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K. D. White

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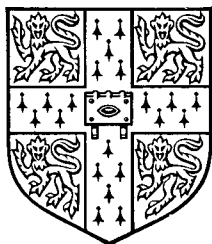
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AGRICULTURAL IMPLEMENTS OF THE ROMAN WORLD

BY

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Reader in Classics, University of Reading



CAMBRIDGE

AT THE UNIVERSITY PRESS

1967

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CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore,
São Paulo, Delhi, Dubai, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521147576

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First published 1967
First paperback edition 2010

A catalogue record for this publication is available from the British Library

Library of Congress Catalogue Card Number: 67-10350

ISBN 978-0-521-06912-0 Hardback
ISBN 978-0-521-14757-6 Paperback

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NOTES ON THE PLATES

1. Miniature from a French manuscript of the fourteenth century, now in the British Museum, London. The work is entitled *Libre des propriétés des choses*, and is a French translation of Bartolomeo de Granville, *De Proprietatibus Rerum*.

Centre background, a walled medieval town with a twin-towered entrance gate. To left, an orchard with fruit pickers. To right, a workman chopping, stacking and bundling wood. Right foreground, a stand of ripe grain, and a reaper about to commence operations. In his left hand, a hook with a long straight shaft for gathering in the sheaves before cutting (the hook is obscured by a tree). In his right hand, a short-handled scythe (see p. 102). In the extreme right foreground another labourer, kneeling, sharpens a heavy sickle of semicircular shape with a hammer.

2(a) Large square digging-spade from Campania, now in the National Museum, Naples (inv. no. 71749). The type is very rare, and was probably used for trenching operations in heavy wet ground. Unlike its northern counterpart, it is oversquare, the width of the blade exceeding the depth by 7 cm.

Dimensions: 31 cm deep (47 cm including the iron socket); 38 cm wide.

(b) Iron single-bladed digging-hoe (*sarculum simplex*) from the villa of Herennius Florus at Boscoreale, near Pompeii, Central Italy. Now in the Museum of Natural History, Chicago, U.S.A. (cat. no. 26151). For operations performed with this implement see pp. 45 f.

Dimensions: depth of blade 18.5 cm; breadth at top 18.5–19 cm.

(c) Iron single-bladed digging-hoe (*sarculum simplex*) from Etruria, now in the Archaeological Museum, Florence (inv. no. 10752). Almost identical in design with the Italian ‘zappetta da cavatore’ (Fig. 25, p. 47). For cultivating in vineyards and orchards.

Dimensions: depth of blade, 18.5 cm; width at bottom, 8.5 cm; maximum width, 12 cm.

(d) Iron single-bladed digging-hoe (*sarculum simplex*), with pear-shaped blade, from Boscoreale, now in the Natural History Museum, Chicago (inv. no. 26154). Much worn on the right side of the blade.

Dimensions: depth of blade, 13 cm; width, 9.9 cm.

3. *Digging with the bidens*. Part of a mosaic pavement from the north-east portico of the Great Palace of the Emperors, Istanbul, Turkey. From *The Great Palace of the Emperors*, 2nd report, ed. by D. Talbot Rice (Edinburgh, 1958), pl. 47.

NOTES ON THE PLATES

Two labourers digging with heavy, long-handled *bidentes*. They are digging in échelon, as is still customary practice in breaking ground with the spade or the hoe. The nearer of the two diggers leans forward as he completes the stroke, while his companion has swung his hoe above his head and is bending forward to make the downstroke. Only the lower part of the handle of his implement is preserved. Both labourers are wearing leggings to protect them from thorns. For the design of the *bidens* see pp. 49 ff.

4. Winter operations in the vineyard: *ablaqueatio* (échausselage) and *sarritio* (sarclage).

Part of a large mosaic pavement discovered at Cherchel, Algeria, in April 1925. J. Bérard, 'Mosaïques inédites de Cherchel', *MEFR*, LII (1935), pl. III and pp. 113 ff. The largest surviving panel is 3.60 × 5.50 m. and consists of four superimposed layers, the third and fourth of which depict work in the vineyard.

Ablaqueatio (échausselage). The scene is a trellised vineyard (*pergula*—Palladius 3. 13. 5) in winter (the vines are quite bare). In the third register three labourers, armed with two-pronged drag-hoes (*bidentes*) are breaking up the soil around the vines. Each is shown in a different phase of the stroke, the first has just struck the clod, the second has almost finished his stroke, while the third is at the top of his swing (his *bidens* can be seen close to the top of the trellis). The vines are trained on strong multiple stakes with single cross-members.

Sarritio (sarclage). In the centre, two large vines with spiralling branches which, unlike those of 8 (a), are self-supporting (Columella, *De Arb.* 4. 1). There are two similar vines to the right, much mutilated. In front a labourer plies his *bidens* vigorously under the eye of a supervisor. The latter, stick in hand, is propped against a vinestock, and seems from his attitude to be reprimanding the labourer for poor work done on the left-hand vine. To the right, another labourer at the same task, his body turned away from the scene in the centre.

5(a) Heavy iron drag-hoe (*rastrum*) with five tines closely spaced, from Etruria, now in the Archaeological Museum, Florence (inv. no. 10779). For the various uses of these implements see p. 55.

Dimensions: width at top, 15 cm; length of centre tine, 12 cm; maximum depth of bar, 5 cm; gap between tines, 2.4 cm; approximate width of socket, 4 cm.

(b) Six-pronged iron drag-hoe (*rastrum*) from Boscoreale, now in the Natural History Museum, Chicago (inv. no. 26159). The teeth are much more widely spaced than those of 5 (a), and the bar is much lighter. On the uses of the implement see p. 55.

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Dimensions: 30 cm at top; length of longest tine, 17.4 cm; gap between tines, 4 cm.

6(a) Heavy plain woodman's axe (*securis simplex*) used for tree felling; from Campania, now in the National Museum, Naples (not inventoried). The design has remained virtually unchanged down to the present day. On the uses of the implement see pp. 60 f.

Dimensions: length, 23.5 cm; maximum width, 16 cm; width at socket, 5.4 cm.

(b) Plain woodman's axe (lighter than 6(a)) from Boscoreale, now in the Natural History Museum, Chicago (inv. no. 26157).

Dimensions: length, 19 cm; maximum width, 9.6 cm; width at socket, 2 cm.

(c) Iron hatchet (*dolabra*) with plain hammer back, from Campania, now in the National Museum, Naples (not inventoried). On the uses of the implement see pp. 60 f.

Dimensions: length of blade, 21.5 cm; width of cutting edge, 5.4 cm; width at socket, 2.7 cm.

(d) Iron adze-axe (*securis dolabrata*) from Boscoreale, now in the Museum of Natural History, Chicago (inv. no. 26156).

Dimensions: overall length, 32.8 cm; width of axe-blade, 7 cm. On the uses of these double implements see p. 61.

7(a) Bronze tanged sickle (*falx messoria*), of typical open shape, from Campania, now in the National Museum, Naples (inv. no. 21659).

Dimensions: length of arc, 50 cm; average width of blade, 5 cm.

(b) Iron tanged sickle (*falx messoria*), of open shape, from Boscoreale, now in the Museum of Natural History, Chicago (inv. no. 26164).

Dimensions: length of arc, 48 cm; average width of blade, 5 cm.

8(a) Iron gardening fork (*furca ferrea*) from Boscoreale, now in the Natural History Museum, Chicago (inv. no. 26160). On the identification of this implement see pp. 107 f.

Dimensions: length (including socket), 41 cm; length of tines, 14.2 cm; gap between tines, 4.5 cm.

(b) Heavy iron tree-pruning billhook (*falx arboraria*) with right-angled hook, from Boscoreale, now in the Natural History Museum, Chicago (inv. no. 26162).

Dimensions: length, 23 cm; width across angle, 7 cm; length of hook, 9.5 cm.

(c) Tanged billhook, broad-bladed, with short hook, found at Villa de la Semois, Étalle, South Belgium. Now in the Musée gaumais, Virton.

Dimensions: length, 38 cm; length of tang, 18 cm; maximum width of blade, 7 cm. On the uses of this implement see p. 87.

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(d) Iron gardening fork with rounded tines and heavy socket, perhaps fitted with a short handle for working in seed-beds (see p. 107). From Boscoreale, now in the Museum of Natural History, Chicago (inv. no. 26160).

Dimensions: length to end of socket, 28.8 cm; gap between tines, 5 cm; length of tines, 18 cm; width of tines, 3.6 cm.

9(a) Scythe-blade of unusually great length, with heavy flange, and sharp backward curvature towards the heel. One of thirteen identical specimens from a large hoard of Romano-British implements found at Great Chesterford, near Cambridge, England, in 1854. R. C. Neville, *Arch. Journ.* XIII, 1 (March 1856), 7–13. On the problems connected with these implements see Appendix E(3).

Dimensions: length of span, 151 cm; length of chord, 120.5 cm; length of tang, 21.5 cm; length of spike, 1.2 cm.

(b) Long-handled bronze brush-hook (*falcastrum* = *runco*), with open crescent-shaped blade and long socket, from Campania. Now in the National Museum, Naples (inv. no. 112242). On the design and use of this implement see pp. 91 ff.

Dimensions: chord, 27 cm; average width, 4.5 cm; length of tang, 22 cm.

(c) Heel of an exact reconstruction of the scythe shown in Plate 9(a).

10(a) Large votive model of a body-ard from Telamon, Etruria, now in the Archaeological Museum, Florence (inv. no. 70940). A. S. F. Gow, 'The ancient plough', *JHS*, xxxiv (1914), pl. xx (c); Haudricourt-Delamarre, pl. III, 10, and pp. 82, 270. See p. 142.

(b) Bronze votive model of a beam-ard with 'arrow-head' foreshare and ground-wrests, from Cologne, now in the Römisch-Germanisches Zentralmuseum, Mainz, West Germany (inv. no. 29898). W. Haberey in *Bonn. Jahrb.* CLIX (1949), 94 ff.; W. H. Manning, 'The plough in Roman Britain', *JRS*, LIV (1964), pl. VIII, 1; Haudricourt-Delamarre, p. 81, fig. 16, and p. 82. See p. 143.

11(a) Bronze votive model of a keeled beam-ard with ground-wrests from Sussex, now in the British Museum (inv. no. 54.12.27.76). W. H. Manning, 'The plough in Roman Britain', *JRS*, LIV (1964), p. 56, fig. 4 (A).

(b) Bronze model of a ploughing team and ploughman, from Piercebridge, Co. Durham, England, now in the British Museum, London. W. H. Manning, *art. cit.* p. 56, fig. 4 (B). See p. 143.

12. Ploughing operations in an olive-grove. The topmost layer of the large mosaic pavement from Cherchel, Algeria (see Plate 4 above).

Ploughing and clod-breaking. In the foreground to right, a plough drawn by a pair of high-spirited bulls; behind, the ploughman leans

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forward over the plough, pressing down with his full weight on the handle; in front of the bulls, a second labourer armed with a stout stick is engaged in smashing the clods thrown up in the previous furrow. In the background, a row of olive trees. On the design of the plough see p. 138.

Sowing and ploughing in the seed. To the left, against a similar background to that above, another plough-team, preceded by a sower; the operation depicted is evidently that of ploughing in the seed. Note the size and depth of the seed-basket.

13. Seasonal operations. Two of the sculptured panels from the central soffit of the arch known as the Porte de Mars at Reims, north-east France.

Haymaking. Of the seven surviving panels representing seven of the twelve seasons of the year, that for July represents a harvesting scene, almost certainly the operation of cutting hay with implements mid-way in design between the sickle and the scythe. Three labourers are represented in the tableau; to the left, a labourer resting on the handle of his implement; centre, another labourer sharpening his implement with a honing-stone; to his right, a third labourer in the act of cutting, employing both hands, and using a sweeping action. For a full discussion on the implement see Appendix E (4), pp. 209 f.

Reaping with the *vallus*. The tableau for August, in spite of inaccuracies in the drawing (see p. 162), evidently represents a *vallus* or heading-machine for grain. Bence's drawing shows, to left, a man walking to the left, but turning round towards the frame of the machine, which he is cleaning with a stick; behind the toothed frame may be seen the left-hand wheel of the machine, incorrectly angled in the drawing, and the head, neck and forequarters of a mule or donkey, walking to the left.

A. de Laborde, *Les monuments de la France* (Paris, 1816), pl. cxiii (reproducing the drawings made earlier by H. Bence).

14. *The Arlon vallus*. Right-hand portion of a mutilated relief panel, depicting a *vallus* or heading-machine in motion. In spite of the damaged surface, the narrow shafts, the steersman, and part of the hindquarters of the animal are clearly visible. Found at Arlon (*Orolaunum vicus*), South Belgium, in 1854. Now in Museum, Arlon. E. Espérandieu, *Gaule*, t. v, no. 4037.

15. The Buzenol *vallus*. Part of a scene from farming life, depicted on the face of a sculptured slab found embedded in a terrace wall constructed in the late imperial period as additional fortification to the Gallo-Roman stronghold of Montauban-Buzenol, in the Luxemburg province of Belgium, close to the border.

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Size of slab, 38 × 52 cm; depth of field, 3 cm.

For a full account of the scene see pp. 162 ff. J. Mertens, 'Sculptures romaines de Buzenol', *Le pays gaumais*, XIX (1958), pls. XIV, XV, and pp. 31–2.

16. The Trier *vallus*. Central portion of a mutilated relief panel depicting a *vallus* or heading-machine. Only the right-hand wheel, part of the container, and the head and forequarters of the animal have survived. Found at Trier, West Germany, in 1890. First identified as part of a *vallus* by H. Cüppers, *Trierer Zeitschr.* XXVII (1964), 151 ff.

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Soprintendenza alle Antichità delle Province di Napoli e Caserta: Plates 2(a), 6(a), 6(c), 7(a), 9(b).

The Natural History Museum, Chicago, U.S.A.: Plates 2 (b), 2 (d), 5 (b), 6(b), 6(d), 7(b), 8(a), 8(c), 8(d).

Soprintendenza alle Antichità d'Etruria: Plates 2 (c), 5 (a), 10 (a).

Edinburgh University Press: Plate 3.

The Museum of Archaeology and Ethnology, Cambridge: Plate 9(a).

Römisch-Germanisches Zentralmuseum, Mainz: Plate 10 (a).

A.C.L. Bruxelles: Plates 14 and 15.

Rheinisches Landesmuseum, Trier: Plate 16.

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PREFACE

My obligations to colleagues and former colleagues, as well as to scholars, scientists and technical experts in many different fields, are very great. In particular, I wish to acknowledge with a deep sense of gratitude the assistance of the following: Professor L. A. Thompson, of the University of Ibadan, who undertook the major task of drawing the implements from which, with one or two exceptions, the text-figures have been made; Mr H. J. Hopfen, of the Agricultural Engineering Branch of the Food and Agricultural Organization of the United Nations in Rome, who placed at my disposal his knowledge of agricultural implements and techniques in many parts of the world; Mr John Beckwith, Keeper in the Department of Architecture and Sculpture at the Victoria and Albert Museum, London, who helped me greatly in the task of tracking down archaeological material; Dr Joseph Mertens, of the University of Louvain, who not only supplied me with numerous photographs and offprints, but personally conducted me to the site of the Buzenol discoveries; Professor Gianfranco Tibiletti and the staff of the Istituto di Storia Antica at Pavia, for much bibliographical help; the Director and Staff of the Institute of Classical Studies, London, for generous help, especially in moments of crisis; Mr Andrew Jewell and his colleagues at the Museum of English Rural Life at Reading, for initiating me into the mechanics of ploughing and other complex agricultural operations; Mr Harry Caswell, of the Institute of Agricultural Research at Samaru, Northern Nigeria, for much assistance on technical problems; and Professor Sir Roger Mynors, Merton Professor of Latin at Oxford, who has been a constant source of encouragement. Dr Mary Smallwood, Reader in Classics at the University of Belfast, read the whole work in typescript, and did much to regularize and clarify the text; and Mr Nicholas Montagu, of the Department of Philosophy at the University of Reading, read the first proofs. To all these, and to the Syndics of the Cambridge University Press for undertaking the publication of a complicated and difficult text, I wish to express my sincere gratitude. Part of my debt to my friend Mr John Crook, Fellow of St John's College, Cambridge, is acknowledged on another page.

K. D. W.

LIST OF ABBREVIATIONS

The abbreviation of references to Greek and Roman authorities follows the usual conventions. The list that follows includes those that will be, and some that may be, unfamiliar to readers.

<i>Arch. Journ.</i>	<i>Archaeological Journal</i>
Billiard, <i>L'Agriculture</i>	R. Billiard, <i>L'Agriculture dans l'antiquité d'après les Géorgiques de Virgile</i> , Paris, 1928
Billiard, <i>La Vigne</i>	R. Billiard, <i>La Vigne dans l'antiquité</i> , Lyon, 1913
Blümlein, <i>Bilder</i>	C. Blümlein, <i>Bilder aus dem Römisch-Germanischen Kulturleben</i> , München-Berlin, 1926
<i>Bonn. Jahrb.</i>	<i>Bonner Jahrbücher</i>
Bruno, <i>Apporti</i>	M. G. Bruno, <i>Apporti delle Glosse alla conoscenza del lessico agricolo latino</i> , <i>Rend. Ist. Lomb.</i> xciii (1959), 115-54
Bruno, <i>Lessico</i>	M. G. Bruno, <i>Il lessico agricolo latino e le sue continuazioni romanze</i> , <i>Rend. Ist. Lomb.</i> xci (1957), 381-406, 921-1035
Cichorius, <i>Traianssäule</i>	C. Cichorius, <i>Die Reliefs der Traianssäule</i> , Berlin, 1896-1900
<i>CIL</i>	<i>Corpus Inscriptionum Latinarum</i>
<i>Corp. Gloss.</i>	<i>Corpus Glossariorum Latinorum</i> , ed. G. Goetz, Leipzig, 1888-1923
Daremberg-Saglio	Ch. Daremberg and E. Saglio, <i>Dictionnaire des antiquités grecques et romaines</i> , Paris, 1877-1919
Del Pelo Pardi, <i>Attrezzi</i>	G. del Pelo Pardi, <i>Gli attrezzi da taglio per uso agricolo in Italia</i> , <i>Nuovi Annali dell'Agricoltura</i> , Roma, 1933
Ernout-Meillet	A. Ernout and A. Meillet, <i>Dictionnaire étymologique de la langue latine</i> , 4th ed. Paris, 1959
<i>ESAR</i>	<i>Economic Survey of Ancient Rome</i> , ed. T. Frank, Baltimore, 1933-40
Espérandieu, <i>Gaule</i>	E. Espérandieu, <i>Recueil général des bas-reliefs, statues et bustes de la Gaule romaine</i> , Paris, 1907-29
Field Mus. Nat. Hist. Anthr.	Field Museum of Natural History and Anthropology (now the Museum of Natural History), Chicago, Ill., U.S.A.
<i>Gaz. Arch.</i>	<i>Gazette Archéologique</i>
<i>HT</i>	<i>A History of Technology</i> , ed. C. Singer and others, Oxford, 1957
Hanfmann, <i>Season Sarcophagus</i>	G. M. A. Hanfmann, <i>The Season Sarcophagus in Dumbarton Oaks</i> , <i>Dumbarton Oaks Studies</i> II, vol. II, Cambridge, Mass.
Haudricourt-Delamarre	A. G. Haudricourt and M. J.-B. Delamarre, <i>L'Homme et la charrue à travers le monde</i> , 3rd ed. Paris, 1955

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Hopfen, <i>FIATR</i>	H. J. Hopfen, <i>Farm Implements for Arid and Tropical Regions</i> , Rome, 1960
Jaberg-Jud	C. Jaberg and J. Jud, <i>Sprach- und Sachatlas Italiens und der Südschweiz</i> , Zürich, 1928-40
Joep, <i>HT</i>	E. M. Joep, 'Agricultural Implements' in <i>A History of Technology</i> , ed. C. Singer and others, Oxford, 1957
<i>JHS</i>	<i>Journal of Hellenic Studies</i>
<i>JRS</i>	<i>Journal of Roman Studies</i>
Kolendo	J. Kolendo, 'La moissonneuse antique en Gaule romaine', <i>Annales: économies, sociétés, civilisations</i> , xv (1960), 1099-114
Le Gall	J. le Gall, 'Les "falces" et la "faux"', <i>Ét. d'arch. class. II à la mém. de M. Launey, Annales de l'Est</i> , mém. 22 (1959), 4, 44-72
Leser, <i>Entstehung</i>	P. Leser, <i>Die Entstehung und Verbreitung des Pfluges</i> , Münster i. Westphal., 1951
LS	C. T. Lewis and C. Short, <i>A Latin Dictionary</i> , Oxford, 1880
LSJ	H. G. Liddell and R. Scott, <i>A Greek-English Lexicon</i> , 9th ed., ed. by H. Stuart Jones, Oxford, 1940
<i>MEFR</i>	<i>École française de Rome, mélanges d'archéologie et d'histoire</i>
Meyer-Lübke	W. Meyer-Lübke, <i>Romanisches etymologisches Wörterbuch</i> , 3rd edition, Heidelberg, 1935
<i>Not. degli Scavi</i>	<i>Notizie degli scavi di antichità</i>
<i>OED</i>	<i>Oxford English Dictionary</i>
Petrie, <i>TW</i>	Sir W. M. Flinders Petrie, <i>Tools and Weapons</i> , London, 1917
Prêcheur-Canonge	Th. Prêcheur-Canonge, 'Inventaire des mosaïques romaines d'Afrique du nord' in <i>La vie rurale de l'Afrique romaine</i> , Publ. de l'Univ. de Tunis, Paris, n.d. (1962)
<i>Proc. Soc. Ant. Scot.</i>	<i>Proceedings of the Society of Antiquaries of Scotland</i>
R-E	A. Pauly, C. Wissowa and W. Kroll, <i>Realencyclopädie der classischen Altertumswissenschaft</i> , Stuttgart, 1894-
<i>REA</i>	<i>Revue des études anciennes</i>
<i>REL</i>	<i>Revue des études latines</i>
Reinach, <i>Cat. Ill.</i>	S. Reinach, <i>Catalogue illustré du musée des antiquités nationales de St-Germain-en-Laye</i> , Paris, 1923
Renard	M. Renard, 'Technique et agriculture en pays trévire et rémois', <i>Latomus</i> , xviii (1959), 77-109, 307-33
<i>Rend. Ist. Lomb.</i>	<i>Rendiconti dell'Istituto Lombardo</i>
Rich, <i>Dict. Ant.</i>	A. Rich, <i>A Dictionary of Greek and Roman Antiquities</i> , 4th ed., London, 1874
Rostovtzeff, <i>SEHRE</i> ²	M. Rostovtzeff, <i>A Social and Economic History of the Roman Empire</i> , 2nd ed., ed. by P. M. Fraser, Oxford, 1957
Savastano, <i>Arboricoltura</i>	A. Savastano, <i>Arboricoltura</i> , Napoli, 1914
Steensberg	A. Steensberg, <i>Ancient Harvesting Implements</i> , transl. by W. E. Calvert, Copenhagen, 1943

Cambridge University Press

978-0-521-14757-6 - Agricultural Implements of the Roman World

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LIST OF ABBREVIATIONS

Stern, <i>Calendrier</i>	H. Stern, <i>Le Calendrier de 354: étude sur son texte et ses illustrations</i> , Paris, 1953
Thielscher, <i>Belehrung</i>	H. Thielscher, <i>Des Marcus Catos Belehrung über die Landwirtschaft</i> , Berlin, 1963
<i>Trierer Zeitschr.</i>	<i>Trierer Zeitschrift</i>
Walde–Hofmann	A. Walde, <i>Lateinisches etymologisches Wörterbuch</i> , 3rd ed., revised by J. B. Hofmann, Heidelberg, 1938