COPY 4 Part II

"THE FRAGMENTS OF ERATOSTHENES OF CYRENE"

Thesis submitted for the Ph.D. Degree

by

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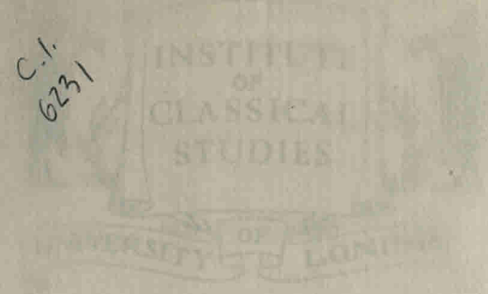
NOTES

ON THE TEXT



INSTITUTE OF CLASSICAL STUDIES
31-34 GORDON SQUARE, LONDON, W.C.1

A. 1. 1: Ἀγλα
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1. 2: Ἀρίο
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1. 2: Lysan
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1. 3. Καλλι
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1. 6:. . .
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NOTES:

LIFE AND WORKS: A-S:

A. 1. 1: Ἀγλαοῦ, οἱ δὲ Ἀμβροσίου. Frs. G and J give Ἀγλαοῦ, but see fr. K. Ἀμβροσίου is generally taken, with reasonable probability, as a nickname or a play on the meaning of ἀγλαοῦ, "glorious".

1. 2: Ἀρίστωνος. See frs. 42 and 43, and Intr. p. xxiii.

1. 2: Lysanias wrote (Ath. XIV, 620C) a work "On Iambic Poets", which may be a part of a general work "On Poets". (Pauly-Wissowa).

1. 3. Καλλιμάχου. Writer of many extant epigrams. See Intr. p. vii, etc., and fr. J, note.

1. 4: τοῦ τρίτου Πτολεμαίου. Euergetes, c. 247-22 B. C.

1. 5: τοῦ πέμπτου. Epiphanes, c. 205-181 B. C. Succeeded at age 5.

1. 6: . . . παιδείας, τοῖς ἄμροις ἐγγίσαντα, βῆτα ἐπεκλήθη.

Em. Meursius, for παιδείας τοῖς ἄμροις ἐγγίσασι τὰ βήματα ἐπεκλήθη.

cf. Marc. Herac. perpil. p. 63: Ἐρατοσθένης, ὃν βῆτα ἐκάλεσαν οἱ τοῦ Μουσείου προστάντες;

also Chrestomath. ex Strab. p. 5 vol. II

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geogr. Hudson: ὅτι Ἐρατοσθένης οὔτε τῶν ἀπαιδεύτων ἦν, οὔτε τῶν γνησίως φιλοσοφούντων· διὸ καὶ βῆτα ἐκαλεῖτο, ὡς τὰ δευτερεῖα φέρειν δοκῶν ἐπὶ πάσῃ παιδείᾳ.

See Intr. p. ix.

l. 7: δεύτερον ἢ νέον Πλάτωνα· Πένταθλον. } See Intr. p. viii.

l. 8: ρκς ''Ολυμπιάδι. 126th Olympiad = 276-2 B. C.

For dates of birth and death, see Intr. pp. i-viii.

l. 9: . . . διὰ τὸ ἀμβλυώττειν. cf. fr. G, and Suidas s. v. Ἀρίσταρχος, where the same account of death is given.

l. 10: Ἀριστοφάνην τὸν Βυζάντιον. . . . . Ἀρίσταρχος.

Both these men were eminent critics and "grammarians". Their exact dates are unknown, but the ἀκμή of Aristophanes appears to have been about the end of the 3rd and beginning of the 2nd century, that of Aristarchus,(whose birth Suidas assigns to the 156th Olympiad) somewhat later. It was Aristophanes who introduced the use of accents in written Greek to assist foreigners in acquiring the correct musical pitch of words, while Aristarchus produced an elaborate new critical edition of the Iliad and Odyssey on which modern editions are founded.

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l. 11: Μνασέας. Author of a περίπλους of Europe, Asia, and Africa, and of a collection of Delphic oracles. He was a follower of Euhemerus (Ath. IV, 158, et passim.)

Ἄρτιος. A friend of Theocritus and Aratus of Cos. (Theoc. VII, 99)

Μένανδρος. Of this Menander nothing more is known (Pauly: Menandros 12)

l. 12: ἱστορίας. cf. fr. K. Knaack takes this as proof that Eratosthenes the son of Agacles is a different man, and Jacoby follows. The word ἱστορία is, however, extremely vague in its essential meaning, and there seems no reason why it should not apply to the Χρονογράφιαι or even to the Γεωγραφικά (see fr. N).

l. 13: καταστερισμούς. Em. Portus, for καταστηριγμούς, or "fixings". For this work see Intr. p. xxviii.

B. Apollonius, usually called Rhodius for his success in teaching rhetoric there, was born at Alexandria. His exact dates are unknown, but he flourished about 200 B. C. His chief work is the still extant "Argonautica", which contains many fine passages and whose third book conveys a foretaste of Romantic literature. It is marred by the excess of recondite reference typical of "Alexandrianism".

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l. 8: τῷ
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l. 2: σύγχρονος. Not necessarily, nor probably, "of the same age", but "living at the same time".

l. 3: Εὐφορίωνος. Poet and critic, librarian at Antioch 221 B. C. Born at Chalcis in Euboea in the same Olympiad as Eratosthenes. (Suidas) He studied under Lacydes and Prytanis (Ath. XI p. 447c)

Τιμάρχος. He is not mentioned elsewhere.

C. This fragment, which reverses the order of Eratosthenes and Apollonius, is accepted by Jacoby in spite of its difficulties and obvious inaccuracies which are pointed out by Grenfell and Hunt.

l. 3: τοῦ πρώτου βασιλέως. "An obvious mistake" (G. and H.) for τρίτου (Euergetes I). Jacoby accepts the emendation without comment.

l. 4: Apollonius the Portrait-Painter, of unknown date, was concerned in establishing the Pindaric canon (Pauly)

Aristarchus: see fr. A, note.

l. 7: Φιλοπάτορος. "A mistake" (G. and H.) for Ἐπιφάνους or Φιλομήτορος, cf. Suidas: Ἀρίσταρχος· γέγονε δὲ . . . . . ἐπὶ Πτολεμαίου τοῦ Φιλομήτορος, οὗ καὶ τὸν υἱον (Εὐπάτορα) ἐπαίδευσεν.

l. 8: τῷ ἑνάτῳ βασιλεί. "τοῦ ἑνάτου βασιλέως" is expected; moreover Euergetes II, if he is here meant, is usually called the 7th or 8th Ptolemy" (G. and H.)

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l. 8: Ζηνο. . . . . Ζηνόδοτος, "or possibly Ζηνοδωρος." (G. and H.)

D. Euclid flourished about 300 B. C.
Archimedes was killed at the siege of Syracuse in 212 B. C., aged 75. (Tzetzes, Chil. II, 106) σύγχρονοι need not mean exact contemporaries here, any more than in fr. B. For the relationship of Eratosthenes and Archimedes see fr. M and note. To what written work of Eratosthenes ὥσπερ καί φησιν refers there is no evidence.

E. If this is the Philochorus who wrote the "Atthis", a history of Athens to 262 B. C. (cf. frr. 59, 114), clearly Suidas has his dates the wrong way round whatever birth-date is assigned to Eratosthenes.

F. Xenocrates became president of the Academy in 339 B. C., aged 57, between Speusippus and Polemon. (Diog. Laert. IV, 15)

G. l. 1: Contrast fr. A: ἀποσχόμενος τροφῆς διὰ τὸ ἀμβλυώττειν.

H. The omitted portion of this passage, which appears to refer to the work of Eratosthenes on Ariston, is included below as fr. 42.

l. 2: A good deal of what we have of the "Geography" is

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11. 10-15: cf
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known to us only at third hand, being quoted by Strabo from Hipparchus' work "Against Eratosthenes". See e. g. frr. 188, 206, 213.

l. 4: cf. Schol. Arist. Av. 11: μέμνηται δὲ αὐτοῦ καὶ Πολέμων ἐν τῷ δευτέρῳ περὶ τῆς Ἀθήνησιν Ἐρατοσθένους ἀποδημίας, and Schol. Soph. Oed. Col. 489: μετὰ γὰρ ἡσυχίας τὰ ἱερὰ (τῶν Εὐμενιδῶν) δρῶσι, καὶ διὰ τοῦτο οἱ ἀπὸ Ἡσύχου θύουσιν αὐταῖς, καθάπερ Πολέμων ἐν τοῖς πρὸς Ἐρατοσθένην φησίν. . . . . Also see Fr. 61, n.
There is no need to suppose that Polemon's quip that Eratosthenes "had not even seen Athens" was meant to be taken literally, or otherwise than as a suggestion that Eratosthenes, writing of Athenian matters in later life, had found his memory somewhat unreliable.

l. 8: ἡ περὶ τῶν ἀγαθῶν ἐκδοθεῖσα. Frr. 44-7.
μελέται. "Exercises" or "essays", usually on philosophical subjects.

ll. 10-15: cf. Fr. A, ll. 5-6, and notes; also inconnexion with "mathematical geography", Strab C. 94: πολλαχοῦ γὰρ ἐκπίπτει πρὸς τὸ ἐπιστημονικώτερον τῆς προκειμένης ἱστορίας, ἐκπεσὼν δὲ οὐκ ἀκριβεῖς, ἀλλ' ὀδοσχερεῖς ποιεῖται τας ἀποφάσεις, τρόπον τινὰ ἐν μὲν τοῖς γεωγραφικοῖς μαθηματικός,

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ἐν δὲ τοῖς μαθηματικοῖς γεωγραφικός ὢν, ὥστε πρὸς ἄμφω δίδωσιν ἀφορμὰς τοῖς ἀντιλέγουσιν.

I. Apollodorus of Cyme is mentioned also by Pliny (H. N. VII, 37) as having been specially honoured by the Amphictyonic Council. He wrote a work on drinking vessels often quoted by Suidas and the Etymology. (Ath. XI, 487)

The word "critic", popular in modern times, was not very much used in antiquity, its connotation being included in that of "grammarian". "Grammar" is a peculiarly Alexandrian invention, of which the nearest modern equivalent is perhaps "Scholarship". It included not only the study of language in its mechanical aspects but also that of style, and hence literary studies generally. Almost immediately this conception spread to the schools of Rome, which came under Greek influence in the 2nd century B. C., and "grammar" became for boys up to 14 or 15 the normal study leading up to the "higher" studies of rhetoric and later to the seven liberal arts. For the development of this idea, which still influences the idea of the "Grammar School"in England, see Aubrey Gwynn's "Roman Education" (Oxford, 1926).

A curious light is thrown on the respect paid to

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K. See

grammarians in the Middle Ages by the development of "grammar" into "gramarye", or magic, and later into "glamour".

For Eratosthenes' work on the subject, which seems to have been more concentrated on the modern idea of linguistic study, see Intr. p. xx and frr. 92-100.

Suetonius (de Illustr. Gramm. 10) also attributes to Eratosthenes the title φιλόλογος, presumably an alternative and almost equivalent to γραμματικός: "Philologi appellationem assumpsisse videtur (Ateius), quia, sicut Eratosthenes, qui primus hoc cognomen sibi vindicavit, multiplici variaque doctrina censebatur."

J. cf. Strab. C. 838: Κυρηναῖος δ'ἐστὶ καὶ Καλλίμαχος καὶ Ἐρατοσθένης, ἀμφότεροι τετιμημένοι παρὰ τοῖς τῶν Αἰγυπτίων βασιλεῦσιν, ὁ μὲν ποιητὴς ἅμα καὶ περὶ γραμματικὴν ἐσπουδακώς, ὁ δὲ καὶ ταῦτα, καὶ περὶ φιλοσοφίαν, καὶ τὰ μαθήματα, εἴ τις ἄλλος, διαφέρων.

The order in which Eratosthenes' interests are placed in both these passages is noteworthy, as is also the fact that, like the entry in Suidas, neither mentions geography at all. See Intr. pp. ix-xi.

K. See Fr. A, l. 12, n.

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L. For the correspondence of Archimedes with Eratosthenes, see Arch. ed. Heiberg vol. II p. 426, or Ivor Thomas, "Greek Mathematical Works", vol. II p. 220:

(Dedication of "The Method"). Περὶ τῶν μηχανικῶν θεωρημάτων πρὸς Ἐρατοσθένην ἔφοδος· Ἀρχιμήδης Ἐρατοσθένει εὖ πράττειν. ἀπεστείλα σοι πρότερον. . .

M. For the authenticity of Eratosthenes' Egyptian studies and records, see Intr. p. xix.

N. The original "Periegesis" of Scymnus was in prose: nothing is known of the origins of this extant work. (Meineke, ed. Berlin, 1846).

l. 3: ἱστορικόν. See Fr. A, l. 12, n., and Fr. K.

l. 5: κλίμασι. See Intr. p. lxx. Here this term appears to be attributed loosely to Eratosthenes, κλίμασι καὶ σχήμασι being roughly equivalent to the modern "physical geography". Cf. fr. P.

O. It is a remarkable tribute to the lasting influence of Eratosthenes on geography that, not only did Julius Caesar take his map on his campaigns (see Intr. p. xl.), but Cicero naturally turned to him as a "model" for a standard work in Latin. It is quite clear that Hipparchus had not succeeded in deposing him from his pre-eminence, for evidently

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Cicero had not even come across Hipparchus' work until he was well on the way to setting about his own. Cicero, though no mathematician, may be taken as typical of the best education of his time apart from mathematical specialists, who were uncommon in Rome.

Serapio of Antioch was among the chief authorities in geographical matters used by Pliny (Elench. Lib. II, 4, 5).

P. Arrian, nearly two centuries after Cicero, still regards Eratosthenes as the best authority for Eastern geography. For the North and West, authorities had multiplied in the meantime, especially for Gaul and Britain.

(γῆς) περίοδος, geographically, is used in two senses: (1) map or chart (Herod. IV, 56, V, 49; Arist. Nub. 206); (2) descriptive geography (Aristot. Pol. II, 3, 9; Rhet. I, 4, 13)

Q. The coupling of these two names (cf. Strab. C. 104) suggests that they had a good deal in common (see Intr.p. lxviii.) The following fragment shows that Eratosthenes was not averse from adopting in considerable detail other people's work. The maps of Dicaearchus were still current in Cicero's time. ". . . hominis, non nequam, sed etiam tuo iudicio

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probati Dicaearchi tabulis credidi." (Cic. Ep. ad Att. VI 2)

R. Timosthenes flourished c. 282 B. C. See Intr. p. lxvii. To what extent this accusation is justified it is impossible to say definitely, though Strabo, C. 92, suggests that it was at least exaggerated: . . . . .καὶ ὑπὸ Τιμοσθένους τοῦ τοὺς λιμένας συγγράψαντος (ὃν ἐπαινεῖ μὲν ἐκεῖνος μάλιστα τῶν ἄλλων, διαφωνῶν δ'ἐλέγχεται πρὸς αὐτὸν πλεῖστα). . . . . It must be remembered that in ancient times not only was there no law of copyright but adaptation and even verbatim copying, with or without acknowledgment, was common and without serious moral stigma. It is not easy to decide where Strabo's quotations begin and end; and even in works of imagination we find a master like Virgil appropriating whole lines from Lucretius as well as literally translating Eratosthenes himself. (See fr. 13, n.) There can be little doubt that Eratosthenes himself adopted and incorporated most of Pytheas on N. W. Europe. (Fr. 271 ff.) Gossellin used this passage to support his charge of ignorant plagiarism from a previous race of astronomers. (Intr. p. lxii)

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8. Aegisthus was the lover of Clytaennestra, who for his sake murdered her husband Agamemnon in his bath on his return from Troy.

It is interesting to note that Eratosthenes, where accusations of plagiarism were concerned, could hold his own not without wit.

Andreas was physician to Ptolemy IV Philopator, and was murdered in mistake for his master in 217 B. C. (Polyb. V, 81) He is mentioned also as a mountebank in Galen XI, 795.

NOTES ON TEXT:

Hermes:

1. This verse is quoted in Stob. Flor. XCV, 15 together with fr. 7, according to Heller in connexion with the educative effect of suffering. Both Bergk and Hiller assign it tentatively to the beginning of the poem, which appears to have opened with the birth of Hermes and the creation of the Milky Way: this was due, according to Eratosthenes (Ach. Tat. in Ar. p. 146 E; Hyg. de Astr. II 43) to his tugging at Hera's breast and spilling her milk when she offered to suckle him.

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2. Theod. περὶ κλίσεως τῶν εἰς ων βαρυτόνων, ed. Dind. ad Schol. Aristoph. vol. III p. 418. The word Λαδονος (em. Dind. Λάδωνος) is quoted as an example of declension. Hiller assigns to "Hermes" as the story begins in Arcadia, where the river Ladon flows. It is mentioned also in fr. 261.

3. Chaerob. in Theod. p. 119. This also is quoted to illustrate the declension of Ἀρύας. This river is not known. Hiller follows Bernhardy in taking it as an Aeolian form of Ἄροας, a tributary of the Ladon. (cf. ξόανος, ξύανος). cf. also Strabo C. 389: Ἀνίαν καλὸν ποταμόν.

4. Schol. Ap. Rhod. III 802, on the derivation of φωριαμὸς. Hiller suggests that the reference is to the story told in Schol. Il. 24, 24. This relates how the infant Hermes stole and hid the clothes of his mother Maia and her sister nymphs while they were bathing, returning them after he had had a laugh at their expense.

5. Ath. V. p. 189 D, on the use of βαθύς as a feminine form, comparing θῆλυς ἔέρση (Hes. Sc. 395 and Hom. Od. V 467). Bernhardy refers to the theft of the oxen, with some probability. cf. Hom. Hym. 95:

πολλὰ ὄρη σκιόεντα καὶ αὐλῶνας κελαδεινοὺς
καὶ πε δι' ἀνθεμόεντα διήλασε κύδιμος Ἑρμῆς.

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6. Pollux VII, 90, quotes for the word φαινασιόν, as a white shoe worn by Athenian gymnasiarchs, Egyptian priests, and, here, country people. Bergk reads κοτιρράπτεσκεν for the Aldine κοτὶ ῥάπτεσκεν, and explains as a method of eluding pursuit instead of reversing sandals.

Bernhardy reads κέλμα κοτί ῥαπτάσκεν. . . . ., and explains as referring to Aphrodite's shoe, taken by Zeus's eagle to Hermes who was in love with her.

7. See note on fr. 1.

8. These lines are quoted, with minor variations, as follows: Schol. Ap. Rhod. I 972; Et. m. 472, 36 s. v. ἴουλος; Tzetz. in Lyc. 23; Tzetz. Chil. XIII, 563; Schol. Ap. Rhod. II, 43. The first of these explains that the primary meaning of ἴουλος is "the first growth of hair on the chin", but that Eratosthenes uses it to mean "a reaper's song", while Didymus, pointing out that both οὖλος and ἴουλος can signify a sheaf, and that Demeter bears the surname Οὐλώ, says that it is used of a hymn to Demeter: he compares the οὔπιγγος of the Troezenians to Artemis.

1. 2: δενδαλίδας· Hesychius gives οἱ μὲν ἄνθος τι· ἄλλοι τὰς λευκὰς κάχρυς (parched barley)· οἱ δὲ τὰς

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1. 3: ἱερ

ἐπτισμένας κριθὰς (winnowed barley) πρὸ τοῦ φρυγῆναι· οἱ δὲ τὰς ἐκ κριθῶν μάζας γενομένας.

9. Et. m. 135, 31 quotes as ἐν τῷ Ἑρμῇ simply, together with a pentameter illustrating the more normal spelling: νιψάμεναι κρήνης ἔδραμον Ἀργαφίης. Bergk and Osann both assign to the "Hermes" of Eratosthenes rather than that of Philetas, and Bergk goes on to assign the pentameter to the "Erigone." It is, however, scarcely likely that Eratosthenes, a specialist in etymology and spelling, would use two spellings of one word even in different poems.

10. Ath. VII p. 284D: the 3rd. line is also quoted in Plut. de soll. anim. p. 981 D, reading εὐδρομίην.

cf. also Ath. VII p. 284 C, from the "Galatea" of Callimachus:

ἢ μᾶλλον χρύσειον ἐν ὀφρύσιν ἱερὸν ἰχθύν,
ἢ κέρκας, ὅσα τ' ἄλλα φέρει βυθὸς ἄσκετος ἁλμῆς.

l. 1: ἰούλους. The "red-fish", or "rainbow-wrasse," more usually ἰουλίς (Arist. H.A. 9, 2, 1 etc.), or χρύσοφρυς ("golden-brow").

l. 2: κίχλη. "Thrush" or "fieldfare": perhaps "speckled."

l. 3: ἱερόν. According to Plutarch, "large", as

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θεσπέσιος etc.

d'Arcy W. Thompson in his "Glossary of Greek Fishes" (Oxford, 1947) pp. 293-4, gives χρύσοφρυς = Gilthead or Dorade, otherwise χρυσωπός (Plut. 977E). He adds that it has a gold band between the eyes, and is sacred to Aphrodite (Arch. ap. Ath. 328 A): it is a sea-fish (Plin. XXXII, 145) but lives inshore and in estuaries.

11. Theo Smyrn. p. 165 (Bull). At p. 192 Theo describes how, according to Eratosthenes, Hermes, after inventing the lyre with a complete octave of eight strings, travelled up into the heavens and was amazed to find that the eight spheres between the unmoved earth and the sphere of the fixed stars each emitted a note corresponding with the scale of his own instrument. Both Theo and Chalcid. comment. in Plat. Tim. 72 emphasize that Eratosthenes did not follow the orthodox Pythagorean order or that of Alexander of Ephesus, but placed the moon and sun first and second from the earth.

Eratosthenes appears to have dealt with this

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subject in prose also, probably in the "Platonicus". See frr. 35, 36 and note.

12. Ach. Tat. p. 152 A quotes in connexion with the "axis", or "spirit" (πνεῦμα) of the universe.

l. 1: αὐτήν. Bernhardy misunderstood as the middle zone. Bergk and Hiller refer it to the earth itself, which makes excellent sense: Theo, on fr. 11, specifically states that Eratosthenes placed the earth fixed in the centre.

Ὀλύμπου. In the Iliad always a mountain, in the Odyssey often confused with οὐρανός, e.g. XX, 103 and 113:

αὐτίκα δ' ἔβρόντησεν ἀπ' αἰγλήεντος Ὀλύμπου,

and ἦ μεγάλ' ἔβρόντησας ἀπ' οὐρανοῦ ἀστερόεντος.

In later times commonly used by philosophers and poets for the sky.

l. 2: ἔπι, Brunck for ἄπο, which hardly makes sense.

13. Ach. Tat. p. 153 C

For the Zones and their treatment, see Introd. pp. l-lii and frr. 169-173 in the "Geography".

The text of this passage, though corrupt, shows sufficient power to explain why it made such an impression on the contemporaries and

subject in prose also, notably in the "Timaeus".
See Tar. 35, 36 and note.

12. Aon. Tat. p. 192 A quotes in connexion with the "axis", or spirit (πνεῦμα) of the universe.

l. 1: αὐτήν. Hermarchy misunderstood as the middle zone. Berek and Miller refer it to the earth itself, which seems irrelevant manner. Thee, on Fr. 11, specifically states that Eratosthenes placed the earth fixed in the centre.

'Ομήρου. In the Iliad always a mountain, in the Odyssey often connected with οὐρανός, e.g. 1.53 and 12.3:

αὐτὰρ ὑπ' ἠερόεντα κατ' οὐρανὸν εὐρὺν ἀερθεὶς
καὶ μετὰ τοῖσι θεοῖσι κατ' ἀγλαὸν ἔδος ἵκανε.

In later times commonly used by philosophers and poets for the sky.

l. 2: ἔα, Brunck for ἐάν, which hardly makes sense.

13. Aon. Tat. p. 193 ?

For the Zeus and their treatment, see Introd. pp. 1-111 and Fr. 168-173 in the "Cosmogony".

The text of this passage, though corrupt, shows sufficient power to explain why it made such an impression on the contemporaries and

successors of Eratosthenes at least until Virgil (Georg. I 233-9) adapted it into Latin:

"Quinque tenent caelum zonae: quorum una corusco
semper sole rubens et torrida semper ab igni;
quam circum extremae dextra laevaque trahuntur
caeruleae, glacie concretae atque imbribus atris;
has inter mediamque duae mortalibus aegris
munere concessae divum, et via secta per ambas,
obliquus qua se signorum verteret ordo . . . ."

The text given here is that of E. Hiller, "Eratosthenes carminum reliquiae". J.U. Powell reads, in l. 9: αἰεὶ πρυμαλέαι, αἰεὶ δ'ὕδατι νοτέουσαι, and for l. 11:

κεῖτ', αἰάν τ'ἀμπίσχε, περὶ ψῦχος δ'ἐτέτυκτο.
ἀλλὰ τὰ μὲν χερσαῖα . . . . .
. . . . . ἀνέμβατοι ἀνθρώποισι·

Anterinys or Hesiod:

14. Schol. Nic. Ther. 472, coupled with the following lines of Antimachus:

Ἡφαίστου πυρὶ εἴκελον, ἦν ῥα τιτύσκει
δαίμων ἀκροτάτης ὄρεος κορυφῇσι Μοσύχλου.

Mosychlus was a volcanic mountain in Lemnos. Bergk emended the MS. εὖ τοι ὄσοις φαίνεσκε . . .

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ἐκ κάνθων φαίνεσκε . . . . .

He quoted Schol. Arist. Lys. 298 for "Lemnian fire", either from the island's women or from Hephaestus.

Bernhardy emended to Εὔιος, ὃς φαίνεσκε . . . . This emendation was accepted by Osann, who assigned the line to the "Erigone", supplying οἶνον from the following line.

The text given is that of Hiller, who assigns it to the "Anterinys" on the ground that the next two fragments, from the same source, clearly belong to it. Powell follows this, and in the absence of other evidence the suggestion may be provisionally accepted.

15. Schol. Nic. Ther. 465, explaining the word κυθεδόνες as σηκεδόνες δυσιάτοι.

Bergk reads κυθεδόνες γάγγραιναν ὀκέτρεφον . . . , and refers the quotation to the disease sent to the Athenians as a punishment for killing Icarius, in the "Hermes". He distinguishes between the diseases described in the "Hermes".and the "Erigone": in the latter it consisted of maidens hanging themselves- the origin of Αἰώρα, a Dionysiac festival at which the Ἀλῆτις was sung and dolls were hung up.

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Hiller's explanation, that it refers to the body of Hesiod after it had been in the sea, has perhaps the greatest probability. It is, however, rejected by Powell, who leaves its position uncertain.

16. Schol. Nic. Ther. 400, quoted for the meaning of ἰυγή, which is explained as βοὴ ἀδιάρθρωτος ἀπὸ τοῦ συμβαίνοντος πεποιημένη. It is quoted as ἐν Ἐριννύι: Bernhardy explains this as a mistake for "Erigone", but Bergk and Hiller refer it to the finding of Hesiod's body in the "Anterinys".

Erigone:

17. Hyg. de astr. II, 4. Hyginus, quoting this line, describes how Icarius planted and tended the vine-shoot given him by Bacchus. It had just come to blossom when a goat nibbled it. Icarius killed the goat, made its hide into a bladder, and danced round it with his companions. This was the origin of the festival of the Ascolia, and according to Bergk the line should be assigned to the "Hermes" with the rest of the unnamed references by Hyginus: he reads Ἰκαρίου κοσὶ . . . . ., following

Hiller's explanation, that it refers to the body of Hesiod after it had been in the sea, has perhaps the greatest probability. It is, however, rejected by Powell, who leaves the question uncertain.

16. Dorpf. Nic. Ther. 400, quoted for the meaning of ἰγνύη, which is explained as βοῦ ὀδαξηρεφὲς ἀπὸ τοῦ συμβεβηκότος καταχρήσει. It is quoted as ἐν Ἐρινεῷ: Bernhardy explains this as a mistake for "Αἰγίονα", but Herzog and Hiller refer it to the finding of Hesiod's body in the "Antaeiqua".

Scholia.

17. Ἡγε. ἐν ἀστρ. II, 4. Hyginus, quoting this line, describes how Icarius planted and tended the vine-shoot given him by Bacchus. It had just come to blossom when a goat nibbled it. Icarius killed the goat, made its skin into a bladder, and danced round it with his companions. This was the origin or the festival of the Ascolia, and according to Herzog this line should be assigned to the "Aetiae" with the rest of the usual references by Hygin- must be read 'Ἰκαρίου κοῦ . . . . .' following

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in part Bernhardy's reading of Ἰκαρίοι κοσὶ . . . Powell, with Hiller, places it at the beginning of the "Erigone".

cf. Steph. Byz. Ἰκαρία· δῆμος Αἰγηίδος φυλῆς, ἀπὸ Ἰκαρίου τοῦ πατρὸς Ἠριγόνης; and Athenaeus II p. 40 B: ἀπὸ μέθης καὶ ἡ τῆς κωμῳδίας καὶ ἡ τῆς τραγῳδίας εὕρεσις ἐν Ἰκαρίῳ τῆς Ἀττικῆς εὑρέθη.

Icarus was the island of Pramnian wine.

18. Steph. Byz. s.v.ἄστυ Bernhardy reads ἄστυ τε δὴ Θ . . . . ., and Bergk follows. This seems a more reasonable correction of the MS. εἴς τε δὴ Θ . . . . . than Hiller's εἰσότε δὴ . . . . ., which Powell accepts.

Thoricus was a deme of Attica near Eleusis, through which, as Bergk points out, Demeter also passed on her way to Eleusis (Hymn to D. 126). Icarius was killed near Marathon, according to Statius XI, 644. This line, according to Bergk, refers to Bacchus going to or from Icarius.

19. Schol. Dion. Thr. p. 654, illustrating the etymology of both ἐξαύσατο and βαυνόν from the verb αὔνω, "I kindle".

in part Burchardt's reading of 'Inopis and . . . Powell, with Hiller, places it at the beginning of the "Erinnes".

cf. Steph. Byz. 'Ινωπία· ὄρος Λιγύδος φυλῆς, ἀπὸ Ἰνωποῦ τοῦ κατὰ Ἡριγόνην; and Athenaeus II p. 40 B: ἀπὸ δὲ ἀνθῶν καὶ ἡ τῆς ἀμπελίας καὶ ἡ τῆς τριγωνίας εὑρεσις ἐν Ἰνωπῷ τῇ Ἀττικῇ κώμῃ.

Ioanna was the island of Dionysian wine.

18. Steph. Byz. s.v. Θόρυ Burchardt reads Θόρυ τε δή Θ . . . . . and Berge follows. This seems a very reasonable correction of the MS. εἴτε τε δή Θ . . . . . then Hiller's εἴτε δή . . . . . which Powell accepts.

Thoryne was a town of Attica near Eleusis, through which, as Berge points out, Demeter also passed on her way to Eleusis (Pausanias to D. 136). Ioanine was killed near Marathon, according to Scholion II. 684. This line, according to Berge, refers to Bacchus going to or from Ioanina.

19. Schol. Ὀρφ. Βάτ. p. 694, illustrating the etymology of both ἐλιδνάω and ἑλιδνός from the verb αἴνω, "I kindle".

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Powell hesitatingly accepts Bergk's suggestion that this refers to Icarius when entertaining Dionysus.

20. Plut. conv. disp. p. 699 A, and Macrob. Sat. VII 15, 22. The line is quoted as support for Plato's doctrine that drink passes through the lungs. Bergk's suggestion that it refers to Icarius tasting wine for the first time is as likely as any.

21. Schol. Dioscoridis apud Matth. Med. vet. p. 360. Osann refers this line, which is quoted in connexion with botanical terminology, to Dionysus giving a lesson in viticulture to Icarius. Hiller follows Bergk's attribution to the eating of the vine-shoots by the goat. There is no evidence whatever which explanation, if either, is to be accepted.

22. βίς Theod. περὶ κλίσεως τῶν εἰς ων ὀξωτόνων. Assigned by Powell, with moderate probability, to the description of the growing vine.

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23. Ath. II p. 36 E, and Stob.Flor. XVIII, 3. The same two couplets are also quoted by Clem. Alex., Paedag. II p. 155 D, who adds

φαίνει ἁμαρτοεπὴς οἶνος μεθύουσιν ὅλισθος
οἶνος ψυχαπάτης . . . . . ,

apparently from another source.

There is no real evidence that these couplets form part of the Erigone. They would, if detached, constitute a complete epigram of the Alexandrian type. This is the interpretation adopted by Powell. Having regard, however, to the subject, it seems better to follow Osann, Bergk and Hiller, of whom Osann assigned them to a speech of Dionysus to Icarius, Bergk to the narrative of the murder of Icarius by shepherds influenced by wine: the last is the most reasonable explanation.

l. 2: Λίβυσσαν ἅλα. No doubt a personal picture of the sea at home in Cyrene.

Epithalamium:

24. Et. m. 170, 47: Ἐρατοσθένης δὲ ἐν ἐπιθαλαμίῳ τὸ κατὰ βότρυν πλῆμα. εἴρηται δὲ ἐπαιωρημένη οὖσα ὄσχη. Reluctant to admit the possibility of an epithalamium, Bernhardy emended Ἐ. δὲ ἐν Ἠριγόνῃ· ἔτι θαλλομένη τ' αὐροσχάς· τὸ κατὰ

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βότρυν κλῆμα, an enterprising way of removing the apparent difficulty. Even Hiller suspected a lacuna between Ἐρατοσθένης and ἐν ἐκιθαλαμίῳ. Powell, however, follows Bergk by placing it under a separate heading, as here.

Osann connects the quotation, by way of ἐκαιωρημένη, with the festival of the Αἰώρα (see fr. 15, n.), but Bergk rightly rejects.

For "Icarioneia", cf. fr. 17, and note.

Epigram.

25. Eutocius ad Arch. sphaer. et cyl. II, 1.

Osann (de Erigone p. 6), (Nachr. Gott. Ges. d. Wissensch. 1894, I) and Knaack (Pauly-Wissowa) believe this epigram genuine. Hiller (E. Carm. Rel. p. 122) is emphatically against it, and Powell, though including it with the Eratosthenic verse, is extremely doubtful of its authenticity mainly on linguistic grounds. His objections, though they must carry weight when dealing with a "grammarian" like Eratosthenes, are not conclusive. The subject is not in any sense

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literary; and the whole outburst conveys a sense of almost naive exultation in achievement which fits what we know of the man's character.

l. 1: ζγαθε. Powell objects that this is not a likely form of address from Eratosthenes to the king. It is, however, a normal address to the passer-by in inscriptions, and there is nothing intrinsically unlikely in the addition of an "apostrophe" such as the last six lines.

l. 2: ἄλλην might be expected for exact sense: " . . . . . any solid character into another", but " . . . . . into something else" is reasonably intelligible.

l. 4: σῖρός, later σῑρός (Draco p. 81).

l. 7: For the figure and demonstration of the construction by half-cylinders, beautiful in theory but not practical (δυσμήχανα), see Heath "Greek Mathematics", vol. I, pp. 246-9.

l. 8: For Menaechmus's two solutions by conic sections, see Heath I, 251-5. Menaechmus was a pupil of Eudoxus and is credited with the discovery of conic sections.

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l. 9: θεουδέος: "god-fearing"; perhaps θεοδείς, not θεοειδής. It is a little difficult to see why Eudoxus in particular should have this epithet, but Powell's objections to this and to the form δίζηαι seem insufficient to prove spuriousness.

According to Heath (pp. 249-51) the solution attributed to Eudoxus by Eutocius is incorrect: Heath suggests that "while Eudoxus made use of what was really a curvilinear locus, he did not actually draw the whole curve but only indicated a point or two upon it sufficient for his purpose." The actual solutions given are the suggestions of Tannery.

l. 12: ἐκ παύρου κυθμένος ἀρχόμενος. "However small the original lines", or perhaps "however small the difference between them".

l. 13: Πτολεμαῖε πατήρ: Euergetes. παιδί: Philopator.

Doubtful Poems.

26. Ath. I, p. 24 A, on the meaning of κάσασθαι, "to be satisfied". Callimachus is also quoted

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in the sense of "tasting" a story.

It is hardly likely that this fragment refers to the supper of Dionysus with Icarius.

27. Ath. I, p. 2 A: referred to ὁ Κυρηναῖος ποιητής- most probably Eratosthenes, as this is how Athenaeus introduces the lines on wine, fr. 23. Bergk places this quotation at the beginning of the "Erigone", in the sense of "third time lucky", deducing that this is a second edition of the full story, the first attempt being a brief form in the "Hermes" among the accounts of some of the stars. Hiller rejects this; but there is no reason why Bergk's suggestion should not be possible in the simple sense that the "Erigone" followed two other major poems.

28. Plin. Nat. Hist. XXII #86.

Bernhardy includes this extract among the fragments of "The Old Comedy". Bergk and Hiller, with some degree of probability, refer it to the meal of Dionysus with Icarius. Powell puts it among the doubtful fragments, where it seems better to leave it.

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29. Ἀντιμάχειος. It is not impossible that this should refer to Antimachus, who flourished towards the end of the 5th century B.C. and wrote an epic "The Thebaid". It looks, however, as though there were some corruption arising from ἀντιμαχητύς; and for this reason Bernhardy reads Ἀττική.

Hiller suggests that perhaps πολλῇ . . . . . ἀντ. are the beginning and end of a hexameter.

Platonicus.

30. Blass de Plat. math. 27: "Videtur mihi veri non dissimile, ab Eratosthene qui ipse poeta fuit hanc de peste Deliaca fabulam esse fictam, qui aemularetur Euripideam". Hiller (Der Πλατωνικός des E.) quotes this remark and objects that the "Platonicus" is no fit place for poetic invention. It does not matter very much whether the story is true or not, but Hiller seems here to be applying Teutonic ideas of suitability and forgetting the Platonic myth. If, as seems most likely, the "Platonicus" was based to some extent on Plato's "Timaeus", it is not difficult to remember that the "Timaeus" begins with the story of Atlantis, which, though

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generally admitted to be fictitious, is frequently taken as a basis for geographical speculation even today. Bernhardy, although he does not seriously try to separate the "Platonicus" from the other philosophical works, places this first among the philosophical fragments.

Whatever the truth is about the Delians, Plato's opinion is clearly stated in Rep.528 A:

. . . . . οὐδεμία πόλις ἐντίμως αὐτὰ ἔχει, ἀσθενῶς τε ζητεῖται, χαλεπὰ ὄντα.

Both the proof and the Delian story are mentioned in connexion with Archytas and Eratosthenes by Vitruvius (de Arch. IX #13-14). See also Procl. in Tim. 149 D and Pappus a (Commandino conversus) III prop. 4.

31. There can be little doubt that the Doubling of the Cube was discussed in the "Platonicus", and it seems reasonable to suppose that the story of the problem from Minos and the Delians on to Menaechmus and Archytas led up to a general discussion on "means", proportions, the universe, the musical scale and perhaps the nature of the soul. Whether a detailed proof of the efficiency

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of the μεσόλαβον was included it is impossible to say, but the general trend cannot have been much different from that given here. This "letter", in the form in which it is quoted by Eutocius, is now generally considered spurious on the authority of Wilamowitz (Goett. Nachr. 1894), but it cannot be determined whether it was based on a prose original or merely a prose expansion of the epigram (fr. 25) with a proof derived by the author from actual sight of the monument. In favour of this view is the fact that the epigram itself is addressed to King Ptolemy.

ll. 5-7: These three lines are not from any known source. They were attributed to Euripides, but Wilamowitz ascribes them to some minor poet: see Ivor Thomas, I, 258, n. The text of lines 6 and 7 was restored by Hiller and adopted by Heiberg from the corrupt version given by Bernhardy from the edition of 1544: διπλάσιος ἔστω, τοῦ κύβου δὲ μὴ σφαλῇς· . . . . . διπλασιάζων ἕκαστον κῶλον ἐν κάχει τάφου ἐδόκει διημαρτηκέναι·

l. 16: Hippocrates of Chios, according to Philoponus (in Phys. I, 2 (Arist. 185 a 16) ed. Vitelli

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31, 3-9) came to Athens to prosecute some pirates who had robbed him. He there consorted with philosophers and became proficient in geometry. He attempted to square the circle by way of "quadrature of the lune". See Ivor Thomas I, 235-253.

ll. 17-20: "If x and y are mean proportionals between a and b, then $\frac{a}{x} = \frac{x}{y} = \frac{y}{b}$ $\therefore y = \frac{x^2}{a} = \frac{ab}{x}$, and, eliminating y, $x^3 = a^2 b$, so that $\frac{a^3}{x^3} = \frac{a}{b}$." (Ivor Thomas, I, 258-9, n.)

ll. 27-31: For Archytas, Eudoxus and Menaechmus see notes on fr. 25.

ll. 41-42: καὶ διὰ τῆς τούτου κ.τ.λ. Literally: "And by means of its (the measure's) side measure of the vessels capable of receiving these (the medimni), how great is their (the vessels') capacity".

ll. 53-55: From the point of view of rigidity rectangles would be more satisfactory , though in the absence of a transparent material like celluloid it would be difficult if not impossible in practice to see the points of intersection of the diagonals. In the account given by Pappus (Coll. III, 7) triangular plates are given. See figure, (next page).

71. 3-9) seems to always to pronounce some pi-
rates who had robbed him. He then commenced
with philosophers and became proficient in geo-
metry. He attempted to square the circle by
way of "quadrature of the lune". See Ivor
Thomas I, 235-237.

11. 17-20: "If x and y are mean proportionals between
a and b, then $\frac{y}{a} = \frac{x}{b}$

$\therefore y = \frac{a}{x} \times \frac{ab}{x}$,

and, eliminating y, $x^2 = a^2b$, so that $\frac{b}{a} = \frac{a^2}{b^2}$."
(Ivor Thomas, I, 258-9, n.)

11. 27-31: For Anaxyrus, Bahurus and Ismaelians see notes
on p. 35.

11. 31-33: wal ḥiḍ ṭarīq ṭarīqu n.t.λ. Literally:
"And by means of his (the measure's) rule ma-
ture of the vessels to enable of receiving them
(the contents), how great is their (the vessels')
capacity".

11. 33-35: From the point of view of rigidity protractors
would be more satisfactory, though in the absence
of a transparent material like celluloid it
would be difficult if not impossible in prac-
tice to see the points of intersection of the
diagonals. In the account given by Fagnan
(Qazi. III, 7) triangular plates are given.
See figure, (next page).

Figure for Archytas's method
by hemicylinders on page 156,
Heath's "Greek Mathematics".

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l. 59: δευτέρου. Two figures are necessary for the full exposition, but there appears to have been only one on the monument. See ll. 89-91.

l. 91: There is no evidence whether this "short proof" is an actual copy from the monument, but it may reasonably be assumed that it is: the chief objection is the mention in l. 94 of the "second figure", but this might easily be an error in the copying.

32. l.2: λόγος. cf. Eucl. El. V Def. 3: λόγος ἐστὶ δύο μεγεθῶν ὁμογενῶν ἡ κατὰ πηλικότητα πρὸς ἄλληλα ποιὰ σχέσις. Also Adrastus ap. Theon. p. 113: λόγος δέ ἐστιν ὁ κατ'ἀνάλογον δυεῖν ὅρων ὁμογενῶν ἡ πρὸς ἀλλήλους ποιὰ σχέσις.

l. 4: καὶ ἐν ἀδιαφόροις. Hiller inserts. cf. Porph. p. 268: ὅτι μὲν τοίνυν ὁ λόγος ἐν διαφόροις γίνεται ὅροις, ὁμογενέσι δέ παντως, καὶ ἐν ἀδιαφόροις, ὡς Εὐκλείδει δοκεῖ, δειχθήσεται· διάστημα δ' (Hiller ὅτι) ἐν τοῖς διαφέρουσι μόνον, φανερόν.

ll. 10-13: cf. Porph. p. 266: Ἐρατοσθένης μὲν οὖν φησιν, ἕτερον εἶναι διάστημα λόγου. ἐν γὰρ ἑνὶ διαστήματι δύο λόγοι γίνονται, ὁ δὲ λόγος δὶς φέρεται, ὅ τε τοῦ μείζονος πρὸς τὸ

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ἔλαττον καὶ τοῦ ἐλάττονος πρὸς τὸ μεῖζον. . . . .

33. Hiller includes the paragraph connecting, in the text of Theo, this fragment and the foregoing. It contains a definition of two kinds of progression called "continuous" and "discrete". From the fact that he begins again with Eratosthenes by name it may be assumed that the intervening remarks are Theo's own.

l. 2: ἀρχὴ καὶ - deleted by Bull. and Hill. If these words are retained the effect is clumsy but the meaning unaffected. Hiller quotes Adrastus ap. Theon. p. 168: δείκνυσι δὲ ὅτι ὁ τῆς ἰσότητος λόγος ἀρχηγὸς καὶ πρῶτός ἐστι καὶ στοιχεῖον πάντων τῶν εὑρημένων λόγων καὶ τῶν κατ'αὐτοὺς ἀναλογιῶν.

l. 9: στοιχεῖον. On the whole argument of inequality as the "unit" of proportion, Hiller quotes Proclus on Tim. 144E: ὡς γὰρ τοῦ καθ'ἑαυτὸ κοσοῦ κηγὴ καὶ ῥίζα ἐστὶν ἡ μονάς, οὕτω τοῦ πρός τι καντὸς ἡ ἰσότης, τὴν μονάδος ἔχουσα τάξιν πρὸς τὰς ἄλλας σχέσεις.

ll. 14-15: τοῦ μὲν οὖν κοσοῦ . . . . στιγμή. The idea of the indivisible unit, together with the absence of conceptions of zero and the minus quantity, produced both the mystical philosophy of numbers among the Pythagoreans and the physical theories of the Atomists. The Pythagorean confusion of unity with the point was responsible for the tetraktys and

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ultimately for their attribution of moral qualities to numbers: hence we find even Aristotle describing justice as a "square". The "analysis" of proportion into "inequality" is a curious but natural development.

cf. also Theo p. 173: Ἐρατοσθένης δὲ ἀποδείκνυσιν, ὅτι καὶ τὰ σχήματα πάντα ἔκ τινων ἀναλογιῶν συνέστηκεν ἀρχομένων τῆς συστάσεως ἀπὸ ἰσότητος, καὶ ἀναλυομένων εἰς ἰσότητα.

11. 23-24: κατὰ συνέχειαν ῥυεῖσα. The old ἀπορία of Achilles and the tortoise had shown the continuity of both time and space, but this idea of the line as the "locus" of a point, the plane as the locus of a line and the solid of a plane was by no means universally held. cf. Sext. Emp. adv. math. III, 28: ἀλλ'εἰώθασι πρὸς τὰς τοιαύτας ἐπιχειρήσεις ὑπαντῶντες οἱ περὶ τὸν Ἐρατοσθένη λέγειν, ὅτι τὸ σημεῖον οὔτε ἐπιλαμβάνει τινὰ τόπον, οὔτε καταμετρεῖ τὸ διάστημα τῆς γραμμῆς, ῥυὲν δὲ ποιεῖ τὴν γραμμήν, ὅπερ ἐστὶν ἀδιανόητον.

34. 11. 1-2: Bernhardy emends πᾶς μὲν λόγος ἢ καὶ διάστημα κατὰ τοὺς ὅρους . . . . . , but Hiller retains the MS. reading. The difference between "every propor-

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tion is increased in respect of difference or in respect to its terms" and "every proportion or difference is increased in respect to its terms" is not very great: both, though obscurely expressed, must refer to what we now call geometrical and arithmetrical progression. cf. Porph. ad Ptol. Harm. III p. 267 (Wallis): βεβαιοῖ δὲ καὶ τὸ προκειμένον καὶ Παναίτιος, ἀποδείξας ὅτι καὶ αὐτὸς Ἐρατοσθένης κατεχρήσατό κου τῷ διαστήματι ἀντὶ τοῦ λόγου.

On κατὰ διάστημα . . . . . αὔξεται Hiller quotes Bullialdus: "Augetur ratio secundum intervallum, quando differentia duorum terminorum additur semel aut pluries maiori."

11.3-4 εὔδηλον δὲ . . . . . αὐξηθήσεται. i.e. if both sides of an equation are increased either by multiplication or by addition, it is still an equation.

11.6-7 πάντα τὰ . . . . . σύγκειται. cf. Proclus in Eucl. El. p. 13: καὶ μὴν καὶ τὸν σύνδεσμον τῶν μαθημάτων οὐ τὴν ἀναλογίαν, ὥσπερ Ἐρατοσθένης οἴεται, θετέον.

35. There was much disagreement about the mathematical and mystical aspects of the different kinds of musical scale. The scales given in the next fragment are presumably those of Eratosthenes himself, and certainly differ from those of the Pythagoreans as well as others: cf. Porph. p. 270: τῶν δὲ

tion is increased in respect of difference or in respect to its terms" and "every proportion or difference is increased in respect to its terms" is not very great: both, though obviously expressed, must refer to what we now call geometrical and arithmetical progression. cf. Porph. ad Ptol. Harm. III p. 207 (Wallis): ἐφαρμοῖ δὲ καὶ τὰ ἀρμονικὴν καὶ ἀριθμητικὴν, ἀναλόγως δὲ καὶ αὐτὰ "ἡρακλείδης καταχρῆται καὶ τῷ ὁριστικῷ ἐπὶ τοῦ λόγου.

Ὁ μὲν γὰρ ὁρισμὸς . . . . . οὕτως: Βαλλιανοῦ Βαλλιάδου: "Λαμβάνει ratio secundum intervallum, quando differentia duorum terminorum additur semel-aut plus maiori."

11.3-4 εἴδηλον δὲ . . . . . οὕτῳ: i.e. if both sides of an equation are increased either by multiplication or by addition, it is still an equation.

11.6-7 κἀνταῦθα . . . . . ὀγκωτέρου: cf. Proclus in Euc. XI. p. 13: καὶ μὴν καὶ τὸν ὀνόμασιν τῶν μαθημάτων οὐ τὴν ἀναλογίαν, ὅπερ "ἡρακλείδης φέρει, θετέον.

15. There was much disagreement about the mathematical and mystical aspects of the different kinds of musical scale. The scales given in the next fragment are presumably those of Eratosthenes himself, and certainly differ from those of the Pythagoreans as well as others: cf. Porph. p. 270: τῶν δὲ

συμφωνῶν, ἐξ τὸν ἀριθμὸν οὐσῶν, ἃς μόνος ὁ Πτολεμαῖος (Harm. p. 9) κατηρίθμησε, παρεὶς τὰς λοιπάς, Ἀριστόξενος γὰρ Διονύσιος καὶ Ἐρατοσθένης καὶ ἄλλοι πολλοὶ κατηρίθμησαν.

Possibly Eratosthenes set out in the "Platonicus" what purported to be a Pythagorean version for criticising as well his own. This would be very much in place in a discussion of Plato's metaphysics, e.g. in "Timaeus" 35 A-36 B.

See also note on fr. 11.

36. Archytas of Tarentum, already mentioned in connexion with the Doubling of the Cube, is quoted as follows in Porph. in Ptol. Harm. ed. Wallis, Opera Math. III 267, 39-268, 9: μέσαι δέ ἐντι τρῖς τᾷ μουσικᾷ, μία μὲν ἀριθμητικά, δευτέρα δὲ γαμετρικά, τρίτα δὲ ὑπεναντία, ἂν καλέοντι ἁρμονικάν.

1) b is the arithmetic mean if $a-b = b-c$; e.g. 2, 4, 6.

2) b is the geometric mean if $\frac{a}{b} = \frac{b}{c}$; e.g. 2, 4, 8.

3) b is the harmonic mean if $\frac{1}{a} - \frac{1}{b} = \frac{1}{b} - \frac{1}{c}$; e.g. 3, 4, 6.

The Pythagoreans, who first discovered the relations between musical pitch and number, discovered that the lengths of string required to give any note, its major fourth and its upper octave are in harmonic

ουρανῶν, ἢ τὸν ὁρατὸν οὐρανόν, ὃς φύσει ἐστὶν ἀστερωτός (Harm. p. 9) κατὰ ἑξῆς τὸν τρόπον, καθὰ τὸν λόγον, 'Αριστόξενος ὁ Λαοδικεὺς καὶ 'Ηρακλείδης καὶ πολλοὶ κατὰ ἑξῆς ἑξῆς.

Possibly Lucretius set out in the "Platonicus" what purported to be a Pythagorean version for criticizing as well his own. This would be very much in place in a discussion of Plato's metaphysics, e.g. in "Timaeus" 35 A-36 B.

See also note on fr. 11.

16. Archytas of Tarentum, already mentioned in connexion with the doubling of the cube, is quoted as follows in Porph. in Ptol. Harm. ed. Wallis, Opera Math. III 257, 32-258, 9: ἐλάττων δὲ ἐστι τρίτῳ τῷ μεσῳ, ὡς μὲν ἀριθμητικῇ, δεκάτῳ δὲ ὑπερτριτῷ, τρίτῳ δὲ ἡμιολίῳ, ὥν μόλιστα ἐφεστᾶσι.

1) b is the arithmetic mean if $a-b = b-c$:
e.g. 2, 4, 6.

2) b is the geometric mean if $\frac{a}{b} = \frac{b}{c}$:
e.g. 2, 4, 8.

3) b is the harmonic mean if $\frac{1}{b} = \frac{1}{a} - \frac{1}{c}$:
e.g. 3, 4, 6.

The Pythagoreans, who first discovered the relations between musical pitch and number, discovered that the lengths of string required to give any note, its major fourth and its upper octave are in harmonic

progression, while those required for a given note, its major fifth and its upper octave are in arithmetical progression. If lengths of string are translated into terms of vibration, as the effect of halving a string is to double its frequency, the same is still true. If, according to the data given by Sir James Jeans in "Science and Music" (Cambridge, 1938) pp. 27 and 160-78, we turn the Eratosthenic figures given here into notes (where possible) on the keyboard of the piano, we arrive at the following:

Harmonics		Chromatics		Diatonics	
60	b	60	b	60	b
76	d#	72	d	67	c#
78	d##(½-tone)	76	d#	75	d#
80	e	80	e	80	e
90	f#	90	f#	90	f#
114	a#	108	a	101	g#
117	a##(½-tone)	114	a#	113	a#
120	b	120	b	120	b

It must, of course, be remembered that the original form reads downwards, the highest note at the top, while the modernized form is the reverse.

It must be emphasized that these tables are a mathematical and metaphysical exercise, of which the poetic side is to be found in the "Hermes" (cf. fr. 11, and note). It may, however, be noted that the "diatonic" column corresponds exactly with the modern major scale, while the "harmonic" contains

progression, while those required for a given note, the major fifth and its upper octave are in arithmetical progression. If lengths of string are translated into terms of vibration, as the effect of halving a string is to double the frequency, the same is still true. If, according to the data given by Sir James Jeans in "Science and Music" (Cambridge, 1938) pp. 27 and 160-72, we turn the Ptolemaic figures given here into notes (where possible) on the keyboard of the piano, we arrive at the following:

Harmonics		Geometric		Diatonic	
60	b	60	b	60	b
75	d♯	72	d	67	g♯
90	d♯♯(¼-tone)	76	d♯	72	d♯
60	c	80	e	80	e
90	f♯	90	f♯	90	f♯
114	a♯	108	a	101	a♯
117	a♯♯(¼-tone)	114	a♯	112	a♯
120	b	120	b	120	b

It must, of course, be remembered that the original form reads downwards, the highest note at the top, while the modernized form is the reverse.

It must be emphasized that these tables are a mathematical and metaphysical exercise, of which the poetic side is to be found in the "Timaeus" (cf. Pr. 12, and note). It may, however, be noted that the "diatonic" column corresponds exactly with the modern major scale, while the "harmonic" contains

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the awkward intervals and quarter-tones to which Plato strongly objected (Rep. 531 A-C: τὰς γὰρ ἀκουομένας αὖ συμφωνίας καὶ φθόγγους ἀλλήλοις ἀναμετροῦντες ἀνήνυτα κοποῦσι. . . . . καὶ γελοίως γε, κυκνώματ' ἄττα ὀνομάζοντες καὶ καραβάλλοντες τὰ ὦτα. . . . . οἱ μέν φασιν ἔτι κατακούειν ἐν μέσῳ τινὰ ἦχην, καὶ σμικρότατον εἶναι τοῦτο διάστημα. The "chromatic" corresponds a little more closely to a modern minor scale. (cf. "Timaeus" 35 B).

The variations of modes and the properly musical aspects of the matter are not strictly relevant here, but they are treated in "Mode in Greek Music", by Prof. J. T. Mountford and ~~Dr.~~ Prof. R.P. Winnington-Ingram, and in an article "The Growth of the Greek 'Αρμονίαι", by M. I. Henderson ("Classical Quarterly", Oct. 1942)

Aristoxenus, who flourished towards the end of the 4th Century, wrote a comprehensive treatise on "Elements of Harmony" which is still extant (ed. H.S. Macran, Oxford 1902).

37. Bernhardy assigns to the group of fragments "on Good and Evil". There is, however, a distinct affinity here with Timaeus 38 C: . . . . . ἵνα γεννηθῇ χρόνος, Ἥλιος καὶ Σελήνη, καὶ πέντε ἄλλα ἄστρα, ἐπίκλην ἔχοντα πλάνητες, εἰς διορισμὸν καὶ φυλακὴν ἀριθμῶν χρόνου γέγονε. The connexion of thought with the musical scale is not

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far to seek. (See fr. 34, and "Hermes", fr. 11 and note).

38. Knaack, in Pauly-Wissowa, assigns the fragment to a supposititious Neo-Platonist named Eratosthenes; perhaps forgetting that the son of Aglaus was by some called "New Plato". The connexion with the "Timaeus" is so obvious that it is unnecessary to labour it. The problem of the connexion between a purely spiritual soul and a purely physical body has in the course of ages produced many curious attempts at explanation, from the desperate "psycho-physical parallelism" to the modern psychologist's "body-mind". Evidently Eratosthenes felt that Plato's teaching of an immortal spirit, sometimes communing with the Ideal World in a state of complete disembodiment, at other times shackled by physical bodies, was not water-tight, and himself put forward a theory that the soul was never wholly disembodied. This doctrine might perhaps be compared with that of S. Paul on the Resurrection of the Body, with its metamorphosis or flowering of the human spirit into a "spiritual body" into which it is "raised incorruptible".

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l. 8: . . . . . εἰς τὰ ὀστρεώδη . . . . . cf. the whole concluding passage of the "Timaeus", on the "evolution" of different species of creatures, and particularly 92 B: . . . . . ἀντὶ λεπτῆς καὶ καθαρᾶς ἀναπνοῆς ἀέρος, εἰς ὕδατος θολερὰν καὶ βαθεῖαν ἕωσαν ἀναπνευσιν. ὅθεν ἰχθύων γένος καὶ τὸ τῶν ὀστρέων, ξυναπάντων τε ὅσα ἔνυδρα γέγονε, δίκην ἀμαθίας ἐσχάτης, ἐσχάτας οἰκίας εἰληχότων.

ll. 9-10: . . . . . εἰς μοῖράν τινα τοῦ αἰσθητοῦ. cf. Proclus ad Plat. Tim. p. 186: οὐκ ἄρα ἀνεξόμεθα λέγειν ἡμεῖς οὕτω μέσην αὐτὴν ὡς ἔχουσάν τι καὶ ἀσώματον καὶ σωματικόν, ὡς Ἐρατοσθένης ὑπέλαβεν.

The Sieve:

39. It is not possible to determine whether the device which Eratosthenes called the "Sieve" was included in some larger work on the nature of number or was published in a separate treatise or letter. It has no obvious relation to proportions, and is very unlikely to have appeared in the "Platonicus" or, if there was such a work, "On Means".

In the work of Nicomachus this complicated exposition is preceded by a triple classification of numbers: (1) πρῶτον καὶ ἀσύνθετον, "prime and not compound",

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i.e. "prime" in the ordinary sense; (2) δεύτερον καὶ σύνθετον, "secondary and compound", i.e. apparently (Ivor Thomas, I, 69 n.) a product of prime numbers; (3) καθ'ἑαυτὸ μὲν δεύτερον καὶ σύνθετον, πρὸς ἄλλο δὲ πρῶτον καὶ ἀσύνθετον, "secondary and compound in itself, but prime and not compound in relation to another", i.e. composed of a number of odd prime factors. Thomas points out that (2) includes (3).

For sorting out the prime numbers Nicomachus quotes the Sieve, which, in somewhat simpkr language than his, works as follows.

The consecutive odd numbers are set out in a row, either vertical or horizontal, beginning from 3. First every third number is struck out, for it contains 3 as a factor, and the other factors of the numbers struck out are the same as the numbers in the original row, thus: 3, 5, 7, ~~9~~ 3, 11, 13, ~~15~~ 5, 16, 17, 19, ~~21~~ 7, 23, 25, ~~27~~ 9, 29, 31 . . . A similar result is obtained by repeating the process with 5, and so on: 3, 5, 7, ~~9~~, 11, 13, ~~15~~ 3, 17, 19, ~~21~~, 23, ~~25~~ 5, ~~27~~, 29, 31, ~~33~~, ~~35~~ 7, 37 . . . The numbers left behind in the original row are prime numbers.

Thomas (I,102-3,n.) sums up the method: "The general formula is that we obtain all multiples of a prime num-

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ber n by skipping n-1 terms at a time. But to make sure that any odd number $2n+1$ left in the series is prime we should have to try to divide it by all the prime numbers up to $\sqrt{2n+1}$, and the method is not a practicable way of ascertaining whether any large number is prime."

Octaeteris:

40. Evidently the festival of Isis had shifted its position in the solar year asaa result of faulty intercalation, like Christmas in England before the elision of eleven days in 1752.

41. ἐλαχίστῳ μορίῳ. The length of the solar year had been calculated with a very close approach to exactitude for a long time. The Julian calendar, established by Julius Caesar and prevailing for over fifteen centuries in Europe, was based on the Egyptian calendar as revised in 238 B.C.

ἀπὸ δὲ σημείου εἰς σημεῖον. The sun and moon are then in the same relative position.

ὀκτωκαιδεκαετηρίδι. The Metonic cycle (discovered by Meton about 432 B.C.) was 6940 days, or a little over nineteen solar years.

Εὐδόξου. c. 408-355 B.C.

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42. 1. 3: ὑφ' ἕνα περίβολον. Probably hendiadys: "within the fortifications (i.e. the central part, right in the city itself) of one city." Possibly metaphorical: "gathered within a single circle in a single city."

1. 4: Ἀρίστωνα. See Intr. p. xxiii.

Ἀρκεσίλαον Of Pitane in Aeolia. He succeeded Crates as Master of the Academy about 241 B.C., and was regarded as the founder of the Second Academy. He died of drink at 75. (Diog. Laert. IV, 18, 30). He summed up his learning (Cicero, Acad. I, 12), as not even being sure of his own ignorance.

1. 7: κορυφαίους. "Leaders of the chorus": perhaps "those who set the tune" for the others.

1. 8: Ἀπελλῆς. Appointed as guardian of Philip V of Macedon by his uncle Antigonus Doson (Polyb. IV, 87).

1. 8: Βίων. Imported to Athens from the Borysthenes as a slave. He was set free, studied and became famous for his pungent comments, comparable with those of Voltaire. cf. Horace, Ep. II, 2, 60: "Bionei sermonibus et sale nigro". (See Diog. Laert. IV, 46 etc.)

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1.10: Odyssey XVIII, 73-4: ἦ τάχα Ἶρος Ἄκρος ἐπίσκοπον κακὸν ἕξει,
οἷην ἐκφανέων ὁ γέρων ἐπιγουνίδα φαίνει.

Odysseus, disguised as an old man on his return to Ithaca, was insulted by Irus in his own home, and when he girded up his tunic to fight he revealed his own heroic limbs underneath. Under the fluttering gewgaws of Bion's wit could sometimes be seen the gleam of sound philosophic judgement.

11.12-13: Ζήνωνος . . . . . γνώριμος. See Intr. p.v-vi.

43. cf. Athen. XIII, p. 588 A: ὁ Μυρτίλος, Μή τι τοιοῦτοι ὑμεῖς οἱ φιλόσοφοι, ἔφη, οἳ καὶ κρὸ τῶν Ἡδονικῶν καλουμένων αὐτοὶ τὸν τῆς ἡδονῆς τοῖχον ὑποσκάπτοντες, ὥς κου ὁ Ἐρατοσθένης φησί.

The fine distinctions of "preferable indifferents" originated by Ariston made it possible for so-called Stoics to live a life wholly at variance with the single-minded pursuit of Virtue as the only desirable possession. On his contempt for dialectic cf. Stob. Serm. LXXX: Ἀρίστων ἔλεγεν ἐοικέναι τὴν διαλεκτικὴν τῷ ἐν ταῖς ὁδοῖς κηλῷ; and Clem. Alex. Strom. II, p. 175: ὅθεν, ὡς ἔλεγεν Ἀρίστων, κρὸς ὅλον τὸ τετράχορδον, ἡδονήν, λύκην, φόβον, ἐκιθυμίαν, κολλῆς δεῖ τῆς ἀσκήσεως καὶ μάχης.

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On Good and Evil:

44. In the absence of positive evidence, this fragment seems to fit most suitably under this title.

45. Ἁρμοσταί. Literally "adjusters".

46. Zeno of Elea, in Italy, was the chief follower of Parmenides. He was born about 488 B.C., and accompanied Parmenides to Athens about forty years later. This story is referred to "On Good and Evil" also in Theodoret. Graec. Affect. serm. VIII, p. 604 B.

47. From its subject-matter, this fragment seems to be most suitably placed here.

Crates of Thebes, who flourished about 320 B.C., was one of the most distinguished followers of Diogenes the Cynic. (See Diog. Laert. VI, 85-93, 96-98).

On Wealth and Poverty:

48. Pyrrho, of Elis, was the founder of the Sceptics. This doctrine was that certain knowledge on any subject is unattainable, and a virtuous life is the sole aim of man. He wrote only a poem in praise of Alexander, and his system was recorded by his disciple Timon. Pyrrho's dates are unknown, but if he accompanied Alexander the Great's expedition his life (of

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ninety years) must have included the second half of the fourth century. (Diog. Laert. IX, 61, 62, 69; Aristocles ap. Euseb. Praep. Ev. XIV, 18)

49. Themistocles, after being the chief instrument of the Greek victory over the Persians under Xerxes, fell into disfavour and was ostracized in 471 B.C. He lived five years at Argos; then, being suspected of complicity with the Spartan king Pausanias in treasonable correspondence with Persia, he himself fled by stages to Persia, where, after waiting for the death of Xerxes, he was handsomely received by the new king Artaxerxes. He died not long afterwards in 449 B.C., aged 65. (Plutarch, etc.)

Letters:

50. Athenaeus has just been descanting on Boeotian gluttony. The remark seems tohave two points: (a) that Boeotians are so brainless that they are entertained by childish fables of an Aesopian type, and (b) that even these fables reflect their preoccupation with capacity for food and drink. The same story, in exactly the same words, is told by Eustathius ad Il. p. 954, 34.

Nothing more is known of Pempelus.

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51. This passage is quoted by Macrob. Sat. V, 21: de Cymbia, where it is assigned to the same source.

l. 5: ἕνεκα. Bernhardy deletes.

l. 11: νεοκρᾶτα cf. Hesychius, νεόκρατοι· τινὲς κρατῆρες ἐλέγοντο, ὧν ἡ χρῆσις διττὴ καθεστήκει· ἔν τε γὰρ τοῖς κεριδείπνοις καὶ ἐν ταῖς ἑστιάσεσιν, ἤγουν σπονδαῖς.

l. 12: ὑμῖν . . . . . φιδιτίοις. Casaubon and Bernhardy prefer ὑμῖν to MS. ἡμῖν as there is no evidence that φιδίτιαον the Spartan model were held at Cyrene, still less at Alexandria.

Old Comedy:

[Fragments 52-56 probably belong to the section referred to as Σκευογραφικός, or "Treatise on Furniture", and fragments 57-58 to the Ἀρχιτεκτονικός, or "Book on Engineering". Both seem to have been glossaries of technical terms, and may well have contained many of the entries to which reference is made in the fragments grouped under the titles of comedies and names of authors. Whether they were prefixed or appended to the main work is unknown: they are placed first here entirely for convenience. See also Introduction p. xxv.]

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52. καραξόνιον is a specialised word which cannot mean anything but "linch-pin". ἔμβολος, however, referring to "what is pushed in", can be used of any kind of peg.

53. Xenophon wrote, probably shortly before the battle of Mantinea in 362 B.C., a guide for commanders of cavalry entitled "Hipparchicus". This may be the work mentioned here.

54. Normally ἀναλογεῖον = ἀναγνωστήριον, "reading-desk". The wording here, though obscure, seems rather to indicate a book-case.

55. Epicles of Crete is cited 21 times by Erotian for his alphabetical glossary.

Callistratus was the most famous pupil of Aristophanes of Byzantium next to Aristarchus. He wrote voluminous works of criticism on Homer and the dramatists, and a "Miscellany", in at least seven books, dealing with general linguistic subjects (Ath. I, 21; III, 125; XIII, 591; etc.)

56. "King-boots": cf. "Wellingtons", "Blüchers".

Pollux, VII, 85 mentions that these were worn by

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the Basileus at Athens. Although the political title of King had died at Athens in prehistoric times, it was retained by the Archon Basileus for religious purposes, like the title of "Rex" at Rome.

57. Athenaeus (XI, 474) gives a similar catalogue of the parts of the mast; but he represents the "heel" (κτέρνα) as fitting into a "tabernacle", or box (ληνός) instead of a mere "step" (ἰκρίον) as in earlier times and smaller vessels.

58. The Paris Scholiast speaks of the κηκτόν, or "compound" plough.

59. Polus: son of Charicles of Sunium, and pupil of Archias of Thurii. (cf. Plut. Dem. 859 B).

Philochorus, who lived at Athens between 306 and 260 B.C., wrote a history of Athens to 262 in 17 books full of detail. It was entitled "Atthis". (Suidas).

διαγωνίσασθαι seems to imply that he was acting as Protagonist in each play. This could involve as much as one "Hamlet" a day; though presumably, if a whole trilogy was performed daily, the maximum possible would be nine tragedies in three days.

60. μολγός = hide, skin: probably (Liddell and Scott,

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8th. ed.) from μέλγω, ἀμέλγω, confused with ἀμέργω = I pluck, strip.

μᾶζα ἀμολγαίη perhaps="milking loaf", i.e. loaf eaten by shepherds or cow-herds at work.

cf. Etymol. M p. 573, 23: . . . . . ἀμολγαίην δέ, τουτέστι κρατίστην, ἀκμαίαν. τὸ γὰρ ἀμολγόν ἐπὶ τοῦ ἀκμαίου τίθεται. Ἐρατοσθένης δὲ κοιμενικήν, and Proclus ad Hesiod V, 590: ἀμολγαίη, ἀντὶ τοῦ κρατίστη, ἀκμαία, τὸ γὰρ ἀμολγόν ἐπὶ τοῦ ἀκμαίου τίθεται. Ἐρατοσθένης ἐν κοιμενικοῖς.

This explanation is based on an identification of ἀμολγός with ἀκμή in the Achaean dialect; cf. the English use of "milk" or "cream" of anything.

61. Eratosthenes seems to have been mistaken in confusing the κύρβις with the ἄξων. The former appear to have borne regulations about religious festivals, the latter secular laws. They were three- and four-sided respectively. Schol. Ap. Rhod. IV 280 confirms that Eratosthenes did confuse the two. cf. Etym. M. p. 547, 51: Ἐρατοσθένης δὲ τριγώνους αὐτάς (κύρβεις) φησιν εἶναι, οὐ τετραγώνους. φησὶν Ἀριστοφάνης ὁμοίας εἶναι τοῖς Ἄξοσι· πλὴν ὅτι οἱ μὲν Ἄξονες νόμους, αἱ δὲ κύρβεις θυσίας ἔχουσιν.

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This fragment may be adduced as evidence that at least this part of the "Old Comedy" was not written at Athens but some time after the author's residence there. Indeed, according to Harpocratio, s.v. ἄξονες, this was one of the points adduced by Polemo to show that he had never visited Athens at all.

62. ὁ Μαρικᾶς (= a minion, or a young foreigner male slave: Hesychius. See Kock, vol I, 307-13). A play by Eupolis, produced in 421 B.C., attacking Hyperbolus and his mother. Aristophanes complains ("Clouds", 553) that it is a poor copy of his own "Knights".

ταῖς διδασκαλίαις. The verb διδάσκειν, "to teach", was used in a specialized sense of teaching or training a chorus, hence of producing a play. Thus αἱ διδασκάλιαι is the name given to the official lists of plays produced at the festivals of Dionysus, with their authors and the order in which prizes were awarded by popular vote.

τῶν Νεφελῶν. According to the fourth "Argument" to the play, it was originally produced in the Archonship of Isarchus, or 423 B.C., when Cratinus took the first prize and Ameippias the second: Aristophanes

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thereupon re-wrote the play to some extent, and it is the second edition which we have. The statement that the play was produced again the following year and failed even more than before is discredited on the grounds that the revision appears not to be complete. The point Eratosthenes is making here seems to be that the "Clouds" appeared before the "Maricas", though it is quite possible that the second edition, if produced, would also appear in the list.

Κλέων. The demagogue "hero" of the "Knights" fell at the battle of Amphipolis in 422 B.C. cf. fr.69, and note.

63. Phrynicus: the Alexandrian critic of the 2nd-3rd centuries A.D., not the comedian or the pre-Aeschylean tragedian.

Lamprocles: a writer of dithyrambs, who flourished about 500 B.C. He was a pupil of Agathocles and teacher of Damon (Schol. Plat. Alc. I p. 387). He improved the Mixolydian mode (Plut. de Mus. 16, p. 1136).

There appears to be no other mention of Cydides.

64. Lycophron, of Chalcis in Euboea, resided at Alexandria in the second quarter of the third century B.C. He wrote a very obscure poem entitled "Cassandra" or

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"Alexander". He worked on the comic poets in the Library and wrote a large work περὶ κωμῳδίας. (Suidas and Tzetzes).

κόρχορος or κόρκορος. According to Liddell and Scott, 6th ed, "pimpernel or Jew's-mallow" 8th ed. omits. omits. κ.ἐν λαχάνοισι, "of sorry pretenders".

65. cf. Schol. Vesp. 388, on Philocleon's cry of ὦ Λύκε δέσποτα, where an alternative and perhaps slightly more likely explanation is given that the jurymen's three obols' pay was dealt out at the shrine of Lycus. Unfortunately the term δεκάς meant a juryman who received bribes, and the connexion remains obscure. Presumably the number had some connexion with the number of "tribes".

Lycus was a son of Pandion, king of Athens. A suggestion of J. van Leeuwen, quoted here by Merry, is that his name is a remnant of an old custom of symbolizing a guilty man as a wolf. cf. the Israelite scapegoat.

66. Lycophron: see fr. 64, n.

cf. American "sicking on" a dog, in the same sense.

67. There may be a play on words between ἀπ'ὀφθαλμῶν

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Κύννης and Hom. Il. 1, 225: κυνὸς ὄμματ' ἔχων.
Perhaps Eratosthenes mentioned this, but whether he was misreported on his conclusion is impossible to say.

Ἐπιμενίδης. Unknown. Valck and Bernhardy independently emend ὡς ἐπὶ ἀναιδοῦς.

68. διδασκαλίαις. See fr. 62, note.

Crates: probably not the Theban Cynic, who flourished about 320, but Crates of Mallus in Cilicia, the first "grammarian" of Pergamus, who opposed Aristarchus in his edition of Homer. (Suidas; Aelian Hist. An. XVII, 9). He was sent as ambassador to Rome between the 2nd and 3rd Punic Wars by Attalus (Suet. de Gram. 2)

69. Cleon, the constant butt of Aristophanes, was a tanner.

Brasidas, the most able and famous of Spartan generals, destroyed the Athenian empire in Chalcidice and fell at Amphipolis after achieving a brilliant victory over Cleon, who was also killed, in 422 B. C. He was adopted as "founder" by the city.

Later in the play (ll. 269, 282) Trygaeus, whose slave makes the remark criticized, learns that both disturbers of the peace are dead.

70. Cratinus, the famous comic poet coupled with Eupolis

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and Aristophanes by Horace (Sat. I, 4, 1), died aged 97 in 422. Aristophanes constantly makes fun of his fondness for the bottle--not, perhaps, in an ill-natured way.

Lycophron: see fr. 64, note.

71. Schol. Plat. 250 says that Eratosthenes made σισύρα a cloak of goat-skins with the hair on, σισύρνα one of fleeces. It seems probable that he was making a distinction that was not really clear.

72. Schol. Av. 1514 states that κηνίκ'ἄττα is not Attic, archaic, or correct. The usage seems similar to the vulgar use of "ever" and "never" in English: e. g. "Whenever did you arrive?" and "He never came".

73. Lycophron: see fr. 64, Note.

74. The offering referred to was the lamb offered on the third day of the Apaturia, the κουρεῶτις, when a father enrolled a son in his brotherhood. (Liddell and Scott).

75. "The Persians", the only extant tragedy on a contemporary subject, was produced in 472 B. C. It concerns the victory of Salamis in 480 B. C., in which Aeschylus himself fought.

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76. "Some votes": partitive genitive.

77. The practice of throwing presents from the stage has not been unknown in modern pantomime and revue. Aristophanes is protesting against the undignified throwing of ἰσχάδια καὶ τραγήματα (figs and dessert-fruits).

διὰ τὸν αὐτῶν ὀβολόν. Bernhardy reads διὰ τὸ αὐτῶν κόβαλον (roguery). The idea of throwing "penny-worths" to the audience seems both apt and more cutting.

78. The practice of introducing lighted torches on the stage is regarded, like that described in the previous fragment, as meretricious.

Λυκόφρων. Fr. 64, note.

ἐν Ἐκκλησιαζούσαις. Presumably a reference to Eccl. 1150: ἔχω δέ τοι καὶ δᾷδα ταυτηνὶ καλῶς.

Strattis flourished a little later than Callias (Suidas), and attacked Philyllius in the "River People", which was produced in 394 or 393 B. C. (Ath. XII, 551c; Pollux X, 189)

Philyllius was a contemporary of Diocles (Suidas) and belongs to the latter part of the Old and the earlier part of the New Comedy.

79. Cratinus. Fr. 70, note.

The old Homeric shields were of ox-hide, stretched

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over a wooden frame-work and drawn to a projecting knob of metal in the centre. This knob, or boss, was always retained, and if possible the warrior caught the point of the enemy's spear on it to make it glance off. This comic degradation of military objects might suggest some such English phrase as "towel-horse lancers".

80. Lysias: one of the famous Attic Orators, 458-378 B.C. Pherecrates, inventor of the Pherecratean metre, was a contemporary of Aristophanes. (Suid. s.v. Πλάτων) Nicomachus is mentioned also by Athenaeus (VIII, 36 A), who calls him ῥυθμικός and assigns to him a play Χείρων.

81. The normal constructions with εὐθύ are: εὐθὺ κρὸς (acc.) εὐθὺ ἑκῃ (gen.) and sometimes εὐθὺ alone with gen.

82. Philosophical schools were usually called by the names, not of their founders, but of the places where they met or the most individual part of their doctrine: e.g. Academies, Sceptics. The only noteworthy exception is the school of Epicurus. There were many στοαί, or colonnades, in and about Athens, as is natural in a warm climate, but the most famous was the Painted Co-

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Nothing is known of any definite school of literary men called Stoics, except that Hesychius, s.v. Στωικοί, gives: οὐ μόνον οἱ ἀπὸ Ζήνωνος φιλόσοφοι, ἀλλὰ καί τινες Γραμματικοί.

83. ἀλαλκεῖν = to ward off

ἀλκέα = a wild mallow

ἄλκιμος = strong

With which, if any, of these words ἀλκεόν is connected it is not possible to say. Perhaps Eratosthenes confused the word with the name Alcaeus.

84. cf. Hes. Αἰγείρου θέα. αἴγειρος ἦν Ἀθήνησι πλησίον τοῦ ἱεροῦ, ἔνθα γενέσθαι θέατρον τὰ ἰκρία ἐπήγνυον; also Phot. Anecd. Bekk. p. 354, 23: Αἰγείρου θέα καὶ ἡ παρ'αἴγειρον θέα, Ἀθήνησιν αἴγειρος ἦν, ἧς πλησίον τὰ ἰκρία ἐπήγνυντο εἰς τὴν θέαν πρὸ τοῦ θέατρον γενέσθαι, οὕτω Κρατῖνος.

The text given here is that of the standard edition of Albert, revised by Schmidt, Jena 1862.

85. Presumably from the "Old Comedy", if the number of the book is correctly given.

Eratosthenes probably made this statement by deduction from the Epic form εὐκλείη (Il. 8, 285, etc.)

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In Aesch. Theb. 685 it is scanned εὐκλεΐᾱ, but the normal form, as with ἄγνοια, etc., is εὔκλεια.

86. Philyllius and Epilycus were contemporaries of the Old Comedy who flourished about the first decade of the 4th century B.C. (Suidas)

Lycophron: fr. 64, n.

The text is that of the codex Marcianus, which seems to make some sense. Bergk reads οἰῶ, σᾶμαι

87. From the mention of Pherecrates (fr. 80), presumably "Old Comedy".

cf. Photius: ἧια. τὴν τῶν ὀσκρίων καλάμην. οὕτως Ἐρατοσθένης.

88. cf. Photius: κοῖ ἦχος. κοῖ, ἐγγύς, εἰς τίνα τόκον. Ἐρατοσθένης δὲ τὸ ἐγγύς.

If the whole argument is that of Eratosthenes, it is an excellent example of his etymological method. As the quotations are from comedy it seems more likely to belong to the "Old Comedy" than to the "Grammatica".

89. σάμαξ is apparently a comic word. The only use quoted in Liddell and Scott is from Chionides, who flourished early in the 5th century B.C. (Meineke, Com. frag. 2, p. 5)

cf. Hesychius: σάμαξ. οἱ δὲ φορμόν.

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90. μετάκερφος quoted also from Philyllius by L.and S. (v. Abh. 123 f)

91. λάγυνος: a comic word.

Grammatica:

92. [Some of these fragments may well belong to the "Old Comedy". The title could include general points of literary criticism, as well as the purely philological. When there is no positive evidence on the source of the point criticized, as there is, e.g., in fragments 87 and 88, the fragments are included under this heading.]

92. This fragment seems most likely to belong to the beginning of the work. The definition given is more purely linguistic, and more nearly approaching the modern idea of "grammar", than the later conception. The "grammar schools" of the Roman Empire supplied what was intended to be a general literary education, with attention to historical and geographical background; these being treated in an "artistic" rather than scientific manner.

See Aubrey Gwynn: "Roman Education", and fr.I, n.

93. This fragment also seems in place in the introduction to a work on literary studies.

"Literis" here must be taken in the narrow sense, of learning the "letters" as a preliminary to more advanced work.

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94. κόρση: the side of the forehead (Hom. Il. 5, 584 etc.) ἐπὶ κόρρης is found in Demosthenes and Plato, κατὰ κόρρης only in Lucian. (See L. and S.)

ἄκασαν is an emendation by Sylburg for ἄκυσαν.

95. There are no extant comic uses of these two terms.

96. There is no other extant reference to this word.

This is included, doubtfully, by Hiller among the poetic fragments. Schmidt places it in the "Old Comedy".

97. The only other reference to this word is in Pollux, IV, 116, where it is explained as the name of a garment worn by soothsayers as well as Bacchanals.

Powell includes this among the poetic fragments "incertae sedis", following Hiller, whosuggests that it might be used of the garment worn by Dionysús in the "Erigone". Bergk, however, thinks it may belong to the "Old Comedy".

98. Od. 9, 6: ἦ ὅτ' ἐύφροσύνη μὲν ἔχῃ κατὰ δῆμον ἅπαντα . .

An interesting example of "higher criticism" from a purely moral standpoint.

According to Thucydides (I, 25) the Corcyraeans were formerly Phaeacians and shipping experts.

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99. Il. 24, 281-2:

τὼ μὲν ζευγνύσθην ἐν δώμασιν ὑψηλοῖσι
κῆρυξ καὶ Πρίαμος, κυκινὰ φρεσὶ μήδε' ἔχοντες.

It will be noted thatthe participle is not dual but plural.

"The nine sons of Priam": Il. 24, 249-50.

For Grates, see fr. 68, n.

100. Homer, in Od. 11, 305-20, tells the story of Iphimedia among those of other famous women whose ghosts Odysseus sees in the Underworld: her twin sons, Otus and Ephialtes, according to his version are sons of Poseidon. At the age of 9, 9 cubits broad and 9 fathoms high, they attempted to invade heaven by placing Mt. Ossa on Olympus, and Pelion on Ossa, but they were destroyed by Apollo before reaching adolescence.

Virgil refers to this often quoted story in Aen. VI, 582-4, also in the Underworld. It is noteworthy that in Georg. I, 278-283, he makes them sons of Earth.

<u>Against Baton</u>:

101. See Intr. p. xxiv.

The writer referred to is Eudoxus of Cnidus, the great mathematician. Diogenes is giving examples of his versatility and breadth of mind.

102. See In

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1.16: ol

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103. The m

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104. Thi

Arsinoe:

102. See Intr. p. xii and p. xx.

l. 4: Arsinoe III; Ptolemy Philopator.

l.16: οἱ Χοές. "The Pitchers": also the name of the second day of the Anthesteria at Athens.

Chronography:

103. The main dates are as follows:

Fall of Troy	1184/3 B.C.
Dorian migration	1104/3
Ionian migration	1044/3
Lycurgus	885/4
1st Olympiad	776/6 (προηγούμενον ἔτος)
Invasion of Xerxes	480/79
Peloponnesian War	432/1
Defeat of Athens	405/4
Battle of Leuctra	371/0
Death of Philip	336/5
Death of Alexander	324/3

l. 5: Λυκούργου. cf. Plut. Lyc. ad init.: οἱ δὲ ταῖς διαδοχαῖς τῶν ἐν Σπάρτῃ βεβασιλευκότων ἀναλεγόμενοι τὸν χρόνον, ὥσπερ Ἐρατοσθένης καὶ Ἀπολλόδωρος, οὐκ ὀλίγοις ἔτεσι πρεσβύτερον ἀποφαίνουσι τῆς πρώτης Ὀλυμπιάδος.

104. This makes Alexander invade Asia 330-29 B.C.

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105. i.e.
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106. Cato
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He left Egypt in the spring of 331, and defeated Darius at Gaugamela in the autumn.

105. i.e. inthe first half of the 11th century.

cf. the same words in Tatiani oratio ad Graecos p. 106, where Eratosthenes is mentioned in a list of γραμματικοί who discussed Homer's works and dates. The others are Zenodotus, Aristophanes, Gallimachus and Crates.

Osann (de Erigona, p. 43) also quotes the same from Codd. Gr. Bibl. Matrit. T. 1. p. 233, where Crates is said to have placed Homer's floruit "over sixty years" after the Trojan War.

Herodotus (II, 53) placesbboth Homerand Hesiod 400 years before himself.

106. Cato the Censor wrote or began a historical work "Origines", quoted in Livy XXXIV, 5.

11.4-5: This would make the foundation of Rome fall in 752-1 B.C.

1. 6: 753-2 B.C. The traditional date by modern reckoning is 753 B.C.

Müller quotes with hesitation Solinus I, 27: Cincio Romam duodecima Olympiade placet conditam, Pictori octava, nepoti et Lutatio opinionem Eratosthenis et Apollodori comprobantibus Olympiadis septimae anno secundo.

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107. According to the later version of the story as finally adopted by Virgil and Livy, Ascanius founded Alba Longa and was succeeded by his son Silvius: Romulus was born three centuries later. Ascanius was presented with the name Iulus, developed from Ilus and Ilium, to connect with the Julii and particularly Julius Caesar. Aeneid I 267-277, and VI 756-779.

108. Bernhardy places this fragment in the "Old Comedy" on the ground that that work was more likely to be known to the Scholiast. Müller, however, places it in the "Chronography".

Pisistratus seized the tyranny 561-0 B.C., and Hippias was banished with his children in 510 B.C.; a total of about fifty years. Pisistratus, however, was banished for five or six years, from 556-5 to 550-49, and again for about ten years, a few months later, until 540-39 (Herod. I, 59-64).

This extract continues to the effect that Aristophanes made the period forty-one years, and Herodotus thirty-six. Presumably the former allowed for the second exile, the latter for both. The most recent theory, put forward by Professor F.E. Adcock, is that there was in fact only one exile, and that the story was duplicated by tradition.

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109. Andron of Ephesus wrote a work on the Seven Sages. (Diog. Laert. I, 30; Suidas and Photius s.v. Σαμίων ὁ δῆμος.

Pherecydes: one, of Syros in Cyclades, flourished about 544 B.C., said to have been the master of Pythagoras; the second, born at Leros but lived at Athens, a logographer, was a contemporary of Herodotus, and wrote a work on myths and on Athenian antiquities, frequently quoted by Scholiasts. (Diog. Laert. I, 119; Stob. C. 487 b)

110. Simonides of Ceos, the lyric poet, was born in 556 B.C. In 489 he defeated Aeschylus at Athens in competition for a prize offered for an elegy on the dead at Marathon. He died at Hiero's court in Syracuse in 467.

The story to which reference is made by Quintilian is as follows: in writing an ode to a victorious boxer he digressed, according to custom, on the subject of Castor and Pollux, and the boxer refused to pay the full price. At the dinner given to celebrate the victory a message was brought to Simonides that two young men wished to see him. As he left the house the dining-room collapsed, killing all the diners; but no young men were to be seen.

Apollodorus: presumably the Athenian historian and

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mythographer of the 2nd century B.C. He wrote περὶ νεῶν (καταλόγου) (fr. 137) and βιβλιοθήκη, a mythological catalogue very often quoted.

111. The Sacred War of 448 B.C., Thuc. I, 112, 5.

The Phocians seized the temple at Delphi, the Spartans sent an expedition and drove them out, and when the Spartans left the Athenians under Pericles restored the temple to the Phocians.

Theopompus was born in Chios about 378 B.C., and was a pupil of Isocrates. He wrote speeches and twelve books of histories, continuing Thucydides to 304 B.C., the latter of which were praised for accuracy but censured for their severity. He was expelled from Chios and fled to Ptolemy in Egypt (Phot. Cod. 176 p. 120). He was a fellow-student of Ephorus (Cic. Brut. 56; de Oratore II, 13, 22).

112. This passage was formerly punctuated: Ἐ. ἐν τῷ ἐννάτῳ τῶν Ἀμαθουσίων, βασιλέα τοῦτον . . . . . Fell and others were thus led to attribute to Eratosthenes a work on "The Amathusians" of nine or more books. This theory was supported by the entry of Hesychius under Ἀφροδίτος . . . . . ὁ δὲ τὰ περὶ Ἀμαθοῦντα γεγραφὼς Παιάνισσον ἄνδρα τὸν θεὸν ἐσχηματίσθαι ἐν Κύπρῳ λέγει. Bernhardy, while repunctuating the passage, places it

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in the "Old Comedy" as a probable gloss on Aristophanes. There is no other extant reference to this Rhoecus.

113. Eupolis, c. 446-411 B.C. Associated with Cratinus and Aristophanes in Horace Sat. I, 4, 1. The Sicilian Expedition, in which this incident was supposed to take place, set sail in 415 B.C.

Bernhardy not unnaturally places this fragment in the "Old Comedy". Jacoby, however, places it in the "Chronography", where in the absence of evidence it may be left.

Duris of Samos, a pupil of Theophrastus, (Ath. IV, 128) wrote many works on historical and literary subjects, including ἡ τῶν Ἑλλήνων ἱστορία from 370-281 at least (Diod. XV, 60). He was a descendant of Alcibiades (Plut. Alcib. 32).

114. Philochorus: fr. 59, n.

Euripides: 480-406 B.C. He died in Macedonia at the court of Archelaus.

115. Hippocrates of Cos, c. 460-c.357 B.C. Most of the extant works under his name are probably by his medical successors.

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Pherecydes: see fr. 110, n.

Apollodorus: fr. 111, n.

Lecanius Areius: a Greek physician of the time of Nero. He wrote a compendium of medicine. (Galen XII, 776)

116. Evenus, an elegiac poet (see Gaisford: "Poetae Minores Graeci") flourished in the middle of the 5th century.

Hyperides was one of the ten Attic Orators and a friend of Demosthenes. He was killed by order of Antipater in 322 B.C. There were extant in antiquity 77 of his speeches, of which 25 were already considered spurious.

~~Only fragments now survive.~~ (Plut., Dec. Or. 848 D; Diog. Laert. III, 46). Only fragments now survive of most of these, but in the 19th century "Against Athenogenes" and "For Euxenippus" were recovered, with parts of four other speeches.

117. Demetrius, born in the deme of Phaleron c. 345 of humble parents, became an orator, philosopher and poet. He was appointed governor of Athens by Cassander in 317, (Diog. Laert. XIX, 78) but fled on the approach of Demetrius Poliorcetes in 307 to Alexandria, where he assisted in the establishment of the Library. He was educated at the school of Theophrastus with Menander, and died about 283. (Diog. Laert. V, 5).

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of the Greek cities, Demosthenes took refuge from Antipater's followers in the temple of Poseidon in the island of Calauria and poisoned himself in 322 B.C.

cf. Decem Oratorum Vitae 847 B: Ἐρατοσθένης δέ, ἐκ κολλοῦ δεδοικότα Μακεδόνας κερὶ τῷ βραχίονι κρίκον κερικεῖσθαι κεφραγμένον.

119. Olympias, daughter of Neoptolemus I of Epirus, married Philip of Macedon c. 357 B.C. He divorced her in 336 to marry Cleopatra, niece of his general Attalus, who at the wedding suggested a prayer for a "legitimate" heir to the throne. Alexander took Olympias to Lyncestis, and shortly afterwards Philip was assassinated probably at her instigation. After Alexander's death she played a prominent part: in 317 she seized the supreme power in Macedonia, but was put to death by Cassander at Pydna in the following year.

Whether Alexander was really the son of Philip cannot be known, but it is fairly certain that, at least after his visit to the temple of Ammon in 331, he himself became convinced that there was something more than human about him.

120. Darius III was utterly defeated at the battle of Gaugamela in 331.

This passage is a good example, whether true or not, of the openly superstitious side of Alexander's charac-

of the Greek cities, Demosthenes took refuge from Anti-
pater's followers in the temple of Poseidon in the
island of Calaurria and poisoned himself in 322 B.C.

cf. Deem Oxyrhynchus Papyri 31 'Αριστοδίκας δέ,
ἐν κυλίκῃ βαδιστικῆς ἐκπεσόντος καὶ τῆς βοηθείας
πρὶν κομισθῆναι τεθνηκότος.

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ter, and also of the "chatty" method of history employed by Eratosthenes.

For the possibility of a separate biography of Alexander, see Intr. p. xxiii.

Philotas was the son of Parmenio and friend of Alexander. (Plut. Alex. 10) He distinguished himself early, and commanded the ἑταῖροι (Arr. Anab. I, 2,5).

Suspected of complicity in the conspiracy of Dimnus, he confessed under torture and was stoned to death. (Arr. Anab. III, 20; Plut. Alex. 48,49).

121. To the ordinary Greek Alexander's aim of mixing the better parts of the Hellenic and Persian cultures and encouraging, even by personal example, the intermarriage of the two peoples must have seemed disgusting and perverted. Evidently Eratosthenes, an eclectic himself, approved of the principle and defended even his apparently effeminate adoption of a Persian garb.

Whether the latter part of the extract belongs to Eratosthenes cannot be decided definitely from the wording, though from the implied approval of the Stoic treatment of ἀδιάφορα perhaps the balance of probability is against it. cf. fr. 42, and fr. 43, n.

Müller ends his extract at . . . . . Ἐ. ἱστόρηκεν; Jacoby gives the whole.

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Doubtful "Chronography":

122. Whether this or the following fragment can reasonably be included in the "Chronography" is very doubtful, though in view of the "popular" nature of the work not impossible. Fabricius (Bibl. Gr. IV) suggested a separate work περὶ Σιβύλλης.

If this fragment is accepted it should presumably stand before fr. 103 at the beginning of the book, as Evander's expedition to Italy was assigned to the period before the Trojan War. As Eratosthenes seems to have as his first date the fall of Troy, this is in itself an argument against its inclusion. Bernhardy includes both in the "Geography".

For the Cumaean Sibyl and her story see Virg. Aen. VI.

123. Jacoby includes the Sibyls in the "Chronography", and adduces this fragment as possible evidence that Eratosthenes had access to ancient municipal records. Bernhardy, with more probability, dismisses the "antiqui annales" as "nihil aliud quam Σαμιακά vetusti cuiusdam logographi".

cf. Suidas: Σιβύλλαι. ἕκτη, Σαμία, ἡ κυρίῳ ὀνόματι καλουμένη Φυτώ· περὶ ἧς ἔγραψεν Ἐρατοσθένης.

According to most accounts there were no fewer than ten Sibyls.

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Olympic Victors:

124. The "white poplar" was associated with the underworld because of its colourless appearance. The name "Acherois" is found in Il. XIII, 389; XVI, 482.

This fragment evidently concerns the events leading up to the foundation of the Olympic Games by Heracles, and belongs to the introduction to the work.

125. Bernhardy places this in the "Old Comedy", under "doubtful plays of Aristophanes". Aristophanes does introduce the phrase τήνελλα καλλίνικος at the end of the "Birds" and the "Acharnians", in the general sense of "See, the conquering hero comes". This fragment seems therefore to refer rather to Heracles himself and his attributes, and to be placed correctly here. The word τήνελλα is supposed to imitate the "twang" of a lyre.

Archilochus flourished c. 714-676 B.C. He was one of the earliest lyric poets, and also invented the iambic metre: cf. Horace, A.P. 79. Archilochum proprio rabies armavit iambo.

126. Bernhardy and Müller placd this passage in the "Chronography", but there can be little doubt that it is better placed here.

[illegible]

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126. Bernhardy and Müller place this passage in the "Chronologia", but there can be little doubt that it is better placed here.

The text is so corrupt that it can be made intelligible only by guess-work; the general sense, however, is clear. The text given here is that of Dindorf (Schol. Graec. in Eurip. Frag., vol. 1, p. 362, Oxford, 1863), which involves less drastic emendation than that of Müller.

127. The σόλος appears to have been more or less spherical, the δίσκος flat.

Evidently Eratosthenes continued his book with a discussion of different customs, sports, and implements used.

The lines are Iliad XXIII, 826 and 431 respectively.

128. Bernhardy, to support his doctrine that there cannot have been more than one book of "Olympic Victors", reads τῷ περὶ for πρώτῳ.

cf. Theopompus ap. Ath. XII, 518B: ὁπὸ δὲ τῆς τρυφῆς οἱ Τυρρηνοί, ὡς Ἄλκιμος ἱστορεῖ, πρὸς αὐλὸν καὶ πάττουσι καὶ πυκτεύουσι καὶ παστιγοῦσιν.

129. Schol. Vesp. 1186 refers to a Maenalian "pancratiast" named Ephudion (Ἐφουδίων), and Bernhardy accordingly reads Μαινάλιον for μέλανον and adopts περιοδονίκην (Sopingius) for περιοδικόν. It seems reasonable to suppose that the references are to the same man.

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128. Bernhardy, to support his doctrine that there cannot have been more than one book of "Olympic Victors", reads τὸν κρῆ for κρῆν.

cf. Theophrastus hp. Ath. XII, 516: ἐπὶ δὲ τῆς τριφῆς οἱ Τυρρηνοί, ὃς "Αλκιμος ἱστορεῖ, πρὸς ἀλλὴν καὶ βαττύειν καὶ κοκκύειν καὶ μοστιγοῦν.

129. Schol. Veng. 1156 refers to a Roman-like "pancratiast" named Ἐφιάλτης (Ἠρακλῆν), and Bernhardy accordingly reads ἡνιόχειν for μάλαν and adopts κεφαλοῦν (Scaliger) for κεφαλίζειν. It seems reasonable to suppose that the references are to the same man.

περίοδος was the name for the complete round of all the games, and νικᾶν τὴν περίοδον meant to win at all of them. The παγκράτιον was a kind of "all-in" wrestling.

There is no evidence to which Polemon this refers.

130. Müller places this fragment in the "Chronography". He takes it as referring to "the Samian Philosopher", and accordingly follows Bernhardy's suggestion that the 48th Olympiad (609-8 B.C.) refers to the year of birth, not to that of competing in the games. Pythagoras the philosopher flourished 540-510.

The whole story, though odd, is not out of character with what little is known of him. It seems, however, to be forcing the sense unduly to take the date as referring to anything but the Games.

cf. Proverb. Cod. Paris. suppl. gr. 676, quoted by Jacoby:

τὸν (ἐν Σάμῳ) κομήτην. Σάμιόν φησιν πύκτην κομῶντα εἰς Ὀλυμπίαν ἀφικόμενον (καὶ νικήσ)αντα ἐπὶ τῶν θηλυπρεπεῖ πρὸς τῶν ἀνταγωνιστῶν χλευαζόμενον εἰς παροιμ(ίαν ἐλθεῖν). Ἐρατοσθένης δὲ κατὰ τὴν μη' ὀλυμπιάδα Πυθαγόραν Σάμιον τὸν κο(μήτην) νικῆσαι.

If the number of stories about the famous philoso-

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pher is taken into consideration, it is difficult to believe that such an example would pass into a proverb simply as τὸν ἐν Σάμῳ κομήτην. The simplest explanation is that the reference is to another Pythagoras.

131. 71st Olympiad = 497-6 B. C.

The father of Meton, who introduced the Metonic Cycle (fr. 41, n.) about 432 B. C., was Empedocles of Acragas, who "flourished" about the middle of the 5th Century. This fragment could possibly refer to him, but if so it is curious that he is not given his own name.

132. 116th Olympiad = 317-6 B. C.

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Geography:

Book I:

133. The way in which Strabo expresses this sentence suggests that the juxtaposition of Homer and the two genuine scientists is intended to stress Homer's claims to a scientific knowledge of geography, and may be taken as Strabo's own. Perhaps Eratosthenes referred to the three writers separately, occupying considerable space in his adverse criticisms of Homer, and then going on to summarize the contributions of Anaximander (born 610) and Hecataeus (fl. c. 520).

cf. fr. 149.

134. Ancher puts this extract as fr. 1, omitting the mere mention of Homer above.

1. 1. The "inconsistency" is to describe Homer as ignorant and then to give examples of his accuracy in description.

1. 2. τῆς λεχθείσης ἀποφάσεως: fr. 135.

The same collection of epithets is quoted also by Strabo at C. 298 and by Eustathius, in Hom. Il. II, 502.

135. The word ψυχαγωγία rouses Strabo to a religious

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11. 30-31: Not

11. 32-33: Not

1. 34: Ῥα
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indignation. He quotes ψυχαγωγίας, οὐ διδασκαλίας at C. 6 and C. 15, as well as in the next fragment.

cf. also C. 25: . . . . . ὡς Ἐρατοσθένης φησί, κελεύων μὴ κρίνειν πρὸς τὴν διάνοιαν τὰ ποιήματα, μηδ' ἱστορίαν ἀπ' αὐτῶν ζητεῖν.

φῄς: Groskurd, for φησίν.

136. Strabo goes on to admit that it is, in fact, fanatical to attribute all knowledge to Homer, and quotes Hipparchus as saying that it is like treating the poet as a Christmas tree (Ἀττικὴ εἰρεσιώνη, a sacrificial branch with offerings tied on it).

137. Apollodorus: see fr. 110, n., and 142.

Ancher omits the first two sentences, and places the rest as fr. 2.

ll. 4-5: τὰ μὲν Ἑλληνικὰ . . . . cf. C. 18: ἀλλ' οὐδὲ τὰ σύνεγγυς μόνον, ὥσπερ Ἐ. εἴρηκε, καὶ τὰ ἐν τοῖς Ἕλλησιν, ἀλλὰ καὶ τῶν πόρρω πολλὰ λέγει.

ll. 10-11: Eratosthenes also quoted (Strabo C. 300) Hesiod: Αἰθίοπάς τε Λίγυς τε ἰδὲ Σκύθας ἱππημολγούς.

ll. 30-31: Not in any extant work of Hesiod (Loeb. ed., p. 180)

ll. 32-33: Not in the extant "Prometheus Bound".

l. 34: Ῥιπαῖα ὄρη: cf. Strabo, C. 293: διὰ δὲ τὴν ἄγνοιαν τῶν τόπων τούτων οἱ τὰ Ῥιπαῖα ὄρη καὶ τοὺς Ὑπερβορείους μυθοποιοῦντες λόγου ἠξίωνται . . . . . ;

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l. 35: 'Ωγύ
l. 36: Μερο
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614)
l. 44: Δήμο
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l. 44: Πελε
said

also Mela I, 117. They were a mythical range in the extreme north of Europe, associated with Boreas (βῖκαι, blasts)

l. 35: Ὠγύιον ὄρος is not mentioned elsewhere.

l. 36: Μεροκίδα γῆν. Aelian (Var. Hist. III, 18) says Theopompus (fr. 111, n.) related a conversation between Midas and Silenus, in which Silenus mentioned the Meropians, a largercontinent than Asia, Africa and Europe put together.

l. 38: Euhemerus and Panchaea: cf. fr. 150, n.

l. 39: κοταμίους λίθους. These are not found inthe extant works of Aristotle.

l. 44: Γερήνων. The birthplace of Nestor, in Messenia.

Ἀκακησίου. A mountain in Arcadia. cf. Schol. B.D. Il. 5, 422, assigned by Hiller to the "Hermes": οὐδ'ὡς Ἐρατοσθένης παρήκουσεν Ὁμήρου εἰκόντος Ἑρμείας ἀκάκητα, ὅτι ἀπὸ Ἀκακησίου ὄρους, ἀλλ' ὁ μηδενὸς κακοῦ μεταδοτικός, ἐκεῖ καὶ δοτὴρ ἐάων. Prometheus was also called Ἀκακήσιος by Hesiod (Theog. 614)

l. 44: Δήμου. Il. 3, 201. Some held that it was the name of a people.

l. 44: Πελεθρονίου. Not found in Homer or Hesiod. Some said it was a city in Thessaly, some a mountain or a

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l. 44-5: Γλα
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l. 57: Ἀξ
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part of Mt. Pelion, others the cave where Cheiron taught Achilles. (Jones, Loeb Strabo, vol. III p. 191-2)

l. 44-5: Γλαυκωπίδου Not in Homer or Hesiod. Apparently connected with Γλαυκῶπις Ἀθήνη.

l. 57: Ἄξενος or Ἄξεινος was originally derived from Persian Achshaenas: dark: cf. Mod. Greek "Mavrothalassa". (Hyde, p. 29-30, n. 14)

l. 58: Ἱππημολγούς . . . . . The Mongol Kalmucks, who still use "koumiss".

138. In 1902 V. Bérard, in "Les Phéniciens et l'Odymée", put forward an ingenious theory based partly on the supposed etymology of place-names that the "Odyssey" was in fact a Greek adaptation of the story of early Phoenician exploration. This theory has been sufficiently exploded by the discoveries about the Minoan civilization made by Sir Arthur Evans at Crete and other archaeologists since that time. ("Ancient Explorers", pp. 15-17; Hyde, p. 33), although the Cadmus story (fr. 263,n.), for example, illustrates that it is not without some basis.

139. This remark is quoted also by Eustathius, in Od. XI, 19.

140. ἀμφοτέρας τὰς ἀποφάσεις. Strabo has just said that

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there is a "better" and a "worse" way for placing the scene of the Odyssey round Sicily: the better, that Homer believed that that was the actual scene and treated it poetically; the worse, to take all the marvellous parts as fact also, or as meant to be so.

For Sirenussae see fr. 267, n. Geryon was associated with the island of Erythea (see fr. 275, n.)

141. Samuel Butler, in "The Authoress of the Odyssey", defends this hypothesis with great energy and some cogency. See also fr. 138, note.

142. Eratosthenes himself appears to have opposed the Sicilian theory to the point of opposing his friend and associate Callimachus. cf. Strabo C. 299.

Apollodorus of Athens: see fr. 137 and 110, note.

Gaudos is Gozo, south of Sicily. Callimachus took it as the island of Calypso.

143. See Intr. III A on the Winds.

The Gulf of Melas (Saros) is on the north of the Thracian Chersonese, and has Thrace also to the north and west. It would, of course, be equally true to say that the north and west winds blow from Thrace in the Hellespont, of which Homer is writing pparticularly

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in the Iliad. Eratosthenes, knowing the ancient method of describing winds by the places where they arise, seems to have forgotten Homer's "horizon" and to have applied the line to the Greek mainland, where it would be meaningless.

144. cf. Schol. Buttm. Od. IV 477: τὸν Νεῖλον Αἴγυπτον ὀνομάζει, ὁ δὲ Ἡσίοδος ὡσὰν νεώτερος Νεῖλον αὐτὸν οἶδε καλούμενον.

The name "Nile", which is Semitic, is first found in Theog. 332. (Hyde, p. 76).

145. It is more than likely that Pharos was at one time "out at sea", but no method of calculating dates is reliable. An alternative explanation of the "whole day's" journey is that it means distance along the coast from the Canobic mouth, Αἰγύπτου referring to the river. The passage (Od. 4, 354-7) is as follows:

νῆσος ἔπειτά τις ἔστι κολυκλύστῳ ἐνὶ πόντῳ
Αἰγύπτου προπάροιθε, Φάρον δὲ ἑ κικλήσκουσι,
τόσσον ἄνευθ' ὅσσον τε πανημερίη γλαφυρὴ νηῦς
ἤνυσεν, ᾗ λιγὺς οὖρος ἐπιπνείῃσιν ὄπισθεν.

146. The idea of two separate "Ethiopias" died hard, and it was not until Alexander's expedition that the Indus was finally separated from the Nile in the minds of geographers (fr. 196, l. 22, n.)

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Strabo (C. 31) quotes Aristarchus as simply denying the existence of two Ethiopias and ascribing the line to the poet's ignorance of "this and of the other points mentioned by Apollodorus in his 'Catalogue of Ships'." The next line, however, οἱ μὲν δυσομένου Ὑπερτίονος, οἱ δ' ἀνίοντος (Od. I, 24), is not so definite as Herodotus (VII, 69, 70) who divides them into "Ethiopians above Egypt" and Ethiopians in Asia, with curly and straight hair respectively (cf. fr. 196). Eratosthenes himself (fr. 222) produces "western Ethiopians" beyond Morocco. See also figures 1 and 2 (Introd.) Αἰθίοψ, in any case, only means "burnt face" or "negro".

147.11.5-7: Diod. Sic. I 67 and 88 also emphatically denies the stories of the sacrifice of strangers to Busiris: he adds that there was no king Busiris, but that this was a local name for the "tomb of Osiris".

11.15-16: There is even a story of a Carthaginian captain who sacrificed his own ship to lure a foreign vessel into the shallows, and was publicly compensated. (Strabo, C. 176).

148. This passage goes closely with the foregoing. Both describe the difficulties and dangers of early exploration owing not only to the necessity of coasting but

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to the inhospitality and hostility of the barbarian tribes encountered. This also shows conclusively that ancient ships, except in very early times, did not always hug the coast.

149. See fr. 133, and note.

For Thales, Anaximander, and Hecataeus see Introd., 3 B.

The extant "Periodos" of Hecataeus is considered a forgery by Glover and others, genuine by M. Cary and Diels. (Hyde, pp. 112-3, n.)

150. Damastes was a contemporary of Herodotus and, according to Suidas, a pupil of Hellanicus. He wrote histories and a κεφίλους, copied according to Agathemerus I p. 2 from Hecataeus. According to Dion. Hal. A. R. I, 72 he mentioned the foundation of Rome.

Euhemerus, most say of Messene, others of Tegea or Cos (Ath. XV, 658) was a Cyrenaic and "rationalized" the gods and myths. He claimed to have sailed along S. Asia to an island Panchaea, and wrote a ἱερὰ ἀναγραφή. (Sext. Emp. IX, 17). The original "Bergaean" was Antiphanes of Berga (Polyb. XXXIII 12 and 5). cf. also Strab. C. 104: Ἐρατοσθένη δὲ τὸν μὲν Εὐήμερον Βεργαῖον καλεῖν, Πυθέᾳ δὲ πιστεύειν.

Diotimus, son of Strombichus, is mentioned by Thucydides (I, 45, 2) as one of the commanders of the first

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ten ships sent by Athens to help Corcyra at the beginning of the Peloponnesian War.

151. Indeed, knowledge of the East remained almost stationary from the time of Eratosthenes to that of Strabo, whereas the Roman penetrations, also military, had opened up the West. Hence Strabo uses Eratosthenes for the eastern "Seals" and then abandons him until he comes to parts where Romans had not yet explored fully.

152. This is the key-passage introducing what appears at first sight to be a digression on the sphericity of the earth, the "circumfluence" of the Ocean and so on, but which seems to fit in better as a history of physical geography following the history of exploration. See Introd. 3 C.

The words ὅκερ ἦν οἰκειότερον . . . . . leave no doubt that the full treatment of the earth as a whole comes later in the work.

153. σφαιροειδὴς = "like a sphere"; not the technical term "spheroidal", but to be distinguished from σφαιρική = "spherical". It is noteworthy that Strabo uses this word particularly in connexion with Eratosthenes, who seems to mean by it that, if its irregularities, which are relatively insignificant, were evened up the earth's

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shape would be a perfect sphere. From this he naturally proceeds to enumerate the researchers into the various causes which have brought about these deviations from perfection.

οὐχ ὡς ἐκ τόρνου is evidently an echo of Herod. IV, 36: γελῶ δὲ ὀρέων γῆς περιόδους . . . . . ἐούσαν κυκλοτερέα ὡς ἀπὸ τόρνου . . . . .

154. Dicaearchus appears to have been the first man to attempt the measurement of mountains by intruments (see Intr. pp. lxvi & lxxiv)

The actual height of Mt. Olympus is given in modern maps as 9744 feet, but it must be remembered that this is height above sea-level.

Simplicius (in Arist. de Caelo II, ad fin) gives the same information in very similar words, emphasizing the same point as fr. 153.

155. In this and the succeeding fragments Eratosthenes goes on dealing with the minor irregularities of the earth's surface, under the sea. The temple of Ammon (Siwa Oasis) is about 150 miles inland, inthe midst of desert: Alexander made a special journey there, and was told he was the son of Ammon.

Whatever the reason, and there is still no generally accepted hypothesis, it is now known that the Libyan desert and the Sahara were covered with sea-water

shape would be a perfect sphere. From this he naturally proceeds to enumerate the reasonders into the various causes which have brought about these deviations from perfection.

οὐχ ὁμοίως τοῦτον is evidently an echo of Herod. IV, 181 γαλᾶ δὲ ὁμοίως γῆς περιόδους . . . . . ἐόντων κυκλοτερέα δὲ ἁπᾶς τόπον . . . . .

154. Diogenianus appears to have been the first man to attempt the measurement of mountains by instruments (see Intr. pp. [illegible])

The actual height of Mt. Olympus is given in modern maps as 9794 feet, but it must be remembered that this is height above sea-level.

Simplicius (in Arist. de Caelo II, ad fin) gives the same information in very similar words, emphasizing the same point as Tr. 153.

155. In this and the succeeding fragments Eratosthenes goes on dealing with the minor irregularities of the earth's surface, under the sea. The temple of Ammon (Siwa Oasis) is about 150 miles inland, in the midst of desert: Alexander made a special journey there, and was told he was the son of Ammon.

Whatever the reason, and there is still no generally accepted hypothesis, it is now known that the Libyan desert and the Sahara were covered with sea-water

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1.5-6: τὴν ἐπ' αὐτὸ ὁδόν. Meineke ἐπ' αὐτῳ.

156-7. Strato of Lampsacus was a Peripatetic, and tutor to Ptolemy Philadelphus. He was head of the School 288-270 between Theophrastus and Lycon (Diog. Laert. V, 58). He was known as φυσικός Cicero (Ac. Quaest. I, 9) censures him for ignoring morals.

Xanthus the Lydian wrote a history to which Herodotus was said to have been indebted (Eph. ap. Ath. XII p. 515 It is not known whether the four books known in ancient times were genuine.

See Introd. p. lxviii.

With this passage cf. Strab. C. 38: . . . . . μὴ γάρ πω τὸ ἔκρηγμα τὸ κατὰ τὰς Στήλας γεγονέναι νομίζει· ὥστ' ἐνταῦθα συνάπτειν τὴν εἴσω θάλασσαν τῇ ἐκτὸς καὶ καλόπτειν τὸν ἰσθμὸν μετεωροτέραν οὖσαν, τοῦ δ' ἐκρήγματος γενομένου ταπεινωθῆναι καὶ ἀνακαλύψαι τὴν γῆν τὴν κατὰ τὸ Κάσιον καὶ τὸ Πηλούσιον μεχρὶ τῆς Ἐρυθρᾶς. He repeats the same point in C. 55 and 764.

Mt. Casius = Jebel-el-Akra, near Nymphaeum in N. Syria. Hadrian climbed it to see "night and day" at the same time, but was prevented by a storm. (Spart. Hadr. 14)

Gerrha: see fr. 211.

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158. Demetrius I of Macedon, surnamed Poliorcetes (Plut., Demet.), 337-283 B. C.

The complicated currents in the Mediterranean, some of which, as at Messina, are very strong and regular, have not yet been completely explained. If anyone is likely to have known and understood Archimedes, it is Eratosthenes, but he seems to have attempted an explanation based on unevenness of surface probably due to unevenness of bed. The submarine ridge at the Sicilian Strait and the great depth of the sea round Sardinia was known to the ancients (Strab. C. 50). It was Pytheas who first associated the Ocean tides with the phases of the moon. (Plac. Phil. III, 16)

159. This passage is placed by Berger in the general survey of Book 3, but as Thalamas suggests it fits in much more appropriately here. Berger also quotes Tzetzes ad Lycoph. 591: καὶ πρότερον συνέστη νέφος κόλυ, καὶ γέγονεν ὁ ἐπὶ Δευκαλίωνος κατακλυσμός, καὶ ὕστερον ἀπὸ σεισμοῦ κατεκοντίσθησαν, ὡς Ἐρατοσθένης φησί.

The battle of Leuctra was fought in 371 B. C., when the Thebans under Epaminondas defeated the Spartans.

ἱππόκαμπος: the sea-horse, supposed to bring luck to sailors. Its ashes, mixed with tar or lard, cure alopecia and other skin diseases (Gal. XII, 362), and

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it was used to cure the bite of a mad dog (Ael. XIV, 20) (D'Arcy W. Thompson, "Glossary of Greek Fishes", Oxford, 1947).

160. Strabo now returns to the order of Eratosthenes. At fr. 152 the section on the history of physical geography succeeded the history of exploration. The book now concludes with some general comments on and warnings against foolish geographers and travellers' tales.

For Hyperboreans, the belief in symmetry, and the general framework of geography in the time of Herodotus, see Intr., 3 A.

The counter-"arguments" raised by Eratosthenes are, perhaps intentionally, as foolish as those of Herodotus. He says (a) you could take any pair of opposites and say the same of them, (b) in any case there is no proof that there are no "Hypernotians", because probably Notus, the south wind, originates from "lower down", that is, nearer to the (Mediterranean) sea. In this "argument", if one is to take it with any seriousness at all, Eratosthenes is evidently arguing from the terminology and point of view of Herodotus; his own ideas on winds, as coming not from places but from directions, are explained in Intr. p. xxxvii.

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The remark of Herodotus (IV, 36) is referred to in a distorted form by Schol. Ap. Rhod. II, 675, where it is attributed to Herodorus: Ὑπερβορέους δὲ Ἡρόδωρος μὲν εἶναι ὅλως φησίν· εἰ γάρ εἰσιν Ὑπερβόρειοι ἔσονται καὶ Ὑπερνότιοι.

The reading γελοίαν is Tyrwhitt's, for λέγοι ἄν

Formerly καί was inserted between ἀλλά and κατωτέρω, which gives a more obvious meaning; but it is dropped again by Kramer, Meineke, Müller, and Jones. "Down" to a Greek meant always "seaward", regardless of the compass: cf. "up-country".

161. Strabo cuts almost the whole of the remarks on "foolish writers" and comparison of sources, which would have been of great interest. He does, however, refer to them at C. 70 (fr. 163) and C687 (fr. 162, n.).

162. Before Alexander's time ignorance about the East was almost complete, even India and Ethiopia being confused (see fr. 146, and note). Thus it was only natural that when the Parapamisus (Hindu Kush) was reached, Alexander's expedition took it for the Caucasus; there is no question of "exaggeration".

Strabo, C. 687, says that Megasthenes was one of a minority who believed such stories, while Eratosthenes considered them as incredible as those current in Greece.

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163. Deimachus and Megasthenes: see Intr. p. lxiii.

'Ενωτοκοίτας: people who have ears so large that each can curl up in one of his own and go to sleep in it.

The only recent attempt to reconstruct Megasthenes is a painstaking survey of the authorities, especially Arrian, Strabo, and Diodorus, by Barbara Catharina Jacoba Timmer. The book is entitled "Megasthenes en de Indische Maatschappij", and was published in Dutch at Amsterdam in 1930.

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164.l. 5: κεραιοικεῖται. cf. fr. 183. From this it seems that Eratosthenes (quoted here verbatim by Strabo) did not think that there was in fact another "inhabited world" in the northern temperate zone, and that the word κεραιοικεῖται does not refer to "Antichthones" and "Antipodes" in fact but only to their theoretical possibility. The "inhabited world" of Eratosthenes did in fact stretch more than half-way round the globe at latitude N. 36° (fm. 183-4)

l. 8: συν τῇ ὑγρᾷ φύσει. Evidently Strabo did not fully understand Eratosthenes on sea-currents, and hence it is impossible to reconstruct fully what he did say. At the beginning of fr. 158 he upbraids Eratosthenes for ignorance of Archimedes on the behaviour of liquids, but if it is a choice between Eratosthenes and Strabo for knowledge and understanding of any theory of Archimedes there can be little doubt which to pick.

165. Strabo's insistence in fr. 164 on the excessive attention paid by Eratosthenes to καὶ ὁ κόσμος and καὶ ὁ οὐρανός makes it permissible to include at this point like Bernhardy the relationship of the earth to other

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heavenly bodies. See Intr. pp. lix-lx.

The same measurements are also referred to Eratosthenes by Johannes Lydus, de Mensibus p. 39, and Stobaeus, Ecl. Phys. p. 566. In Plac. Phil. II, 31, the two measurements are confused: περὶ ἀποστήματος σελήνης, ὃ' ἀφέστηκε τοῦ ἡλίου . . . . . Ἐ. τὸν ἥλιον ἀπέχειν τῆς γῆς σταδίων μυριάδας ἑβδομήκοντα ὀκτώ.

There is no ancient authority for the exact methods employed by Eratosthenes, but he is presumed to have used the observation that the sun cast no shadow over a belt three hundred stades across at Syene at the time of the solstice. (Fr. 167)

F. Hultsch, "Poseidonios ueber die Groesse und Entfernung der Sonne" (Goettingen, 1897), mentions Eratosthenes in passing. He considers (p. 5 note 2) that he wrote a περὶ ἀναμετρήσεως τῆς γῆς and probably a περὶ ἀναμετρήσεως τοῦ ἡλίου, and follows Maass (Aratea: Phil. Ant. von Kiess und Wil. XII, p. 380) in ascribing to him a περὶ κόσμου καὶ ποιότητος τῶν φαινομένων, On p. 18 of the same work he also gives a somewhat misleading construction for the size of the sun, based on Cleomedes II, 1, 79-80 . . . ὁ Π. ὑποθέμενος μυριοπλασίονα εἶναι τὸν ἡλιακὸν κύκλον τοῦ τῆς γῆς κύκλου, ἀπὸ τούτου ὁρμώμενος δείκνυσιν,

heavenly bodies. See Intr. pp. lix-lx.

The same measurements are also referred to Gnatos-thenes by Johannes Lydus, de Mensibus p. 39, and Ste-banus, Eol. Phys. p. 366. In Plac. Phil. II, 31, the two measurements are connected: ἀφ' ὧν ἐστιν ἀνάγκη, δ' ἀφέστηκε τοῦ ἡλίου . . . . . 'Ε. τὸν ἥλιον ἐκλείειν τῆς γῆς στάσιν ποιούσας ἡμερήσιον ἔνεκα.

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ὅτι μυριάδων τριακοσίων εἶναι δεῖ τὴν τοῦ ἡλίου διάμετρον.

AB is the diameter of the 300-stade circle inwhich the sun is overhead.
CD is the diameter of the Sun. O is an imaginary observer at the centre of the earth. Assuming that the sun's orbit is 10,000 times the earth's circumference, the radius OC= 10,000 OA; and in the similar triangle OCD, OAB,

OD = 10, 000 AB = 3, 000, 000 stades.

166. Hultsch, op. cit. p. 5 note 3, points out that as Macrobius says Posidonius multiplied the earth many times in his measurement of the sun, the 27 times of Eratosthenes must refer to volume, not diameter; in other words, that the sun's diameter is treble the earth's.

167. See Int
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167. See Introd. pp. xlvii-xlix.

Sir J. Heath: Greek Astronomy, pp. 109 . . .

Ivor Thomas: Greek Mathematical Works, II, pp. 267-73

For other references to this and other measurements of the earth's circumference see Introd. p. lxxxiii.

Pliny gives some further interesting but unreliable information. In VI #171 he says Eratosthenes "used Berenice as his starting-point" for his earth-measurement, perhaps meaning that he travelled to Syene by the sea-route to Berenice. The district of the Troglodytes and of Meroe, he says, for 45 days before and after the (summer) solstice has either no shadows or shadows falling to the south, and the same happens (II #183) at Ptolemais (Epitheras) 4320 stades from Berenice. At Syene no shadow is cast on the actual day of the solstice, as is proved by a well dug on purpose- whether by Eratosthenes himself is not stated, but it is not unreasonable to suppose that it was. For Meroe, cf. Strab. C. 77.

Amm. Marc. XXII, 15; 31 gives the information about Syene and the 90 days more briefly.

Marc. Cap. VI #596 seems to confuse Meroe-Syene (Assuan) with Syene-Alexandria.

168. Though not explicitly ascribed to Eratosthenes, this

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method of checking his measurement (similarly to that of measuring the inclination of the ecliptic) is almost certainly his. The fraction $\frac{1}{50}$ of the great circle would have been expressed in degrees by Hipparchus or anyone later.

169. cf. Theo Alex. p. 60: . . . . . καὶ γὰρ ὁ Ε. διαιρήσας τὸν ὅλον κύκλον κγ΄εὕρισκε τὴν μεταξὺ τῶν τροπιῶν τῶν αὐτῶν ια΄, καὶ ἔστιν ὡς τξ΄κρὸς μξ΄μβ΄ μ" οὕτως κγ΄ κρὸς ια΄ (360°: 47° 42' 40":: 83:11).

This $\frac{11}{83}$ of the great circle seems to be the original measurement of Eratosthenes, presumably reached by measuring the difference between the angles of the gnomon's shadows at the two solstices, either at Alexandria or elsewhere.

Berger (Erdkunde der Griechen, vol. III, p. 46) remarks that the previous measurement of $\frac{1}{15}$ for the inclination of the ecliptic must have been known to Dicaearchus, who was a schoolfellow of Eudemus. Eudemus (see Ivor Thomas, op. cit. I, p. 149 note e) atributed its discovery to Oenopides of Chios.

170. For Parmenides and the possibility that the attribution to him of "zones" is due to misunderstanding of his στεφαναί, see Introd. p. xlv.

"Antichthones" refers to a land-mass "balancing" ano-

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ther in the opposite half of the same hemisphere; "antipodes" to a land-mass "opposite" in the other hemisphere. cf. fr. 13 l. 17.

171. A possible explanation of this fragment is given in Introd. pp. li-lii.

172. For diagrams and explanations of this passage see Introd. pp. l-li.

The calculation of diameter as exactly $\frac{1}{3}$ of circumference was current practice in Eratosthenes's time. (cf. Plin. II 8248) For the division of the circumference into sixtieths, see Introd. p. lxxvii.

This passage is not quoted explicitly with the name of Eratosthenes, but it can hardly come from any other source in its essentials. The same description is given by Achilles Tatius, isag. Uranolog. p. 154 D, f., where the zones are named as follows: (1) Northern- zone of Cronos (2) Summer- zone of Zeus (3) Equatorial- zone of Ares (4) Winter- zone of Aphrodite (5) Southern- zone of Hermes. Also see Macrob. in somn. Scip. II, 6.

Strabo attributes directly to Eratosthenes the measurements (1) Meroe to the Cinnamon parallel, 3000 stades, and from there to the equator (i. e. half the torrid zone), 8800 (C. 95); (2) from the equator to

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the summer tropic, four-sixtieths or 16,800 (G 113,114).

It is particularly important to note that the "arctic circle" is N. 54°, not 66° as might be expected from the 24° of the tropic. See fig. 9, but cf. fr. 182 for the Arctic Circle in the modern sense.

173. Although this passage is not explicitly ascribed to Eratosthenes, the general method of approach is unmistakably his. The comparison of the truncated cone left after removing the tropics and the arctic circle to a "spinning whorl", and of the inhabited world to a "chlamys" (Intr. p. lxix) are similar to that of Mesopotamia to a ship (fr. 205) and his general use of popular language.

cf. Gemin. isag. G. 12 Uranolog. p. 56 A: τῶν δὲ εὐκράτων δύο ζωνῶν τὴν βόρειαν ὑπὸ τῶν ἐν τῇ καθ' ἡμᾶς οἰκουμένῃ οἰκεῖσθαι συμβέβηκεν, ἐπὶ μὲν τὸ μῆκος οὖσαν ὡς ἔγγιστα περὶ δέκα μυριάδας σταδίων, ἐπὶ δὲ τὸ πλάτος ὡς ἔγγιστα τὸ ἥμισυ.

Strabo (G. 118) deliberately rejects detailed consideration of zones as irrelevant, and particularly questions οἷον εἰ περιοικεῖται. It is, he says, credible that there is another inhabited world (America) on the far side of our zone, but the business of the practical geographer is with οἱ παρ' ἡμῖν; as Geminus puts it, ἡ καθ' ἡμᾶς οἰκουμένη, "<u>our</u> world".

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In the last two lines there is a lacuna between ἰσημερινοῦ and κλέον. The emendation is Groskurd's, and accepted by Jones.

174. cf. fr. 164, n. and fr. 158. This fragment appears more relevant here, where the situation of the single inhabited land-mass is described, than in Book One, where the general principles of sphericity and the history of research are concerned.

Additional references for this doctrine of Eratosthenes are Eustath. ad Dionys., Geog. Min. II, p. 217; Schol. in Dionys. perieg. 1, Geog. Gr. Min. II, p. 428 B.

175. It appears certain thatEratosthenes accepted the assertion of Patrocles that the Caspian Sea opened northwards into the Ocean, although Strabo says (C. 518): οὐχ ὁμολογοῦσι δ', ὅτι περιέκλευσάν τινες ἀπὸ τῆς Ἰνδικῆς ἐπὶ Ὑρκανίαν, ὅτι δὲ δυνατόν, Πατροκλῆς εἴρηκε.

See fr. 226, and notes.

At this period there appears to have been a gulf opening from Khiva Bay in the Caspian towards the Aral Sea, and the River Oxus may have flowed into it. The Oxus was used extensively as a trade-route with India. It is thought that the story about the con-

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nexion of the Caspian and the Ocean arose from the stories heard by Patrocles when exploring this Gulf: he did not explore the north end of the Caspian at all. ("Ancient Explorers", pp. 151-2, quoting W. Tarn, J.H.S. XXI, 1901, pp. 10 ff; Hyde, p. 172 n.)

Herodotus (I, 202) says correctly: ἡ δὲ Κασπίη θάλασσά ἐστι ἐπ'ἑωυτῆς, οὐ συμμίσγουσα τῇ ἑτέρῃ θαλάσσῃ.

176. Berger, curiously, includes in his fragments nothing about the Winds but the remark of Ach. Tat., isag. Uranolog. p. 158 B: ἐπραγματεύσατο δὲ περὶ ἀνέμων καὶ Ἐρατοσθένης; but on this slight foundation he builds up the theory, referred to in Intr. pp. xxxvii-xxxviii. that Eratosthenes used a wind-rose, its centre at Rhodes, in some way to construct his map.

Vitruvius (de Arch. I, 6, 6-7) repeats the method given here in detail as that used in the construction of the Tower of Winds (Introd. fig. 3), and also as useful for the construction of wind-screens in houses and gardens. He goes on (I, 6, 9) to say that, as Eratosthenes makes the circumference of the earth 252, 000 stades, each of the eight winds has $\frac{1}{8}$ of this to play about in, and hence "inclinationibus et recessionibus varietates mutatione flatus faciunt", a curious jumble of the old disc earth and the individual winds with definite districts of origin with

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For general discussion of the Winds see Introd. III A and figures.

l. 1: ἐν τῷ διαγράμματι. See Introd. fig. 5.

l. 2: τὸν κόσμον. Again, a confusion between direction and place.

l. 4: τοὺς πρώτους. The 4 "cardinal" winds- the old originals.

ll.6-11: Even in this passage the names of the winds are not consistent: in ll. 39-51 Eurus, the S.W., becomes Euronotus; Apeliotes, the E., becomes Eurus, and Caurus, the N.W., becomes Argestes. Which are the names used by Eratosthenes himself is impossible to decide finally; especially as the writer goes on to explain, in a manner quite inconsistent with the division into eight equal segments, that there are three easterly and three westerly winds because the sunrise and sunset vary in direction, and introduces the Aristotelian names Caecias, Meses and Phoenicias (Introd. fig. 4)

ll.11-39: The geometrical construction, although it is clear enough, what is to be done, appears to have suffered in transmission. It is difficult to imagine a real geometer giving instructions for the bisection of an angle in the words: ἀπὸ τοῦ β σημείου καὶ τοῦ γ γεγράφθω κατὰ χιασμὸν γραμμή, ἀφ'οὗ τὸ δ (ll. 19-20);

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or, without intermediate steps, writing λαμβανέτω δὲ ἑξῆς ὅλου τοῦ κύκλου τὸ δεκαεκταῖον μέρος καὶ τίθεσθον τὸ κέντρον ἐν τῇ μεσημβρινῇ γραμμῇ, ἥπερ τοῦ κύκλου ἅπτεται κατὰ τὸ ε, καὶ ποιητέον σημεῖον ἀπ' ἀριστερῶν καὶ δεξιῶν, ἀφ' οὗ τὸ η καὶ τὸ θ.

l.38-39: τῶν ἀνέμων τε καὶ πνευμάτων. ἄνεμοι are the original four "cardinal" winds, πνεύματα any subsequent additions.

ll.39-53: This appears to be an attempt to fit former wind-roses into the Eratosthenic division. See above, ll. 6-11, note.

l. 47: ἀντιπνεῖ. This clearly cannot mean "blows from a diametrically opposite direction," but "blows on the other side of the diagram" - the circle being divided into right- and left-hand halves (l. 26). So also l. 48: ὃς ἀντὶ τοῦ εὐρονότου πνεῖν φαίνεται.

The Greek Government have recently issued a set of eight stamps illustrating the Winds represented and named on the Tower of the Winds at Athens (see Introd. fig. 3).

177. πλάτος. To the Greek geographer "breadth" is always to be measured north and south by distance between parallels, "length" east and west; whence come our words latitude and longitude. Here Eratosthenes takes the breadth of the inhabited world "correctly", by the distance between the parallels bounding its northern

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and southern limits; not, it must be noticed, by the arctic circle and the tropic, beyond which it was formerly thought that life could not exist.

For table of measurements on the "prime meridian" see Introd. p. lxxii. The meridian itself is again mentioned and defended by Strabo, C. 114.

178. cf. Plin. V #132: sed pulcherrima et libera Rhodus . . distat ab Alexandria Aegypti DLXXXIII M, ut Isidorus tradit, ut Eratosthenes CCCCLXIX M (at 8 stades to the Roman mile).

For this distance, one along the "prime meridian" on which the whole scale of the map depended, and for the general vagueness of sea distances, see Introd. p. lxxx. At 10 stades to the geographical mile Eratosthenes is only slightly in excess. (Bunbury I p. 665, note D).

179-181. See Introd. p. lxxiii on "parallels".

Strabo (C. 133, 4) quotes also, without reference to Eratosthenes a parallel passing τῇ μὲν διὰ Κυρήνης καὶ τῶν νοτιωτέρων Καρχηδόνος ἑνακοσίοις, μέχρι Μαυρουσίας μέσης, τῇ δὲ δι'Αἰγύπτου καὶ Κοίλης Συρίας καὶ τῆς ἄνω Συρίας καὶ Βαβυλωνίας καὶ Σουσιάδος Περσίδος, Καρμανίας, Γεδρωσίας τῆς ἄνω μέχρι τῆς Ἰνδικῆς The mention of Cyrene makes it tempting to ascribe this to Eratosthenes, but it must be remembered that his recorded observations are all related to Ale-

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xandria. This parallel is not mentioned in his measurements along the "prime meridian", and on the whole it is unlikely to behis.

The fact that Strabo ascribes the Byzantium-Massilia parallel explicitly to Hipparchus seems to rule out the likelihood of its use by Eratosthenes, although Hipparchus based his line on an observation by Pytheas. (C. 115) The parallel used by Eratosthenes in this neighbourhood is that through the Hellespont. (cf. fr. 187)

182. According to fr. 177, Eratosthenes certainly took Thule as the northern limit of the inhabited world. How much of what Strabo quotes direct from Pytheas can be taken as having been also used by Eratosthenes is by no means certain; see fr. 271 and note, and Introd. pp. lxiv-lxv.

For Thule, see fr. 282 and notes.

ὁ αὐτός ἐστι τῷ ἀρκτικῷ ὁ θερινὸς τροπικὸς κύκλος.

i.e. the path of the sun, on the day onwhich it reaches its highest point, does not dip below the horizon at all. For "arctic circle" see fr. 172, Introd. p. li, and figg. 8 and 9.

There were exaggerated stories current about this phenomenon: e.g. that quoted by Cleomedes. Cycl. Theor., I, 7, 37, that there is " a day a month long"

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when the sun is in the Crab; and that by Eustathius, ad Dion. Perieg. 581 (Geogr. Gr. Min. II, p. 329), that the year in those latitudes is divided into a single day and night."

cf. also fr. 283 and notes.

183. cf. Agathem. I, 2, Geog. Gr. min. II, p. 471: πρῶτος δὲ Δημόκριτος, πολύκειρος ἀνήρ, συνεῖδεν ὅτι προμήκης ἐστὶν ἡ γῆ ἡμιόλιον τὸ μῆκος τοῦ πλάτους ἔχουσα. συνήνεσε τούτῳ καὶ Δικαίαρχος ὁ περιπατητικός· Εὔδοξος δὲ τὸ μῆκος διπλοῦν τοῦ πλάτους, ὁ δὲ Ἐρατοσθένης πλεῖον τοῦ διπλοῦ.

For a possible explanation of this belief see Introd. p. xxxiv .

The idea that it should be possible to reach the far east of India by sailing westwards across the Atlantic was ultimately reponsible for Columbus's voyage of discovery and the present name of the West Indies. It is noteworthy that it is Strabo himself (fr. 173), not Eratosthenes, who suggests the likelihood of a "balancing" land-mass or ἀντίχθων on the far side of "our" zone.

184.11.1-4: This was not really a matter of "known" length and breadth, but a preconceived idea. See fr. 183 and Introd. p. xxxiv.

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l. 6: Strabo adopts the parallel of Ierne (Ireland) instead of that of Thule (Norway?) as the northern boundary of the inhabited world.

l. 10: τὸ μὲν τῆς Ἰνδικῆς : : : . . Strabo, C. 69, says that Hipparchus says Eratosthenes prefers ἀναγραφή τις to both Patrocles and Megasthenes on the length of India because they disagree, giving 15, 000 and 16, 000 stades respectively.

l. 16: τριακοσίους: Gossellin, for πεντακοσίους.

ll. 16-18: cf. Pliny V #40: "Polybius et Eratosthenes diligentissimi existumati ab oceano ad Carthaginem magnam $\overline{\text{XI}}$ M passuum, ab ea Canobum, Nili proximum ostium, $\overline{\text{XVI}}$ XXVIII M passuum ferunt." Strabo (C. 93) says that as Eratosthenes put Caria, Rhodes and Alexandria, Carthage and the Sicilian Strait, respectively on the same meridians, and as "all agree" that from Caria to the Strait is not more than 9, 000 stades, Eratosthenes had exaggerated the distance from Alexandria to Carthage by over 4000 stades. Actually, both "meridians" are very wrong and the distance remarkably near to the truth; Caria to the Strait being in the order of 900 miles, Alexandria to Carthage 1300 miles.

l. 26: οὐδὲν πρὸς τὸ μῆκος συντείνοντα. Brittany and Ushant do not add to the "length," as they lie north, not west. They were, of course, not figments of Pytheas.

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For tabulation of these measurements see Introd. p. lxxii. It seems likely that, in adding the 2, 000 stades at each end, Eratosthenes really was, perhaps unconsciously, under the influence of preconception.

lxxii

185 and 186 The point is much the same in both these passages, that broad divisions either of tracts of country or of groups of mankind can only be arbitrary. The division into continents dated from the time when Asia was merely Asia Minor and Libya a vague tract to the south, both separated from Greece by sea; while the division into Greeks and foreigners was a relic of days when Greeks were, or rather thought themselves, the only civilized people. Both were now obsolete, and particularly out of place for a Greek born in Cyrenaica and working in Egypt.

In these ideas may be detected (1) the effects of Alexander's policy of blending east and west (2) the vague brotherliness and "pantheism" of the Stoic (3) the naturally greater cosmopolitanism of Alexandria than of Greece proper.

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187. 1.2: For the "diaphragm" of the inhabited world see Intr. pp. xxxiii-xxxvi, lxviii-lxxii, Strab. C. 78 and 84 and frr. 189-191.

1. 8: See fr. 188.

1.14: τοῦ Ταύρου. The name "Taurus", originally that of the mountains of Cilicia in S.E. Asia Minor, was extended westwards with Greek exploration. The diaphragm according to Dicaearchus ran (Agath. I, 5) "through . . . . . Lycia, Pamphilia and Taurus right through to Mt. Imaus (Himalayas in Kashmir)". This suggests that Eratosthenes was probably the first to use "Taurus" as a convenient general name for all the groups and ranges running in something like a straight line across Asia.

cf. Arrian, Hist. Ind. II, 2; Anab. V, 5, 2.

11. 16-19: See fr. 190.

1.18: δι''Αθηνῶν: Kramer, for διὰ Θινῶν.

The city of Thinae is mentioned in the "Periplus of the Erythraean", 64, andin Ptolemy, 7, 3, 6. According to the Periplus it was the capital of This, under the very north, and exported silk. Schoff, p. 261, identifies This as Ts'in, or China, and Thinae as

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Hien-Yang, on the Wei near its confluence with the Hoang-Ho. Direct contact with it was not established until the 2nd centruy A.D. ("Ancient Explorers", p. 83, 84, where Thinae is placed in the Salween valley in Burma). Ptolemy, according to Hyde ("Ancient Greek Mariners" p. 223) confuses Serica, which includes This, and the land of the Sinae to the south-east: Tsin, Chin, or This is to the north-west, Tartary and Tibet.

It seems that the name of Thinae must have crept into this passage much later. It is unlikely that Strabo could have referred to the main "parallel" as "that through Thinae", a vague unlocalized city at the ends of the earth, and inconceivable that Eratosthenes should have done so. Kramer's emendation δι'' Ἀθηνῶν is now generally accepted. cf. fr. 188.

11.20-21: τὸν ἀρχαῖον πίνακα. This presumably refers to the traditional Greek maps of the disc earth with the Mediterranean conveniently dividing the "northern and southern halves" and dating frombefore Dicaearchus. (See Intr. 3 A.) St.-Martin thinks (Histoire de la Géographie, p. 152) that it refers to Dicaearchus himself.

11.22-24: συνεπισπᾶσθαι δὲ καὶ τὴν Ἰνδικήν . . . . . cf. Strab. C. 87: . . . . καὶ καθάπερ ἡ ἑωθινὴ πλευρὰ παρέσπασται πολὺ πρὸς ἕω, καὶ μάλιστα τῷ ἐσχάτῳ ἀκρωτη-

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ρίφ, ὃ καὶ πρὸς μεσημβρίαν προπίπτει πλέον παρὰ τὴν ἄλλην ἠιόνα, οὕτω καὶ ἡ παρὰ τὸν Ἰνδὸν πλευρά.

1.23: ἣ δεῖ Groskurd, for ἤδη.

1.26: αὐταίρειν. In the "old maps" this would mean to be in a corresponding position in the northern and southern halves in accordance withthe prevailing belief in symmetry, as were the rivers Danube and Nile. Eratosthenes extends the meaning here to include being in a corresponding position on the other side of another sheet of water, the Indian Ocean, in an east-west direction, on the same "parallel", not "meridian".

1.26-27: ἀπό τε τῶν ἀέρων . . . . . τεκμαιρόμενοι. This method of judging latitude from climate was afterwards adopted by Hipparchus, theoretically as a method of checking astronomical observation. It would lead to curious results, the cold weather in southern Russia tending to place it too far north, and the similar conditions leading to confusion of the Indus with the upper waters of the Nile. For the differences of opinion possible even in elementary observation of "celestial phenomena" see fr. 194.

11.23-51: This whole example of the use by Eratosthenes of measurement and climate for "checking" parallels is an excellent compendium of his method.

11.36-37: In fr. 177, Eratosthenes says the Hellespont is 8, 100

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stades north of Alexandria, or 4350 north of the diaphragm. Here he says Sinope is 3000 stades from the Gulf of Issus, on the diaphragm, and that the "line through Sinope westwards passes through the Hellespont". This confusion of a basic measurement makes it impossible even to begin reconstructing the "northern half" of the map.

188, 189, 190. cf. Strab. C. 91: . . . . . τοῦ Ἐ. ἐν πλάτει λαμβάνοντος τὰς εὐθείας, ὅπερ οἰκεῖόν ἐστι γεωγραφίας, ἐν πλάτει δὲ καὶ τὰς μεσημβρινὰς καὶ τὰ ἐπὶ ἰσημερινὴν ἀνατολήν . . . . .

The argument appears to be that the real division of the world is effected by a parallelogram (or rectangle) 3000 x 70, 000 stades, and that it does not matter and certainly cannot be helped that the imaginary line of the diaphragm follows a somewhat zigzag course so long as it keeps approximately to the middle of this rectangle. The difficulty then arises that, whereas the Mediterranean is a clear and definite division between north and south, there are many peoples living partly or wholly within the belt of the Taurus. Eratosthenes arbitrarily solves this difficulty by taking the latitude of Caspian Gates as the dividing line, which means that tribes and districts <u>within</u> the belt count as northern.

stadia north of Alexandria, or 4500 north of the Alpheus. Here he says Strabo is 3000 stadia from the Gulf of Issus, on the diaphragm, and that the "line through Strabo's Lysimachia passes through the Hellespont". This conclusion of a basic measurement makes it impossible even to begin reconstructing the "northern half" of the map.

189, 189, 190. cf. Tzetz. C. 91: . . . . . τοῦ Ἴ. ἐν ᾧδαις λαμβάνοντος τὰς ἀφετάς. ὅπερ ἀληθὲς ἐστι γεωγραφικῶς, ἐν ᾧδαις δὲ καὶ τὰς μεταφορικὰς καὶ τὰ ἐπ' ἐμφαντικὴν ἀναγκάζον . . . . .

The argument appears to be that the real division of the world is effected by a parallelogram (or rectangle) 3000 x 70,000 stadia, and that it does not matter and certainly cannot be maintained that the imaginary line of the diaphragm follows a somewhat sinuous course so long as it keeps approximately to the middle of this rectangle. The difficulty then arises that, whereas the Mediterranean is a clear and definite division between north and south, there are many peoples living partly or wholly within the belt of the Taurus. Eratosthenes arbitrarily solves this difficulty by taking the latitude of Sagalassos as the dividing line, which means that tribes and districts within the belt count as northern.

For σφραγῖδες see Intr. p. liii.

190.l. 5: N.B. Strabo's vague use of κλίματα in regard to Eratosthenes: cf. fr. N and Intr. p. lxxiii.

l. 6: τείνοντα. Kramer suspects, Meineke ejects.

191,192. Eratosthenes appears to have made it quite clear that his contribution to the science of geography was theoretical, not practical; that of fitting the discoveries and measurements of the best authorities into the framework provided by his own mathematical discoveries. In these two fragments he distinguishes between (1) facts vouched for personally by reputable witnesses (2) traditional notions unbacked by evidence.

193. ἐχούσας τι εὐπερίγραφον. A naive and probably true explanation of the origin of "Seals".

cf. Strab. C. 84: καὶ τοῦ νοτίου μέρους ἡ μὲν Ἰνδικὴ περιώρισται κολλοῖς· καὶ γὰρ ὄρει καὶ ποταμῷ καὶ θαλάττῃ καὶ ἑνὶ ὀνόματι, ὡς ἓν ἔθνος· ὥστε καὶ τετράπλευρος ὀρθῶς λέγεται καὶ ῥομβοειδής.

Also Plin. VI #56; Arrian, Anab. V, 6, 2.

194. For Deimachus and Megasthenes see fr. 163 and Intr. p. lxiii.

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11.3-4: μεταξὺ κεῖσθαι . . . . . χειμερινῶν. Evidently this must be taken of position, not direction. See. Intr. pp. xxxii-xxxiii.

11.6-7: τὰς σκιὰς ἀντικίπτειν. i.e. periodically the sun's path is to the north, indicating that the district concerned is south of the tropic.

11.9-10: Perhaps Deimachus was thinking of the sunrise on its southward journey!

1.14: ἐν τῇ ἀναμετρήσει. This can hardly refer to anything but a previous section of this work, and there seems no reason why it should not refer to the whole of Book Two as a sub-title. See Intr. p. xxvi.

It is noteworthy that Strabo (C. 77) says that "no one, not even Eratosthenes himself, records the κλῖμα in India."

195.11.8-9: Paropamisus = Hindu-Kush; Emodus and Imaus = E. and N.W. Himalayas. Eratosthenes, while keeping these separate names, regards them all as parts of his main "Taurus"range: cf. fr. 189 n. For the Macedonian attribution of the name "Caucasus" see fr. 162 and note.

1.19: ἐξ ἴσης ἐφ' ἑκάτερον: i.e. an equal distance both south and east, or south-east.

1.21-23: The straight distance from the Himalayas to the Indian Ocean along the Indus is about 800 miles.

11.27-33: Patna is about the same distance, 800 miles, from

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196.1.11: μίαν
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1.12: δυσὶ
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the Indus in a straight line. From Patna to the mouth of the Ganges is some 400.

1.29: σχοινίοις. Corais σχοίνοις; μυρίων, Casaubon for δισμυρίων.

1.42: The Coniaci were the people of Colchi Indiae, a port on the Malabar coast N.E. of C. Comorin, celebrated for pearls. This, Coliacum and other names are probably confused from Colchis. The passage of "Peripl. Mar. Eryth." is very corrupt at this point.

Although aware that most of the west (or south) coast of India was south of the Tropic, no one down to and including Eratosthenes realized its direction. In the absence of gnomonic readings this was only to be expected: with the sun roughly overhead every day there was nothing to indicate clearly to sailors that for much of the voyage they were proceeding almost due south.

Arrian, Ind. C. 3, 1; Ind. C. 2, 5; Anab. V, 4, 1; gives somewhat more concisely the same information as Strabo in this and the following extract.

196.1.11: μίαν ἐκβόλην. The Ganges Delta was known by the time of the "Periplus Maris Erythraei", some two centuries later.

1.12: δυσὶ στόμασιν. There are really three main outlets.

the Indus in a straight line. From Patna to the mouth of the Ganges is some 400.

l.29: ἀχαίνιστος. Δοκεῖ ἀχάνιστος; ἀφίλον, Casaubon for διάφορον.

l.42: The Oreitai were the people of Gedrosia, a port on the Malabar coast N.E. of C. Comorin, celebrated for pearls. Thus, Ptolemaeus and other names are probably confused from Ophiaia. The passage of "Periplus Mar. Erythr." is very corrupt at this point.

Although aware that most of the west (or south) coast of India was south of the Tropic, no one down to and including Eratosthenes realized its direction. In the absence of geometric readings this was only to be expected: with the sun roughly overhead every day there was nothing to indicate clearly to sailors that for much of the voyage they were proceeding almost due south.

Arrian, Ind. 6, 3; Ind. 6, 2, 5; Anab. V, 4, 1; give somewhat more concisely the same information as Strabo in this and the following extract.

l.11: μέγα ἐκβάλλον. The Ganges Delta was known by the name of the "Regius Mouth Erythraeat", some two centuries later.

l.12: ἐπὶ τριάκοντα. There are really three main outlets.

1. 14: Patale

11. 15-21: cf. St
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1. 33: κεν
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l. 14: Patalene, from Sanskrit "patala" = leaf.

ll. 15-21: cf. Strab. C. 693: Μεγασθένης δὲ τὴν εὐδαιμονίαν τῆς Ἰνδικῆς ἐπισημαίνεται τῷ δίκαρπον εἶναι καὶ δίφορον· καθάπερ καὶ Ἐρατοσθένης ἔφη, τὸν μὲν εἴκων σπόρον χειμερινόν, τὸν δὲ θερινόν, καὶ ὄμβρον ὁμοίως. Also Arrian Ind. 6, 5.

ll. 22-25: It was these similarities that led to the old idea that the upper waters of the Indus were those of the Nile. (Arrian Ind. 6.,8)(cf. Aesch. Prom. 807-12; Suppl. 284-6)

l. 24: Onesicritus was with Nearchus in his Periplus from the Indus to the Euphrates. He appears to have made a mistake about the hippopotamus.

ll. 25-29: Colouring and straightness of hair are mentioned also by Arrian, Ind. 6, 8, and Eustath. ad Dion. 1107. (Geog. Gr. min. II, p. 399)

l. 30: Taprobane (Ceylon) = Palaesimundum (Perip. Mar. E. 61). Taprobane is derived from Sanskrit "tamraparni"= "copper-leaves" (Hyde, p. 219).

l. 32: ἡμερῶν ἑπτὰ πλοῦν. Whether this is a case of "omne ignotum", of simple, deliberate exaggeration, or of a genuine record of an unfortunate voyage it is impossible to say. The actual nearest distance from India to Ceylon is about 100 miles.

l. 33: πεντακισχιλίων. Groskurd and Meincke for ὀκτακισχιλίων.

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197. This point is also mentioned in C. 698.

198. This fragment amplifies fr. 196, ll. 29-33.
The actual area of Ceylon is 25, 500 square miles (Whitaker's Almanac). According to the measurements ascribed to Eratosthenes it would be between 300,000 and 400,000.

199. Ariana is the second "Seal", approximately Iran.
Although he "defends" Eratosthenes against the strictures passed by Hipparchus on the Seals as not being accurately geometrical, Strabo himself cannot avoid feeling that there is a geometrical intention behind them.

200. l. 5: Paropamisus: see fr. 195, n.
l. 5: Caspian Gates = Sirdar Pass. This does not lead through the Elburz mountains to the Caspian Sea, but through a range at right angles to the main range.
ll. 6-8: i. e. Parthia and Carmania are included in Ariana.
l. 8: κλάτος δὲ τῆς χώρας. . . . . The Indus is taken as lying along a meridian. Actually it flows slightly W. of S. The distance in a straight line is about 800 miles.
ll. 11-12: "Stages of Asia": apparently by Amyntas, who accompanied Alexander. (Ath. XI, 500D; XII, 529E; Aelian XVII, 17)

1. 15: Ortosp

1. 16: Bactra

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1. 15: Ortospana, or Gabura.

1. 16: Bactra = Balkh.

11. 21-24: As the 1500-1600 stades (see fr. 202) from Alexandria Ariorum to Prophthasia is almost due south, while the 2000 from Arachoti to Ortospana is almost N. E., the deduction of 1300 seems a little conservative. The actual distance in a straight line is about 1200 miles.

11. 24-30: The distance along the coast can hardly be made as much as 1000 miles at the utmost, though it is left very vague by Strabo (and presumably by Eratosthenes) exactly where Ariana ends. The factor of language seems hardly to be considered consistently in a matter of physical geography, but it is in line with Eratosthenes's general attitude to divisions into continents. cf. frr. 186-7.

201.

	Stades	Eng. Miles (approx)
Caspian Gates to Hecatompylus	1960	200
Hecatompylus to Alex. Ariorum	4530	460
Alex. Ariorum to Prophthasia	1500-1600	150
Prophthasia to Arachoti	4120	210
Arachoti to Ortospana	2000	290
Ortospana to India	1000	150
	15110-15210	1460

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are remarkably near to accuracy, whereas the last three are almost equally wild. Even following the course of the river Etymander, the distance from Prophthasia to Alexandria Arachosiorum cannot be much more than 300 miles.

202. The voyage of Nearchus is fully described in Arrian's "Indica". cf. fr. 200, ll. 24-end.

These are almost certainly the figures selected by Eratosthenes as the most reliable, being "not much less" than the land distance of 14, 000 stades. There is a certain but unimportant discrepancy between Strabo's (or Nearchus's) statement that the Arbies are part of India and Eratosthenes's adoption of the Indus as the boundary: this is explained in fr. 203, ll.6-10.

δισχίλιοι. Edd. for τρισχίλιοι.

203.11.9-10: This negotiation was part of the treaty between Seleucus and Sandracottus (Chandragupta) as a result of which Megasthenes went as resident ambassador to Palibothra (Pataliputra) and wrote the book which was the chief authority not only for Eratosthenes but through him for Strabo himself.

Seleucus Nicator, son of Antiochus and founder of the Syrian monarchy, was born about 358 B.C. and reigned 312-280. He was with Alexander and distinguished himself in the Indian campaigns.

1.13: Ἄρκτον. Kramer for ἀριστερόν.

204.11.2-3: καρ

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204.11.2-3: καραλίας.- τῆς τοῦ Ἰνδοῦ is omitted by most MSS.

l. 4: κοιήσασα. Kramer, for κοιήσας.

l. 6: ἐν ἀκόψει οὖσαν. The nearest point is some fifty miles away.

205. The main measurements are given more concisely in C. 81.

l. 4: οὐκ εὐκρινῶς ἀφώρισται. See fr. 199.

l.12: ἣν νότιον μὲν καλεῖ κλευράν. Presumably this means the length of the southern side: the "side" itself must be the coast-line, which refuses to fall into a recognizable geometrical shape. See.ll. 46-47.

ll.13-14: καράλληλον δ'οὐ λέγει τῇ βορείῳ. In spite of his own misgivings, Strabo "defends" Eratosthenes against over-geometrical critics such as Hipparchus. cf. fr. 188 and note.

l.19: ὑπηρεσίῳ καρακλήσιον. cf. our likening of Italy to a boot, and Eratosthenes"s own comparison of the temperate zone to a spinning-whorl and of the inhabited world to a cloak. (fr. 173).

l.23: εἰκεῖν inserted by Meineke.

l.27: ὧν, inserted by Corais.

ll.29-44: Caspian Gates to Thapsacus is about 600 miles in a straight line. The route described is not very far from straight or, on the average, far from parallel to

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11.47-50: From

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1.48: ἕως

11.57-60: Each

11.62-63: cf.

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11.69-end: In

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11.75-79: cf.

11.79-81: cf.

the "diaphragm". The mountains themselves are not, of course, in a straight line.

11.47-50: From Babylon through Susaand Persepolis to the boundary is about 650 miles. The two distances as measured are about the same.

1.48: ἕως, Gobet, for καί.

11.57-60: Each distance is about 300 miles.

11.62-63: cf. C. 82 and C. 77, where Strabo defends Eratosthenes against criticism by Hipparchus on geometrical grounds. Taking the latitude of Pelusium as 2, 500 stades S. of Babylon, and taking Eratosthenes's distance of 4,800 as applying to parallels, he shows that Thapsacus to Pelusium must be 8000 not 6000 as stated by Eratosthenes (C. 88).

11.64-69: From the sea to the Median border is some 450 miles and on to the Caspian Gates about 170.

11.69-end: In C. 82 Strabo again opposes Hipparchus: παρά τε γὰρ τὸν Εὐφράτην φησὶν εἶναι τὴν ὁδὸν ταύτην ὁ Ἐρατοσθένης, καὶ τὴν Μεσοποταμίαν συν τῇ Βαβυλωνίᾳ μεγάλῳ κύκλῳ περιέχεσθαι λέγων ὑπό τε τοῦ Εὐφράτου, καὶ τοῦ Τίγριδος, τὸ πλέον τῆς περιοχῆς ὑπὸ τοῦ Εὐφράτου συμβαίνειν φησίν· ὥσθ'ἡ ἀπὸ Θαψάκου εἰς Βαβυλῶνα εὐθεῖα οὔτ'ἂν παρὰ τὸν Εὐφράτην εἴη . . . . .

11.75-79: cf. Strab. C. 529.

11.79-81: cf. Strab. C. 746 ἐπὶ μῆκος δὲ συχνὸν προπέπτωκεν

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ἡ συναγωγὴ τῆς Μεσοποταμίας, καὶ πλοίῳ πως ἔοικε· ποιεῖ δὲ τὸ πλεῖστον τῆς περιφερείας ὁ Εὐφράτης.

These distances supplement those in fr. 205.

206. Babylon to the Caspian Gates is about 500 miles, from Babylon to Carmania about 550 miles; from Babylon to Susa about 240 miles, and from the Caspian Gates to Susa just over 300. These are all straight distances, whereas those of Eratosthenes are itinerary.

The arguments of Hipparchus, if Strabo reports him correctly (C. 86, 87), are again based on false interpretation of Eratosthenes. Taking Eratosthenes's measurements and assuming that the Babylon-Susa line to Carmania is a parallel of latitude, he proves to his own satisfaction that Eratosthenes misplaces the Caspian Gates by 4400 stades and that the Indus (as in the "old maps") flows S. E.

(Hipparchus's version in brackets)

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211.1. 2: ἡ κατ

207. Strabo himself here appears to employ the terms "length" and "breadth", strictly confined by ancient geographers to distances east-and-west and north-and-south respectively, the wrong way round.

208. Even in his "Geography" Eratosthenes is still γραμματικός: cf. Eustath. ad Dionys. v. 775 on the same point, and also

209-210. Lake Thopitis, called Thospites by Ptolemy and Pliny, is identified as the lake of Van, which is salt and over 5000 feet above sea level. According to Strabo it contains potash and is good for washing clothes: he adds that the Tigris receives its name from its speed, as "tigris" in Median means "an arrow". Pliny (6: 127,128) repeats the story with slight variations, the chief of which is that he takes the lake of Van for two lakes. The name of his eastern lake, Arctissa, is the same as Arsissa (Ptolemy 5. 13. 8) and Arsene, which Strabo gives as an alternative for Thopitis, and which still exists in the name Ardjish.

The source of the Tigris is very close to the lake, but there is in fact no connexion between them. There is potash, and the fish cluster round the mouth of the stream mistaken for the Tigris. (Tozer, pp. 267-270)

211.1. 2: ἡ κατὰ Πέρσας θάλαττα: "the sea by the Persians".

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l. 4: ἐξ Ἀρμόζων: later Ormuz, the whole district; at that time a small island called by Nearchus Organa. See Tozer, p. 142.

ἀκρωτηρίου: Cape Mussendam.

l. 6: The coast of Carmania is curiously said to turn "away from Carmania" (presumably the "capes of Carmania"). The northern coast of the Gulf does not in fact turn east at any point.

l. 13: Ἀνδροσθένη: see l. 19, note.

l. 14: καί: Tyrwhitt inserts.

l. 15: μικρὸν ἀκολείκεται: a not unreasonable estimate on the available data. The Black Sea is rather more than half as large again.

l. 19: Nearchus stopped at the mouth of the Euphrates; Androsthenes continued the voyage round the gulf. The island is not now identifiable owing to silting-up at the head of the gulf.

ll. 29-30: Aristobulus: see Intr. p. lxiii.

l. 30: Gerrha = Adjer (?) (Jones, Loeb Strabo, vol. VII, p.303)

ll. 34-5: These islands also cannot be identified with any certainty, but are most probably taken as the Bahrein Islands. Herodotus (I, 1; VII, 807) says the Phoenicians came from here.

l. 41: Kramer Ὤγυριν, Corais Ὤγυρον, for Τυρίνην.

Orthagoras (date unknown) wrote Ἰνδοὶ λόγοι (Ael.

l. 4: ἐξ Ἀρκέλων: later Crenae, the whole district at that time a small island called by Pausanias Ὀρφνία. See Toner, p. 142.

ἐκπορθέω: Cape Kumemetam.

l. 6: The coast of Daunania is courtesy said to turn "away from Daunania" (presumably the "capes of Daunania"). The northern coast of the Gulf does not in fact turn east at any point.

l. 13: Ἀνθρωποφάγοι: see l. 19, note.

l. 14: καί: Tyrwhitt inserts.

l. 15: μικρὸν ἐκκλίνοντι: not unreasonable estimate on the available data. The Black Sea is rather more than half as large again.

l. 19: Mesrouna stopped at the mouth of the Euphrates; Andronikos continued the voyage round the gulf. The island is not now identifiable owing to silting-up at the head of the gulf.

ll. 29-30: Aristobulus: see Intr. p. lxxii.

l. 30: Ὀστρία ἀλίμενος (?) (Jones, Loeb Strabo, vol. VII, p.303)

ll. 34-5: These islands also cannot be identified with any certainty, but are most probably taken as the Kuwait Islands. Herodotus (I, ii; VII, 207) says the Phoenicians came from here.

l. 41: Kramer Ὕτρυν, Coraïs Ὕτρυν, for Τρύγην.

Orthagoras (date unknown) wrote Ἰνδικὴ λέξις (Ael.

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N. A. XVI, 35; XVII, 6; Strab. 766; Philos. Vit. Apoll. III, 53).

Arrian (Indic. 37) says the tomb of Erythras is on Caracta, 300 stades from rocky Ogyris. Vincent (Voy. Nearch. p. 348) thinks the island meant is Arek, not Hormuz.

11. 42-45: There have been many theories to account for the name of "Red" applied to the sea: this is the typically Greek method of the eponymous hero (cf. Icarian Sea, etc.). Gossellin puts up a good case for the reddish reflexion in the water of the barren Arabian hills.

l. 45: Ἀροίτου. Meineke for Ἀρηίνου.

11. 50-54: These are perhaps mangrove trees.

212. Strabo (C. 83-86), though defending Eratosthenes against the geometrical criticisms of Hipparchus, very strongly criticizes his divisions into "Seals" on the grounds that, when breaking up countries and districts for separate discussion, the geographer should proceed like a surgeon and detach at the "natural" joints τὰ μέρη . . . περιγραφὴν ἔχοντα φυσικήν, ἀρθρώσει τινὶ καὶ τόπῳ σημειώδει. It does not occur to him that opinions may differ on what is "natural", as in the difficulty over the continents (See fr. 186). He goes so far as to say that Eratosthenes would have done better to bound his third Seal by the coast of the Persian Gulf up to the Euphrates, the frontiers

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of Mesene and Babylonia and across the isthmus to the Nile Delta: the fourth Seal would then consist of Arabia Felix, the Red Sea, all Egypt, and Ethiopia, and would be bounded properly by the parallels and meridians through its extremities. In putting forward this suggestion he omits to say what in fact the fourth Seal was.

Here, and again in C. 88, he agrees with the criticism of Hipparchus that Eratosthenes does not take the "length" of his Seal along a parallel, but slantwise, ὥσπερ εἴ τις παραλληλογράμμου τὴν διάμετρον μῆκος αὐτοῦ φαίη.

213. Apart from being drawn "aslant", the line from Thapsacus to Pelusium cannot be straight without cutting across the S. E. corner of the Mediterranean. The actual distance is in the neighborhood of 400 miles.

214. It seems likely that Eratosthenes took the material about lakes and subterranean rivers from Strato of Lampsacus, whom he used extensively in Book One of the "Geography". cf. frr. 156, 157.

Polybius (V, 80) and Ptolemy (IV, 5, 12) assign Rhinocolura to Egypt, making Rophia the last city in Coele Syria. It was said to have been founded by thieves who had their noses cut off and were expelled by Actisanes of Ethiopia when he conquered Egypt.

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215. ll. 5-8: He
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l. 6: Coraic
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l. 10: It is
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l. 19: παραλ

l. 26: Sabae

l. 30: Χατρα

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l. 47: ἐν Θα
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l. 49: Γερρα
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l. 53: Anaxi
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ll. 53-4: Not a
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(Diod. Sic. I, 60; Strab. C. 759)

215. ll. 5-8: Heroopolis to Babylon is some 700 miles. Petra is in fact a little south ofrthe straight line between them.

l. 6: Corais and Meineke emend to ἐστὶν ἐν τῷ πρὸς τῷ Νείλῳ μυχῷ.

l. 10: It is hardly possible to determine an exact border, but Arabia Felix may be taken as stretching over 1000 miles southwards.

l. 19: παραπλησίως τῇ Ἰνδικῇ. cf. fr. 197 and note.

l. 26: Sabaeans: roughly Yemen.

l. 30: Χατραμωτῖτις = Hadramaut.

l. 34: νομοί: an Egyptian term Hellenized, presumably suggested here not only from the fact of being on the side of the Red Sea facing Egypt but from the fertile seaboard civilization reminiscent of the Delta.

l. 47: ἐν θατέρῳ μυχῷ: i. e. the gulf at the northern end of the Red Sea on the eastern side of Sinai, opposite to that on which Heroopolis stood. (l. 5)

l. 49: Γερραῖοι: from Gerrha near the Persian Gulf coast. See fr. 211 l. 30. Some MSS. give Γαβαῖοι.

l. 53: Anaxicrates was with Seleucus Nicator in his "Periplus of the Red Sea". (cf. Tzetz. Chil. VII, 174) He wrote a topography of Argos (Schol. Eur. Andr. 224).

ll. 53-4: Not a great exaggeration. The distance is some 1300 miles in a straight line.

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1. 67: χάραξ
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1. 69: τὰ κα
11. 72-73: ἐξ νῆ
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11. 56-59: The distance down the west coast is slightly greater, about 1400 miles. Both distances would be much increased by coasting.

1. 67: χάραξ = a stake; hence a camp fortified with a palisade, as the Roman "vallum". cf. the many prehistoric forts in England ascribed to the Danes.

1. 69: τὰ κατὰ Δειρὴν στενά = Bab-el-Mandeb.

11. 72-73: ἓξ νῆσοι συνεχεῖς: These seem more likely to be the "Six Brothers" just outside the narrowest part now, rather than the Darmabah Islands some distance inside, where the sea is much wider.

1. 78: ὅσον πεντακισχιλίων - about 700 miles.

All the main measurements given in this passage are also given very briefly by Agathemerus, II, 14.

216.1. 2: At its nearest, about Thebes, the Nile is about 100 miles from the Red Sea; at its furthest, up to Meroe and beyond, well under 500 miles. Hence Groskurd's ἐννακοσίους ἢ χιλίους seems a reasonable emendation for ἑνακισχιλίους.

1. 3: This double bend (the Dongola bend) of the Nile was lost, and did not re-appear in modern maps until the nineteenth century.

cf. Schol. in Dionys. 242 (Geog. Gr. Min. II, p. 441): ἐν τῷ πίνακι τῷ κατ''Ερατοσθένην καὶ Διονύσιον οὐκ ἔγκειται τὸ τῆς Αἰγύπτου σχῆμα, εἰ δεῖ αὐτὴν λαβεῖν

ll. 5-13: These
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ll. 16-18: Astab
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l. 21: τοὺς
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οὕτως κειμένην, καθὰ καὶ ὁ Διονύσιος ἐκφράζει, τρίπλευρον ἰσοσκελῆ.

ll. 5-13: These distances are roughly, in straight lines, as follows:

	Miles	Stades
From: Meroe to the S. W. Bend:	200	2700
S. W. Bend to N. Bend:	200	3700
N. Bend to Syene	450	6500
Syene to the Sea	500	5300

The nearest measurement is naturally the most accurate, but the others are much nearer to the truth than might be expected, although Eratosthenes does somewhat exaggerate the S. W. deviation. It appears as though he were fitting the reports of boatmen, which would be fairly uniform in their exaggeration of distance (see Intr. p. lxxxi.) with gnomonic readings for Meroe, Syene, and Alexandria.

ll. 16-18: Astaboras = Atbara; Astasobas = Blue (or possibly White) Nile; Astapus = Blue Nile.

l. 21: τοὺς θερινοὺς ὄμβρους. cf. Procl. in Plat. Tim., p. 37 B: Ἐρατοσθένης δὲ οὐκέτι φησὶν οὐδὲ ζητεῖν χρῆναι αἰτίαν τῆς αὐξήσεως τοῦ Νείλου, σαφῶς καὶ ἀφικομένων τινῶν εἰς τὰς τοῦ Νείλου πηγὰς καὶ τοὺς ὄμβρους τοὺς γινομένους ἑωρακότων, ὥστε κρατύνεσθαι τὴν Ἀριστοτέλους ἀπόδοσιν.

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l. 26: Σεμβρῖται: called Αὐτόμολοι, or "Deserters", by Herodotus, who places them (II, 30) in Ethiopia.

l. 28: τὴν Ἐρυθράν: here evidently the "Arabian Gulf", or our Red Sea.

The Megabari, or Megabarri (Plin. VI, 30) had a town of Apollo.

l. 29: Βλέμμυες = Βλέμυες (Steph. Byz.) and Blemyae (Plin. 8. 8.). Ptolemy puts them S. and E. of Egypt, but in earlier times they were more dispersed.

l. 30: These Troglodytes inhabited both shores of the Red Sea, and are the best known. There were others in Mauretania (Strab. 828) and N. of Caucasus (Strab.506)

l. 33: The Nubians were semi-nomadic negroes, so called by the Egyptians. There was no country of Nubia.

l. 38: Somewhat under 170 miles.

χίλιοι: Edd. for τρισχίλιοι.

217. Neither Strabo nor any other authority gives any detailed information of any Seal beyond the fourth. It is, however, possible to conjecture that if the fifth was Egypt and southward, the sixth comprised the rest of Africa. This would be as much of a right-angled triangle as India was rhomboidal (fr. 194), and would fit in with the idea of a Seal according to Eratosthenes. Strabo's figures in the latter part of the passage are based on those of Eratosthenes: "breadth" -

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Alexandria to Syene, 5,000 stades; Syene to Meroe, 5,000 stades; total, 10,000 (fr. 178): "length" - Alexandria to Carthage, 13,500 stades; Carthage to the Pillars, 8,000; total, 21,500 (fr. 185). Strabo objected to the measurement from Alexandria to Carthage, himself making it not more than 9,000 stades (C. 93). This makes the total "a little less than double the breadth".

What is not made absolutely clear is where Eratosthenes placed the Delta itself. In fr. 214 the boundary of the fourth Seal is made to terminate in the "districts round Canopus and Alexandria", while in fr. 215 the distance is given from Pelusium to Thapsacus, and in fr. 185 the measurement, for the Diaphragm, is given from Canopus to Carthage; in fr. 220 apparently Strabo takes the same measurement as from Alexandria to Carthage. In the present passage the boundary is given simply as "Egypt and the Nile", the "breadth" being taken from Alexandria itself. Though possible, it is not really likely that Eratosthenes took the Delta as a separate Seal, or left it unattached like the City of York in the midst of three Ridings. The final words of fr. 218 seem to establish with reasonable certainty that the northern boundary of Egypt (the fifth Seal) was from Pelusium to Canopus.

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218. This distance is almost right, being a slight under-estimate.

219. "The Hesperides" = Ben Ghazi.

The length of the Syrtis is altogether about 600 miles, not including the journey in of over 100 miles at each end, which is presumably included in the κύκλος. The Great Syrtis was the quicksand, the dread of all shipping in antiquity from Aeneas to St. Paul.

220. The land of the Lotus-Eaters, visited by Odysseus (Od. IX, 94-7), has been located by the Lesser Syrtis, and is described by Polybius (XII. 2): the lotus is a small tree, with a white fruit the size of an olive, with a small stone; the inhabitants in ancient times did in fact live on it, preserving it for food by pounding with spelt, and making of it a mead-like drink. (Tozer p. 28)

There is no obvious reason why Eratosthenes should have assigned it, against all tradition (e. g. Herod. IV, 177-8), to an island, though in the right neighbourhood; but Polybius also twice mentions Μήνιγξ as the island of the Lotus-Eaters (I, 39, 2; XXXIV, 3, 12), and Agathemerus once (V, 22).

221. Calpe = Gibraltar; Abilyx = Jebel-el-Mina or Monte del Hacho. It is also spelt Ἀβύλη and Ἄβυλυξ.

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222. cf. C. 825: πλησίον δὲ καὶ πολίχνιον μικρὸν ὑπὲρ τῆς θάλάττης, ὅπερ Τίγγα καλοῦσιν οἱ βάρβαροι, Λύγγα δ'ὁ Ἀρτεμίδωρος προσηγόρευκε, Ἐρατοσθένης δὲ Λίξον.

The river Lixus, mentioned by Hanno (Periplus #6), as a great river flowing from Libya, is assumed to be the Wady Draa, which enters the sea opposite the Canary Islands and is said to be longer than the Rhine. Perhaps Eratosthenes transferred this name to the town of Lynx or Tinx near to it, as he was apt to alter names to his own etymological taste. (cf. fr. 210, etc.) In later times the Phoenician posts in these parts fell into disuse, though πόλεις . . . . . παμπόλλας τινάς has the appearance of exaggeration.

"Western Ethiopians" appear in Herodotus (III, 114) who held that the Ethiopians stretched right across Africa. Here it must refer to the negroes of that coast. See diagrams of Ephorus and Timosthenes, Introd. 3A, and figg. 1 and 2.

On the atmospheric effects, cf. Strab. C. 138 of the setting sun at Gadeira: τὴν δὲ τοῦ μεγέθους φαντασίαν αὔξεσθαι μὲν ὁμοίως κατά τε τὰς δύσεις καὶ τὰς ἀνατολὰς ἐν τοῖς πελάγεσι διὰ τὸ τὰς ἀναθυμιάσεις πλείους ἐκ τῶν ὑγρῶν ἀναφέρεσθαι· διὰ δὲ τούτων ὡς δι'ὑάλων κλωμένην τὴν ὄψιν πλατυτέρας δέχεσθαι τὰς φαντασίας.

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223. This fragment is assigned by Berger to the discussion on the circumference of the Ocean: it evidently refers to the Periplus of Hanno (Geog. Graec. Min.), of about 470 B. C.

Cerne is identified with a small island now called Herne in a deep bay at the mouth of the Rio de Auro. According to Hanno it is "opposite" Carthage, i. e. its distance from the Pillars is the same as from the Pillars to Carthage. For the rest of the voyage see Tozer, pp. 104-109 and fr. 222.

224. Presumably, although there is no definite proof, Eratosthenes described the "Seals" of the "Southern Half" from east to west, and then returned to the far east and repeated the process for the "Northern Half". Tempting as it is to theorize about the number and arrangement of the northern Seals, there is no evidence for anything but the slightest of hints. The only mentions of them in Strabo are for adverse criticism--C. 86: οὐκ εὖ δὲ οὐδὲ αἱ διαβόρειοι λαμβάνονται μερίδες; and C. 92: ἐν δὲ τῷ δευτέρῳ ὑπομνήματι ἀναλαβὼν (ὁ Ἱππαρχος) πάλιν τὴν αὐτὴν ζήτησιν τὴν περὶ τῶν ὄρων τῶν κατὰ τὸν Ταῦρον, περὶ ὧν ἱκανῶς εἰρήκαμεν, μεταβαίνει πρὸς τὰ βόρεια μέρη τῆς οἰκουμένης.

Both the rivers Oxus and Jaxartes were in ancient times believed to flow into the Caspian, not into the Sea of Aral as they do now. There appears to be reason

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to believe that the Oxus at least actually did so in Alexander's time, and that there really was a trade-route between Europe and India by way of the Black and Caspian Seas and the Oxus (cf. frr. 225-6; 175, and n.)

Whether this fragment describes a single "Seal" cannot be determined, but the measurements with which it concludes look like one of the "length" measurements of Ariana (fr. 200) or the third Seal (fr. 205).

The straight distances are about:

R. Cyrus to Caspian Gates	500 miles
Caspian Gates to Alexandria	520 "
Alexandria to Bactra	300 "
Bactra to the Jaxartes	260 " (through mountains)

225. See frr. 224, n., 175, n.

Hyrcanian Sea = the Caspian, from one of the tribes to the south; see fr. 226.

226. ἀνέχων ἐκ τοῦ ὠκεανοῦ: cf. fr. 175, where this is mentioned in support of the theory of "circumfluence". The reputed expedition of Patrocles from the Indian Ocean to the Caspian is also mentioned by Pliny (II, 167; VI, 58) and Marcianus Capella (VI, 619).

The distances and names are given with slight variations by Pliny, VI, 36: Eratosthenes ponit et mensuram ab exortu et meridie per Cadusiae et Albaniae

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oram quinquiens mille CCCC stadia, inde per Atiacos, Amarbos, Hyrcanos ad ostium Zoni fluminis quater mille DCCCC stadia, ab eo ad ostium Iaxartis MMCCCC, quae summa efficit quindeciens centena LXXV mil. passuum.

cf. also Strabo C. 508: τὸ μέν τοι πλέον τῆς περὶ τὴν ὀρεινὴν παραλίας Καδούσιοι νέμονται, σχεδὸν δέ τι ἐπὶ πεντακισχιλίους σταδίους, ὡς φησι Πατροκλῆς, ὃς καὶ πάρισον ἡγεῖται τὸ πέλαγος τοῦτο τῷ Ποντικῷ.

Albania stretched on both sides of the eastern end of the Caucasus.

Strabo (C. 518) gives the distance between Oxus and Jaxartes, according to Patrocles, as 80 parasangs.

227-8. The range still called the Caucasus; not that mistaken for it by the early explorers. See fr. 162.

The Caspii are also mentioned as in eastern Media, near Hyrcania, by Herodotus (III, 29) and Strabo Epit. XI.

229. Hipparchus infers that the Caspian Gates are the same distance from Thapsacus and Mt. Caspius; that, as it is much less than 10,000 stades from Mt. Caspius to the Caspian Gates, the measurement of 10,000 that Eratosthenes gives (fr. 206, ll. 30-1) must be taken by a roundabout way.

Strabo goes on to point out that in order to oppose

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Eratosthenes Hipparchus not only perverts his meaning by applying direct distances as though they were distances between parallels and meridians, but even falsifies his figures (as in fr. 230). The middle of the Caucasus is in fact some five degrees east of the Bosphorus.

230. Schol. Ap. Rhod. IV, 259 repeats this, confirming it with a quotation from Artemidorus that τὸν Φᾶσιν μὴ συμβάλλειν τῷ Ὠκεανῷ, ἀλλ' ἐξ ὀρέων καταφέρεσθαι.

According to Pindar (Pyth. IV, 26-7) the Argonauts sailed up the Phasis to the Western Ocean, and by way of the Erythraean Sea to South Libya.

The town of Phasis was at the mouth.

The Colchians themselves, who in fact had many Egyptian traits, were reputed to be remnants of the army of Sesostris (Herod. II, 104; Diod. I, 28).

231. The lines to which the scholiast refers are:

ἕκλυον οἳ καὶ κολλὸν ἑκὰς Τιτηνίδες αἴης (or Αἴης)
Κολχίδα γῆν ἐνέμοντο κατὰ κροχοῇσι Λύκοιο. . . . .

Aea was an early name for Colchis, after the king Aeetes, father of Medea.

Berger (p. 328) gives up this passage altogether. It might, however, be possible to hazard some connexion, either (1) with the Prometheus myth and the Caucasus--

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the land at the east end of the Euxine being distinguished from that on the south side, or (2) with Circe, who was the sister of Aeetes and herself lived in an island Aeaea. Both Prometheus and Circe were Titans and might entitle Colchis to be called Τιτηνὶς αἶα (or Αἶα), the river Titen being invented to explain the name.

232. There were in fact two rivers of Pontus, Thermodon and Lycus, flowing into the south side of the Black Sea at no great distance from each other. The Lycus was much the larger.

The mouth of the Thermodon is about 150 miles west of Tropegus, that of the Lycus 170. For the Lycus, see quotation in fr. 231, n.

cf. fr. 137.

233. In V, 47 Pliny says: "ab ore autem Ponti ad os Maeotis Eratosthenes . . . . . $\overline{XV}$ XLV M pass."-- i. e. about 100 more, not less.

The distance is about 500 (English) miles. As Eratosthenes made the whole length of the sea 8,000 stades (see fr. 235), which is not far from the truth, something must have happened to both figures, which are those of the Teubner text.

234. Panticapaeum is the modern Kerch, at the entrance to

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Lake Maeotis or the Sea of Azov. The coldness of the climate in south Russia led the ancients generally to believe, since they were ignorant of the effects of climate of the Atlantic Drift, that it was much further north than it is in relation to western Europe.

Eratosthenes may have quoted this epigram in Book Two, when discussing the northern limits of habitability. cf. fr. 182, etc.

235. The length of the Black Sea is about 700 miles; from Phasis to Dioscurias 60 miles. Strabo goes on to say that Hipparchus "cut down" the 9000 stades total of Eratosthenes to 6,600, allowing only 5,600 for the Black Sea.

Strabo himself (G. 124) gives a more detailed description of the Black Sea, which is likely to be based to some extent on Eratosthenes.

236. A coasting voyage would amount to something under 2,000 miles. If Hecataeus really gave this figure, it is remarkably close to the truth; but it must be remembered that he showed considerable acquaintance with the tribes of the Black Sea, and as far as the Caspian (Hec. frr. 153-4).

It is unfortunately not possible to decide whether it was Eratosthenes who originated the comparison

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with the bow, but it is worthy of note that his name stands first, and cf. fr. 205, fin., etc.

237. cf. Tzetz. ad Lycoph. v. 1285: ὁ δὲ Ἐρατοσθένης Συνορμάδας καλεῖ· κεκρυμμένας δὲ καὶ λεληθότας κερὶ τὸν Εὔξεινον κόντον φησίν, ἤ τοι κερὶ το στενόν.

The same idea is put forward, though without mention of Eratosthenes, in Etymol. magn. p. 718, 30: σκολιὸν κόρον λέγουσι καὶ τὸν ἀκὸ Βυζαντίου κλοῦν ἕως τοῦ στομίου τοῦ κόντου, ἔνθα εἰσὶν αἱ Κυάνεαι κέτραι διὰ τὸ σκαμβὸν εἶναι καὶ οὐκ ἴσον· ἔοικε δὲ τῷ ξ στοιχείῳ καὶ θηρίῳ ἕρκοντι; and by Dion. Byz. anapl. Bosp. Thrac. (Geog. Gr. Min. II, p. 65 b): "Neque vero, inquit (Dionysius), Bosporus directus, sed continuus et parallelis promontoriis fractus; praevertunt enim et tanquam se invicem supplantant et propemodum se decipiunt promontoria prohibentia navigantes ulterius progredi. Unde, ut ipse ait, mihi videntur Symplegades nominasse petras, quoniam adnavigantibus modo aperiri, modo claudi videntur, fallente aspectu opinionem: id enim quod videtur finis, statim principium esse apparet."

Strabo, though quoting the measurements of Eratosthenes, calls them simply the "Blue Rocks". (fr. 229)

The Planctae, or "Wandering Rocks", of the western Mediterranean, mentioned in Od. XII, 59, 70-72; XXIII,

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327, were in later times confused with the Symplegades (Clashing) or Synormades (Rushing Together) of the Argonauts. They appear originally to have been associated with the Lipari group. (Hyde, pp. 57 & 82).

238. The original Taurus range being in the S. E. corner of Asia Minor, it follows that Asia Minor lies in the "northern half", not improbably as a Seal by itself.

The Bebryces were a pre-historic tribe of Bithynia and Mysia, often mentioned in legend (e. g. Ap. Rhod. II, 2 and 794). There is no other ancient reference to the Colycantii, who may perhaps be associated with Cilicia.

The Leleges are associated with the Pelasgians and are frequently mentioned in Greek pre-history: in Asia by Steph. Byz. (Μεγάλη πόλις, Νινόη and Μίλητος), in connexion with Greece by Strabo (C. 322, 401) and Steph. Byz. (Λακεδαίμων).

The Solymi were a people of Pisidia (Steph. Byz., Πισιδία) associated with Ζεὺς Σολυμεύς.

There is no other ancient reference to the Tripsedi.

239. Gangra was a town in Paphlagonia, S. of Mt. Olgasys. It was the royal residence of Deiotarus, the last king. (Strab. 564) Steph. Byz says that it was originally built by goatherds, "gangra" in Paphlagonian meaning "goat".

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240. There is no other reference to Amaxa (Pauly).

241. Eustath. ad Dionys. v. 867 contradicts this: Ἐρατοσθένης δέ φησι τὴν κλῆσιν τῇ πόλει εἶναι ἀπὸ Διὸς Τερσίου τοῖς ἐκεῖ καλουμένου. οἱ δέ φασι Τερσὸν τὰ πρῶτα διὰ τοῦ ε στοιχείου ὀνομασθῆναι τὴν πόλιν, διὰ τὸ τοὺς ἐκεῖ πρώτους συναγαγόντας καρπὸν χλῶρον τερσῆναι, ὅ ἐστι ξηρᾶναι, καὶ εἰς χειμῶνος ἀποθέσθαι τροφήν.

If the name Ταρσηνός was used by Eratosthenes it would suggest that he inclined to the derivation from τερσαίνειν.

242. In expressing his preference for the sense "Artemis of the Blazing Countenance" (αἴθω) Eratosthenes presumably mentioned the place-name as well.

The river Hyllus is a tributary of the Hermus in Lydia. It was also called Phrygius (Strab. C. 626).

243. Magarsus was a city in E. Cilicia, near the mouth of the Pyramis (Strab. C. 676). Alexander sacrificed there. (Arr. An. II, 5).

This Teucer was the son of Telamon and Hesione, step-brother of Ajax. Telamon would not receive him home to Salamis after the Trojan War, because he had not avenged Ajax. He was given Cyprus by Belus of Sidon and founded Salamis there (Serv. ad Aen. I, 619).

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Agapenor, grandson of Lycurgus, son of Ancaeus, king of Arcadia, founded Paphos (Paus. VIII, 5, 2).

Acamas, son of Theseus and Phaedra, gave his name to the promontory Acamas, to Acamentium in Phrygia, and to the Attic "tribe" Acamantis. (Steph. Byz. Ἀκαμάντιον; Paus. I, 5, 2).

This is the only reference to Praxander and Cepheus. (Pauly).

244. In C. 682 Strabo gives the circumference of Cyprus as 3,420 stades, but there is no positive evidence that this figure is taken direct from Eratosthenes. Pliny V, 129, however, gives 427⅔ miles as from Timosthenes, which may well have been used by Eratosthenes.

For the clearing of forests for smelting, compare the S. E. of England and the consequent transference of the iron industry to the north when coal smelting was introduced.

Strabo himself, and Pliny, V, 130, put Hierocepia on the west of the island.

Theophr. (Hist. Pl. V, 8, 1) says: ἐν Κύπρῳ γοῦν οὐκ ἔτεμνον οἱ βασιλεῖς, ἅμα μὲν τηροῦντες καὶ ταμιευόμενοι, ἅμα δὲ καὶ διὰ τὸ δυσκόμιστον εἶναι.

As Eratosthenes counted all within the "Taurus" as belonging to the "northern half", he would doubtless apply the principle to all the islands of the Medi-

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terranean: in any case, Cyprus is N. W. of the line bounding the fourth Seal.

245. This disputed passage seems most likely to belong to the description of Samos. The text is beyond any but the most conjectural emendation, but evidently refers to the temple of the "Gaping Dionysus". According to Pliny, VIII, 57, 58, this was dedicated by a Samian, called Elpis, who climbed a tree to escape from a "gaping" lion and called on Dionysus. The lion (as in the story of Androcles) made it clear that it was asking for help, whereupon Elpis descended and removed a bone which was wedged in its teeth. Afterwards the lion brought its prey to him in gratitude.

Samos may well have been treated by Eratosthenes as part of Asia Minor.

246. In C. 92, where he is discussing the criticism of Eratosthenes by Hipparchus, Strabo gives the three promontories as: μίαν μέν, ἐφ' ἧς ἡ Πελοπόννησος, δευτέραν δὲ τὴν Ἰταλικήν, τρίτην δὲ τὴν Λιγυστικήν, ὑφ' ὧν κόλπους ἀπολαμβάνεσθαι τόν τε Ἀδριατικὸν καὶ τὸν Τυρρηνικόν. Whether the confusion is that of Hipparchus or Strabo it is hardly possible to say with certainty, but the meaning of this passage is clear: τὴν κατὰ Μαλέας means the whole Balkan peninsula, from

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the Adriatic to the Bosphorus, bounded on the north by the Don. Cape Malea is the eastern prong of the Peloponnese, regarded by the ancients as the most southern. The central, Taenarum (Matapan), in fact projects slightly further.

The three promontories are also mentioned by Pomp. Mel. I, 3; 2, and Dionys. Perieg. 331 f.

247. "ostium Oceani" = Straits of Gibraltar.

In modern usage "Tyrrhenian" and "Tuscan" are still applied to that part enclosed by Sicily, Sardinia, and Italy; "Sicilian" is confined to the Strait between Sicily and Tunisia, and "Cretan" to the part north of Crete. "Sardinian" is not found in most modern maps.

248. This is scarcely a specific dogma of Eratosthenes. Naturally when measuring the "length" of the Mediterranean along the diaphragm he would hardly take it to any other point than the Gulf of Issus, while Strabo is taking the Black Sea as part of the Mediterranean.

249. This "Ram's Forehead" is the S. W. cape of Crete (Ptol. III, 2, etc.). The same name was given to the S. headland of the Crimea (Strab. C. 124, etc.).

Cimarus - a northern cape of Crete. Kiepert (Att. Ant. V) gives it as Κάβος Βοῦζα. ἐπὶ Ταίναρον,

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Meineke inserts; Müller ἐκὶ Μαλέας, but Cythera does not lie between.

Samonium (Σαλμώνη, Acts XXVII, 7, etc.) was the E. promontory of Crete--probably not Salomon, but Sidero. (See Mus. Class. Ant. II p. 302)

250. Cf. Scymn. orb. descr. 785 f. (Geog. Gr. Min. I, 227):

ἔχει δὲ καὶ νήσους ἐν αὐτῷ κειμένας
πολλάς τε καὶ μεγάλας μεγέθεσιν, ὡς λόγος,
ὧν ἡ μεταξὺ τῆς θαλάττης κειμένη
καὶ τῶν στομάτων οὐκ ἔστ' ἐλάττων μὲν Ῥόδου,
Πεύκη δὲ λέγεται διὰ τὸ πλῆθος ὧν ἔχει
πευκῶν·

The same points are also attributed to Eratosthenes in Schol. Ap. Rhod. IV, 310.

251. Strabo mentions this in connexion with the winds "blowing from Thrace" and Eratosthenes's criticism of Homer, Il. IX, 5. See fr. 143 and note.

252. There is no other mention of Ichnae or Achnae.

253. The name "Sintians" occurs again in Od. VIII, 294, οἴχεται ἐς Λῆμνον μετὰ Σίντιας ἀγριοφώνους, referring to old inhabitants of Lemnos, skilled in sorcery and medicine. Eratosthenes appears to derive it from σίνομαι, "I tear, mangle".

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Berger, relying on Steph. Byz. Σιντία (district) and Σίντιες (people) places them in Thrace, traditionally the land of sorcery and witchcraft.

254. Ithaca to Corcyra--an extraordinary underestimate. The distance is nearly 70 miles.

The straight distance from Epidamnus to Thessalonica is about 200 miles, so that the later estimate is much better.

This measurement looks like one of those for the "length" of a Seal: perhaps it may be taken as a hint that Greece itself formed a Seal separate from the rest of the Balkan peninsula (fr. 247). It is given also at C. 92 in connexion with Hipparchus's criticisms.

255. Generally called "Molossis", in Epirus. Neoptolemus, son of Achilles and Deïdamia, was fetched from Scyros with Philoctetes to conquer Troy. After its fall he received Andromache, Hector's widow, as part of the spoil.

256. Charax of Pergamum wrote Ἑλληνικά and Χρονικά, mixing history and fact. (Suidas and Steph. Byz.). His date is unknown, but he mentions Nero.

257. Repeated in Servius ad Aen. II, 7.

The Myrmidons were the Thessalian tribe led by Achilles.

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258. There were two Greek tribes of Agraeans, in Aetolia and Acarnania respectively. (Strabo C. 338; Steph. Byz. s. v. Ἔφυρα.)

259. cf. "Cypriots", "Siceliots", etc., for descendants of settlers.

πρώτῳ. Ancher thought that this fragment was detached from an account of the residence in Athens (see fr. 42) in the first book of the "Geography". The more likely view, however, is that of Seidel (p. 146), Bernhardy (p. 85), and Berger (p. 352) that it belongs to the third book and that πρώτῳ should read τρίτῳ - a fairly early copying error.

For Athens in Euboea see Strab. C. 446 and Steph. Byz. Ἀθῆναι.

260. Cf. Theophrastus. Hist. Plant. III, 16, 3: ὃ δὲ καλοῦσιν οἱ Ἀρκαδες φελλόδρυν τοιάνδε ἔχει τὴν φύσιν· ὡς μὲν ἁπλῶς εἰπεῖν ἀνὰ μέσον πρίνου καὶ δρυός ἐστιν· καὶ ἔνιοί γε ὑπολαμβάνουσιν εἶναι θῆλυν πρῖνον.

The cork-tree has a greyish appearance, with serpentine boughs and bark and narrow leaves.

261. The disappearance and reappearance of rivers is fairly common in limestone districts and unusually frequent in Greece. The Alpheus is one of the few Greek rivers containing water all the year round: it disappears in

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the district of Asea, and probably for this reason was formerly called Nyctimus (river of darkness). See Tozer, p. 10.

1. 3: ζέρεθρον: Arcadian for βάραθρον.

1. 6: Λάβωνα: see fr. 2, and note.

1. 13: διοσημία: "A sign from Zeus", especially thunder or rain in large quantities. cf. Arist. Ach. 171.

262. The Hylli, or Hyllini, were an Illyrian tribe. Hyllus was the son of Heracles by Deianeira; here apparently confused with his companion Hylas.

263. The city itself was later known as Dyrrhachium. Cadmus was the legendary founder of Thebes and introducer into Greece of the Phoenician alphabet. Zeus gave him Harmonia, daughter of Ares and Aphrodite, to wife, and among their children was Illyrius. According to Hyde (pp. 39, 40) there are no Phoenician objects in the palace at Thebes, and perhaps Cadmus was an Achaean who brought the alphabet (alpha = aleph) from north Syria.

264. Pharos, or Pharia. It is difficult to say whether Eratosthenes means that the island off the Dalmatian coast was colonized from that by Alexandria. It was in fact colonized from Paros in the Aegean as late as 385 B. C. with the assistance of the elder Dionysius.

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It is frequently mentioned: e. g. Diod. XV, 13; Plin. III, 30; Ptol. II, 17, 14. The last two call it Pharia.

265. Berger argues (p. 356) that some of the legends which Strabo expressly omits were probably included (for entertainment) by Eratosthenes, and there is a good deal of probability in this view.

Strabo says (C. 215): τὰ δὲ πολλὰ τῶν μυθευομένων ἢ πατεψευσμένων ἄλλως ἐᾶν δεῖ, οἷον τὰ περὶ φαέθοντα καὶ τὰς Ἠλιάδας τὰς ἀπαιγειρουμένας περὶ τὸν Ἠριδανόν, τὸν μηδαμοῦ γῆς ὄντα, πλησίον δὲ τοῦ Πάδου λεγόμενον, καὶ τὰς Ἠλεκτρίδας νήσους τὰς πρὸ τοῦ Πάδου καὶ μελεαγρίδας ἐν αὐταῖς· οὐδὲ γὰρ τούτων οὐδέν ἐστιν ἐν τοῖς τόποις.

266. This passage fixes the alignment of Carthage and Rome, with the Straits of Messina, and presumably Sicily itself, between, neatly dividing off the western third of the Mediterranean. It seems likely that this "meridian" was based no less on guesswork than Strabo's own: the currents in this part of the sea are so strong and variable that any kind of dead reackoning was bound to be misleading.

267. Cf. Strabo C. 22: τὰς γοῦν Σειρῆνας τοὺς μὲν ἐπὶ τῆς Πελωριάδος καθιδρύειν (Cape Faro, Sicily), τοὺς δὲ ἐπὶ τῶν Σειρηνουσσῶν πλείους ἢ δισχιλίους διεχουσῶν

It is frequently mentioned: e. g. Diod. IV, 19; Plin. III, 30; Pomp. II, 17, 16. The last two call it Ilmarta.

268. Berger argues (p. 324) that some of the legends which Strabo expressly cites were probably invented (for entertainment) by Eratosthenes, and there is a good deal of probability in this view.

Strabo says (C. 219): τὰ δὲ πολλὰ τῶν ποιουμένων ἢ παραψευδόνων ἄλλως ἐστί, οἷον τὰ περὶ Φαιάκων καὶ τὰς Ἡλιάδας τὰς ἀναγεγραμμένας περὶ τὴν Ἠριδανίαν, τὴν μιμουμένην γὰρ ἔστιν, ἀμφίον δὲ καὶ Ἀμφίονα καὶ τὰς Ἑσπερίδας τὰς ἐν τοῖς Ἀθλοις καὶ παλαιγήρας ἐν αὐτοῖς· οὐδὲ γὰρ τοῦτον οὐδὲν ἔστιν ἐν τοῖς τόποις.

269. This passage takes the alignment of Gerthage and Tore, with the Straits of Messina, and presumably Sicily itself, between, mostly dividing off the western third of the Mediterranean. It seems likely that this "meridian" was based no less on guesswork than Strabo's own: the currents in this part of the sea are so strong and variable that any kind of dead reckoning was bound to be misleading.

270. C2. Strabo C. 22: τὰς γοῦν Σειρήνας τοῖς μὲν ἐπὶ τῇ Πελωριάδος καλουμένῃ (Capo Faro, Sicily), τοῖς δὲ ἐπὶ τῶν Σειρηνουσῶν νήσοις ἢ ὀκτώ, τοῖς δὲ

σταδίους· εἶναι δ'αὐτὰς σκόπελον τρικόρυφον διειργοντα τὸν Κυμαῖον καὶ Ποσειδωνιάτην κόλπον (Gulfs of Naples and Salerno). (fr. 140). There can be no doubt that Eratosthenes mentioned this in his passages on Homer, but it is also probable that he would refer to such an important feature as the Bay of Naples in his description of Italy.

The name "Sirens" is said to be derived from σύριγξ - i. e. the wail of the wind in a ship's rigging.

268. At their nearest points Corsica is something over 50, Sardinia about 150, miles from the mainland. Corsica is frequently visible, but if the normal state of visibility is taken Eratosthenes may be held justified.

269. The Noric Alps, S. W. of Vienna.

270. The Hercynian or Orcynian Forest was a vague name for most of central Europe; in legend it was bounded to the north by the Rhipaean Mountains (fr. 137 and note). The Black Forest is only a small remaining piece of it.

271. Pytheas was at this time, and indeed until Strabo's own time, the only authority for N. W. Europe. It seems reasonable to suppose that Eratosthenes adopted his remarks more or less word for word after a critical appreciation (διακορήσαντα) of such stories as that of

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the "sea-lung" (fr. 284). The geographical discoveries attributed to Pytheas are therefore given here. See also Intr. pp. lxiv-lxvi.

272. It is difficult to decide whether Eratosthenes thought of Pyrene as a city. It so appears in Herod. II, 33, where Gaul is still a land of mystery, but by Strabo's time it was known that the Pyrenees were a range of mountains, although taken as running due north and south. (Strabo C. 177).

The distances given by Eratosthenes are very close: Marseilles to Gibraltar is about 800 miles, from the Pyrenees about 650.

273. Tarragona, N. of the E. coast of Spain.

274. Latin Gades, modern Gadiz. The same remark is given, without reference to Eratosthenes, in Eustath. ad Dionys. 65, and again at 1. 451. The more common form is the neuter, τὰ Γάδειρα, from the Phoenician "Gaddir". Cf. Avien. Ora Marit. 267:

Gaddir hic est oppidum:
Nam Punicorum lingua consaeptum locum
Gaddir vocabat.

275. Tartessus, or Tarshish, is recorded as early as Genesis X, 4, and I Kings X, 22. It took its name from

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the inhabitants of the hinterland, the Turdetani. It was visited by the Phocaeans before their foundation of Massilia in 600 B. C. (Herod. I, 163). It is mentioned by Hecataeus. Like the Land of Punt (Somaliland) it was a fabulous land of wealth.

Erythea was identified by some with the actual "Isla de Leon" of Gades. Geryon was supposed to feed there the oxen stolen by Heracles. (Hes. Theog. 287, 979; Herod. IV, 8).

From Gibraltar to Cape St. Vincent (Sacred Cape) is rather over 200 miles. Broche (ch. IX) explains the five days by a long detour to avoid the Phoenician garrison at Gadeira; but he took four days from France to Cornwall.

καὶ τὸ τὰς ἀμπώτεις μέχρι δεῦρο κερατοῦσθαι. It seems, as Berger remarks (p. 367), that Artemidorus must have misunderstood Eratosthenes here and in Book One. This can hardly refer to the tides' being "limited" in the sense of dividing the Ocean in two at Gades, but to the tides of Ocean not penetrating into the Mediterranean.

εὐκαροδώτερα: there is a current along the north coast of Spain, resulting from the Atlantic Drift, which assists the coasting voyage west to east.

276. By "Gauls" it is likely that Eratosthenes meant nothing

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more than "Celtic peoples", in the old sense: see Intr. p. xxxiii and fig. 1.

277. Cf. C. 63: καὶ τὰ περὶ τοὺς Ὠστιμίους δὲ καὶ τὰ πέραν τοῦ Ῥήνου τὰ μέχρι Σκυθῶν πάντα κατέψευσται; and Steph. Byz. s. v. Ὠστίωνες: ἔθνος παρὰ τῷ δυτικῷ ὠκεανῷ, οὓς Κοσσίνους Ἀρτεμιδωρός φησι, Πυθέας δ' Ὠστιαίους.

The Ostimii were the inhabitants of Brittany, whose projection westwards Pytheas was the first to report. Broche, connecting these passages with others, ignoring the force of καὶ περὶ τοῦ Ῥηνου, dismissing δυτικῷ as the mistake of a "mere compiler", and assuming that Pytheas was the only authority for northern Europe down to the time of Pomponius Mela, tries to show that these Ὠστίωνες or Ὠστιαῖοι have nothing to do with Brittany, but are the Aestii of Tacitus (Germ. 45), the the collectors of amber, and are in fact Esthonians.

278. Diodorus Siculus wrote nearly 50 years after Julius Caesar, but he made use of Timaeus of Tauromenium, the historian who introduced the system of dating by Olympiads which was perfected by Eratosthenes. Timaeus was a little junior to Pytheas and used his material. Caesar did not visit any of Britain but the south-east, and this account, which reads like that of an eye-witness,

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is almost certainly that of Pytheas, whose interest in tides is to be remarked here too.

Ictis: Pliny has two statements which make the problem of identifying this island with certainty almost impossible. He says: (H. N. IV, 36): Ex adverso Celtiberiae complures sunt insulae, Cassiterides dictae Graecis, a fertilitate plumbi (albi); and (H. N. IV, 30): Timaeus historicus a Britannia introrsus sex dierum navigatione abesse insulam Mictim, in qua candidum plumbum proveniat. Ad eam Britannos vitilibus navigiis corio circumsutis navigare.

These three passages have led to the placing of the entrepôt for British tin in the Scilly Islands, Thanet and the Isle of Wight in the past, whereas the present favorite is St. Michael's Mount (Cary, p. 215, who says the "six days' sail" is due to confusion with Thule; Warmington, p. 172, who says that it was confused with Ireland (Ierne, Iris)). Broche explains the six days as from Cornwall to the Isle of Wight, measured in coracles, and suggests that perhaps the Solent in Pytheas's time was dry at low tide (ch. XIII). He does not explain "introrsus", which could hardly mean anything but towards "home"--the Mediterranean.

The only explanation which seems to cover everything is that, either simultaneously or, more likely, at

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different periods, different places were used: possibly the Scillies for a direct sea-route to Carthage, and later, in Pytheas's time, St. Michael's Mount for the channel-land-route across Gaul, obviating the difficult and dangerous carriage of lead in coracles.

According to R. G. Collingwood and J. N. L. Myres ("Roman Britain and the English Settlements", pp. 31 and 282; Oxford, 1936) the Britanni were a Belgic tribe whose name was confused by Caesar with Welsh "Pretani" or "Priteni" ("painted" = Pict), which had already given rise to the Greek Πρεττανική, a more nearly correct form.

Belerium = Land's End; Cantium = S. Foreland; Orca = Duncansbay Head (John o'Groats) more probably than C. Wrath.

The distances given here are well over double the actual, the perimeter of Great Britain in straight lines amounting to about 1600 (land) miles. Caesar (B. G. V, 13) gives S. side = 500; W. side = 700; N. side = 800; total = 2000, all in Roman miles, which is a very close estimate. It is noteworthy, too, that Caesar makes Britain lean over in the opposite direction to Diodorus, making the east side the north, with Ireland on the West. These facts point strongly to the copying of the whole passage from Pytheas, and confirm

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the measurements given as being his own record. Almost all these measurements are grossly exaggerated, and in his case there were very unusual tidal conditions: in his passage from Ushant or Brittany to Belerium he must have had bad conditions to take four days over 100 miles or so; and the circumnavigation would, as Broche points out (ch. XV), be enormously extended by coasting and making many landings. According to Strabo (C. 104). . . . ὅλην μὲν τὴν Βρεττανικὴν (τὴν) ἐμβατὸν ἐκελθεῖν φάσκοντος, τὴν δὲ Περίμετρον κλειόνων ἢ τεττάρων μυριάδων ἀποδόντος τῆς νήσου. . . . This may be (Cary p. 35) a sarcastic remark by Polybius, from whom Strabo is quoting, that he "visited all Britain on foot"; or (with or without the τὴν inserted by Berger) it may mean that he landed everywhere that was accessible. In any case it implies a detailed story.

One measurement not included among the fragments, as there is no evidence which version was adopted by Eratosthenes, is that from "the continent" to Cantium. The incompatible texts are:

Diod. Sic. V, 21: τὸ μὲν ἐλάχιστον ἀπὸ τῆς ἠπείρου διεστηκὸς ἀκρωτήριον, ὃ καλοῦσι Κάντιον, φασὶν ἀπέχειν ἀπὸ τῆς γῆς σταδίους ὡς ἑκατόν;

Strab. C. 63: καὶ τὸ Κάντιον ἡμερῶν τινῶν πλοῦν ἀπέχειν τῆς Κελτικῆς φησί (Πυθέας).

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The most obvious explanation, though by no means final, is that Strabo's version is taken from Pytheas's actual record, and that he did not go straight across to Pas-de-Calais, but made a long leg to east and north, while Diodorus's version comes from a later source. Broche (ch. XIV) suggests that the channel was much narrower (even under 12 miles) then, and has been enlarged by the tidal erosion since: he ignores Caesar's "commodissimus traiectus" (B. G. V, 2) of about 30 (Roman) miles. In fact, on a clear day, it is difficult to think it impossible for the ordinary person to swim across, and Diodorus's authority may have given a perfectly honest estimate.

There is no means of knowing how accurate is the account of British life, but it may not be out of place to remember the idyllic Hyperboreans of Greek legend.

280. There is no convincing explanation of this measurement. It has been suggested (Cary p. 36, who quotes also Blazquez, "Pyteas de Marsella", pp. 28-30) that this really refers to waves in the Pentland Firth when a gale blows against the tide. In view of the interest shown by Pytheas in tidal phenomena (cf. fr. 278, and Plac. Phil. III, 16, where he is credited with connecting tides with phases of the moon), it is almost impossible that he should himself have confused waves with tides.

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although "intumescere" may suggest something more than a normal rise; the greater likelihood is that Pliny failed to understand what he did say, having never seen a tide himself.

281. Diodorus says of Ireland (V, 32): ἀγριωτάτων δὲ ὄντων τῶν ὑπὸ τὰς ἄρκτους κατοικούντων καὶ τῶν τῇ Σκυθίᾳ πλησιοχώρων, φασί τινας ἀνθρώπους ἐσθίειν, ὥσπερ καὶ τῶν Βρεττανῶν τοὺς κατοικοῦντας τὴν ὀνομαζομένην Ἴριν.

There can be little doubt that Strabo's account is from Pytheas, although his οὐδὲν ἔχομεν λέγειν σαφές, πλὴν ὅτι shows that he cannot bring himself even to mention him as a source.

Caesar (B. G. V, 13) also mentions the "small islands", and names Mona (Man).

l. 3: πρόμηκες: Jones, for προμήκης. Other editors, after Corais, insert ἢ after μᾶλλον.

l. 6: κολυφάγοι: Some editors read κοηφάγοι.

282. By τὰ οὐράνια καὶ τὴν μαθηματικὴν θεωρίαν Strabo means much the same as τὰ κλίματα (see Intr. p. lxx), involving the observation of weather, temperature, and agricultural conditions to supplement primitive astronomical calculations (cf. fr. 196). This detailed account is still useful, if only negatively, in disproving the hypothesis that Thule is Iceland. The

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presence of bees is not known north of latitude 61°. (Tozer, 2nd ed., p. XXII, note by M. Cary)

According to Strabo (C. 63): Θούλην φησὶ Πυθέας ἀπὸ μὲν τῆς Βρεττανικῆς ἓξ ἡμερῶν πλοῦν ἀπέχειν πρὸς ἄρκτον. From this and the assumption that the Arctic Circle passes through Thule, Cary ("Ancient Explorers", p. 37), Warmington (p. 173), and Hyde (p. 130) agree that Norway is the most likely identification. It must, however, be remembered that Pytheas does not (fr. 284) claim to have been to Thule himself; while even fr. 282 does not explicitly identify τοῖς τῇ κατεψυγμένῃ ζώνῃ πλησιάζουσι with Thule itself. If it took Pytheas four days to sail from Brittany or Normandy to Cornwall, it seems not altogether impossible that it should take the some one (natives?) five or six days in amongst the islands and tides from (say) Wick to Mainland in the Shetlands; while its official shortest night of five hours consists largely of twilight. In such dubious matters, where unreliable writers report what Pytheas related at second hand, final identification is not possible.

1. 2: Jones inserts ἂν, others after ἱκανῶς, or emend δόξει for δόξειε.

1. 6: κόμα ἐντεῦθεν. Presumably both beer and mead.

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283. It is worthy of note that Geminus does not say that Pytheas went further north than the 18-hour belt, or that Pytheas measured the length of the day with accuracy himself; indeed, without a minimum stay of over two years and accurate calculation of the solstice, even supposing him to have a really reliable water-clock intact in his ship, he could not have done so. The only actual quotation extant from Pytheas himself is this somewhat cryptic remark about the sun's resting-place. It is difficult to imagine that this can mean anything but a general indication that, further north, there was a region where the sun did not rise at all for one or more days--i. e. the Arctic Circle and further.

In connexion with the length of the longest day in northern latitudes, Strabo quotes Hipparchus as follows: (Strabo, C. 75):

Φησὶ δέ γε ὁ Ἵππαρχος κατὰ τὸν Βορυσθένη καὶ τὴν Κελτικὴν ἐν ὅλαις ταῖς θεριναῖς νυξὶ παραυγάζεσθαι τὸ φῶς τοῦ ἡλίου περιιστάμενον ἀπὸ τῆς δύσεως ἐπὶ τὴν ἀνατολήν, [ταῖς δὲ χειμεριναῖς τροπαῖς τὸ πλεῖστον μετεωρίζεσθαι τὸν ἥλιον ἐπὶ πήχεις ἐννέα· ἐν δὲ τοῖς ἀπέχουσι τῆς Μασσαλίας ἑξακισχιλίοις καὶ τριακοσίοις (οὓς ἐκεῖνος μὲν ἔτι Κελτοὺς ὑπολαμβάνει, ἐγὼ δ'οἶμαι Βρεττανοὺς εἶναι, βορειοτέρους τῆς Κελτικῆς σταδίοις δισχιλίοις πεντακοσίοις) πολὺ μᾶλλον τοῦτο συμβαίνειν· ἐν δὲ ταῖς

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χειμεριναῖς ἡμέραις ὁ ἥλιος μετεωρίζεται πήχεις ἕξ, τέτταρας δ'ἐν τοῖς ἀπέχουσι Μασσαλίας ἑνακισχιλίους σταδίους καὶ ἑκατόν, ἐλάττους δὲ τῶν τριῶν ἐν τοῖς ἐκέκεινα, οἳ κατὰ τὸν ἡμέτερον λόγον πολὺ ἂν εἶεν ἀρκτικώτεροι τῆς Ἰέρνης.] οὗτος δὲ Πυθέᾳ πιστεύων κατὰ τὰ νοτιώτερα (ἀρκτικώτερα, Meineke and Broche) τῆς Βρεττανικῆς τὴν οἴκησιν ἡμέραν ὡρῶν ἰσημερινῶν δέκα ἐννέα, ὀκτωκαίδεκα δέ, ὅπου τέτταρας ὁ ἥλιος μετεωρίζεται πήχεις· οὓς φησιν ἀπέχειν τῆς Μασσαλίας ἐννακισχιλίους καὶ ἑκατὸν σταδίους. ὥσθ'οἱ νοτιώτατοι τῶν Βρεττανῶν βορειότεροι τούτων εἰσίν.

For some reason this has been taken by Broche (ch. XX) and others to show that Pytheas himself took the lengths of the longest days mentioned, and Broche remarks on their great accuracy; an accuracy not surprising, as clearly Hipparchus worked out the times and elevations in connexion with his framework of κλίματα, fitting in afterwards the data and measurements <u>in stades</u> left him, more or less correctly, by Pytheas and Eratosthenes and contradicted by Strabo. The all-night glow of the sun in northern latitudes is evidently not Hipparchus, ad may, with the 19-hour day, be attributed to Pytheas. It must be remembered that Hipparchus seems to have followed Eratosthenes in placing the "arctic circle" bounding the frigid zone (fr. 172) at

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N. 54, which in fact passes through Harrogate, slightly north of York.

Sir Walter Scott's note on chapter 19 of "The Pirate" may have some relevance to this and the foregoing fragment: "From the hill of Hoy (an island of Orkney, not Shetland) at midsummer the sun may be seen, it is said, at midnight. So says the geographer Bleau, although, according to Dr. Wallace, it cannot be the true body of the sun which is visible, but only its image refracted through some watery cloud upon the horizon."

Cf. also Tec. Agric. 12, on the short, light nights in north Britain.

284. Broche, who believes that Pytheas sailed to Iceland and beyond, holds (ch. XXVI) that this passage refers to pack-ice of the "Mare Cronium" which prevented further advance. This does not seem to cover "earth, or sea, or air". The most convincing explanation appears to be a really thick, cold sea-fog (Cary, p. 37).

285. Pliny quotes Timaeus (H. N. IV, 13): Exeundum deinde est, ut extera Europae dicantur, transgressisque Riphaeos montes litus oceani septentrionalis in laeva, donec perveniatur Gadis, legendum. Insulae conplures sine nominibus eo situ traduntur. Ex quibus ante Scythiam, quae appellatur Raunonia, unam abesse diei cursu,

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According to Broche (see Introd. p. xlvi), Pytheas sailed right into the Baltic Sea (aestuarium Oceani), which was formerly called Men, or Tunum (p. 214, n. 3) to Samland in Esthonia. This was Abalus, Basileia, or Raunonia, the great amber island.

The word "abalus" is Celtic for "apple" (Gary p. 38), and the reasons for its metamorphoses seem impossible to fathom. It does, however, seem unlikely that anyone could mistake the Baltic for an estuary, even nearly 700 miles across, or that Samland could be reached in one day from the entrance. The most credible explanation seems to be (Gary p. 78) that the "estuary" is the Frisian Bight, though this is not anything like 6000 stades across, and the amber island Heligoland. This is supported by Hyde (p. 133), but Broche says the amber deposits on Heligoland are negligible in modern times, and conditions could not have changed so much; although the Isle of Wight may have been a peninsula, the Channel under 12 miles across, and there may have been bees in Iceland.

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According to Brooke (see Introd. p. xlvi), Tyrrhen sailed right into the Baltic Sea (Mentuerium Oceanum), which was formerly called Mem, or Tuem (p. 274, n. 3) to Samland in Estonia. This was Abalus, Baltia, or Basonia, the great amber island.

The word "abalus" is Celtic for "apple" (Darg p. 38), and the reason for its metamorphosis seem irreducible to fiction. It does, however, seem unlikely that anyone could mistake the Baltic for an estuary, even nearly 700 miles across, or that Samland could be reached in one day from the entrance. The most possible explanation seems to be (Darg p. 78) that the "estuary" is the Frisian Bight, though this is not anything like 6000 stades across, and the amber island Heligoland. This is supported by Rude (p. 133), but Brooke says the amber deposits on Heligoland are negligible in modern times, and conditions could not have changed so much; although the Isle of Wight may have been a peninsula, the Channel under 12 miles across, and there may have been been in Ireland.

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Aeschylus

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