāt*, 159 f., & *passim*.
- Quarrel, 19, 176.
- Quivers, Chinese, 149.
- Range: of target/war arrows, cross-bow bolts, darts, 30; and follow-through, 68.
- Raḥl*, 159 f., & *passim*.
- Recovery, rate, speed of, 7, 18, 105 f., 176, 204 n.1<sup>1</sup>.
- Recurve, 176.
- Reed (in sectional arrow), 105, 108.
- Reflex (-ed), see bow.
- Reins, in shooting from horseback, 72 f., 75, 79 f., 85 f., 202 n.28.
- Relaxation, points of, 111 ff.
- Relaxed method, 113.
- Release, 37, 40; Mongolian, 54; see also loose.
- 'Reserve draw', 55.
- 'Retainer' (*mahbas*), 72, 80.
- Ring, archer's see thumb-ring.
- Riser, 11.
- Sandarac: on bows, 16; on arrows, 164.
- Seat (squatting position): definition, 102; oblique, 102 f., 116 ff., 122 ff., 130; square/frontal, 102 f., 122 f., 130 f.; intermediate, 102, 123; Andalusian, Egyptian, Khorasanian, Persian, 103; 'feather's', innominate, 'kings', 103, 'sprinter's', 102.
- Self bow, see bow.
- Semi-tension method, 113.
- Shaft (of arrow), see arrow.
- Shield, and shooting, 101 f., 125.
- 'Shooting limb', 74, 90, 161.
- Sighting, 58-63; synonymous with aiming, 40; a fundamental, 37, 40; essentials in, 60; use of lights in, 58, 201 n.2<sup>1</sup>; and posture, 62, 122 f.; and elevation, 60, 62 f.; methods: askant/ 'squint-eyed', 58, 61, 179, of Abū Hāshim, 130, of Chosroes, 58, of at-Tabarī, 134, of Japanese, 62, external, internal, 59 ff. & Fig. 24, 122 f., 125, 130, with split vision, 59 f., 62, monocular, 58, 61, for long, short range, 60; at stationary, moving horsemen, 137, 141 f.; see also aiming.
- Silk: in bowstrings, xxix f., 8, 20, 22, 49, 197 n.2<sup>1</sup>.
- Sinew: in bows, xxvi, 6, 10 f., 13 f., 17, 45; in arrows, 164 ff.; in strings, xxix.
- Siper*, 46, 106 f. & Fig. 40, 110, 113, 119.
- Siyah*, xxviii f., 6, 8, 11 f. & Figs. 7 & 8, 16 f., & *passim*.
- Snatched, see loose.
- Snatching, see draw, and 176.
- Somatic differences and technique 122-29; see also grasp, posture.
- Span (measure), 160.
- Spasm, 51, 119.
- Splices in composite, 11 f.
- Spurs, correct position for horse-archer, 72 f.
- Stance (standing position): a fundamental, 41; oblique, 101 f., 123 (Fig. 42), 131 (Fig. 45); square/frontal, intermediate, 101 f., 131 (Fig. 45); flight shooting, 101, 104; military, 101; target-shooting, 102.
- Steel: in arrow-guide, 140; arrow-head, 26.
- Stillness, points of, 111 ff.
- Stirrup bow, 19; — crossbow, 85-89, 203 n.1<sup>1</sup>; — guide, 146 & Fig. 51, 150 f.
- 'Stone of Jenghiz Khan', 110.
- String: xxix f., 20-23, 197 n.2<sup>1</sup>; preparation of, a fundamental, 37; matching with bow, 91, 98; stretch, 22, 98; length, 21 f.; weight in war bow, 20; in flight bow, 8, 20, 105, 197 n.3<sup>1</sup>, in crossbow, 21, 197 nn.7<sup>1</sup>, 9<sup>1</sup>; Cathayan, 20, 185, 197 n.2<sup>1</sup>, Persian, 20, 197 n.2<sup>1</sup>, Ottoman, Sino-Tatar, 197 n.2<sup>1</sup>; early Turkish, 22; effects of thin, short, long, 21, 197 n.3<sup>1</sup>; of thick, 21, 25; loops, 20 ff., in crossbow 21, 197 n.9<sup>1</sup>; loop-knots, 23 & Fig. 13, Pl. 5; nocking-point, 49, 56, 117, 140, 207 n.20; and lead weights, 105, 110; see also glue, hide horse-hair, leather, silk, wax.
- String-bridge, function in composites, xxix; nature of, 12.
- String-stopper, 163.
- Stringing, see bracing.
- Switch, 73 f. & Fig. 27.
- Syrian weight, 86, 88, 160, & *passim*.
- Tabqirah* (*Taqirah* *arab al-albāb*), xxxiv, & *passim* (quoted).
- Tahīl*, see crescent.
- Tang, 26, 198 n.15, 177.
- Target ranges, 30, 141.
- Telhis resāl er-rūmāt*, xxxiii, & *passim* (quoted).
- Tendon, see sinew.
- Tension, points of, 111, ff.
- Tension method, 113.
- Thumb-guards, xxv, 5, 34-36 & Fig. 17, 119, 199 n.9; see also thumb-ring.
- Thumb-lock: as opposed to finger loose, xxv, 54; military advantage of, 102; in flight shooting, 105; see also lock, locking.
- Thumb-ring, xxv, 34 f., 205 n.7<sup>1</sup>; see also thumb-guards.
- Tillering, 15, 177.
- Toxophilus*, xxiv, & *passim* (quoted).
- Trajectory, to test: 138, 141 f.; in war, 141.
- Tremor, 113, 116.
- Ulkī*, 141.
- Uqiyah*, 160.
- Wādīh*, see under *kitāb*.
- Wāsiyyah*, 6, 10.
- Wax: in strings, xxix, 22, 197 n.2<sup>1</sup>; in *mushamma'* of flight shooter, 113.
- Weight, see draw-weight.
- Weights and measures, 159-60.
- Well, shooting enemy in, 137, 206 n.3<sup>1</sup>.
- Wood: in bows, xxvi, 6, 8, 10 ff., & *passim*; in sectional arrows, 105; in arrows, *passim*.
- Wrist, meaning in Arabic, 204 n.2<sup>1</sup>.
- Yew, 8, 19.



INDEX OF PLACES AND PEOPLE

(— before an entry indicates omission of 'al')

- Abbasid(s), xxiii f., 39.  
 Abraham, 3.  
 Abū Hāshim al-Bāwardī, 37, 39 f., 45 f., 48 f., 55, 62, 66, 102, 122, 129 f., 199 n.2<sup>3</sup>, 206 n.10<sup>1</sup>.  
 Acre, sieges of, 139, 143.  
 Adam, 3.  
 Afghanistan, 39.  
 Ainslie, Sir Robert, 109.  
 Akbar (Emperor), Pl. 3.  
 Alfī Qānī Bak ash-Sharīfī, xxxv.  
 'Alī, 153, 208 n.16.  
 Anaxagoras, 110.  
 —Aqsarā'ī, Muḥammad, xxxiv.  
 Arabia, Arabians, xxiii, 10 f.  
 Arabs, xxiii, 6, 10, 106; see also Beduin(s).  
 Ardashir I, 39, 200 n.10.  
 Arghūn, 110.  
 Ascham, R., xxiv, 57, 126, 201 n.2<sup>1</sup>.  
 —Ashraf Khānī (Sultan), 77.  
 —Ashraf Sha'bān (Sultan), xxiv, xxxviii.  
 Ayalon, D., xxiv, xxxiii, 77 f., 109.  
 Aydamūr, 203 n.34.  
 'Ayn Jālūt, battle of, xxiv.  
 Ayyūbids, xxiii.  
 Azdamūr (Özdemir), 76, 203 n.34.  
 Baer, G., 155.  
 Baghdad, xxiii, 10.  
 Bahrām Gūr (Vahram V), 37, 39, 46, 52 (Fig. 22c), 53, 59.  
 Bahri, Bahriyyah, xxiii f., xxxii, xl n. 10, 71, 202 n.1.  
 Balfour, H., 170.  
 Balkh, 39.  
 —Balkhī, see Tāhir al-Balkhī.  
 Barquq (Sultan), xxiv.  
 Barsbāy (Sultan), xxxv.  
 —Bārūdī, 39.  
 —Bāwardī, see Abū Hāshim al-Bāwardī.  
 Baybars I (Sultan), xxiv, 77, 109, 143, 203 n.35.  
 —Baysarī, Badr ad-Dīn (Amir), 78.  
 Beduin(s), xxiii, 10.  
 Bertier, A. de, 83.  
 Boudot-Lamotte, A., xxxiv, xl n.29.  
 —Bukhārī, 208 nn. 13, 21.  
 —Bunduqdārī, see Baybars.  
 Busbecq (Busbequius), 78 f.  
 Cahen, C., xxxiv, 19.  
 Cairo, xxiv, 79, 109 f.  
 California (State Flight Shoot), 109.  
 Caspian, 40.  
 Cathay, 20.  
 Caucasus, xxiv, xl n.16.  
 Central Asia, xxiii, 39, 78.  
 Chosroes (Persian Kings), 39, 53 f., 58, 201 n.12.  
 Circassian Mamelukes, xxiv, xl n.16, 77, 203 n.35.  
 Companions, 71, 202 n.4.  
 Cordier, V., 83.  
 Crassus, xxiv.  
 Crusades, Crusaders, xxiii, 142 f.  
 Damascus (weight), 159 f., & *passim*.  
 Dārā (Darius, King), 200 n.6<sup>1</sup>, Pl. 12.  
 Dhū l-Aktāf, see Shapur I.  
 Drake, H., 109.  
 Egypt, xxiii f., xl n.13, 103, 155; see also Cairo.  
 Elmer, R. P., xxxiii f., 14, 41, 55, 106, 120 f., 148, 159 f., 174, 196 n.4<sup>3</sup>, & *passim* (quoted).  
 Elott, M. E., 119.  
 Emesa, xl n.13.  
 English, xxxii, 31.  
 Fabian, G., 14.  
 Farāwah, 40.  
 —Farāwī, 'Abd ar-Rahmān, 40, 56, 200 n.8<sup>2</sup>.  
 Faris, N. A., xxxiii, 14, 41, 55, 106, 120 f., 148, 159, 196 n.4<sup>2</sup>.  
 Fazārah, Fazārī, 200 n.8<sup>2</sup>.  
 Fez, xl n.13.  
 Flinton, J., 16.  
 Franks, 8.  
 Gabriel (Archangel), 3.  
 Giorgetti, G., 88.  
 Guglielmini, A., 83.  
 Halqah, xxiv.  
 Hammer-Purgstall, J. von, xxxiii.  
 Hansard, G. A., 31, 79.  
 —Harawī, 39.  
 —Harawī, Muḥammad ibn al-Ḥasan 96.  
 —Hasan, 64, 201 n.3<sup>4</sup>.  
 Heath, E. G., 151.  
 Hcin, J., xxxiii f., 106, 200 n.8<sup>2</sup>; see also Muṣṭafā Kānī.  
 Hejaz, Hejazis, 6, 10.  
 Herat, 39.  
 Hims, xl n.13.  
 Hinz, W., 159.  
 Hulagu (Hūlū), xxiii, Pl. 4.  
 Huuri, K., xxxiv, xl n.23, 19.  
 Ibil-Ishar, xxvi.  
 Ibn Abi Ḥajalah, 195.  
 Ibn al-Fāqih, xxiii.  
 Ibn Hajar, xxxvi.  
 Ibn Mājah, 208 nn.13 & 21.  
 Ibn Sidah, 10, 30.  
 Ibn Taghribirdi, 172.  
 Idris ibn Yahyā, 64.  
 Ināl (Sultan), xxxv.  
 Iran, Iranian(s), xxiii, 39; see Persia.  
 Iraq, Iraqis, xxiii, 6, 17, 160.  
 Isaac, 3.  
 Isfahan, 78.  
 Ishāq ar-Raffā', 37, 39 ff., 45 f., 48 ff., 55, 62, 66, 102, 123, 129, 131 f., 199 n.2<sup>3</sup>, 206 n.10<sup>1</sup>.  
 Ishmael, 3.  
 Istanbul, 109; see Ok Meydanı.  
 —Jabartī, 156.  
 —Jāhiz, xxiii.  
 Jamshīd, 123, 205 n.6<sup>3</sup>.  
 Jānim al-Ashrafī, xl n.39.  
 Japanese, 55, 57, 62, 113, 126.  
 Kānī, Muṣṭafā, see Muṣṭafā Kānī.  
 Kharezm, see Khwārizm.  
 Khārijites, xxiii.  
 Khiva, 40.  
 Khorasan, Khorasanian(s), xxiii, 6, 17, 39, 103, 133, 200 n.8<sup>1</sup>.  
 Khusrāw (Chosroes I), 39.  
 Khwārizm (or -azm), 40, 105.  
 —Khwārizmī, 40.  
 Kipchak steppe, Kipchaks, xxiii f., 202 n.1.  
 Kızıl Arvat, 40, 200 n.8<sup>2</sup>.  
 Klopsteg, P. E., xxxiii f., 32, 106, & *passim* (quoted).  
 Koreans, 119, 149 f.  
 Leningrad, 110.  
 Lutful-Huq, A.L.S.M., xxxiv.  
 McEwen, E., 16, 109, 170 f.  
 Maghreb, Maghrebi(s), 8, 146.  
 Maḥmūd II (Sultan), xxxiii.  
 Mamehukes, xxiii f., xl nn. 16, 20, & 21, 8, 71, 77, 106, 126, 202 n.1.  
 Manchester Museum, 16 f., 46, 106, 109, 149, 166.  
 —Maqrizi, 172.  
 Mardī ibn 'Alī ṭ-Tārsūsī, xxxiv, 18, 22, 39, & *passim* (quoted).  
 —Māwardī, 39.  
 Maydān al-Qabaq, 109.  
 Maydān as-Sibāq, 109.  
 Maydān-i Shāh, Isfahan, 78.  
 Medina, 3.  
 Mehmet, see Muḥammad.  
 Mehmet, " "  
 Merv, 39.  
 Meshed, 39.  
 Mongolia, Mongols, xxiii f., 77.  
 Morocco, xl n.13.  
 Morse, E. S., xxv, 54.  
 Muḥammad (Prophet), 3, 37, 125, 153 f., 208 n.13.  
 Muḥammad II (Sultan), 109.  
 Murād II (Sultan), Pl. 13.  
 Murdā, see Mardī.  
 Muslim (Traditionist), 208 nn.13, 21.  
 Muṣṭafā Kānī, xxxiii, 14, 46, 54, 65 ff., 106, 108, 113, 119, 155 f., 201 n.4<sup>3</sup>, 205 n.3<sup>1</sup>, & *passim* (quoted).  
 Naram-Sin, xxvi.  
 —Nasā'ī, 208 n.13.  
 —Nāṣir Muḥammad (Sultan), xxiv.  
 Nishapur, 105, 110.  
 North Africa, North Africans, 8 f.; see also Maghreb.  
 Nūshirvān, Pl. 10.  
 Odessa Museum, 110.  
 Ok Meydanı, Istanbul, 108 f.  
 Olbia, 110.  
 Ottoman(s), xxxiii, 29, 67, 106 ff.  
 Oxus, 39.  
 Özdemir, see Azdamūr.  
 Parthia, Parthians, xxv, 78.  
 Partington, J. R., 144.  
 Payne-Gallwey, R., 14, 88.  
 Persia, Persian(s), xxiii, 6, 17, 20, 37, 40, 55, 62, 78, 102, 106, 125, 148; see also Chosroes, Iran, Sasanids.  
 Phoenicians, Pl. 9.  
 Pitt Rivers Museum, Oxford, 10, 16.  
 Pope, S., 142.  
 Prophet, see Muḥammad.  
 Qādisiyyah, battle of, 200 n.3<sup>2</sup>.  
 Qalā'ūn (Sultan), 77.  
 Qarāwah, —Qarāwī, 200 n. 8<sup>1</sup>.  
 Quraysh, 3.  
 —Raffā', see Ishāq ar-Raffā'.  
 Raqqah, 39.  
 Reinaud, M., 19, 156.  
 Ritter, H., xxxii.  
 Rome, xxiv.  
 Sa'd ibn Abi Waqqāṣ, 56, 200 n.3<sup>2</sup>.  
 —Saffāh (Abu l-'Abbās), 64, 201 n.7.  
 Saladin, xxiii f., 18, 39.  
 Samarkand (-qand), 39.  
 —Samarqandi (Muḥammad ibn 'Isā) 39 f.  
 Sarakhs, —Sarakhsi, 39.  
 Sasanids, 37, 39, 53, 58; see also Iran, Persia.  
 Sayf ad-Dīn Azdamūr, 203 n.34.  
 Sayf ad-Dīn Bakrūt (Amir), 109 f.  
 Sayf ad-Dīn Jānim al-Malaki l-Ashrafī, xxxv.  
 Scanlon, G., xxxiii f., xl n. 23.  
 Selim III (Sultan), 109.  
 Seljuqs, xxiii.  
 Sha'bān, see al-Ashraf Sha'bān.  
 —Shāfi'ī (Jurist), 56, 200, n.2<sup>3</sup>.  
 Sha-Sefi, 78.  
 Shapur I (Dhū l-Aktāf), 40.  
 Simon, H. Ingo, 16; see also Manchester Museum.  
 Skinner, D., 16.  
 Spain, Muslim, 9.  
 State Hermitage Museum, Leningrad, 110.  
 Syria, xxiii f., xl n.13, 7, 27, 39, 76, 88, 160.  
 —Ṭabari (Aḥmad ibn 'Abd Allāh Muḥibb ad-Dīn), xxxiv, 37, 40 f., 46, 56, 66, 132 ff., 148, 182 f., 199 nn.2<sup>2</sup> & 3<sup>1</sup>, 200 n.8<sup>1</sup>, & *passim* (quoted).  
 Ṭabaristan, 40, 206 n.10<sup>1</sup>.  
 Tāhir al-Balkhī, 25, 30, 34, 37, 39 ff., 42 f., 46, 48 f., 55, 60, 66, 88, 101 f., 123, 129 ff., 159, 199 n.2<sup>3</sup>, 206 n.10<sup>1</sup>.  
 Tartars (Tatars), 78.  
 Taybughā (Author), xxiv, xxxvi, & *passim*.  
 Termez, 39.  
 —Tirmidhī, 39.  
 Transoxiana, 39.  
 Tripoli (Syria), 76, 203 n.34.  
 Turkestan, 83.  
 Turkey, Turks, &c., xxiii, 6, 17, 26, 29, 44, 47 f., 71, 77 f., 148, 202 n.1; see Ottomans, Turk-mens.  
 Turkmenistan, 39 f., 200 n.8<sup>2</sup>.  
 Turkmenens, xxiii, 34, 77 f.  
 Uḥūd, battle of, 3.  
 Umayyad(s), xxiii.  
 Uzbekistan, 39 f.  
 Vahram, V, see Bahrām Gūr.  
 Wāsiṭ, 10.  
 Wāsiṭis, 201 n.12.  
 Willcox, R., 119.  
 William of Tyre, 142.  
 Yadin, Y., 170.  
 —Ya'qūbī, xxiii.  
 Yisūngkā, 110.  
 Zajaczkowski, A., xxxiv.

## INDEX OF TECHNICAL TERMS

(Arabic, Persian, Turkish)

N.B. Readers should also consult the Arabic-English Glossary (pp. 178-94) as this index does NOT include words which occur only once as main entries of the Glossary

- Adhnāb, 181  
 'Ahd, 155  
 Ahdāf, 26, 164, 181  
 Ahwal, 58, 179  
 A'immah, 130, 179, 183  
 'Ajz, 166  
 Akhta'a, 179  
 Aktaf, 32  
 Aktāf, 32, 179, 198 n.19  
 Akuff, 32, 198 n.19  
 A'lā s-zind, 194  
 'Alāmah, 41, 179, 183  
 'Āli, 26, 179  
 Amāji, 29, 164  
 Amājiyyah (-āt), 77, 179, 198 n.10  
 'Amūd, 179, 197 n.8  
 A'nāq, 193  
 Anfād(h), 199 n.10  
 Angushtāneh, 199 n.2  
 Angushtāneh, 199 n.2  
 Anhā, 7, 179, 188  
 'Aqab, 8, 162 (Fig. 54), 179  
 'Aqabah, 161  
 'Aqadu, 54, 179  
 'Aqd, 40 f., 51, 54, 179, 205 n.7  
 " Bahrāni, 53, 179  
 " Khus(s)ra(u)wāni, 53 f., 179  
 " al-luṣṭi, 47, 179  
 " ar-radif, 53, 55, 179, 192  
 " as-ṣaḡālibah, 53, 179  
 " at-tardif, 55, 192  
 " thalāthah wa-sittin, 179  
 " tis'ah wa-sittin, 179  
 'Aqqaba, 6, 179  
 'Aqqār, 29 f.  
 'Aqr, 112, 115, 179  
 Aqwa, 189  
 Arkān, 5, 199 n.3  
 Asbaq, 26  
 Asbāsālārī, 145, 179  
 Aṣl az-zind, 194  
 Asra', 198 n.20  
 Aṭrad li-s-sahm, 6, 34, 179  
 'Awāmīd as-sibāq, 109, 179  
 Awāl, 161, 179  
 Awātār, 193  
 Atwal waṣfā', 123, 193  
 Awzān, 27, 194  
 Ayyil, 199 n.6  
 Badan, 24, 28, 47, 134, 180  
 Baghshaq, baghshaq, 204 n.16  
 Bahrāmī, 53, 179, 180  
 Bandūq, 8, 19, 180  
 Baqqam, 105, 180  
 Barjās, 83  
 Barṣaq, 180, 204 n.16  
 Barshaq, 93, 99, 180, 204 n.16  
 Baṭn, 91, 180, 193  
 Battiyah, 152, 156, 180  
 Bayād 122 f., 127 ff., 180, 205 n.5  
 Bayad ar-rijl, 101, 180  
 Bayram Shāh, 145, 180  
 Bayt, 147, 161, 180  
 " al-haff, 161, 180  
 " haff al-watr, 161  
 " al-ṣqāt, 161, 180  
 " al-yad, 180 f.  
 Bazlah, 30, 180  
 Bidāyah, 57, 123, 127 ff., 180, 185  
 Birjās, xiii, 76, 83, 180  
 Birin, 143, 180  
 Bunduq, 19, 139, 180  
 Burjās, 83  
 Buṣūn, 180  
 Chang al-bāz, 46  
 Changal-i bāz, 44, 180  
 Charkh, 184  
 Chelik, 14, 182  
 Chillah, 20, 180, 197 n.1  
 Chulā, 180  
 Daffah, daffatāni, 134, 180  
 Daffatā l-fūq, 161, 180  
 Dākhil, dākhilī, min dākhil al-qaws, 62, 181  
 Dastgāh, 181  
 Dastgāh, 7, 181  
 Dastgāh, 148 f., 181  
 Daymah, see dīmah  
 Destgāh, 100, 181  
 Dhakar, 151  
 Dhanab, 181  
 Dhirā', 159, 181, & passim  
 " al-'amal an-najjārī, 181  
 " al-'amal li-n-najjārīn, 181  
 " al-Hāshimī, 181  
 Dihān, 8, 181  
 Dimak, 113, 161 f., 181  
 Dirham, 159 f., 181, & passim  
 Dūdān, 181  
 Dūdāni, 29, 149, 164, 181  
 Dustār, 8, 11 ff., 16 ff., 161 f., 181, & passim  
 " ar-rijl, 8, 181  
 " al-yad, 8, 181  
 Fahlah, 7, 181  
 Fā'idah, 206 n.10  
 Farāwān, 164 & Fig. 55  
 Farāwān, 164  
 Fard, 161 f., 181  
 Fāris, 202 nn. 1, 3  
 Farkah, 64, 66 f., 130, 135, 181, 188  
 Fathah, fathah bi-sh-shamāl, 41, 181  
 Fauq, 161  
 Filq, 10, 181  
 Fūq, 24, 47, 117, 130, 164, 181, 184, 205 n.8, 206 n.10  
 Fursān, 202 n.1  
 Furū' (ar-ramy), 40  
 Furūsiyyah 202 n.3  
 Futūr al-iqlāq, 113, 181  
 Fuvāq, 134, 181  
 Gez, 47  
 Ghazāl, 32  
 Ghilmāniyyah, 206 n.10  
 Ghizlān, 32, 181  
 Hadaf, 28, 181  
 " tamāni, 141, 181  
 Hadd an-nafāḥ bi-l-iqlāq, 181, 204 n.6  
 Hafw, 165  
 Halāq, 134, 182  
 Halāwat al-jadh, (7), 182  
 Halqah, 8, 164, 182  
 Hanilat al-haykal, 85  
 Haqwa, 164 f.  
 Harbi, 28, 182  
 Harrafa, 182  
 Hāshimī, 8, 159, 182  
 Haft, 161  
 Haawala, 182  
 Haydari, 26, 29, 197 n.9  
 Hayl, 20, 182  
 Hazm, 8, 182  
 Hazwah, 164  
 Hīr, 161  
 Hudūd, 161, 163  
 Husbān, 29, 148 ff., 164, 182  
 Ibranjak(q), 14 f., 122 f., 130 f., 134, 161, 182, & passim  
 Idār, 30, 182  
 Iqlāt, 40, 53, 182  
 Ijazah, 155 f., 182  
 Ikhlās (min al-watr), 182, 202 n.16  
 Ikhtalasa, 64, 182  
 Ikhlās, 67, 182  
 Ikhtiyārī, 37, 182  
 'Ilal, 205 n.4  
 Imām, 134, 183, 199 n.2  
 Infitāq, 112 f., 183  
 " al-'aqd, 183  
 " al-bān, 113, 183  
 " al-qabāḥ, 112, 183  
 Inharafa, 124, 183  
 Inhinā, 113, 161, 183  
 Inqilāb (al-qaws), 90, 183, 190  
 Inqilāb al-fisād, 116, 183  
 Intiqāb ilā l-'alāmah, 41, 183  
 Irtāsh, 112, 115  
 Isbāsālārī, see asbāsālārī  
 Isqāt, 161, 180  
 Istawā, 46, 56, 183  
 Istifā, 27, 183  
 Istiwā, 53, 130, 183  
 'Itamada, 101, 183, 188  
 Itār, 41, 183  
 'Itimād, 40, 183  
 Iqlāq, 40, 113, 180, 181, 183, 191  
 Jabbād, 85, & Fig. 29, 183  
 Jadh, 27  
 Jalasa, 183, 189  
 Jalshah murabba'ah, 103  
 Jalsat al-hārib, 102  
 " al-mulūk, 103  
 " al-mukhāḡif, 103  
 Jam', 10, 105, 183, 191  
 Jama'a, 180, 183  
 Jami', 183  
 Janb, 45  
 Janwari, 29, 182, 183, 197-8 n.9  
 Jarād, 29, 145, 149 f., 164, 184  
 Jarid, 83  
 Jarkh, 8, 18 Fig. 11, 19, 88, 146 f., 151, 184, 197 n.9, & passim  
 Jarmakī/jarmukī, 82  
 Jarr 'alā l-fam, 41  
 Jarrāmī, 152, 184  
 Juti'ah, 34, 184  
 Jaznah, 184  
 Jawzah, 24, 86, 147, 183, 184  
 Jilā, jilā, 184, 197 n.1  
 Jinkilbāz, 46, 180, 184  
 Julbah, 139 f., 143, 184, 191, 206 n.13, 207 n.16  
 Julūs, 102, 183, 184, 189  
 Kabak, 172, 189  
 Kabba ('alā l-fūq), 117, 184  
 Kabbād, 152, 184  
 Kabid al-qaws, 64, 145, 161, 184  
 Kaff, 189, 194  
 Kānān, 98, 180, 185  
 Kanūr, 22, 184  
 Kashf (l-)bayād, 20, 127 ff., 180, 184  
 Kāz (-āt), 27, 47, 130, 138, 181, 184, 206 n.10  
 Kāz (arrow), 164  
 Kepāde, 208 n.3  
 Kharanj, 105  
 Khām, 8, 26, 184  
 Khāne-ye kamān, 180  
 Khawq, 56, 117, 184  
 Khārij, min khārij al-qaws, 61, 184  
 Kharuonān, 93, 98, 185  
 Kharq, 24, 185, 197 n.6  
 Khashab, 8, 30, 185  
 Khashabah, 75  
 Khashrah, 68 ff., 73, 185  
 Khat al-istiwā, 130, 185  
 Khatāf, 85, 185  
 Khayta'ah, 199 n.3  
 Khita'ah, 185  
 Khudrud, 163  
 Khurūm, 86, 146, 185  
 Khus(s)ra(u)wāni, 53 f., 185  
 Kifāyah, 57, 127, 129, 185  
 Kigāq, 172, 189  
 Kigāmāh, 165  
 Kuliyātāni, 164  
 Kursū', 205 n.8  
 Kushiṭbān/kushubān (-āt), 185, 199 n.1  
 Kushiṭwān (-āt), 34, 185  
 Kustibānikustubān, 185, 199 n.1  
 Kuqr, 161  
 Kuzān, 51, 119  
 Kycadjiky-kaj, 172  
 La'b, 112, 185  
 Lakzah, 65, 185  
 Laqshah, 8, 19, 185  
 Lāḡilāḡ, 26, 138, 185, 187  
 Layy (al-qaws) halqatān, 8, 185  
 Layyīn, 111, 185  
 Lihām, 8, 185, 193  
 Lu'ām, 198 n.23  
 Lughūb, 198 n.23  
 Madd, 40, 56, 185  
 " juncwānī, 120, 185  
 " ramān, 64, 185  
 Madhāhib, 134  
 Madhāḡ, 164  
 Madāḡil, 161  
 Madfūh, 64, 66 f., 186  
 Madfūl, 27, 186  
 Mahbas, 72, 80, 186  
 Mahtūf(ah), 161, 186  
 Majāri, 145, 186 f.  
 Majrā, 28, 30, 105 f., 145  
 " as-sahm, 49  
 " min al-ibhām, 186  
 Makbūl, 32  
 Makilāt, 198 n.19  
 Maktūl, 32  
 Makyūl, 26, 32, 198 n.19  
 Manāzil, 123 f., 186  
 Maqābid, 6, 186  
 Marmā, 153, 186  
 Masāh, 128  
 Maskah Turkiyyah, 47  
 Maynū'ah, 10, 186  
 Massāh, 128  
 Matn, 42 ff., 122 f., 130 f., 134, 164 f., 186  
 Mawādīn, 186  
 Mawḡi' at-tafaḡ, 49, 186  
 Mawtūr, 180, 186  
 Mayādīn, 186  
 Maydān, xxiv, 28, 109  
 " al-qabaq, 109  
 " as-sibāq, 109  
 " sawil, 141  
 Maydāni (arrows), 25, 27 ff., 33, 164, 186, 190; (guide), 140  
 Mi'balah, 164  
 Midfa', 207 n.16  
 Miḡāl, 193  
 Miḡāh, 147, 186  
 Miḡbas, 186  
 Mijrāt, 28, 105 f., 140, 145 f., 187  
 " al-khurūm, 146, 187  
 " ar-rikāb, 146, 187  
 Mi'rād, 164, 166  
 Misāh, 122, 128 f.  
 " (al-)bayād, 123, 131, 187  
 " (al-)qabāḡ, 123, 127, ff., 187  
 " (as-)sawād, 129, 131, 187  
 Mishqāq, 164  
 Mismār, 30  
 Miṣra', 164  
 Mu'ajjir, 161  
 Mu'akhhah (al-'ayn), 58, 187  
 Mu'allim, 153, 155, 187, 208 n.12  
 Mu'aqqab(ah), 10, 187  
 Muḡtādī 155, 208 n.12  
 Mudawwar, 179, 207 n.16  
 Muḡtarib, 55, 187  
 Muḡawwāq, 205 n.8  
 Muhallil, 64  
 Muḡharif, 187  
 Mukattal, 32  
 Mukhtalas, 64, 66 f., 182, 187  
 Mukhtalāh, 28, 187  
 Munāḡalāh fi l-ahādāf, 164  
 Munahhar, 146, 187  
 Munḡasīlah, 6, 187, 193  
 Munhar, 187  
 Munharif, 101, 122  
 Munḡahī, 155, 208 n.12  
 Muqaddam (al-'ayn), 58, 187  
 Murabba', 103, 187  
 Murakkabah, 10, 187  
 Murayyash, 26, 187



- Murrān*, 6, 187  
*Murtasī*, 138, 185  
*Musaddā*, 20  
*Musaddar*, 24, 187  
*Mushaddad*, 111, 187  
*Mushanuna*, 113, 119, 187  
*Musta'an*, 71, 79 f., 187  
*Mustalqi*, 6, 187  
*Mustawi*, 66, 188, 201 n.12  
*Mustawi n-naht*, 24, 188  
*Muta'allim*, 153, 155, 188, 208 n.12  
*Mutamatti*, 66 f.  
*Mutawajjih*, 101, 188  
*Mutawassif*, 101, 188
- Nab'*, 6, 188  
*Nabl*, 27, 30, 86, 145, 164, 188, 198 n.27  
*Nablah*, 188  
*Nadab*, 26, 29, 188  
*Nafdah*, 181, 188, 204 n.6  
*Nayl*, 25, 164 f.  
 „ *al-hadaf*, 188  
*Naza'a (fi l-qaws)*, 58  
*Nazar* 40, 58, 188  
 „ *dakhlil*, 62  
 „ *kharij*, 61  
*Nibāl*, 198 n.27  
*Nihāyah*, 57, 104, 123, 127 ff., 188  
*Nihāyah*, 3, 57, 123, 127, 188  
*Niyāt*, 161  
*Nushshāb*, 164, 188  
*Nusūl*, 188  
 „ *al-ahdāf*, 26, 188
- Qabaq*, 71, 77 ff., 185, 189  
*Qabd*, 40, 42, 189  
*Qabdah*, 40, 127, 162, 186  
 „ *muharrarafah*, 46  
 „ *murabba'ah*, 45  
*Qabdat al-qates*, 49  
*Qadib*, 30  
*Qafala*, 54, 189  
*Qaf*, 19  
*Qafiah*, 40, 54, 189  
*Qā'idah*, 206 n.10<sup>1</sup>  
*Qālab/qālib*, 91, 189  
 „ *ash-sha'irah*, 24, 189  
 „ *ash-sham'ah*, 24, 189  
*Qalam*, 28, 145, 164, 189  
*Qalansuwah*, 161  
*Qālib*, see *Qalab*  
*Qar'ah*, 172  
*Qarqal*, 26, 189, 198 n.11  
*Qasab*, 105  
*Qasir*, 28, 123, 189  
*Qaws al-bundiq*, 19  
 „ *ar-rjl*, 6, 18, 88, 184, 189  
 „ *ar-rikab*, 19, 29 f., 88  
 „ *al-yad*, 6, 189  
*Qayghaj/qayqaj*, 17  
*Qibād*, 189  
*Qidh*, 164  
*Qighaj/qiqaj*, 71, 79 f., 172 f., 189  
*Qintār*, 86, 147, 160  
*Qirāt*, 159, 189, & *passim*  
*Qirqil*, 189
- Qitiyy as-sabq*, 190  
*Qismat al-aynayn*, 62  
*Qiyām*, 101, 189  
*Qiyām rijl al-qaws*, 121, 189  
*Qubbād*, 43, 46, 146, 189  
*Qudhdadh*, 164  
*Qu'ud at-tahrif*, 118, 192  
*Quwwah*, 3, 196 n.4<sup>2</sup>
- Radif*, 53, 55, 179, 189, 192  
*Raf'*, 8, 189  
*Rahb*, 164  
*Rajaha*, 189  
*Rāji'(ah)*, 161, 189  
*Ramy as-sibāq*, 104, 191  
*Rāqid*, 53, 190  
*Ra's*, 164, 190  
 „ *an-naql*, 134  
*Rasafah*, 164  
*Rasf*, 159 f., 190, & *passim*  
*Rikāb*, 29 f., 146  
*Rikābdāriyah*, 202, n.8  
*Rish*, 26, 190  
*Rujū'*, 104, 190  
*Rukbah*, 161 f.  
*Rumār*, 189  
*Ru'z*, 166
- Sabbābah*, 27, 190, 200 n.7<sup>1</sup>  
*Sabqi*, 29, 164, 190  
*Sadr*, 30, 164, 166, 190  
*Safā'ih*, 190, 198 n.11  
*Sahm*, 30, 47, 164, 197 n.8<sup>1</sup>  
 „ *qasir*, 28, 190  
 „ *tamām*, 20, 190  
 „ *al-hadaf*, 28  
 „ *al-mūs*, 138, 190  
 „ *as-sibāq*, 190  
 „ *fatwil*, 28, 188, 190  
*Sākin*, 64, 66 f., 111, 183, 190  
*Salas al-jadhb*, 190  
*Sandarūs*, 16  
*Sar-afār*, 79, 191  
*Sari' ar-rujū'*, 104, 190  
*Saf'*, 190  
*Sawād*, 112, 127 ff., 191, 205 n.5<sup>2</sup>  
*Sawā'id*, 190  
*Sayalān*, 191  
*Saysarah*, 20, 34, 94, 191, 204 n.20  
*Shāh majrā/mijrāt*, 145, 146, 191  
*Shahādah*, 27, 112, 191, 200 n.7<sup>1</sup>  
*Shagg*, 112, 115, 145 ('slot'), 191  
*Sharij*, 10  
*Sharijah*, 164 f.  
*Sharkh (-āni)*, 164  
*Shawhaṭ*, 6, 187, 191  
*Shaykh*, 155, 208 n.8  
*Shibr*, 29, 191  
*Shiddah*, 3, 196 n.4<sup>2</sup>  
*Shuqūq*, 191  
*Sibāq*, 20, 104, 109, 179, 193, 198 n.20  
*Sihām*, 7, 164, 190  
*Silān*, 26, 138, 191, 207 n.16  
*Siper*, 46, 106, 107 (Fig. 40), 110, 113, 119, 191  
*Sirifsār*, 71, 79, 191
- Sisarah*, see *saytarah*  
*Siyah (-āt)*, xxviii, 8, 161 ff., 191, & *passim*  
*Sukūn*, 191
- Ta'āliq as-suft/sift*, 198 n.17  
*Tadmik*, 56, 112, 116, 191  
*Tafwiq*, 40, 49, 134, 192  
*Taharraka*, 25, 192  
*Tahlil*, 131, 192  
*Tahrif*, 53, 118  
*Tahrik as-sākin*, 111  
*Talaqa*, 192  
*Tālib*, 152, 155  
*Talyin al-mushaddad*, 111  
*Tamām*, 27, 192  
*Tāmm*, 123  
*Tāqāt*, 192, 196 n.2<sup>2</sup>  
*Taq*, 8, 192  
*Taqṣir al-qasir*, 189, 192  
 „ *at-fatwil*, 123, 192  
*Taqwīm al-iwāj*, 37  
*Taraf az-zind*, 194  
*Tarbid*, 205 n.5<sup>1</sup>  
*Tārid*, 179  
 „ *li-s-sahm*, 53, 192  
*Tarjih*, 8, 192  
*Tarq*, 56, 115, 192  
*Tarqi'*, 193  
*Tarqutwah*, 205 n.8<sup>2</sup>  
*Tashdid al-layyin*, 111  
*Tasmā/tasmā'*, 140, 192  
*Taswib as-sahm*, 120 f., 192  
*Taswīt*, 120  
*Tatris*, 118, 192  
*Tatwil al-qasir*, 123, 189, 192  
 „ *at-fatwil*, 192  
*Tatwis*, 8, 193  
*Tawil*, 28, 123, 190, 192 f.  
*Tazbid*, 205 n.5<sup>1</sup>  
*Tazliq*, 41, 193  
*Taznid*, 112, 193, 205 n.5  
*Tirkāsh*, 184, 193  
*Torba*, 156  
*Tūmār*, 164
- 'Ulamā' ar-ramy*, 208 n.8  
*Ulki*, 138, 141 f., 193  
 „ *qasir*, 193  
*Ūlkū*, 141  
*'Unq*, 162, 193  
*'Uqad*, 193, 205 n.7<sup>1</sup>  
*'Uqdah*, 29, 120, 193  
*Ūqiyyah*, 160, 193  
*'Uqūd*, 54, 179  
*'Urewah*, 162, 193  
*'Uṣfūr*, 161  
*'Uṣfūrī*, 29, 149, 164  
*Uṣṣā*, 155  
*Uṣṭādūn/-in*, 7, 73, 122, 193  
*Uṣṭād(h)*, 111, 155, 208 n.8  
*Uṣūl ar-ramy*, 37, 199 n.3<sup>2</sup>  
*Uṣrah*, 161, 164 f.
- Wafā'*, 20, 57, 123, 180, 183, 193  
 „ *bayād*, 131, 180, 193
- Wafā' bidāyah*, 130, 180, 193  
 „ *mihāyah*, 104, 188, 193  
 „ *tamām/tāmm*, 44, 46, 183, 193  
*Wāfirah*, 166  
*Wajh (al-qaws)*, 91, 161, 193  
*Watara*, 180  
*Wāqif(ah)*, 53, 190, 193  
*Wāsiyyah*, 6, 193  
*Watr*, 20, 162, 179, 193  
*Wazana*, 60, 193
- Wazn*, 20, 60, 194
- Yad (al-qaws)*, 90  
*Yaghliq*, 28, 164, 194  
*Yāmūr*, 105, 194  
*Yāsij*, 77, 164, 198 n.28
- Zāfirah*, 166  
*Zahr*, 45, 162, 193, 194
- Zanbūrak*, 8, 19, 194  
*Zaqq*, 112, 194  
*Zaradah*, 138, 194  
*Zardiyyah*, 133  
*Zifr*, 161  
*Zind*, 194, 204 n.2<sup>2</sup>  
*Ziyār*, 22  
*Zufr*, 161 f.  
*Zuhūr*, 6, 194  
*Zurqah*, 115, 194