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DIO

Aubrey Diller Legacies

Ptolemy GEOGRAPHY Book 8

Diller's 1984 Establishment of
The First Critical Edition

DIO's Numbered Catalog of Book 8's 360 Sites
With Tabular Correlation to Data of Books 2-7

Plus 2009's Unexpected Confirmation of

The Diller Pioneer 1934 Proof of Spherical Trigonometry's 130 BC Use by Hipparchos

Dedication

To Aubrey Diller (1903-1985), the 20th century's ultimate devoted philologist of ancient geographical mss, who honored *DIO* by leaving to us the manuscript of his last work: the pioneer completion of two centuries of scholars' scrupulous cumulative labors towards establishment of a reliable text of 2nd century AD mathematician-astrologer Claudius Ptolemy's famous *Geographical Directory* (*GD*), popularly known as the *Geography* or *Geographia*, and said to be the most-written-of work in all the history of geography.

The frustrations of non-completion steadily increased following the series of scholarly but invariably unfinished *GD* editions by Wilberg & Grashof 1838-1845, Müller 1883&1901, & Renou 1925 (which collectively took the project up through Book 7), culminating in Diller's 1984 achievement of establishing the text of the *GD*'s finale: Book 8.

The project of making the *GD* readily accessible continued with the valuable English edition of Berggren & Jones 2000 [henceforth B&J] of all the work's textual parts. (Diller translated only Book 8's preface.) DR's original findings in this field (Rawlins 1985G, Rawlins 2008S, & within at §D3) would never have occurred absent the shoulders of Diller 1984 (Book 8) & B&J. DR's *GD* researches continue below at fnn 64&68 — now upon the additional shoulders of the monumental work (in German) of Stückelberger & Graßhoff 2006 (henceforth S&G), which finally brought all eight books of the *GD* together in one gorgeous publication, for which all scholars of ancient geography are grateful.

Diller's 1984 typescript was accomplished at age 82 at DR's behest, while he was Professor Emeritus of Classics at Indiana University at Bloomington. It was done from index cards of Book 8 data which Diller had been compiling for years — data he generously shared with DR right from our 1st meeting (1982/8/4), data which were of crucial use to the researches that went into DR's presentation at the 1984 Longitude Zero Symposium at Greenwich celebrating the centenary of the Greenwich meridian's 1884 establishment. Diller's full Book 8 data might have been lost at his 1985 death had he not created the typescript from the cards and sent it to DR a year earlier, in time for use in the final published version (Rawlins 1985G) of the Greenwich paper.

Every page of Diller's complete original 1984 typescript[1] is (thanks to *DIO* Editor Dennis Duke) posted on the *DIO* website, available through, e.g., www.dioi.org/gad.htm or www.dioi.org/diller8/diller8.htm.

Aubrey Diller's most enduring discovery, his 1934 proof that Hipparchos used spherical trig and found an accurate obliquity, is also discussed within at §D, where we announce (§D3 [7]) the 2009/4/1 finding of Diller's final vindication. With greater perception or intensity, DR could have discovered this capper decades ago; so, the pleasure of vindication is mingled with a touch of regret, since Diller (and Hugh Thurston, who would have so enjoyed this) both passed away before the controversy's ultimate resolution could be shared with them. Let us hope that belated appreciation of Diller's 75y old discovery will now atone for all of the shortcomings of our generation's scholarly heirs to his brilliance.

Dennis Rawlins *DIO* 2009

The results of DR's 3 decades (1979-2009) of original investigations in ancient geography appear in Rawlins 2008S (*DIO 14* §3 pp.33-58 — online at www.dioi.org/vols/we0.pdf) and the present issue (www.dioi.org/w50.pdf), a cheekier summation of which may be found at www.dioi.org/cot.htm#dmfe. Downloadable booklet PDFs for printshop-creating paper copies: www.dioi.org/bk/de0.pdf and d50.pdf. For Rawlins 2008S in HTML, see www.dioi.org/gad.htm, which includes Nobbe's illustration of Ptolemy's 1st projection of the *ekumene* (known world). The anciently intended[2] neat projection is reconstructed with rigorous precision via raw Postscript at Rawlins 2008S §M Fig.1.

[1] As explained at Rawlins 2008S fn 1, the standard Greek accents of the original Diller typescript are not relayed here. (This anti-anachronism has been adopted with his explicit assent.)

[2] Perfect illustrations of the conventional version are found at, e.g., B&J p.86 or S&G pp.122-123. (The clear explanations & diagrams at both places are must reading for students of the field.) The key to the difference in DR's rendering at Rawlins 2008S Fig.1 is explained in *ibid* fn 51.

Aubrey Diller: Ptolemy GEOGRAPHY Book 8 & Proof of Spherical Trigonometry's Early Use

A Aubrey Diller's Legacy to Historians of Geography & Mathematics

A1 The 2 purposes of the present *DIO* are: [1] To present (§A2 etc) Aubrey Diller's Greek text and English translation of the opening portions of the crucial final Book 8 of Ptolemy's *Geographical Directory* (*GD*), followed by a full tabulation of both traditions of the *GD* Book 8 *data* which Diller so thoroughly established for the 1st time in history. [2] To reveal (§D) the sudden 2009 final redemption of Diller's long cult-loathed (fn 22) but ***now copper-fastened*** proof of Hipparchos' use of spherical trig in the 2nd century BC.

A2 The *GD* Book 8 data comprise the locations of 360 "important cities"[1] throughout the known world (*ekumene*), entirely in ***time***-coordinates, listed on the righthand pages of Tables 1-26, below: longest-day M in *hours* (instead of latitude L in degrees), and longitude A in *hours* west (plus-sign) or east (minus-sign) of Alexandria. (This is astronomers' sign-convention for geographical longitude.)

A3 As another pioneering part of this project, we will number the 360 cities of *GD* 8 (in the order of the least corrupt tradition, that of the XZ mss), using the prefix "D" so that city Dx is the x^{th} site in this §G tabulation: Tables 1-26 (pp.18-40).

A4 DR has long contended (Rawlins 1985G, Rawlins 2008S) that this type of data formed the geographical grid-network underlying[2] the positioning of the more famous bulk

[1] Similarly proportioned lists of "important cities" survive in the *Handy Tables* and in, e.g., the ancient mss published by Honigmann 1929 (see fn 19). DR has called Book 8 "the Handiest Tables" (fn 72), a play on the title of Ptolemy's similarly (Rawlins 2008S §D) astrologer-intended *Handy Tables*, reflecting DR's contention that Book 8 was (more than any other part of the *GD*) designed for astrologers' convenience. (See www.dioi.org/gad.htm#sgch.) This factor may help explain [a] why the density of listings of cities in Book 8 (per Books 2-7 listings) is nearly 1/2 again higher in Asia (where astrology has traditionally achieved greater mass-mental-bondage) than in Europe, and [b] why the *GD* survived the Dark Ages. Note that the *GD* draws from sources with some knowledge of regions only rarely if at all touched upon in other surviving ancient western literature.

[2] As to the mystery of who was responsible for this grid and its scientifically fateful shortcomings: though DR has long wondered (based upon *GD* 1.4.2) about the degree of Hipparchos' involvement, there is a strong piece of evidence (see also *DIO 16* ‡3 fn 18) that he was at least not exclusively the culprit, namely, *GD* 5.2.34's latitudes for four sites on Rhodos Island, none of them explicitly Rhodos City, strangely. (A similar Ptolemy lapse: *Almajest* 7.3's concentration upon brightest Pleiad η Tauri vs. the four Catalog Pleiads' omission of same at *Almajest* 8.5.) S&G 2:498 takes some liberties (similar to ours here for D33 = Scandinavia) in order to uncertainly reconstruct a *GD* 5.2.34 match to D189 = Rhodos at *GD* 8.17.21. Contra (esp. Lindos) previous editions (Nobbe 1843-5 2:16, Wilberg & Grashof 1838-1845 p.342, Müller 1883&1901 p.837). But the only *GD* site that is surely near Rhodos City and is virtually identical in latitude is Ielysos (Ιηλυσος: old Rhodos City) just west of the famous later classical-era metropolis, so we opt to use it in Table 15 below. (Its great proximity to Rhodos City suggests that its choice was intended to unambiguously mark the latter's $B\&L$.) The sole possibly accurate site of the four is Panos Akra if (contra H.Kiepert) it is meant to be Cape Prassonesi (S tip of Rhodos Island), where Rawlins 1994L §E4 found that the southern section of the Ancient Star Catalog was observed by transit, equatorial data later transformed by sph trig (via eq.4) to ecliptical by assuming $L = 35°\,5/6$. Most of the *GD* 5.2.34 data's positionings are not so bad relative to each other, but the absolute values of at least two are awful. All of Hipparchos' work shows that he knew his latitude to c.$1'$. (See, e.g., Rawlins 1994L Table 3.) So it is unlikely that Hipparchos authored the mistaken data for Ielysos & Kamiros. Since two of the four latitudes might have been meant to be at or near Rhodos city, we note that the actual city is at $L = 36°.4$, vs *GD* 5.2.34's $35°\,11/12$ (Panos Akra as the harbor's north cape?) or $36°$ (Ielysos). But both those two cited *GD* 5.2.34 listings could be merely $14^{\text{h}}1/2$

of the *GD* (Books 2-7), 8000 cities' latitudes L in degrees, & longitudes B in ***degrees*** east of the Blest Isles (BI). (No signs are necessary for B, since no B is west of the BI.)[3]

A5 Rawlins 2008S was 1st to reveal that the Blest Isles were the Cape Verde Islands. (Contra a long & hitherto unexplained[4] tradition of suggesting that the BI = the Canaries.) Compare any modern map to *GD* 4.6.34 or the *GD*'s 4th map of Asia (S&G p.838) or world map (S&G pp.748&750, or either volume's inside front cover).

A6 Book 8 (*GD* 8.15.10) places the BI at 4^{h} west of Alexandria, while Book 4 (*GD* 4.5.9) places Alexandria $60°1/2$ east of the BI. (A pretty consistent distance, given *GD 8*'s rounding roughness.) So sites' longitudes in Book 8 show a systematic difference of nearly 4^{h} versus those of Books 2-7. But since sign-conventions here for our two longitudes are opposite (A positive to the west, B positive to the east), the equation that will hold for all sites (despite generally minuscule local irregularities) is $A^{\text{h}} + B°/(15°/\text{hour}) \doteq 4^{\text{h}}$, or:

$$A + B/15 \doteq 4 \qquad (1)$$

B The Manuscripts' Lineages

B1 The earliest of the surviving mss are from c.1300 AD, thus considerably later in time (from Ptolemy[5] and his prime immediate geographical source, Marinos[6] of Tyre) than the oldest mss of Ptolemy's other famous compilation, the *Almajest* — and the key *GD* mss are much less consistent with each other.

B2 There are several descending traditions of *GD* mss, but Diller knew that there were two distinct main families, so he established not one *GD* 8 text but two: "XZ" and "UNK", separately arranged & paginated. (See original Diller typescript via www.dioi.org/gad.htm.) The XZ tradition is generally and rightly considered less tampered-with[7] (that was Diller's opinion and is that of B&J pp.43f: see also Rawlins 2008S fnn 7&12), its data being less precisely accordant with *GD* 2-7 than UNK's. Which suggests that if *GD* 8 (or its forebears) much earlier generated (via eq.2) some of *GD* 2-7's key-city latitudes, the XZ tradition mss are nearer in time to the era when such semi-hypothetical transformation (discussed in Rawlins 1985G & Rawlins 2008S) occurred. Bear in mind that the ***precision*** of agreement between *GD* 2-7 and the UNK tradition can obscure realization that both traditions suffer from an ***accuracy*** whose mean pre-longitude-expansion error (Rawlins 2008S §D1, fn 13, & §L3) is shockingly[8] large: ordmag 1°. Thus, XZ's larger *GD* 8-vs-*GD* 2-7 disconnect may carry a trace of the crudity of the old klimata tables that originally (a millennium prior to our earliest mss) caused the *GD*'s gross inaccuracies in latitude.

B3 The UNK tradition's data are not only more internally consistent[9] (*GD* 8-vs-*GD* 2-7) but are less subject to scribal errors (e.g., §B4). And, in much of Greece (where *GD* latitudes are generally too low), M values tend to be a few timemin higher in UNK than in XZ, suggesting mass shifts by a later hand. This may have been intended to improve accord with reality,[10] while (fn 9) inadvertently obscuring original data. And what original data that remain can be revealing, e.g., XZ's disparate A values omitted by S&G for, e.g., Miletos (D181) & Europos (D269) appear to provide (via eq.1) residual reflections of an earlier tradition[11] in which the B of Alexandria (D149) was set at 60°, not the curious $60°1/2$ value whose patently-touched-up[12] precision[13] is naïve in context, a value that eventually (via the proposed archetype of B&J p.42?) became standard.[14] The discrepancies of the former and Java (D357) may be miscomputations, but it is at least as likely that they once had different longitudes, e.g., Java B seems (for XZ's $A = 7^{\text{h}}2/3$ east: omitted by S&G pp.900-901) to have been at $B = 175°$ before ending up at 167° (*GD* 7.2.29 congruent with UNK's A).

B4 Still, at least some of the UNK corrections are valid contributions even to manuscript restoration. E.g.: [a] Undoing[15] the accidental switch of the M data between D79&80 (corrections we adopt below and typically mark with "r" in the XZ column for these two sites' M). [b] Not maintaining the needless identities in XZ's *GD* 8 coordinates for D171&174, D211&212, D255&256, D274&275. [c] Not mixing-up the A for D240&241, as XZ did. [d] Generally not being misled[16] by cases where an editor (usually XZ and outside areas of high western civilization) mistakenly took[17] Σ for B on an ancient majuscule ms.

klimata: 36° based on using eq.3 (the obliquity ϵ which we know was that of Eratosthenes & Ptolemy) in eq.2, or $35°11/12$ from instead using eq.4 (Hipparchos' 1st value) with it. As with Elephantine Island and Syene (Rawlins 1985G n.6) we may have multiple listing of what is effectively a single site, each based on one of these two competing ϵ values. (Since, at *GD* 6.7.7 Pseudokelis' $L = 12°1/2$ fits *GD* 8.22.7 via eq.2 better than Okelis' $L = 12°$, one can wonder if D281 is yet another double site. See fn 24.) The suggestion is that Marinos and thus Ptolemy inherited traditional compilations (and were convinced of their data's accuracy from their sheer handed-down-ness [*GD* 2.1.2]: a classic error of scholarship) — from at least two post-Hipparchos hands. (See tables of major *GD* cities at Rawlins 1985G p.262: involving the same two obliquities just cited.) Each of the ultimate sources had computed key (network-basis) sites' latitudes L from typically (fn 19, Rawlins 1985G pp.260f, Rawlins 2008S §D) discrete-interval-rounded klimata M, via eq.2 — but using the disparate obliquities noted here.

[3] See eq.1. The six Blest Isles (*GD* 4.6.34) are listed with B equal to 0° or 1° (Nobbe 1843-5 1:274, Wilberg & Grashof 1838-1845 p.298, Müller 1883&1901 p.754; contra S&G 1:454&456) the unweighted mean of which is $1°/2$. Is that related to the oddity that the B of Alexandria (4^{h} east of the Blest Isles: *GD* 8.15.10) is $60°1/2$ (*GD* 4.5.9), not 60°?

[4] Rawlins 2008S asks: did error originate from one of the Blest Isles being named "Kanaria Nesos"?

[5] By least-squares analysis of *Almajest* 7.3's star declinations, the *GD* (cited in *Almajest* 2.13 as imminent) has been dated to no earlier than their epoch, c.160 AD: Rawlins 1994L Table 3 & fn 45.

[6] Marinos is dated to c.140 AD in Rawlins 2008S §I, but may be as late as c.160 AD.

[7] Note hint at fn 66. However, as one moves east in *GD* 8, the S data of XZ sometimes seem more precisely arranged than UNK's.

[8] For why such laxity requires explaining, see Rawlins 2008S §D6; for the explanation itself, see *ibid* & Rawlins 1985G, or briefly here at §A4.

[9] UNK's editor(s) evidently went to much trouble to check out consistency, specially recomputing M via sph trig (eq.2) to ensure its match to L — which is why the great majority of UNK data marked "eggista" ("nearly") are M. This labor is admirable in its intent but unfortunate since, again, both M and L are generally in such poor accord with reality (and M so nearly useless, except to astrologers) that this was essentially just a purely mathematical exercise, which has accomplished little except to make it harder for us to trace the M values that originally distorted ancient geography so disastrously.

[10] E.g., if not operating independently, perhaps UNK's editors realized that XZ's poor M of Termessos (D202) had been based on a klimata table with over-rough $1^{\text{h}}/2$ intervals. (The identification of XZ's D202 with the Termessos of *GD* 5.5.6 [rather than of *GD* 5.3.2's out-of-order Telmessos] is indicated by XZ's A value.) Similar case: the A of Busra (D250).

[11] And UNK may use eq.1's 60° precisely to generate A, e.g., Persepolis (D271) & Kabul (D322).

[12] Akin to a modern over-precision fret discussed at *DIO 10* fn 67.

[13] Precision varies throughout the *GD*; e.g., the B&L of Gaul are expressed only to degree-sixths (not twelfths) with the sole exception of Pytheas' famous L for Marseilles. See similarly for Vietnam (degree-quarters) at Rawlins 2008S §K10.

[14] Ptolemy preferred round parameters, so if he accepted a $60°1/2$ home longitude (questionable), it must have been Marinos' value. Particularly precise XZ examples of A computed from setting Alexandria's B at $60°1/2$, are those of Little Armenia's Νικοπολις (D208) & Susa (D263). The identity of the Nicopolis datum with the UNK value suggests the possibility that it leaked into XZ from UNK; but that explanation does not work for the precise and disparate Susa value.

[15] The implication that XZ was known to those who created the UNK edition is not mere speculation. The number of cases (e.g., D259, D292, & twice at D297) in which a UNK datum is identical to XZ's, but the word "eggista" is added, is way above chance. It seems that when the later editors checked XZ and found good but not highly precise agreement, they sometimes just indicated the imperfection (via the comment) but made no change otherwise.

[16] Ancients perhaps over-doing restoration (if AD's reading is right): for an instance where it seems that UNK's editors may've replaced majuscule B with Σ when the true reading was actually B, see Kossura (D140). Case correctly dealt with by S&G (pp.824-825).

[17] E.g., XZ's Vid (D47), Oppidon (D126), Tabarka (D129), Thusdros (D138), Ankara (D196), Belkis (D201), [possibly Gagra (D216)], Astaxata (D227) [twice], Ashkelon (D244), Bostra (D250) [UNK:

C Correlative Tabulation

C1 In the extended facing-page tabulations to follow (Tables 1-26), we will list the two *GD* 8 traditions' hour-data side-by-side on the right page and list on the left page (lined-up in the same row, for each city) the corresponding *GD* 2-7's longitude B (BI-based) & latitude L, both in degrees. (Details at §G3.)

C2 Such correlation has not been previously done for the entire *GD* 8, though two tables (for a few sample cities) were published at Rawlins 1985G p.262 — and there analysed for mathematical connexions (discussed also in Rawlins 2008S, e.g., §D) via the obliquities of Eratosthenes and Hipparchos, since M and L are related by a spherical trig equation:

$$\cos(15M/2) = -\tan\ L \tan\epsilon \qquad \text{or} \qquad \epsilon = \arctan[-\cos(15M/2)/\tan\ L] \qquad (2)$$

where obliquity ϵ was usually taken to be that of Eratosthenes-Ptolemy (eq.3) or nearby $23°5/6$, or one of Hipparchos' two values (eqs.4&6), the latter ($23°2/3$) being the exclusive and totally unexpected discovery of Diller 1934.

C3 The Rawlins 1985G tables discovered that numerous major cities' L & M did indeed correlate with either the obliquity of Eratosthenes,

$$\epsilon_{\rm E} = 23°51'20'' \qquad (3)$$

or the early Hipparchos obliquity (Rawlins 1982C pp.367-368)

$$\epsilon_{\rm H1} = 23°11/12 = 23°55' \qquad (4)$$

C4 Rawlins 1985G p.262's tables showed:

[a] The cities correlated with Eratosthenes' eq.3 (or its common rounding: $23°5/6$) included Babylon, Korinth, Kyrene, & Meroë, all related to Eratosthenes' birth or writings.

[b] The cities correlated with Hipparchos' eq.4 included Arbela, Athens, Carthage, Nicaea, & Rhodos — all known to have been related to Hipparchos' birth, life, or geography.

C5 Since correlations §C4 [a] were found via sph trig (eq.2), we have here (also Rawlins 1982N n.11) a shaky hint that possibly sph trig was known in the 3rd century BC. (Contra this tenuous possibility, keep in mind: eq.3's earliest firmly-known use [§D1] was subsequent to Eratosthenes, who appears to have used the term "klima" without longest-day implication.) If so, it was probably nascent at that time. (Otherwise, the simple double-sunset Earth-measure method [which requires sph trig for exact results in the general case] would[18] presumably have led Eratosthenes to speak openly of the large disagreement between the lighthouse method's 256000-stades (likely known before him: Rawlins 1982N p.215 & Rawlins 2008Q §I1) vs the sunset method's 180000-stades. (The latter being the Poseidonios-Marinos-Ptolemy value which eventually became dominant. Conversion discussed in Rawlins 2008Q & Rawlins 2008S. The resulting stretch [discovered by P.Gosselin] of longitude-degrees (which preserved world E-W distances in stades fairly accurately) is discussed in Rawlins 1985G & Rawlins 2008S §L3, but it is most effectively illustrated by the nice diagram at S&G 1:47.)

independently of XZ], Orchoe (D258), Nineveh (D260), Badeo (D278), Sabe (D289) Sapphara (D290), Auzakis (D313). (In these cases, we tend to reconstruct 1/2 to 1/6, usually in accord with S&G.)

[18] If Eratothenes knew of both methods, he would have had to face Earth-size estimates differing by a giant factor: close to 36/25 or 1.44 (the square of 6/5). Did such a hypothetical conflict lead him into his ruminations (Strabo 1.3.11, Rawlins 2008Q §§H1&K2) on possible variability of sea-curvature "*even in places that lie close together*" (emph added)? (If using the Pharos for both methods, the directions over the Mediterranean would differ.) This passage may be an early hint of a central ancient conflict over whether to use 256000 or 180000 stades (for Earth-circumference), a conflict of which we found (Rawlins 2008Q §K3) that no detailed account survives, though Strabo 1.4.1 notes that Eratosthenes' large circumference came under fire from other scholars.

Table 0: Hipparchan Klimata Fits: Princetitute vs Diller-DR

Klima	Longest Day M	Hipparchos-Strabo L [Data]	Princetitute-Muffia L [Babylonian]	A.Diller-DR L [Greek]
Cinnamon	$12^h3/4$	8800	10200	8800
Meroë	13^h	11600	12800	11600
Syene	$13^h1/2$	16800	17600	16800
Lower Egypt	14^h	21400	21800	21400
Phoenicia	$14^h1/4$	23400	23700	23400
Rhodos	$14^h1/2$	25400	25500	25400
Hellespont	15^h	28800	28800	28800
Massalia	$15^h1/4$	30300	30300	30300
Pontus	$15^h1/2$	31700	31600	31700
Borysthenes	16^h	34100	34100	34100
Tanais	17^h	38000	38000	38000
S.Little Britain	18^h	40800	40800	40800
N.Little Britain	19^h	42800	42800	42800

D Cultists vs Scientists: Bad News & Glad News

D1 We don't need §C4 item [b] to tell us sph trig (eq.2) was surely known to Hipparchos, ***as Diller 1934 was 1st to prove***. (An array of evidences for dating sph trig's use in Hipparchos' century is brought together for the 1st time at www.dioi.org/cot.htm#mmsz.)

D2 Strabo gives a data-pool of Hipparchan latitudes L in stades for his klimata,[19] which we list in the middle column of Table 0 (same as Neugebauer 1975 p.1313 except for Meroë: §D3 [7]). In 1934 Diller discovered that, using Hipparchos' scale

$$1° = 700 \text{ stades} \qquad (5)$$

(Strabo 2.5.7&34 or Neugebauer 1975 p.305 n.27), each L was computed from a discrete klima's M (2nd column in Table 0) via eq.2, using[20] the unattested but impressively accurate obliquity:

$$\epsilon_{\rm H2} = 23°2/3 = 23°40' \qquad (6)$$

[19] Ancient astrologers (e.g., Hipparchos, Ptolemy) assigned the term "klima" (from which our word "climate" derives) for latitudes L corresponding (via eq.2) to longest day values M, usually at intervals of about 1/2 or 1/4 hour, e.g., *Almajest* 2.6&8. (*S&G have helpfully ruled klimata every 1/4 hour on their excellent maps.*) We have occasionally suggested that this might have been done for reasons of sph-trig astrological-house-computing efficiency (Rawlins 2008S §A4 [2]). But perhaps the causes included a commercial factor: house tables sales could be juiced if geography were distorted to convince more-numerous big-city users that they lived right on a klima, a pseudo-circumstance which would obviate the need to interpolate between house tables. (These tables were computed of course only for discrete klimata. A common number of primary klimata for the whole *ekumene* was seven; see, e.g., Pliny 6.39.211-218, Honigmann 1929 ["The Seven Klimata and Important Cities"], Neugebauer 1975 pp.722f. So the interval-spacing and thus the associated crude rounding was large.) Conclusions:
[a] The cause of latitudes' undeniable (fn 23) historical degradation was not scientific.
[b] Thus astrology devastated the high-precision ancient geography of genuine scientists before its occultist-filtered remains reached us. A point thoroughly treated in Rawlins 1985G & Rawlins 2008S. Two fresh evidences (found 2009 March) in favor of this hypothesis are provided in fn 23.

[20] We now see that Hipparchos switched to eq.6's $\epsilon_{\rm H2} = 23°40'$ (dropping early $\epsilon_{\rm H1} = 23°55'$: eq.4) after making a better outdoor determination — presumably during his also accurate (Rawlins 1991H §B2) observation of the time of the 135 BC S.Solstice.

This Diller discovery proved: [a] use of sph trig in $2^{\rm nd}$ century BC science, & [b] Hipparchos' late adoption of a carefully observed and accurate obliquity ϵ (eq.6) — error c.3′, far better than any other obliquity-value knowably used in antiquity. ***Both of these crucial discovery-contributions to our knowledge of ancient mathematics & science were $1^{\rm st}$ proved by Aubrey Diller***, a non-member of the possessively seething clique which (seeing outsiders as just bad-news for its own grantsmanship) reflexively claims they're merely doing "incompetent work in [our] realm".[21] [Thorough exam of cultism vs Diller: *DIO 16*.]

D3 Diller 1934 made an extremely powerful case (alone totally convincing to any balanced, mathematically able reader). And its validity has since been put beyond all (but hyper-cultist) dispute by an impressive array of confirmations. (Note, too, that DR independently made Diller's discovery in 1979 [reporting his vindication to him by phone 1979/11/26], which tells us that the logic of the discovery did not depend on one person's perception.)[22] These confirmations come from information unknown to Diller at the time, a remarkable serial-demonstration of his solution's fruitfulness:

[1] Rawlins 1982C p.368 found that eq.6 was the ϵ underlying Pliny's "circuli" klimata: a perfect fit with minimal reconstruction. (Genuinely fun details: *DIO 16* ‡3 fn 50.)

[2] The statistical analyses of Rawlins 1982C (pp.367-368, eq.28) found that the northern stars of Hipparchos' Ancient Star Catalog are consistent with his adoption of the Diller-discovered Hipparchan obliquity: 23°2/3 — eq.6 again.

[3] Nadal & Brunet 1984's statistical investigation of Hipparchos *Comm* found (§D5) that its hundreds of stellar phenomena were computed via obliquity 23°2/3: eq.6. Again.

[4] DR found (*DIO 4.2* p.56) that Hipparchos' $19^{\rm h}$ klima (North Little Britain), though unknown to Diller, nonetheless fit his theory: predictivity, again.

[5] DR found (*ibid*) that if we assume all L computed by Hipparchos from eqs.2&6 had been (ere conversion to stades) rounded by him to 5′ or 1/12 of a degree (klimata's precision at *Almajest* 2.6 & *GD* 1.23), this ***converted two of Diller 1934's 3 near-hits into spot-on hits***, creating a virtually unanimous fit for the entire klimata table, as the number of non-fits went from 3 to merely 1: the $13^{\rm h}$ Meroë klima[23] (resolved at [7], below).

[6] In 2002, DR found (*DIO 11.1* p.26 fn 1) that one more hitherto unnoticed Hipparchos-Strabo klima (for $12^{\rm h}3/4$: Cinnamon Country)[24] fit Diller's thesis perfectly — while its disagreement with the competing Neugebauer theory (Table 0) was Neugebauer's worst failure: by 1400 stades or 2 full degrees of latitude. The superiority of fit (Diller-DR vs Neugebauer) is obvious from the 2002-revised *DIO 4.2* p.56 [1994] table, reproduced here as Table 0, with a single alteration which is the subject of our item [7]:

[7] On 2009/4/1, DR realized that while Meroë ***city*** was at 11800 stades (hitherto the one non-fit in the *DIO 4.2* p.56 Table 1), Hipparchos' Meroë ***klima*** was at 11600 stades,[25] perfectly fitting the Diller-DR solution, leaving Table 0 with a pristine 13-for-13 score.

D4 Ere Meroë-resolution, even without 100 stade rounding: the root-mean-square fit (rms) of the Diller-DR theory (to the Hipparchos-Strabo klimata data) was 9 times better than the Princetitute fit . With Meroë re-solved this ratio rises to 22 times better. Rounding the calculated klimata to the same 100 stade precision Strabo's data displays, the ratio becomes ∞ since all 13 results fit **perfectly** now. Very, **very** seldom in ancient astronomy history does such compelling evidence appear, backed by such a hit-after-hit-after-hit lock-on.

D5 The validity of Diller's eq.6 was independently confirmed by scientists Nadal & Brunet 1984 (p.231 & n.17). DR had the privilege of being first to relay him the glad news.

D6 Finally, despite $68^{\rm y}$ of embarrassingly uncomprehending Muffia abuse (or just systematic non-citation) of Diller's greatest discovery, justice overcame cult-think in 2002, when his finding was honored by the eminent mathematician Hugh Thurston in the world's leading history of science journal, *Isis* (Thurston 2002 p.67 & n.18) — thanks to Editor Margaret Rossiter's refusal to be bound by political pressure. And no paper subject to non-fake[26] refereeing has since questioned the finding. So we may take it that Diller's discovery of Hipparchos' use of sph trig (eq.2) with accurate obliquity (eq.6) is now a permanently established part of our scholarly heritage. In pace requiescat, Aubrey.

[21] Neugebauer's A.Aaboe to DR 1976/3/9. *DIO 4.3* ‡15 §G9 [1994]; *DIO 6* ‡1 §B5 & ‡3 §B2 [1996].

[22] The cementality of the Neugebauer cult, known here as the "Muffia" with due respect for the well-foundedness of its perceptions, is shown by the fact that Diller & DR could independently discern the system behind the Hipparchos-Strabo data of Table 0; yet, when its 13-for-13 score (news which is gladdening the hearts of honest scholars) is placed as a gift before any Muffioso, he grumpily ashcans it as an impossibly opaque back-to-square-one enigma (www.dioi.org/fff.htm#bsns). These are ***the same people*** who for decades (up to *JHA 33*:15-19 [2002]) ***accepted as gospel Neugebauer's laughably ill-fitting Princetitute theory*** (6-for-13: $4^{\rm th}$ col. in Table 0), enthroning it even in the *Dictionary of Scientific Biography*. (Full history of eminent promos: *DIO 4.2* p.55.) Similarly mote-beam: Muffiose Nobody's-Perfect defense of Ptolemy's shortcomings (spoofed at Rawlins 2002V p.70); yet, when evaluating outlander heretics **even *perfection*** (§D3 [7]) is insufficient. The spectacle of scholars pushily, robotically doing a Chauvin-to-the-last-ditch (without a glimmer of philosophy-of-science perception, for $75^{\rm y}$ now) is as pathetic as the ineducable Cook-kooks vs photos (*DIO 7.2-3&9.2-3*).

[23] Eratosthenes & Hipparchos required (Strabo 2.5.7) that Alexandria, Syene, & Meroë be symmetrically spaced at 5000 stade intervals: Alexandria city (not klima) was at latitude 21760 stades or 31°1/12 (Rawlins 1982G; Honigmann 1929 p.147 #75), Syene at 16800 stades or 24°, Meroë (astronomically measured: Strabo 2.1.20) at 11800 stades or 16°11/12 (where solstitial-noon gnomon errors cancel), all these L being much more correct than those in the *GD* (see Tables 13&14 below): 31°, 23°5/6, 16°5/12, resp, vs 31°12′, 24°05′, 16°57′ in reality. Hipparchos-Strabo vs *GD* rms errors for the 3 cities: 5′ vs 22′, resp. This striking contrast and the equally ***hitherto-unremarked fact that the 3 sites really ARE symmetric in latitude*** (to 1′ precision! — note parallel to *DIO 1.1* ‡6 fn 30) provide yet further indicators that scientific geography existed in antiquity but was later lost: fn 19.

[24] In effect, *GD* 1.7.4 relates the latitude of Okelis (*GD* 6.7.7, D281 of *GD* 8.22.7) to the Cinnamon Country klima (the southern limit of Hipparchos' ekumene: Strabo 2.5.7), whose latitude Strabo 2.5.35 says equals α UMi's *NPD*. Rawlins 2008S §C wondered whether Marinos' prime latitudes were klimata-based, as were Hipparchos' and Ptolemy's. Marinos' adducement of Okelis (D281) appears to tilt the balance in favor of a positive answer to the question. (See also his Aromata at $M = 12^{\rm h}1/4$: B&J n.53.) Unfortunately. Note that Pseudokelis (also *GD* 6.7.7) has a latitude of 12°1/2, which is nearer real Okelis (Turbah, 12°41′N) than D281 and is consistent (fn 2) with the latitude of the Cinnamon Country klima ($M = 12^{\rm h}3/4$), computed via eq.2 for Hipparchos' $1^{\rm st}$ obliquity $\epsilon_{\rm H1}$ (eq.4) or Eratosthenes' $\epsilon_{\rm E}$ (eq.3). Regarding Okelis, see also Rawlins 2008S §H & fn 30.

[25] The key is Strabo's mixing-up of city & klima for Alexandria, Carthage, & Meroë. *All* his Meroë citations are to the ***city***, except Strabo 2.5.36, his sole mention of the $13^{\rm h}$ "Meroë" klima, obviously for huge Meroë "Island" (not city, as Pliny 6.220 & *Almajest* 2.6 knew, most klimata being big regions): a confused passage — like nearby 2.5.38, as rightly noted in part at *JHA 33*:15-19 (2002) p.18 n.9, though missing that the alleged shadow ratios (7:5 & 11:7) for ***cities*** Alexandria & Carthage are just longest:shortest-day ratios $M{:}m$ for the Alexandria & Carthage ***klimata*** (Neugebauer 1975 p.336 n.29, Rawlins 1985G n.17) where $M = 14^{\rm h}$ & $14^{\rm h}2/3$ (Neugebauer 1975 pp.722-732), resp. Strabo 2.5.36 places the Meroë klima 1800 stades further from the Equator than from "Alexandria", which Strabo 2.5.38's equation (of Alexandria & 7:5) lets us take as the Alexandria $14^{\rm h}$ ***KLIMA*** at $L = 21400$ stades (Table 0), ***thus placing Meroë's klima at 11600 stades, just the figure predicted all along by the Diller-DR sph trig theory***: 11600 stades was right in Diller 1934 (p.267), $75^{\rm y}$ ago.

[26] Which exempts *JHA 33.1*:15-19 [2002]. (On *JHA* refereeing, see www.dioi.org/fff.htm#ccff.) No serious referee could miss pp.15&16's innocence of *Almajest* 1.12's use of solstitial not equinoctial data for finding ϵ&L, resp, as Thurston was $1^{\rm st}$ to note, in parallel shock at non-citation of Rawlins 1985G & esp. *DIO 4.2* p.55 n.6 (producing 11-hits-out-of-12: p.56 Table 1) which by 2002 had been on the published record [*DIO 4.2* p.56] for $8^{\rm y}$. See §D3 [5] for how (with [4], [6], & [7]) it now elevates Diller's hit-score from 8-for-11 success (Diller 1934) to 13-for-13 perfection. None of the *JHA*-proposed deus-ex-machination tampering with the table's data produces an ϵ that matches Diller's eq.6 in either roundness or a single subsequent vindication. Much less 3 such: §D3 [1]-[3]. Hist.astron pols' decades of rejection of Diller 1934 is a phenomenon not of scholarship but of grant-Svengalism. Ancient astronomy's old-guard has taken decades to (Rawlins 2008R §A) learn almost nothing about how ancients founded theory upon empirical data and can hardly be taken seriously by able scientists while lockstep-adding to a 3/4 century disgrace during which we have thus far vainly waited for even *one* of its Trilbys (*DIO 9.3* ‡6 fn 70) to surprise by rising above the herd (www.dioi.org/che.htm#crbh) and admitting **merely the *POSSIBLE* value** of Diller's important, now septuply-vindicated (§D3) & flawless ([7]) contribution to the history of mathematics. As at *DIO 1.3* ‡10: "The search continues."

E Preface to Book 8: Greek Text Established by Aubrey Diller

[English translation follows at §F.]

8.1. Μετα ποιας προθεσεως δει ποιεισθαι τηνκατα πινακας διαιρεοιν της οικ–ουμενης;

8.1.1. Οσα μεν ουν εχρην εις την γεωγραφικην υφηγησιν συνεισενεγκειν εκ τε της συνεχεστερας ακριβωσεως[27] των τας εκτετοπσμενας ημων χωρας περιελθοντων και της εις το προχειροτερον αμα και οικειοτερον των καταγραφων επιβολης αυταρκως εχειν ηγουμαι. το γαρ επιλεγειν κατα τον αυτον τροπον τοις προ ημων ωσπερ επι κεφαλαιον δια τινων τοπων εκαστος γραφεται των εντασσομενων τη καταγραφη παραλληλων η και μεσημβοινων, μη και γελοιον η παντων απλως των τοπων και των μη πιπτοντων εις τους εκτεθειμενους κυκλους παρακειμενας εχοντων τας εποχας των δι αυτων γραφομενων παραληλλων τε και μεσημβρινων.

8.1.2. Επειδη[28] τις αν γενοιτο της οικουμενης ολης καταγραφη[29] συμμετρας καθ ενα πινακα καταλαμβανομενης υτ οψιν ημιν γεγονεν, ακολουθον εστι[30] προεκθεσθαι τας εσομενας υπογραφας κεφαλαιωδεις ει δαιρουμεν αυτην εις πλειους πινακας ενεκεν του δυνασθαι και παντα τα εφωδευμενα και μετα της προς το ευδηλοτερον συμμετριας κατατασσειν. επι μεν γαρ της υφεν καταγραφης αναγακιον γινεται δια το δειν συντηρειν τους προς αλληλα των μερων της οικουμενης λογους τα μεν στενοχωρειεθαι δια το συνεχες των εντασσομενων τα δε παρελκειν απορια των εγγραφησομεων.

8.1.3. Οπερ οι πλειστοι περιισταμενοι πολλαχη[31] διαστρεφειν ηναγκασθησαν τα τε μετρα και τα σχηματα των χωρων υπο των πινακων αυτων ωσπερ και μη υπο της ιστοριας χειραγωγηθεντες, καθαπερ οσοι το μεν πλειστον μερος του πινακος απενειμαν τη Ευρωπη και κατα μηκος και κατα πλατος δια το πολυχουν και πυκνον των εντασσομενων το δε ελαχιστον τη μεν Ασια κατα το[32] μηκος τη δε Λιβυη κατα το πλατος δια το εναντιον. παρα γαρ τουτην την αιτιαν το μεν Ινδικον πελαγος μετα την Ταπροβανην επι τας αρκτους απεστρεψαν ενσταντος αυτοις του πινακος προς την επι τας ανατολας προχωρησιν επειδη μηδεν ειχον τοιουτον επι της υπερκειμενης κατα το βορειον Σκυθιας αντιπαραγραφειν, τον δε δυτικον ωκεανον επι τας ανατολας απεστρεψαν παλιν ενσταντος[33] αυτοις του πινακοσ επι την μεσμβριαν[34] διαστασιν ετει μηδε[35] ενταυθα το της εντος Λιβυης βαθος η το της Ινδικης ειχε τι δυναμενον κατα το συνεχες αντιπαρατεθηναι[36] τη δυτικη παραλιω,[37] ως και δια τα τοιαυτα την περι του περιρρεισθαι[38] την γην ολην τω ωκεσνπω δοξαν αρξασθαι μεν[39] απο γραφικων αμαρτηματων καταστρεψαι δε εις ασυστατον ιστοριαν.

[27] ακριβως εως U^1NK.
[28] επι δε X επειδη Z επειδ η UNK.
[29] υπογραφη X παραγραφη Z.
[30] εστιν XU^1N.
[31] πολλα δη UNK.
[32] om. το XZ.
[33] εν οταν τοις $U^1$$N^a$K.
[34] μεσημβρινην XZN^a.
[35] επειδη δε X επει μηδεν ZUK επει δη μηδεν N.
[36] αντιπαρασταθηναι UNK.
[37] παραλια N^aK.
[38] περιωρισθαι U^1K περιωρεισθαι N.
[39] μεν XZK μετα U^1N.

8.1.4. Επι μεντοι της κατα πινακας[40] διαιρεσεως[41] εκθυγοιμεν αν το ειρημενον συμπτωμα ει ποιοιμεθα τας διαιρεσεις ουτως ωστε τας μεν πολυχουστερασ των χωρων η μονας η μετ ολιγων απολαμβανειν τον πινακα κατα μειζους των κυκλων διαστασεις τας δε απυκνους και μη διειλημμενας ολας μετα πλειονων ομοιων υφ ενος περιεχεσθαι πινακος εν ελαττοσι των κυκλων διαστασεσιν. ουδεν γαρ ετι δει και παντας τους πινακας αλληλοις ειναι συμμετρους, αλλα μονα τα εν εκαστω διασωζειν τον προς αλληαλα λογον, ωσπερ οταν μονην κεφαλην υπογραφωμεν τα μονης της κεφαλης,[42] η μονην χειρα τα μονης της χειρος, ουκ ετι δε και τα της κεφαλης τοις της χειρος ει μη οταν υφ εν σχημα ποιωμεν ολον τον ανθρωπον. αλλ ονπερ τροπον το πον ουδεν κωλυει ποτε μεν αυξειν ποτε δε μειουν, ουτως ουδε των μερων οταν η καθ αυτα τα μεν αυξειν τα δε μειουν προς τας των υποτιθεμενων πινακων ευρυχωριας.

8.1.5. Ου παρα πολυ δε εσται της αληθειας, καθαπερ εν αρχη της συνταξεως ειπομεν, καν ευθειας γραμμας αντι των κυκλων επι γουν των κατα μερος πινακων παραγραφωμεν[43] και προσετι τας μεσημβρινας μη συννευουσας αλλα και αυτας παραλληλους αλληλαις. επι μεν γαρ της ολης οικουμενης οι του πλατους και του μηκους οροι κατα μεγαλας λαμβανομενοι διαστασεις αξιολογους ποιουσι τας των ακρων κυκλων παραλλαγας, επι δε εκαστου[44] των πινακων ουκ ετι. διο και κατα τον λογον του διχα τεμνοντοξ τον πινακα παραλληλου προς τον μεγιστον κυκλον λεγομεν δειν ποιεισθαι τας μοιριαιας παραβολας ινα μηδε[45] το παρ ολην την διαστασιν του πινακος ενδεον επιζητωμεν αλλα μονον το παρα την απο[46] του μεταξυ προς το ετερον των περατων.

8.2. Τινα καθ εκαστον των πινακων υπογραφειν αρμοζει;

8.2.1. Της τοιαυτης τοινυν προθεσεωζ επερχομενοι τας διαιρεσεις της Ευρωπης εποιησαμεθα πινακασ δεκα της δε Λιβυης πινακας τεσσαρας της δε ολης Ασιας πινακας δωδεκα. τας δε καθ εκαστον υπογραφας εξεθεμεθα, προτασσοντες μεν τινος τε εστιν ο πιναξ ηπειρου και ποστος και ποιας περιεχει χωρας και τινα λογον εχει ο δια μεσου αυτων παραλληλος εγγιστα προς τον μεσημβρινον και τις ολου του πινακος γινεται περιορισμος, υποτασσοντες δε των καθ εκαστην χωραν διασημων πολεων τα μεν εξαρματα μετειλημμενα εις τα μεγεθη των εν αυταις μεγιστων ημερων[47] τας δε κατα μηκος εποχας εις τας απο του δι Αλεξανδρειας μεσημβρινου διαστασεις ητοι προς ανατολας η προς δυσμας μεγεθεσι των εγγιστα ωρων[48] ισημερινων και ων ο ζωδιακος υπερκειται ποτερον απαξ η δις ο ηλιος γινεται κατα κορυφην και πως διακειμενος προς τας τροπας.

8.2.2. Προσεθηκαμεν δ αν και τινα των απλανων εχουσιν επι των κατα κορυφην τοπων[49] ει συντηρουντες εφαινοντο τα προς τον ισημερινον πλατη, τουτεστιν ει δια[50] των αυτων αει παραλληλων εφεροντο. επειδηπερ απεδειξαμεν εν τη μαθηματικη συνταξει οτι μεταπιπτει τε και η των απλανων σφαιρα εις τα επομενα του κοσμου παρα τα[51] τροπικα και ισημερινα σημεια και ου περι τους του

[40] πινακος U^1K.
[41] της διαιρεσεως U^1NK.
[42] την κεφαλην UNK.
[43] παραγραφομεν XUN.
[44] εκαστων UNK.
[45] om. –δε UNK.
[46] om. την απο X om. το παρα Z.
[47] ημερων μεγιστων Z om. μεγιστων UNK.
[48] ωρων XZ^m ημερων $Z^t$$U^1$NK.
[49] των τοπων U^1N.
[50] ιδια $U^1$$N^1$.
[51] om. τα U^1NK.

ισημερινου πολους αλλα περι τους του δια μεσων των ζωδιων κυκλου[52] καθαπερ και αι[53] των πλανωμενων ως δια τουτο μη δυνασθαι τους αυτους αστερας των αυτων τοπων αει γινεσθαι κατα κορυφην αλλα μεταχωρειν εξ αναγκης τους μεν αυτων επι τους βορειοτερους τοπους[54] των προτερων τους δε επι τους νοτιωτερους, παρελκειν[55] ημις εδοξεν[56] η τοιαυτη προσθηκη της υπογραφης, εξον[57] επι της κατα την τοιαυτην υποθεσιν αστεριζομενης ημιν σφαιρας την εν τοις επιζητουμενοις χρονοις θεσιν αυτης προς τον δι[58] αμφοτερων των πολων κυκλον καθισταντας[59] και περιφεροντας ολην παρα την του μενοντος μεσημβρινου οιηρημενην [60] πλευραν οκοπειν το σημειον αυτου τοσαυτας απεχον του ισημερινου μοιρας οσας και ο δια του ζητουμενου τοπου επι τα αυτα παραλληλος και λαμβανειν[61] προχειρως ειτε μηδ ολως τις ενεχθησεται δι εκεινου του σημειου των απλανων ειτε εις[62] η πλειους και τις η τινες.

8.2.3. Τουτων δη[63] προδιωρισμενων αρκτεον της λοιπης προθεσεως εντευθεν.

[52] ζωδιακων κυκλων U^1NK.
[53] om. αι UNK.
[54] τροπους U^aN.
[55] παρελκον U^1NK.
[56] εδειξεν Z^aN.
[57] εξ ων U^1NK.
[58] προς των αμφ. U^1NK.
[59] καθιστωντας U^1NK.
[60] διειρημενην U^1N.
[61] καταλαμβονειν U^1NK.
[62] εισι U^1NK.
[63] δη X ηδη ZUNK.

F Preface to Book 8: Diller's English Translation of §E

8.1. With what project must division of the ecumene be made by maps?

8.1.1. What ought to be put into the Geographical Guide [Directory] from the increasing accuracy of those who have visited our outlying regions and from the design of the maps for both convenience and relevance I think is clear enough. For to add summarily as those before us have done through what points each parallel or even meridian shown on the map passes may be absurd, since for all the points, even those that do not lie on the circles presented, the positions of their parallels and meridians are available.

8.1.2. Now that we have seen what rendering of the whole ecumene in a single map would be suitable, the next thing is to set out the summary outlines to be if we divide it into several maps in order to put in the actual data in full and in scale for clarity. For in a single drawing where we must keep the proportion of the parts of the ecumene to each other it is necessary for some of the parts to be crowded because of the wealth of the data being shown and for others to be wasted for lack of data to be shown.

8.1.3. To evade this most were forced by the maps themselves, but not by the matter, to distort the sizes and shapes of the countries extensively. Thus those who allotted the greatest part of the map to Europe in both longitude and latitude for the wealth of data being shown, and the least part in longitude to Asia and in latitude to Libya for the contrary. For this reason they turned the Indian ocean beyond Taprobane northward as the map prevented their extending it eastward while they had nothing to put in against Scythia lying to the north, and they turned the western ocean eastward as the map prevented their extending it southward while here too the depth of interior Libya and of India did not have anything to be put in to continue the western coast. In this way the notion of the whole earth surrounded by ocean began from errors in drawing and ended in unproved doctrine.

8.1.4. In the division by maps, however, would escape this result if we made the divisions so that the map would take the richest countries either single or few together with large distances between the the circles while the meagre and undistinguished would be contained whole with several like them in one map with lesser distances between the circles. For the maps need no more be all in proportion to each other but only the parts in each need to keep the ratio to each other as when we sketch a head alone the parts of the head only or a hand alone the parts of the hand only but no more the parts of the head to the parts of the hand unless we do the whole man in one figure. But just as nothing prevents now enlarging now reducing the whole so the parts also when they are by themselves, according to the space of the respective map.

8.1.5. It will not be far from the truth, as we said in the beginning of work ([Geogr Dir] II 1.10), if we make straight lines instead of circles at least on the partial maps, and moreover the meridians not converging but them also parallel to each other. For in the whole ecumene the lines of latitude and longitude taken at large intervals produce considerable changes at the ends of the circles but not on the several maps. Therefore we say the comparisons in degrees must be made in the ratio between the parallels dividing the map in half and the greatest circle in order not to reckon the reduction on the whole breadth of the map but only that on the distance from the middle to one off the margins.

8.2. What is suitable in an outline for each map?

8.2.1. Pursuing the divisions in this project we have made ten maps of Europe, four of Libya [Africa], and twelve of greater Asia. We have set out the outlines for each, prefacing what continent the map belongs to and it number in order and what countries it contains and the ratio of the parallel through the middle to the meridian and what bounds the whole map, and subjoining for the outstanding cities in each country their latitude converted into the length of their longest day and their positions in longitude converted into distances from the meridian of Alexandria either east or west in number of equinoctial hours and for those that lie under the zodiac whether the sun touches zenith once or twice and how it stands to the solstices.

8.2.2. We would have added what fixed star they have at zenith if they [stars] appeared to keep their [declination vis-a-vis] the equator, that is, if they moved always along the same parallel. We have shown in our mathematical work ([*Alm*] VII 2-3) that the sphere of the fixed stars also moves backward in relation to the tropical and equinoctial signs and not around the poles of the equator but around those of the zodiac, as do those [the spheres] of the planets also, and for this reason the same stars cannot always touch zenith to the same points but must shift some north some south. So I thought this addition to the outline superfluous, since with the stellar sphere [which] I have made for this purpose we can, by setting it at the proper position for a given time in relation to the circle through the two [equatorial] poles and turning it along the graduated edge of the fixed meridian, not the point on it as many degrees from the equator as the parallel through the given place and thus perceive easily whether no star at all passes through that point or one or more and which one or ones.

8.2.3. With these preliminaries settled we must begin the rest of the project.

Remarks by DR: letters (e.g., X, U, etc.) are used here to signify the key manuscript families, which are catalogued and discussed in Diller's preface to the modern reprint of Nobbe's pioneering 1843-1845 first complete (semi-critical) edition of the *Geogr Dir*.

Diller's own judicious note regarding variants: "Variae lectiones XZ UNK. Only conjunctive variants are reported; variants in only one manuscript are omitted as insignificant."

G First Full *GD* 2-7 & *GD* 8 Joint Tabulation

G1 Now to our tables[64] for displaying Diller Book 8's data. Almost all *GD* data are found in S&G, but we include some which S&G have dropped;[65] thus, the present catalog will help complete the available *GD* record.[66] And every so often our listed data differ[67] from S&G. But providing these differences & occasional extra data and alternate interpretations[68] here

[64] For identifications of *GD* sites with modern ones we have drawn freely, gratefully, and generally trustingly upon S&G's. (We often use durable older non-ancient names, such as USSR, Ceylon, Sian, or Saigon, since [1] They lasted much longer than the recent ones have as yet. [2] Too often, altered appellatons prove ephemeral. (E.g., Cape Kennedy; Hadrian's vain Ailia Kapitolias for Jerusalem.) We do not claim greater preferability for most of our occasional differing identifications, except for:
[a] The *GD*'s zero-longitude, the Blest Isles, is the Cape Verde Islands group (Rawlins 2008S §F).
[b] Alexandria Eschate (D309) is Iskander.
[c] Kattigara (D357) is Saigon [presently Ho Chi Minh City], while S&G (e.g., p.18) suggests it was Hanoi. DR now (contra orig. edition of Rawlins 2008S) realizes that the coast of Vietnam was not explored beyond Saigon. (Even aside from the huge L discrepancy between Kattigara & Hanoi [fn 68]: if Hanoi were reached by direct sailing, mountainous Hainan would probably have been sighted; but no such feature is listed in the *GD*.)
[d] "Java" is probably today's Java, and Sumatra was the Golden Peninsula which became mistakenly merged with the adjacent Malay Peninsula, while (*idem*) S&G appear (e.g., p.18) to suppose that: the sailors never got near Java, but they went 100s of miles through the narrow Malacca Strait between Malay&Sumatra without noting the existence of Sumatra (the huge, lengthy island to the SW). (It may also be implied that small "Java" [Ιαβαδιου] island, way to the SE, is Sumatra.)

[65] Usually XZ data, generally omitted for fitting poorly to corresponding data in *GD* 2-7. Occasional S&G-dropped UNK data include, e.g., the A of Kattigara (D356).

[66] S&G often drop *GD* 8 data that do not fit the corresponding *GD* 2-7 data. However, the omitted data may be clues to prior (now lost) editions of the *GD* (which could have been nearer in time & state to Marinos-Ptolemy's original). E.g., XZ's M for Mouza (D280) indicates that Mouza's L may once have been at $12°1/2$, right on the 4th *Almajest* 2.6 klima — reflecting the crude-klima-intervals which may have corrupted the *GD*'s L. Mouza is probably the modern Arabian town of Mawshij (Yemen), of actual $L =$ c.$13°2/3$. Which is a bit of evidence that XZ is the older version of the *GD*, since its L is c.$1°$ too far south, as is the Hipparchos-era latitude for nearby Okelis in all versions of *GD* 1.7.4.

[67] E.g., Jul Caesarea (D124), Garame (D164), Aromata (D170), Smyrna (D179), Miletos (D181), Turambe (D218), Osika (D226), Palmyra (D239), Caesarea (D243), Petra (D248), Medaba (D249), Ambrodax (D275), Doumetha (D277), Mouza (D280), Drosache (D315), Sera (D317), Koni (D327), Cabenis (D332). If these alternate data are useful to future scholars, all to the good. But, again: there is no implication that they are better than S&G's.

[68] Our occasional *GD* 8 data-disagreements with S&G are mostly from differing choices among variants: Diller vs S&G. (Our tables of course adopted the former in what is, after all, a Diller issue of *DIO*!) We do not here list data-variants which Diller found in his researches, since they may be consulted in the two appendices to the original Diller typescript, via www.dioi.org/diller8/diller8.htm. For many sites, modern attempts at identification (especially far eastern) are some part guesswork. We have not bothered putting question-marks at any, since no hard boundary exists here between certain and uncertain; but be warned that fallibility in this game is taken for granted. Note: Much inspired by S&G's grand opus (though, in the following exceptional cases, agreeing little with it) DR has fundamentally re-thought his 2006 identifications (www.dioi.org/gad.htm) in the Malay-Vietnam region, with (hopefully) some large-scale-clarifying improvements (check vs S&G Map 25 [pp.902-903] or our Table 25), mainly identifying Χρυσης Χερσονησου (Golden Peninsula)] as Sumatra, a large island (running close-in-parallel to the Malay Peninsula for hundreds of miles) mis-taken by the *GD*'s SE Asia source, "Alexandros", to be Malay's extension. Confusing island & peninsula is a common *pioneer*-explorer error (e.g., Schei "Island" & Peary "Land"), but such errors are unlikely to survive repeated visits. So either [a] western ships had never achieved the Malacca Strait (from pirates, tides, or ancient topography?) or [b] the *GD* coastal profile from Phuket (south around Sumatra, and back north) to Singapore was based on a ***single*** voyage by a prototype for Sindbad (whose later legend did include reaching Sumatra) presumably though not certainly explorer (?) Alexandros himself — who, like (doubly) Ptolemy, boasted an authoritative royal name. (In modern times, royals acquire no sure awe by donning the name Alexander. Even aside from the ill-fated fictional *Man Who Would Be King*, no less than three actual royal Alexanders have been assassinated: Russian czar 1881, Serb king

is in no way meant to be a denigration of Stückelberger & Graßhoff 2006: a magnificent, accurate (99.99%+ flawless tabulation), conscientiously[69] and judiciously accomplished, epochal achievement — which has earned eternal credit for its team of dedicated authors and the University of Bern. (One of the two main authors, Gerd Graßhoff, has recently been granted DIO's R.R.Newton Award.)

G2 As mentioned above (§A3) and in Rawlins 2008S, each Book 8 site is here numbered in our Tables 1-26 (below) with a prefix "D" which indicates its order:[70] calling Athens by the label D109, means that this is the 109th city in Diller's XZ typescript and in our tables.

G3 Each of our *GD* tables is spread over two facing pages:
The leftmost column is the site's order, D# (as just explained). Just to the right of that is the "Site" column, for either the site's modern name or (for famous ancient cities) the original one in modern garb. Following that, we have the Greek name of the same site as listed in the *GD*. The next two columns are Books 2-7's B & L, respectively, in degrees, as listed according to S&G's best selective judgement. The final column gives the location of said $B\&L$ in *GD* 2-7. (The book's # is at the column's head, marked 'G', and the chapter c & section s are found in the column, in the form: c.s ; the sole exception, Doumetha [D277], is G5.19.7.) In the righthand page facing the foregoing data, each row merely continues that which is directly to its left on the lefthand page: the righthand-page's 1st column gives the chapter c in Book 8 in the form 8.c at the head and section s in the column. In the next four columns over, we find Book 8's M and A data, first for Diller's XZ typescript, then for his UNK typescript. (Every digit of this, Diller's final work, is reproduced, with the exception of a few reconstruction-speculations. These are marked "r" to the datum's right: Diller's original value may be checked in his typescript via www.gad.htm.) The final two columns appear only for those tables which include the tropics, and are for both traditions' S data (solar-orbit noon-trans-Equator semi-arc: §G6) as described in §G6.

G4 For the *GD* 2-7 columns[71] of L & B, we use S&G.[72] For *GD* 8, we have drawn the M, A & S from Diller's ms.

G5 We have put marks next to uncertain data: "c" with all data marked "nearly" [εγγιστα] in the ms, "r" with all that are reconstructed; and occasionally "x" for some data that appear to be scribal errors, and "n" for the subclass of such instances which can perhaps be explained by an ancient editor's dropping of negative-signs[73] (or similar slips).

G6 For tropical sites there is an extra pair of columns (XZ & UNK) at the far right for the semi-arc S of the path of the Sun during the period when it is north[74] of the zenith at said site's local apparent noon. (All Book 8 S values are less than 90°, since no Book 8 site lies on the Equator.) S is related to L by the equation:[75]

$$S = \arccos[\sin L / \sin \epsilon] \tag{7}$$

G7 Each of the 26 tables that follow is associated with a *GD* map. (Convenient reconstructions of which are found with, e.g., S&G vol.2 or (for Books 2-5) Müller's little-known 1901 map volume. The S&G maps are especially helpful for those interested in Book 8, since all *GD* 8 sites are highlight-marked by ⊙.) Both *GD* 2-7 and *GD* 8 are divided according to the same 26 maps with the following breakdown (www.dioi.org/gad.htm#dsqy): 10 maps of Europe, with 118 *GD* 8 sites; 4 maps of Africa, with 52 *GD* 8 sites; 12 maps of Asia, with 190 *GD* 8 sites. Our geographical headers for the tables provided here are not meant to be all-inclusive, being intended merely to provide modern readers a familiar rough[76] idea of the location of the table and thus the corresponding *GD* map.

1903, Yugoslavia's inventor&king 1934.)
The linchpin error of fusing Malay & Sumatra has misled geographers for centuries. (Also Rawlins 2008S.) A key adjacent *GD* 7 error is the Malay Peninsula's false shortening (& fattening). Another: the successive sign-errors (latitude & "Landlubber") which hugely moved & rotated Vietnam, macro-mixups already unravelled at Rawlins 2008S §§K5&10, resp. Results of DR's 2009 investigation:
Marëoura (D352; *GD* 7.2.24) = Rangoon (Burma).
Sabara & Sabarakos Gulf (*GD* 7.2.4) = Phuket (Malay) & Malacca Strait (between Malay & Sumatra).
Golden Peninsula (*GD* 7.2.5) = Sumatra.
Takola (D347; *GD* 7.2.5) = Banda Akeh (NW tip of Sumatra).
Zabai (D348; *GD* 7.2.6) = Singapore. (I see that R.Hennig has earlier suggested this: S&G p.93 n.93.)
Μεγαλου κολπου [Great Bay] (*GD* 7.2.7) = Gulf of Thailand.
Tomara (*GD* 7.2.24) = Bangkok [Krung Thep] (Siam [Thailand]).
Aspithra (D354; *GD* 7.3.5) = Chanthaburi (also Siam).
Thinai (D355; *GD* 7.3.34) = Phnom Penh (Cambodia [Kampuchea]).
Νοτιον ακρον [South cape] (*GD* 7.3.2) = S.tip of Vietnam.
Kattigara (D356; *GD* 7.3.3) = Saigon [Ho Chi Minh City] (Vietnam).
So, along Vietnam's coast, Saigon was (contra Rawlins 2008S) Alexandros' ***farthest probe east***: after 20^d sail from Phuket (mostly along SW-facing Sumatran coast) to Singapore, then a few days more "crossing" from there (past *revealingly-named* "SouthCape" cited just above) to Saigon (*GD* 1.14.1-6). This take on *GD*'s Map 25 (Asia 11) will be grafted into future printings of Rawlins 2008S at §§K8-11. Its latitude residuals for the nine precise sites of our foregoing list are all under 5° (rms 3°.2), vs S&G p.18's tentative suggestions that Zabai = Saigon & Kattigara = Hanoi: errors 6° & 12°1/2, resp.

[69] Perhaps too conscientiously with respect to the length of the stade, which is ambiguously defined (at, e.g., S&G pp.47 & 71 n.35) as 1/8 or 2/15 of the 1481m1/2 Roman mile (i.e., 185m or 197m1/2, resp) — even as the evidence for 1/8's correctness has lately been proceeding monotonically to a point beyond reasonable doubt. The latest evidence is displayed in Rawlins 2008Q eqs.11&25-28, whose cascade of ultimate fits are based upon the standard 185m Greek stade.

[70] S&G has nearly the same order as ours but follows that of Nobbe & the UNK mss, which here & there has minor differences from that of the XZ mss. See sites D120-122, D191-192, D236-237, D294-296, D318-319, D328-329, & D354-359. No publication previous to *DIO* has numbered the 360 cities of Book 8 consecutively. Not all cities are listed in both traditions, so our list is a merge. For itemization of the very few cities omitted by the merges of Nobbe or Diller, see Rawlins 2008S fn 3.

[71] Note that in some eastern regions, cities' degree-longitudes B are integral much more often than are the same cities' degree-latitudes L — suggesting that these L were manipulated independently of adjustments of the B data. (This should not be a surprise, if [as Rawlins 1985G & Rawlins 2008S argue] the L were adjusted to klimata, while the B were simply expanded by 4/3 or 7/5.) A symptom of similar independence in Book 8: in some regions in the UNK tradition, while M is written numerically, the very same city's A datum is spelled out verbally.

[72] Compared to those for *GD* 8, the disagreements between the two *GD* ms traditions appear to be relatively trivial for *GD* 2-7 — presumably because astrologers made much more use of Book 8, their ideal Handiest Tables (fn 1), and thus argued more over its editing. (See, e.g., fn 19.)

[73] A few XZ slips may have arisen from sign errors, indicating that some ancients dealt regularly with negatives. (See Rawlins 1999 §B5 for how ancient use of negatives greatly compacted their continued-fraction expressions — an unexpected reconstructive window into how ancient math was done by actual scientists, as against pedants. For another example of confusion caused by the latter, see Rawlins 2008R §C5.) E.g., Nikephorion (D253) where longitude east $A = 1^h - 1/5$ was apparently read by XZ as east $1^h 1/5$. [For Labbana (D254) it may be that XZ&UNK reversed rôles in error. Or, perhaps the A of D253&254 were reverse-misfiled.] Or see Gagra (D216) where perhaps $16^h - 1/6$ was doubly mis-read by XZ as $16^h + 1/2$. The most intriguing coincidence of the lot is the UNK data for Nisaia (D301), where one finds an inexplicably gross mistake. Or, during computation of M from L by eqs.7&3, the tan of $L = 39°1/6$ was mis-interpolated: 1/6 down from 40° instead of 1/6 up from 39°, resulting in $M = 15^h - 1/9$, whose sign was lost, leaving the UNK M of $15^h 1/9$. (None of these postulated lost-negatives are restored in our tables but are simply marked "n" there.)

[74] Remarkably, the sole *GD* Book 8 site genuinely (Rawlins 2008S §K5) south of the Equator, is Java (D357), where S thus instead refers to the noon-Sun's appearances *south* of the zenith.

[75] The crawling evolution of data over the centuries is revealed by such cases as D290 (*GD* 8.22.16), where it is clear (eqs.7&3) that XZ's S was computed from $L = 14°$; and UNK's S, from $L = 14°1/4$ — yet *GD* 6.7.41 lists the site's L as 14°1/2. A weighted statistical study of all *GD* S data could reveal the ϵ adopted for eq.7. It appears often to have been eq.3, suggesting Ptolemy as computer. Which is one lead-in to the question: was Book 8 the only part of the *GD* he wrote? Why would he compose Books 2-7 based on the Blest Isles as zero-longitude? — when *Almajest* 2.13 predicts his *GD* will (as in *GD* 8) use Alexandria for such, since *Almajest* astronomical tables ***are for Alexandria time***.

[76] For more exact descriptions of *GD* maps' geographical ranges, see Ptolemy's at S&G pp.908-915; also S&G's Table of Contents (pp.5-6 or pp.476-477), thoughtfully printed at the start of ***each*** volume for the reader's convenience; and at each's endpapers is a helpful overview-quilt-key to all 26 maps.

Table 1: Europe 1 Brittania

D#	Site	*GD* Name	*B*	*L*	G2
1	Shetlands	θουλη	29°	63°	3.32
2	Limerick	Ιουερνις	11°	58° 1/6	2.10
3	Rheban	Ραιβα	12°	59° 3/4	2.10
4	London	Λουδινιον	20°	54°	3.27
5	York	Εβορακον	20°	57° 1/3	3.17
6	Catterick	Κατουρακτονιον	20°	58°	3.16
7	Pinnata Castra	Πτερωτον	27° 1/4	59° 1/3	3.13
8	Lewis	Δουμνα	30°	61°	3.31
9	Isle of Wight	Ουηκτις	19° 1/3	52° 1/3	3.33

Table 2: Europe 2 Iberia

D#	Site	*GD* Name	*B*	*L*	G2
10	Cáceres	Νωρβα Καισαρεια	7° 5/6	39° 11/12	5.8
11	Mérida	Αυγουστα Ημεριτα	8°	39° 1/2	5.8
12	Seville	Ισπαλις	7° 1/4	37° 5/6	4.14
13	Córdoba	Κορδυβη	9° 1/3	38° 1/12	4.11
14	Astorga	Αστουρικα Αυγ.	9° 1/2	44°	6.36
15	Cartagena	Νεα Καρχηδων	12° 1/4	37° 11/12	6.14
16	Tarragona	Ταρρακωνη	16° 1/3	40° 2/3	6.17
17	Peñalba deCas.	Κλουνια	11°	42°	6.56
18	Zaragoza	Καισαρεια Αυγ.	14° 1/4	41° 1/2	6.63
19	Cadiz	Γαδειρα	5° 1/6	36° 1/6	4.16

Table 3: Europe 3 Gaul

D#	Site	*GD* Name	*B*	*L*	G2
20	Saintes	Μεδιολανιον Ακ.	17° 2/3	46° 3/4	7.7
21	Bordeaux	Βουρδιγαλλα	18°	45°	7.8
22	Autun	Αυγουστοδουνον	23° 2/3	46° 1/2	8.17
23	Lyon	Λουνδουνος	23° 1/4	45° 5/6	8.17
24	Boulogne	Γησοριακον	22° 3/4	53° 1/2	9.3
25	Reims	Δουροκοττορονr	23° 3/4	48° 1/2	9.12
26	Marseilles	Μασσαλια	24° 1/2	43° 1/12	10.8
27	Narbonne	Ναρβον	21°	43°	10.9
28	Vienne	Ουιεννα	23°	45°	10.11
29	Nimes	Νεμαυσος	22°	44° 1/2	10.10

Table 4: Europe 4 Germany

D#	Site	*GD* Name	*B*	*L*	G2
30	Amisia	Αμασεια	31° 1/2	51°	11.28
31	Lippstadt	Λουππια	34° 1/2	52° 3/4	11.28
32	Embrun	Εβουροδουνον	39°	48°	11.30
33	Sweden	Σκανδια νησος	45°	58°	11.34

Table 1: Europe 1 Brittania

G8.3	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	20^h	2^h	20^h	2^h
4	18^h	3^h1/4r	18^h	3^h1/4
5	18^h7/12	3^h1/5	18^h1/2	3^h1/5
6	17^h	2^h2/3	17^h	2^h2/3
7	17^h5/6	2^h1/3		
8	18^h	2^h2/3	18^h	2^h2/3
9	18^h1/2	2^h1/6r	18^h1/2	2^h1/6
10	19^h	2^h	19^h	2^h
11	16^h2/3	2^h2/3	16^h2/3	2^h2/3

Table 2: Europe 2 Iberia

G8.4	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^h11/12	3^h1/2	14^h11/12c	3^h1/2
3	14^h5/6	3^h1/2	14^h5/6	3^h1/2
4	14^h2/3	3^h11/20	14^h2/3	3^h1/15x
4	14^h2/3	3^h2/5	14^h2/3	3^h2/5r
5	15^h	3^h2/5	15^h5/12c	3^h2/5
5	14^h2/3	3^h1/5	14^h2/3	3^h1/6
5	15^hc	3^h	15^hc	2^h11/12
5	15^h2/3	3^h1/3	15^h1/8	3^h1/4
5	15^h1/12	3^h2/3	15^h1/12	3^h1/15
5	14^h1/2	3^h2/3	14^h1/2	3^h2/3

Table 3: Europe 3 Gaul

G8.5	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^h3/4	2^h2/3	15^h3/4	2^h5/6
4	15^h1/2	2^h5/6r	15^h1/2r	2^h5/6
5	15^h2/3	2^h1/2	15^h3/4	2^h5/12
5	15^h1/2	2^h1/2	15^h2/3	2^h1/2c
6	16^h1/2	2^h1/2	16^h1/2	2^h5/12
6	16^h	2^h1/2	16^h	2^h5/12
7	15^h1/4	2^h2/5	15^h1/4	2^h5/12
7	15^h1/4	2^h1/2	15^h1/4	2^h7/12
7	15^h1/2	2^h1/2	15^h1/2	2^h1/4
7	15^h5/12	2^h1/2	15^h1/2c	2^h1/2

Table 4: Europe 4 Germany

G8.6	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	16^h1/2	2^h	16^h1/2	2^hc
3	16^h7/12	1^h3/4	16^h5/6	1^h2/3
3	15^h11/12	1^h1/3	15^h11/12	1^h1/3
4	18^h	1^h1/15	18^h	1^h

Table 5: Europe 5 Western Balkans

D#	Site	*GD* Name	*B*	*L*	G2
34	Bregenz	Βριγαντιον	30°	46°	12.5
35	Augsburg	Αυγουστα Ουενδ.	32° 1/2	46° 1/3	12.8
36	Pöchlarn	Αρελατη	35°	47°	13.3
37	Zuglio	Ιουλιον Καρνικον	34° 1/2	45° 1/4	13.4
38	Ptuj	Ποτοβιον	37°2/3	45° 1/2	14.4
39	Sopron	Σκαρβαντια	39° 1/2	47°	14.5
40	Ljubljana	Ημωνα	36° 1/2	45° 1/3	14.7
41	Bosanska Grad.	Σερβιτιον	42° 1/3	46° 1/2	15.6
42	Osijek	Μουρσια	43° 1/2	45°3/4	15.8
43	SremskaMitrov.	Σιρμιον	44° 5/6	45°	15.8
44	Zadar	ΙαδερΛιβουρνιας	42°	43°3/4	16.3
45	Sidrona	Σιδρωνια	43° 1/2	44° 1/6	16.10
46	Solin	Σαλωναι Δαλματ.	43° 1/3	43° 1/6	16.4
47	Vid	Ναρωνα	44° 1/3	42°3/4	16.12
48	Scardona	Σκαρδονα νησος	40°2/3	43°2/3	16.13

Table 6: Europe 6 Italy

D#	Site	*GD* Name	*B*	*L*	G3
49	Rome	Ρωμη	36°2/3	41°2/3	1.61
50	Nice	Νικαια	28°	43°5/12	1.2
51	Terracina	Ταρρακιναι	37°3/4	41° 1/4	1.5
52	Naples	Νεαπολις	40°	40° 1/2	1.6
53	Tarentum	Ταρασ	42° 1/6	40°	1.12
54	Brindisi	Βρενδεσιον	42° 1/2	39°2/3	1.14
55	Ancona	Αγκων	36° 1/2	43°2/3	1.21
56	Ravenna	Ραουεννα	34°2/3	44°	1.23
57	Aquileia	Ακουληια	34°	45°	1.29
58	Benevento	Ουενεβενδος	41°	41° 1/3	1.67
59	Capua	Καπυη	40°	41° 1/6	1.68
60	Aleria	Αλερια	31° 1/2	40° 1/12	2.5
61	La Canonica	Μαριανη	31° 1/3	40°2/3	2.5

Table 5: Europe 5 Western Balkans

G8.7	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^{h}2/3	2^{h}	15^{h}2/3	2^{h}
4	15^{h}2/3	1^{h}17/30	15^{h}3/4c	1^{h}5/6
5	15^{h}5/6	1^{h}2/3	15^{h}5/6	1^{h}2/3
5	15^{h}1/2	1^{h}11/15	15^{h}1/2	1^{h}2/3
6	15^{h}17/30	1^{h}1/2	15^{h}7/12	1^{h}1/2
6	15^{h}5/6	1^{h}2/5	15^{h}5/6	1^{h}1/3
6	15^{h}5/6	1^{h}2/3	15^{h}1/2	1^{h}17/30
7	15^{h}	1^{h}1/6	15^{h}3/4c	1^{h}1/6
7	15^{h}7/12	1^{h}1/8		
7	15^{h}1/2	1^{h}1/15	15^{h}1/2	1^{h}
8	15^{h}1/3	1^{h}1/5	15^{h}1/3	1^{h}1/5
8	15^{h}5/12	1^{h}1/8	15^{h}5/12	1^{h}1/8
8	15^{h}1/4	1^{h}1/8	15^{h}1/4	1^{h}1/8
8	15^{h}1/6r	1^{h}1/15	15^{h}1/4c	1^{h}1/15
9	15^{h}1/3	1^{h}4/15	15^{h}1/3	1^{h}1/4

Table 6: Europe 6 Italy

G8.8	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^{h}1/2x	1^{h}5/8	15^{h}1/12	1^{h}5/8
3	15^{h}1/4	2^{h}1/8	15^{h}1/4	2^{h}1/8
3	15^{h}1/12	1^{h}1/2	15^{h}1/15	1^{h}1/2
4	14^{h}2/3	1^{h}1/3	14^{h}11/12	1^{h}1/3
4	14^{h}11/12	1^{h}4/15		
4	14^{h}5/6	1^{h}1/5	14^{h}5/6	1^{h}1/6
5	15^{h}1/3	1^{h}1/2	15^{h}1/3	1^{h}17/30
5	15^{h}5/12	1^{h}11/15	15^{h}5/12c	1^{h}2/3
6	15^{h}1/2	1^{h}11/12x	15^{h}5/12c	1^{h}3/4r
6	15^{h}1/12	1^{h}4/15	15^{h}1/12c	1^{h}1/4
6	15^{h}1/12	1^{h}1/3	15^{h}1/12	1^{h}1/3
7	14^{h}7/12	2^{h}	14^{h}11/12	2^{h}c
7	15^{h}	2^{h}	15^{h}c	2^{h}c

Table 7: Europe 7 Sardinia & Sicily

D#	Site	*GD* Name	*B*	*L*	G3
62	Sulci	Σολκοι	30°3/4	35°5/6	3.3
63	Susaleus	Σουσαλεος	31°11/12	36°2/3	3.4
64	Cagliari	Καραλλις	32°1/2	36°	3.4
65	Porto Torres	Παργος Λιβιοσων.	30°1/4	38°5/6	3.5
66	Cuglieri	Γουρουλις Νεα	30°1/2	37°1/3	3.7
67	Lilybaeum	Λιλυβαιον	37°	36°	4.5
68	Syracuse	Συρακουσαι	39°1/2	37°1/4	4.9
69	Messina Sic.	Μεσηνη	39°1/2	38°1/2	4.9
70	Centuripe	Κεντουριπαι	38°1/2	37°3/4	4.13
71	Segesta	Σεγεστα	37°1/6	36°1/2	4.15
72	Catania	Κατανη	39°7/12	37°2/3	4.9

Table 8: Europe 8 Ukraine

D#	Site	*GD* Name	*B*	*L*	G3
73	Tamyrake	Ταμυρακη	59°1/3	48°1/2	5.8
74	Navaron	Ναυαρον	58°1/2	50°	5.27
75	Berislav, Dnepr	ΟλβιαΒορυσθενησ	57°	49°	5.28
76	Feodosija	Θεοδοσια	63°1/3	47°1/3	6.3
77	Kerch	Παντκαπαια	64°	47°11/12	6.4

Table 9: Europe 9 Eastern Balkans

D#	Site	*GD* Name	*B*	*L*	G3
78	Bormanon	Βορμανον Ιαζυγην	43°2/3	48°1/4	7.2
79	Salinai	Σαλιναι	49°1/4	47°1/6	8.7
80	Hunedoara	Ζαπμιυσογουσα	47°5/6	45°1/4	8.9
81	Arčar	Ραιτιαρια	49°	43°1/3	9.4
82	Skopje	Σκουποι	48°1/2	42°1/2	9.6
83	Varna	Οδησσα	54°5/6	45°	10.8
84	Gigen	Οισκας	51°	44°	10.10
85	Enez	Αινος	53°1/6	41°1/2	11.2
86	Sozopol	Απολλωνια Ποντ.	54°5/6	44°1/3	11.4
87	Byzantium	Βυζαντιον	56°	43°1/12	11.5
88	MarmaraEreğl.	Περινθος	54°5/6	42°1/3	11.6
89	Goce Delčev	Νικοπολισ	51°3/4	42°1/3	11.13
90	Lysimachia	Λυσιμαχια	54°1/6	41°1/2	11.13
91	Marmara Island	Προκονησος	55°1/2	42°	11.14
92	Alçitepe	Ελαιους	54°1/2	40°3/4	12.3
93	Yalikavat	Σεστος	54°11/12	41°1/4	12.4

Table 7: Europe 7 Sardinia & Sicily

G8.9	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	$14^{h}1/2$	2^{h}	$14^{h}7/12$	$1^{h}9/10$
3	$14^{h}7/12$	$1^{h}9/10$	$14^{h}7/12$	$1^{h}9/10$
3	$14^{h}1/2$	$1^{h}13/15$	$14^{h}1/2$	$1^{h}5/6$
3	$14^{h}3/4$	2^{h}	$14^{h}3/4$	2^{h}c
3	$14^{h}2/3$	2^{h}	$14^{h}5/8$	$1^{h}23/24$
4	$14^{h}1/2$	$1^{h}17/30$	$14^{h}1/2$	$1^{h}17/30$
4	$14^{h}7/12$r	$1^{h}2/5$	$14^{h}5/8$	$1^{h}2/5$
4	$14^{h}3/4$	$1^{h}2/5$	$14^{h}3/4$	$1^{h}2/5$
4	$14^{h}2/3$	$1^{h}11/24$	$14^{h}2/3$	$1^{h}11/24$
4	$14^{h}1/2$	$1^{h}17/30$	$14^{h}1/2$	$1^{h}17/30$
4			$14^{h}2/3$	$1^{h}2/5$

Table 8: Europe 8 Ukraine

G8.10	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	16^{h}	$0^{h}1/15$	16^{h}	$0^{h}1/15$
3	$16^{h}1/4$	$0^{h}1/8$	$16^{h}1/3$	$0^{h}1/8$
3	$16^{h}1/12$	$0^{h}1/5$	$16^{h}1/12$	$0^{h}1/5$
4	$15^{h}5/6$	-0°1/5	$15^{h}5/6$	-0°1/5
4	$15^{h}11/12$	-0°1/4	$15^{h}11/12$	-0°1/4

Table 9: Europe 9 Eastern Balkans

G8.11	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	16^{h}	$1^{h}1/8$	16^{h}c	$1^{h}1/12$
4	$15^{h}1/2$x	$0^{h}2/5$	$15^{h}5/6$	$0^{h}11/15$
4	$15^{h}1/2$r	$0^{h}5/6$	$15^{h}1/2$	$0^{h}5/6$
5	$15^{h}1/4$	$0^{h}2/3$	$15^{h}1/2$	$0^{h}3/4$
5	$15^{h}1/4$	$0^{h}19/24$	$15^{h}1/6$	$0^{h}3/4$
6	$15^{h}1/2$	$0^{h}1/15$	$15^{h}1/2$	$0^{h}1/3$
6	$15^{h}3/8$	$0^{h}5/8$	$15^{h}3/8$	$0^{h}7/12$
7	$15^{h}1/12$	$0^{h}11/24$	$15^{h}1/12$	$0^{h}11/24$
7	$15^{h}5/12$	$0^{h}2/5$	$15^{h}5/12$	$0^{h}1/3$
7	$15^{h}1/4$	$0^{h}2/5$	$15^{h}1/4$	$0^{h}1/4$
7	$15^{h}1/2$	$0^{h}2/5$	$15^{h}1/6$	$0^{h}1/3$
7	$15^{h}1/6$	$0^{h}2/3$	$15^{h}1/6$	$0^{h}17/30$
7	$15^{h}1/8$	$0^{h}2/5$	$15^{h}1/12$	$0^{h}2/5$
8	$15^{h}1/2$	$0^{h}2/3$	$15^{h}1/8$	$0^{h}1/3$c
9	15^{h}	$0^{h}2/5$	15^{h}	$0^{h}1/3$
10	$15^{h}1/12$	$0^{h}1/3$	$15^{h}1/8$	$0^{h}1/3$

Table 10: Europe 10 Greece & Crete

D#	Site	*GD* Name	*B*	*L*	G3
94	Durrës	Δυρραχιον	45°	40° 5/6	13.3
95	Thessalonika	Θεσσαλονικη	49° 5/6	40° 1/3	13.14
96	Amfipolis	Αμφιπολις	50°	41° 1/2	13.31
97	Bitola	Ηρακλεια Μακ.	47° 2/3	40° 2/3	13.33
98	Edessa	Εδεσσα	48° 3/4	40° 1/3	13.39
99	Pella	Πελλα	49° 1/3	40° 1/12	13.39
100	Larisa	Λαρισσα Πελασγ.	50°	39° 1/6	13.42
101	Nea Potidea	Κασανδρεια	51° 1/12	40°	13.13
102	Lemnos	Λημνος	52° 1/3	40° 11/12	13.47
103	Nicopolis	Νικοπολις	47° 7/12	37° 11/12	14.5
104	Arta	Αμβρακια	48°	38° 1/3	14.6
105	Corfu	Κερκυρα	45° 2/3	37° 3/4	14.11
106	Kefallinia	Κεφαληνια	47° 2/3	37° 1/6	14.12
107	Thebes Gr.	Βοιωτιαι Θηβαι	52° 2/3	37° 2/3	15.20
108	Megara	Μεγαρα	52°	37° 5/12	15.21
109	Athens	Αθηναι	52° 3/4	37° 1/4	15.22
110	Mavromati	Μεσσηνη	49° 1/4	35° 1/4	16.8
111	Corinth	Κορινθος	51° 1/4	36° 11/12	16.17
112	Tegea	Τεγεα	49° 5/6	36° 1/3	16.19
113	Argos	Αργος	51° 1/3	36° 1/4	16.20
114	Sparta	Λακεδαιμων	50° 1/4	35° 1/2	16.22
115	Chalkis Eub.	Χαλκις	53° 1/2	38°	15.24
116	Karystos	Καρυστος	54° 1/2	37° 2/3	15.24
117	Gortyna	Γορτυνα	54° 1/4	34° 5/6	17.10
118	Knossos	Κνωσσος	54° 3/4	35°	17.10

Table 10: Europe 10 Greece & Crete

G8.12	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^{h}	1^{h}	15^{h}	1^{h}
4	$14^{h}11/12$	$0^{h}11/15$	$14^{h}11/12$	$0^{h}2/3$
5	$15^{h}1/8$	$0^{h}11/15$	$15^{h}1/12$	$0^{h}2/3$
6	$15^{h}1/8$	$0^{h}19/24$	15^{h}c	$0^{h}5/6$
7	$14^{h}14/15$	$0^{h}11/24$		
8	$14^{h}5/6$	$0^{h}11/15$	$14^{h}11/12$c	$0^{h}3/4$c
9	$14^{h}3/4$	$0^{h}7/10$	$14^{h}3/4$c	$0^{h}2/3$
10	$14^{h}5/6$	$0^{h}5/8$	$14^{h}11/12$c	$0^{h}7/12$
11	15^{h}	$0^{h}8/15$	15^{h}	$0^{h}1/2$
12	$14^{h}5/8$	$0^{h}13/15$	$14^{h}2/3$	$0^{h}5/6$
13	$14^{h}3/4$	$0^{h}5/6$	$14^{h}3/4$c	$0^{h}5/6$c
14	$14^{h}5/8$	1^{h}	$14^{h}2/3$	1^{h}
15	$14^{h}7/12$	$0^{h}7/9$	$14^{h}5/8$	$0^{h}5/6$
16	$14^{h}5/6$	1^{h}	$14^{h}2/3$	$0^{h}1/2$
17	$14^{h}5/8$	$0^{h}17/30$	$14^{h}5/8$	$0^{h}17/30$
18	$14^{h}7/12$	$0^{h}1/2$	$14^{h}5/8$	$0^{h}1/2$c
19	$14^{h}5/12$	$0^{h}5/12$	$14^{h}5/12$	$0^{h}11/15$
20	$14^{h}7/12$	$0^{h}5/8$	$14^{h}7/12$	$0^{h}5/8$
21	$14^{h}1/2$	$0^{h}7/10$	$14^{h}1/2$	$0^{h}2/3$
22	$14^{h}1/2$	$0^{h}5/6$	$14^{h}1/2$	$0^{h}5/8$
23	$14^{h}1/2$	$0^{h}2/3$	$14^{h}5/12$c	$0^{h}2/3$
24	$14^{h}3/4$	$0^{h}1/2$	$14^{h}2/3$	$0^{h}1/2$
24	$14^{h}5/8$	$0^{h}2/5$	$14^{h}2/3$	$0^{h}11/30$
25	$14^{h}3/8$	$0^{h}5/12$	$14^{h}1/3$	$0^{h}2/5$
25	$14^{h}5/12$	$0^{h}2/5$	$14^{h}1/3$	$0^{h}1/3$

Table 11: Africa 1 Northwest Africa

D#	Site	*GD* Name	*B*	*L*	G4
119	Tangiers	Τιγγις Καισαρεια	6° 1/2	35° 11/12	1.5
120	Asilah	Ζιλια	6° 1/2	35° 1/6	1.13
121	Larache	Λιξ	6° 3/4	34° 11/12	1.13
122	Walila	Ουολουβιλις	8° 1/4	33° 2/3	1.14
123	Ténès	Καρτινα	14° 1/2	33° 2/3	2.4
124	Cherchell	Ιωλ Καισαρεια	17°	33° 1/3	2.5
125	Bougie	Σαλδαι	22°	32° 1/2	2.9
126	Ksar el-Kebir	Οππιδιον Νεον	16°	32° 2/3	2.25
127	Miliana	Ζουγαβαρρι	16° 5/6	32° 2/3	2.25
128	Tiklat	Τουβουσουπτος	23° 3/4	31° 1/3	2.31

Table 12: Africa 2 North Africa

D#	Site	*GD* Name	*B*	*L*	G4
129	Tabarka	Θαβρακα	31° 1/4	32° 1/3	3.5
130	Utica	Ιτυκη	33° 2/3	32° 3/4	3.6
131	Carthage	Καρχηδων	34° 5/6	32° 2/3	3.7
132	Souse	Αδρουμητος	36° 2/3	32° 2/3	3.9
133	Lebda	Μεγαλη Λεπτις	42°	31° 2/3	3.13
134	Constantine	Κιρτα Ιουλια	26° 5/6	31° 1/3	3.28
135	El-Kef	Σικα Ουενερια	30° 1/2	30° 5/6	3.30
136	Hammam Dar.	Βουλλα Ρηγια	30° 2/3	31° 1/2	3.30
137	Oudna	Ουθινα	34° 1/4	31° 1/3	3.34
138	El-Djem	Θυσδρος	37° 5/6	32° 1/6	3.39
139	Djerba	Μηνιγξ	39° 1/2	31° 1/3	3.45
140	Pantelleria	Κοσσυρα	37° 1/3	34° 1/3	3.47
141	Malta	Μελιτη	38° 3/4	34° 2/3	3.47

Table 11: Africa 1 Northwest Africa

G8.13	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^h1/2	3^h7/12	14^h1/2	3^h7/12
4	14^h1/2	3^h1/2	14^h5/12	3^h11/12
5	14^h5/12	3^h1/2	14^h1/3	3^h17/30
6	14^h1/3	3^h1/2	14^h1/4	3^h1/2c
7	14^h1/3	3^h	14^h1/4	3^h
8	14^h1/4	2^h2/3	14^h1/4	2^h11/12
9	14^h1/6	2^h1/2	14^h1/6	2^h17/30
10	14^h1/6r	3^h	14^h1/12	2^h11/12r
11	14^h1/5	2^h3/4	14^h1/5	2^h9/10
12	14^h1/8	2^h1/2	14^h1/8	2^h5/12

Table 12: Africa 2 North Africa

G8.14	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^h1/6r	2^h	14^h1/6	2^hc
4	14^h1/5	1^h3/4	14^h1/5	1^h3/4
5	14^h1/4	1^h3/4	14^h1/5	1^h2/3
6	14^h1/5	1^h5/6	14^h1/5	1^h7/12
7	14^h1/8	1^h1/4	14^h1/8	1^h1/5
8	14^h1/12	2^h1/4	14^h1/12	2^h1/4
9	14^h1/12	2^h	14^h	2^hc
10	14^h1/12	2^h	14^h1/12	2^hc
11	14^h1/12	1^h3/4	14^h1/12	1^h3/4
12	14^h1/6r	1^h1/2	14^h1/8	1^h1/2
13	14^h1/12	1^h2/5	14^h1/12	1^h2/5
14	14^h1/3	1^h17/30	14^h1/3	1^h1/6
15	14^h1/4	1^h11/24	14^h1/3	1^h11/24

Table 13: Africa 3 Cyrenaica & Egypt

D#	Site	*GD* Name	*B*	*L*	G4
142	Benghazi	Βερενικη Κυρ.	47°3/4	31°1/3	4.4
143	Tokra	ΑρσινοηΤευχειρα	48°2/3	31°1/3	4.4
144	Tolmeta	Πτολεμαις Κψρ.	49°1/12	31°1/6	4.4
145	Apollonia	Απολλωνια Χυρ.	50°1/6	31°2/3	4.5
146	Cyrene	Κυρηνη	50°	31°1/3	4.11
147	Ras et-Tin	Μεγαλη Χεπσον.	52°	31°2/3	5.2
148	Marsa Matruch	Παραιτονιον	57°	31°1/6	5.6
149	Alexandria	Αλεξανδρεια	60°1/2	31°	5.9
150	Pelusium	Πηλουσιον	63°1/3	31°1/4	5.11
151	Memphis	Μεμφις	61°5/6	29°5/6	5.55
152	El-Minshije	Πτολεμαις Ερμ.	61°5/6	27°1/6	5.66
153	Thebes Eg.	Θηβων Μεγαλη Δ.	62°	25°1/2	5.73
154	Syene>Aswan	Συηνη	62°	23°5/6	5.73
155	Siwa	Αμμων	55°1/2	28°	5.33
156	Great Oasis	ΜεγαληΟασις	59°1/2	26°11/12	5.37
157	Quseir	Μυος	64°1/2	27°1/2	5.14
158	Bender elKebir	Βερενικη Μαρμ.	64°1/12	23°5/6	5.15

Table 14: Africa 4 Interior Africa

D#	Site	*GD* Name	*B*	*L*	G4
159	Autolalai	Αυτολαλαι	10°	23°5/6	6.24
160	Iarzeitha	Ιαρζειθα	10°	15°1/2	6.6
161	Thaondokana	Θαμουδοκανα	23°	17°	6.28
162	Geira	Γειρα	36°	18°	6.31
163	Djerma	Γαραμη	43°	21°1/2	6.30
164	Gebel Barkal	Ναπατα Αιθ.	63°	20°1/4	7.19
165	Meroë	Μεροη	61°1/2	16°5/12	7.21
166	PtolemyLodge	Πτολεμαις Θηρων	66°	16°5/12	7.7
167	Massawa	Αδουλις	67°	11°1/3	7.8
168	Ras Siyan	Δηρη	74°1/2	11°	7.9
169	Ras Antarah	Μοσουλον	79°	9°	7.10
170	CapeGuardafui	Αρωματα	83°	6°	7.10

Table 13: Africa 3 Cyrenaica & Egypt

G8.15	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
3	14^h1/15r	0^h13/15	14^h1/12	0^h5/6		
4	14^h1/12	0^h3/4r	14^h1/12	0^h11/15		
5	14^h1/8	0^h3/4	14^h1/12	0^h3/4		
6	14^h1/8	0^h2/3	14^h1/8	0^h2/3		
7	14^h1/12	0^h2/3	14^h1/12	0^h2/3		
8	14^h	0^h17/30	14^h1/8	0^h17/30		
9	14^h1/12	0^h1/4	14^h1/12	0^h1/4		
10	14^h1/15r	0^h	14^h1/12	0^h		
11	14^h1/15r	-0^h1/5	14^h1/12	-0^h1/5		
12	14^h	-0^h1/12	13^h19/20	-0^h1/8		
13	13^h3/4	-0^h1/12	13^h43/60	-0^h1/8		
14	13^h5/8	-0^h1/12	13^h5/8	-0^h1/8		
15	13^h1/2	-0^h1/12	13^h1/2	-0^h1/8	0°	0°
16	13^h5/6	-0^h1/3	13^h5/6	-0^h1/3		
17	13^h2/3	-0^h1/15	13^h2/3	-0^h1/15		
18	13^h3/4	-0^h1/4	13^h3/4	-0^h1/4		
19	13^h1/2	-0^h1/4	13^h1/2	-0^h1/4	0°	0°

Table 14: Africa 4 Interior Africa

G8.16	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
3	13^h1/2	3^h1/3	13^h1/2	3^h1/3	0°	0°
5	12^h11/12	3^h1/3	12^h11/12	3^h1/3	48°2/3	43°2/3
5	13^h	2^h1/2	13^h	2^h1/2	43°2/3	43°
6	13^h1/15r	1^h5/8	13^h1/12	1^h5/8	40°1/3r	40°1/3
7	13^h1/4	0^h1/6	13^h1/4	0^h1/6	25°	25°
8	13^h1/4	-0^h1/6	13^h1/4	-0^h1/6	31°1/6	30°
9	13^h	-0^h1/15	13^h	-0^h1/15	45°2/3	45°
10	13^h	-0^h1/5	13^h	-0^h2/5	45°1/3	45°
11	12^h1/4	-0^h13/30	12^h2/3r	-0^h11/24	60°	62°c
12	12^h7/12	-0^h11/12	12^h2/3	-1^h	62°3/4	63°3/4
13	12^h1/2	-1^h1/4	12^h1/2	-1^h1/3c	68°1/8	68°3/4
14	12^h1/3	-1^h1/2	12^h11/24	-1^h1/2	75°	76°

Table 15: Asia 1 Asia Minor

D#	Site	*GD* Name	*B*	*L*	G5
171	Chalcedon	Χαλκηδων	56°1/12	43°1/12	1.2
172	Nicomedia	Νικομηδεια	57°1/3	42°1/2	1.3
173	ApameiaBithyn.	Απαμεια	56°11/12	42°	1.4
174	Ereğli	Ηερακλεια Ποντου	59°	43°1/2	1.7
175	Nicaea>Iznik	Νικαια	58°	42°1/4	1.14
176	Kyzikos	Κυζικος	56°	41°1/2	2.2
177	AlexandriaTroas	ΑλεξανδρειαΤρωας	55°5/12	40°2/3	2.4
178	Bergama	Περγαμος	57°5/12	39°3/4	2.14
179	Smyrna/Izmir	Σμυρνα	58°5/12	38°7/12	2.7
180	Ephesos	Εφεσος	57°2/3	37°2/3	2.8
181	Miletos>Balat	Μιλητος	58°	37°	2.9
182	Knidos>Datça	Κνιδος	56°1/4	36°	2.10
183	Sardis>Sart	Σαρδεις	58°2/3	38°1/4	2.17
184	Magn.Maeander	ΜαγνησιαΜαιαν.	58°1/2	37°5/6	2.19
185	Dinar	Απαμεια Κιβωτος	61°1/6	38°11/12	2.25
186	Gölhisar	Κιβυρα	60°1/6	38°11/12	2.26
187	Mitilini	Μιτυληνη	55°2/3	39°2/3	2.29
188	Chios	Χιος	56°1/3	38°7/12	2.30
189	Ielysos,Rhodos	Ροδος	58°1/3	36°	2.34
190	Gelemiş	Παταρα	60°1/2	36°	3.3
191	Kale	Ανδριακη	60°3/4	36°5/12	3.3
192	Demre	Μυρα	61°	36°2/3	3.6
193	Turinçova	Λιμυρα	61°5/12	36°7/12	3.6
194	Sinope	Σινωπη	63°5/6	44°	4.3
195	Amisos	Αμισος	65°	43°1/12	4.3
196	Ankara	Αγκυρα	62°2/3	42°	4.8
197	Sivrihisar	Γερμα	61°1/2	42°	4.7
198	Ballihisar	Πεσσινους	61°	41°1/2	4.7
199	Selimiya	Σιδη	63°5/12	36°2/3	5.2
200	Aksu	Περγη	62°1/4	36°11/12	5.7
201	Belkis	Ασπενδος	62°1/4	36°3/4	5.7
202	Termessos	Τερμησσος	62°1/6	37°1/4	5.6
203	Trabzon	Τραπεζους	70°3/4	43°1/12	6.5
204	Gümenek	Κομανα Ποντικη	67°	41°1/2	6.9
205	Kayseri	Μαζακα Καισ.	66°1/2	39°1/2	6.15
206	Şar	Κομανα Καππ.	68°	38°	7.7
207	Malatya	Μελιτηνη	71°	39°1/2	7.5
208	Pürk	Νικοπολις Μ.Αρμ.	69°	41°2/3	7.3
209	Sadağ	Σαταλα Μ.Αρμεν.	69°1/2	42°1/6	7.3
210	Silinti	Σελινους	64°1/3	36°3/4	8.2
211	Viranşehir	Πομπηιουπ. Σολοι	67°1/4	36°2/3	8.4
212	Mallos	Μαλλος	68°1/2	36°1/2	8.4
213	Tarsus	Ταρσος	67°2/3	36°5/6	8.7
214	Adana	Αδανα	68°1/4	36°3/4	8.7

Table 15: Asia 1 Asia Minor

G8.17	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^h1/4	0^h1/4	15^h1/4	0^h1/4
4	15^h1/6	0^h1/4	15^h1/4	0^h1/6
5	15^h1/12	0^h1/4	15^h1/8	0^h1/6
6	15^h1/4	0^h1/4	15^h1/3	0^h1/10
7	15^h1/8	0^h1/4	15^h1/8	0^h1/7
8	15^h1/12r	0^h1/4r	15^h1/12	0^h1/4
9	15^h	0^h1/3	15^hc	0^h1/3
10	14^h5/6	0^h1/5	14^h7/8	0^h1/5
11	14^h3/4	0^h1/5	14^h3/4	0^h1/8
12	14^h2/3	0^h1/5	14^h2/3	0^h1/6
13	14^h5/6	0^h1/8	14^h7/12	0^h1/6
14	14^h1/2	0^h1/4	14^h1/2	0^h1/4
15	14^h3/4	0^h1/8	14^h3/4c	0^h1/8
16	14^h2/3	0^h1/8	14^h2/3	0^h1/8
17	14^h2/3	0^hc	14^h2/3	0^hc
18	14^h2/3	0^hc	14^h2/3	0^h
19	14^h5/6	0^h1/3	14^h5/6	0^h1/3
20	14^h3/4	0^h1/4	14^h3/4	0^h1/4
21	14^h1/2	0^h1/8	14^h1/2	0^h1/8
22	14^h1/2	0^h	14^h1/2	0^h
24	14^h7/12	-0^hc	14^h1/2	-0^hc
23			14^h7/12	-0^hc
25	14^h7/12	-0^hc		
26	15^h3/8	-0^h1/4	15^h1/3	-0^h1/4
27	15^h1/4	-0^h1/3	15^h1/4	-0^h1/3
28	15^h1/6r	-0^h1/8	15^h1/8	-0^h1/6
29	15^h1/8	-0^hc	15^h1/8	-0^hc
30	15^h1/12r	-0^hc	15^h1/12	-0^hc
31	14^h1/2	-0^h1/5	14^h1/2	-0^h1/5
32	14^h7/12	-0^h1/12	14^h7/12	-0^h1/8
33	14^h7/12	-0^h1/6r	14^h7/12	-0^h1/8
34	14^h1/2	-0^h1/9	14^h5/8	-0^h1/8
35	15^h1/4	-0^h2/3	15^h1/4	-0^h2/3
36	15^h1/8	-0^h2/5	15^h1/12	-0^h11/24
37	14^h5/6	-0^h2/5	14^h5/6	-0^h2/5
38	14^h3/4r	-0^h1/2	14^h3/4c	-0^h1/2
39	14^h5/6	-0^h7/10	14^h5/6	-0^h3/4
40	15^h1/8	-0^h17/30	15^h1/8	-0^h17/30
41	15^h	-0^h1/2	15^h1/8	-0^h5/8
42	14^h7/12	-0^h1/4	14^h7/12	-0^h1/4
43	14^h7/12	-0^h1/2	14^h7/12	-0^h1/2c
44	14^h7/12	-0^h1/2	14^h17/30	-0^h1/2
45	14^h7/12	-0^h1/2	14^h7/12	-0^h1/2
46	14^h7/12	-0^h1/2	14^h7/12	-0^h1/2

Table 16: Asia 2 Southern Russia

D#	Site	*GD* Name	*B*	*L*	G5
215	Akçaabat	Ερμωνασσα	65°	47° 1/2	9.8
216	Gagra	Οιανθια	69° 2/3	47° 1/4	9.9
217	Tanaïs>Don	Ταναις	67°	54° 2/3	9.16
218	Stanitsa Peresyp	Τυραμβη	69° 2/3	49° 5/6	9.4
219	Rostov	Ναυαρις	70°	55°	9.16

Table 16: Asia 2 S.Russia

G8.18	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^h5/6	-0^h1/3	15^h5/6	-0^h1/3
4	16^h1/6rn	-0^h5/6	15^h5/6c	-0^h2/3c
5	17^h	-0^h5/6	17^h1/6	-0^h13/30
6	16^h1/3	-0^h2/3	16^h1/3	-0^h2/3c
7	17^h1/4	-0^h2/3	17^h1/4	-0^h2/3

Table 17: Asia 3 Armenia

D#	Site	*GD* Name	*B*	*L*	G5
220	Sukhumi	Διοσκουριασ	71° 1/6	46° 3/4	10.2
221	Poti	Φασις	72° 1/2	44° 3/4	10.2
222	Urbnisi	Αρτανισσα	75° 2/3	46°	11.3
223	Tsitsamuri	Αρμακτικα	75°	44° 3/4	11.3
224	Baku	Γαγγαρα	79° 1/2	45°	12.2
225	Alvan	Αλβανα	81° 2/3	45° 5/6	12.2
226	Saki	Οσικα	77° 1/2	44° 3/4	12.5
227	Artashat	Αρταξατα	78°	42° 2/3	13.12
228	Armavir	Αρμαουρια	76° 2/3	42° 3/4	13.12
229	Van	Θωσπια	74° 1/3	39° 5/6	13.19
230	Edremit	Αρτεμιτα Αρμεν.	78° 2/3	40° 1/3	13.21
231	Haraba	Αρσαμοσατα	73°	38° 1/3	13.19

Table 17: Asia 3 Armenia

G8.19	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	15^h3/4	-0^h11/15	15^h3/4	-0^h11/15
4	15^h1/2	-0^h19/24	15^h1/2	-0^h5/6
5	15^h7/12	-1^h	15^h2/3	-1^h1/30
6	15^h5/12r	-1^h	15^h1/2c	-1^h
7	15^h1/2	-1^h1/4	15^h1/2	-1^h1/4
8	15^h5/6	-1^h2/5	15^h2/3	-1^h13/30
9	15^h1/8	-1^h1/8		
10	15^h1/6r	-1^h1/6r	15^h1/6	-1^h1/6
11			15^h1/4c	-1^h1/10
12	14^h11/12	-1^h	14^h7/8r	-1^hc
13	14^h5/12	-1^h1/5	14^h11/12	-1^h1/4
14	14^h3/4	-0^h5/6		

Table 18: Asia 4 Middle East

D#	Site	*GD* Name	*B*	*L*	G5
232	Paphos	Παφος	64° 1/3	35° 1/6	14.1
233	Limassol	Αμαθους	65° 3/4	35°	14.2
234	Ammokhostos	Σαλαμις	66° 2/3	35° 1/2	14.3
235	Latakia	Λαοδικεια	68° 1/2	35° 1/12	15.3
236	Antioch	Αντιοχεια	69°	35° 1/2	15.16
237	Membidj	Ιεραπολις	71° 1/4	36° 1/4	15.13
238	Apamea	Απαμεια	70°	34° 3/4	15.19
239	Tadmur	Παλμυρα	71° 1/2	34°	15.24
240	Baalbek	Ηελιουπολις Συρ.	68° 2/3	33° 2/3	15.22
241	Banias	Καισαρ. Πανιας	67° 2/3	33°	15.21
242	Damascus	Δαμασκος	69°	33°	15.22
243	Caesarea	Καισαρεια	66° 1/4	32° 1/2	16.2
244	Ashkelon	Ασκαλων	65°	31° 2/3	16.2
245	Teveryah	Τιβεριας	67° 1/4	32° 1/12	16.4
246	Nablus	Νεαπολις Σαμαρ.	66° 5/6	31° 5/6	16.5
247	Jerusalem	Ιεροσολυμα/ΑιλΚ	66°	31° 2/3	16.8
248	Wadi Musa	Πετρα	66° 3/4	30° 1/3	17.5
249	Medaba	Μηδαυα	68° 1/2	30° 3/4	17.6
250	Busra	Βοστρα	69° 3/4	31° 1/2	17.7
251	Urfa	Εδεσσα Μεσοπ.	72° 1/2	37° 1/2	18.10
252	Neşibin	Νισιβις	75° 1/6	37° 1/2	18.11
253	Raqqa	Νικηφοριον	73° 1/12	35° 1/3	18.6
254	Qalaat Sergat	Λαββανα	77° 5/6	36° 1/2	18.9
255	Seleucia	Σελευκεια	79° 1/3	35° 2/3	18.8
256	Babylon>Hillah	Βαβυλον	79°	35°	20.6
257	Birs Nimrud	Βορσητα	78° 3/4	34° 1/3	20.6
258	Warka	Ορχοη	78° 1/2	32° 2/3	20.7
259	Basra	Τερηδων	80°	31° 1/6	20.5

Table 18: Asia 4 Middle East

G8.20	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^{h}1/2	-0^{h}1/4	14^{h}5/12	-0^{h}1/4
4	14^{h}2/3	-0^{h}1/3	14^{h}5/12c	-0^{h}2/5
5	14^{h}1/2	-0^{h}2/5	14^{h}1/2c	-0^{h}11/24
6	14^{h}5/12	-0^{h}1/2	14^{h}5/12	-0^{h}17/30
7	14^{h}1/2	-0^{h}17/30	14^{h}1/2c	-0^{h}7/12
8	14^{h}1/2	-0^{h}3/4	14^{h}1/2	-0^{h}3/4
9	14^{h}5/12	-0^{h}5/8	14^{h}5/12c	-0^{h}2/3
10	14^{h}1/3	-1^{h}1/2	14^{h}1/3c	-0^{h}3/4
11	14^{h}1/4	-0^{h}1/2	14^{h}1/4	-0^{h}17/30
12	14^{h}1/4	-0^{h}17/30	14^{h}1/4c	-0^{h}1/2
13	14^{h}1/4	-0^{h}17/30	14^{h}1/4c	-0^{h}7/12
14	14^{h}1/6	-0^{h}2/5	14^{h}1/5	-0^{h}2/5
15	14^{h}1/6r	-0^{h}5/12	14^{h}1/8c	-0^{h}1/3
16	14^{h}1/6r	-0^{h}5/12		
17	14^{h}1/8	-0^{h}5/12		
18	14^{h}1/8	-0^{h}2/5	14^{h}1/8c	-0^{h}2/5
19	14^h	-0^{h}2/5	14^h	-0^{h}13/30
20	14^{h}1/12	-0^{h}1/2	14^h	-0^{h}17/30
21	14^{h}1/8	-0^{h}1/2	14^{h}1/6r	-0^{h}2/3c
22	14^{h}2/3	-0^{h}3/4	14^{h}5/8	-0^{h}5/6
23	14^{h}2/3	-1^h	14^{h}5/8	-1^h
24	14^{h}5/12	-1^{h}1/5n	14^{h}7/12x	-0^{h}5/6
25	14^{h}1/2	-1^{h}1/6r	14^{h}1/2	-0^{h}5/6x
26	14^{h}5/12	-1^{h}1/4	14^{h}1/2c	-1^{h}1/4
27	14^{h}5/12	-1^{h}1/4	14^{h}5/12	-1^{h}1/4
28	14^{h}1/4	-1^{h}1/4	14^{h}1/3	-1^{h}1/4c
29	14^{h}1/6r	-1^{h}1/4	14^{h}1/6	-1^{h}1/5
30	14^{h}1/12	-1^{h}1/3r	14^{h}1/12c	-1^{h}1/3

Table 19: Asia 5 Babylonia & Persia

D#	Site	*GD* Name	*B*	*L*	G6
260	Nineveh	Νινος	78°	36°2/3	1.3
261	Arbela>Irbil	Αρβηλα	80°	37°1/4	1.5
262	Ktesiphon	Κτησιφων	80°	35°	1.3
263	Susa>Shush	Σουσα	84°	34°1/4	3.5
264	Tarsiana	Ταρσιανα	82°	32°1/2	3.5
265	Dschabul	Πασινου Χαραξ	81°2/3	31°	3.2
266	Kyropolis	Κυροπολις	85°1/2	41°1/2	2.2
267	Ekbatana	Εκβατανα	88°	37°3/4	2.14
268	Arsakia	Αρσακια	88°	36°1/2	2.16
269	Europos	Ευρωπος Μηδ.	93°2/3	36°2/3	2.17
270	Axima	Αξιμα	87°3/4	33°5/6	4.4
271	Persepolis	Περσοπολις	91°	33°1/3	4.4
272	Marrasion	Μαρρασιον	92°1/2	34°1/2	4.4
273	Taoke	Ταοκη	89°	30°1/3	4.7
274	Hekatonpylos	Εκατομπυλος	96°	37°5/6	5.2
275	Ambrodax	Αμβρωδαξ	94°1/2	38°1/3	5.2
276	Artakana	Αρτακανα	96°	34°1/2	5.4

Table 20: Asia 6 Arabia Felix

D#	Site	*GD* Name	*B*	*L*	G6
277	Dumat elCandal	Δουμεθα	75°	29°2/3	5.19.7
278	Badeo	Βαδεω	70°	20°1/4	7.6
279	Pudnos	Πουδνου	72°1/2	16°1/2	7.7
280	Mawshij	Μουζα	74°1/2	14°	7.7
281	Turbah	Οκηλις	75°	12°	7.7
282	Aden	Αραβιας	80°	11°1/2	7.9
283	Kane	Κανη	84°	12°1/2	7.10
284	Gerra	Γερρα	80°	23°1/3	7.16
285	Marib	Μαρα	76°	18°1/3	7.37
286	Omanon	Ομανον	77°2/3	19°1/3	7.36
287	Menambis	Μεναμβις	75°3/4	16°1/2	7.38
288	Shabwah	Σαββαθα	77°	16°1/2	7.38
289	Saue	Σαυη	76°	13°	7.42
290	Zafar	Σαπφαρ	78°	14°1/2	7.41
291	Dioskorides	Διοσκοριδους	86°2/3	9°1/2	7.45
292	Sarapis	Σαραπιδος	94°	17°1/2	7.46
293	Apphana	Απφανα	81°1/3	28°2/3	7.47
294	Hormuz	Αρμουζα	94°1/2	23°1/2	8.5
295	Samydake	Σαμυδακη	99°1/2	22°2/3	8.7
296	Kirman	Καρμανα	100°	29°	8.13
297	Karminna	Καρμιννα	102°	18°	8.16

Table 19: Asia 5 Babylonia & Persia

G8.21	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^{h}7/12	-1^{h}1/6r	14^{h}7/12	-1^{h}1/4x
3	14^{h}5/8r	-1^{h}1/3	14^{h}5/8	-1^{h}1/3
4	14^{h}1/2	-1^{h}1/3	14^{h}7/12c	-1^{h}1/3
5	14^{h}1/3	-1^{h}17/30	14^{h}1/3	-1^{h}7/12
6	14^{h}1/6	-1^{h}1/3x	14^{h}1/6	-1^{h}1/2c
7	14^{h}1/12	-1^{h}1/3		
8	15^{h}1/3	-1^{h}2/3	15^{h}	-1^{h}2/3
9	14^{h}2/3	-1^{h}2/3	14^{h}2/3	-1^{h}5/6
10	14^{h}1/2	-1^{h}5/6	14^{h}7/12	-1^{h}5/6
11	14^{h}7/12	-2^{h}1/5	14^{h}7/12	-2^{h}1/4
12	14^{h}1/4	-1^{h}3/4	14^{h}1/3	-1^{h}5/6
13	14^{h}1/3	-2^{h}	14^{h}1/4	-2^{h}1/15
14	14^{h}1/3	-2^{h}1/6r	14^{h}1/3	-2^{h}1/6
15	14^{h}	-1^{h}5/6	14^{h}	-2^{h}c
16	14^{h}2/3	-2^{h}1/3	14^{h}2/3	-2^{h}2/5
17	14^{h}2/3	-2^{h}1/3	14^{h}3/4c	-2^{h}1/3
18	14^{h}5/12	-2^{h}1/3	14^{h}3/8	-2^{h}2/5

Table 20: Asia 6 Arabia Felix

G8.22	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
3	13^{h}11/12	-1^{h}				
4	13^{h}1/4	-0^{h}2/3	13^{h}1/4	-0^{h}1/3x	31°1/6r	30°
5	13^{h}	-0^{h}3/4	13^{h}	-0^{h}5/6	45°1/3	44°2/3
6	12^{h}3/4	-1^{h}	12^{h}5/6	-1^{h}c	53°1/4	54°1/3
7	14^{h}1/4x	-1^{h}	12^{h}3/4c	-1^{h}	58°	61°1/4
8	12^{h}2/3	-1^{h}1/3	12^{h}2/3	-1^{h}1/3	59°1/2	62°1/3
9	12^{h}3/4	-0^{h}17/30	12^{h}3/4	-0^{h}3/5	59°	60°3/4
10	13^{h}1/2	-0^{h}2/3	13^{h}1/2c	-0^{h}1/3	0°	4°1/3
11	13^{h}1/8	-1^{h}	13^{h}1/8	-1^{h}1/15	39°	37°1/2
12	13^{h}1/4	-1^{h}3/4	13^{h}13/60	-1^{h}1/5c	33°1/3	32°
13	13^{h}	-1^{h}	13^{h}	-1^{h}1/20	45°1/3	45°
14	13^{h}	-1^{h}1/3	13^{h}	-1^{h}1/8	45°1/3	45°
15	12^{h}3/4	-1^{h}	12^{h}47/60	-1^{h}1/15	56°1/6r	58°
16	12^{h}11/12	-1^{h}1/6r	12^{h}7/8	-1^{h}26/30	53°1/4	52°1/2
17	12^{h}1/2	-1^{h}3/4	12^{h}2/3x	-1^{h}2/3x	68°1/2	62°1/2
18	13^{h}1/12	-2^{h}1/4	13^{h}1/12c	-2^{h}4/15	42°	41°
19	13^{h}1/2x	-1^{h}2/5				
21	13^{h}1/2	-2^{h}1/3	13^{h}1/2c	-2^{h}3/10	0°	3°
22	13^{h}5/12	-2^{h}2/3	13^{h}5/12	-2^{h}2/3c	17°2/3	10°
20	13^{h}11/12	-2^{h}2/3	13^{h}7/8	-2^{h}2/3		
23	13^{h}1/8	-2^{h}3/4	13^{h}1/8c	-2^{h}4/5	40°	40°c

Table 21: Asia 7 Southern USSR

D#	Site	*GD* Name	*B*	*L*	G6
298	Hyrkania	Υρκανια	98° 1/2	40°	9.7
299	Amarua	Αμαρουσα	95°	40°	9.7
300	Mary	Αντιοχεια Μαργ.	106°	40° 2/3	10.4
301	Nisaea	Νισαια	105° 1/4	39° 1/6	10.4
302	Katracharta	Χατραχαρτα	110°	44° 1/6	11.7
303	Waziradad	Ζαριασπα	115°	44°	11.7
304	Balkh	Βακτρα	116°	41°	11.9
305	Samarkand	Μαρακανδα	112°	39° 1/4	11.9
306	Oxeiana	Ωξειανα	117° 1/2	44° 2/3	12.5
307	Maruka	Μαρουκα	117° 1/4	43° 2/3	12.5
308	Drepsa	Δρεψα	120°	45°	12.6
309	Iskander	Αλεξανδρεια Εσχ.	122°	41°	12.6
310	Aspabota	Ασπαβωτα	102°	44°	14.2
311	Dauaba	Δαυαβα	104°	45°	14.14

Table 22: Asia 8 China

D#	Site	*GD* Name	*B*	*L*	G6
312	Issedon Scyth.	Ισσηδων Σκυθικη	150°	48° 1/2	15.4
313	Auzakia	Αυζακια	144°	49° 2/3	15.4
314	Issedon Ser.	Ισσηδων Σερικη	162°	45°	16.7
315	Drosake	Δρωσαχη	167° 2/3	42° 1/2	16.7
316	Ottorokora	Οττοροκορρα	165°	37° 1/4	16.8
317	Sian [Xi'an]	Σερα	177° 1/4	38° 7/12	16.8

Table 23: Asia 9 Afghanistan & Pakistan

D#	Site	*GD* Name	*B*	*L*	G6
318	Bitaxa	Βιταξα	103° 2/3	38°	17.4
319	Areia	Αρεια	105°	35°	17.7
320	Herat	ΑλεξανδρειαΑρεια	110°	36°	17.6
321	Naulibis	Ναυλιβις	117°	35° 1/2	18.5
322	Kabul	Καβουρα	118°	35°	18.5
323	Prophthasia	Προφθασια	110°	32° 1/3	19.4
324	Ariaspe	Αριασπη	108° 2/3	28° 2/3	19.5
325	Kandahar	ΑλεξανδρειαΑραχ.	114°	31°	20.4
326	Arachotos	Αραχωτος	118°	30° 1/3	20.5
327	Koni	Κουνι	110°	27°	21.5
328	Arbis	Αρβις	105° 1/3	20° 1/2	21.5
329	Musarna	Μουσαρνα	115°	27° 1/2	21.5

Table 21: Asia 7 S. USSR

G8.23	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	14^h11/12	-2^h17/30	14^h11/12	-2^h17/30
4	14^h11/12	-2^h2/3x	14^h7/8	-2^h2/5
5	15^h	-3^h	15^hc	-3^h1/15
6	14^h5/6	-3^h	15^h1/9n	-3^h
7	15^h3/8	-3^h1/3	15^h5/12c	-3^h1/3
8	15^h2/3	-3^h2/3	15^h3/8	-3^h2/3
9	15^h	-3^h2/3	15^h	-3^h11/15
10	14^h5/6	-3^h1/2	14^h5/6	-3^h1/2c
11	15^h5/6x	-3^h1/8x	15^h1/2c	-3^h5/6c
12	15^h1/3	-3^h3/4	15^h1/3c	-3^h3/4c
13	15^h1/2	-4^h	15^h1/2	-4^h
14	14^h3/4x	-4^h1/10	15^h	-4^h1/8
15	14^h5/12	-2^h3/4	14^h3/8	-2^h5/6c
16	15^h1/2	-3^h	15^h1/2	-2^h9/10

Table 22: Asia 8 China

G8.24	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}
3	16^h	-6^h	16^h	-6^h
4	16^h1/6r	-6^h1/4	16^h1/4c	-5^h3/5
5	15^h1/2	-6^h3/4	15^h1/2	-6^h5/6c
6	15^h1/6	-7^h1/8	15^h1/6	-7^h1/6c
7	14^h5/8	-7^h	14^h2/3c	-7^h
8	14^h3/4	-7^h3/4	14^h3/4	$-7^h5/6<8^h$

Table 23: Asia 9 Afghanistan & Pakistan

G8.25	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
4	14^h2/3	-2^h5/6	14^h2/3	-2^h11/12		
3	14^h5/12	-3^h	14^h5/12	-3^h		
5	14^h1/2	-3^h1/3	14^h1/2	-3^h1/3		
6	14^h1/2	-3^h3/4	14^h1/2c	-3^h5/6		
7	14^h1/3	-3^h1/2	14^h5/12	-3^h13/15		
8	14^h1/6r	-3^h1/3	14^h1/6	-3^h1/3		
9	14^h1/2	-3^h1/5	14^h5/6	-3^h1/4		
10	14^h1/12	-3^h17/30	14^h1/12	-3^h3/5		
11	14^h	-3^h5/6	14^h	-3^h13/15		
12	13^h3/4	-3^h1/4r	13^h5/6c	-3^h1/3	0°x	
14	13^h1/4	-3^h	13^h1/2c	-3^h	30°	0°c
13	13^h3/4	-3^h2/3	13^h3/4	-3^h2/3		

Table 24: Asia 10 India

D#	Site	*GD* Name	*B*	*L*	G7
330	Chaul	Σιμυλλα	110°	14°3/4	1.6
331	Cranganur	Μουζιρις	117°	14°	1.8
332	Tranquebar	Χαβηνις	128°1/3	15°3/4	1.13
333	Palura	Παλουρα	136°2/3	11°1/2	1.16
334	Kaspeira	Κασπειρα	127°	31°1/4	1.49
335	Bukephala	Βουκεφαλα	125°1/2	33°	1.46
336	Patna	Παλιμβοθρα	143°	27°	1.73
337	Patala	Παταλα	112°5/6	21°	1.59
338	Barbarei	Βαρβαρει	113°1/4	22°1/2	1.59
339	Bharucha	Βαρυγαζα	113°1/4	17°1/3	1.62
340	Ujjain	Οζηνη	117°	20°	1.63
341	Paithan	Βαιθανα	117°	18°1/6	1.82
342	Hippokura	Ιπποκουρα	119°3/4	19°1/6	1.83
343	Tirukkarur	Καρουρα	119°	16°1/3	1.86
344	Madurai	Μοδουρα	125°	16°1/3	1.89
345	Uraiyar	Ορθουρα	130°	16°1/3	1.91
346	Pintida	Πιτυνδρα	135°1/2	12°1/2	1.93

Table 25: Asia 11 Southeast Asia

D#	Site	*GD* Name	*B*	*L*	G7
347	Banda Akeh	Τακωλα	160°	4°1/4	2.5
348	Singapore	Ζαβαι	168°1/3	4°3/4	2.6
349	Dhauli	Τωσαλει	150°	23°1/3	2.23
350	Tugma	Τουγμα	152°1/2	22°1/4	2.23
351	Mandalay	Τριλιγγον	154°	18°	2.23
352	Rangoon	Μαρεουρα	158°	12°1/2	2.24
353	Rhandamarta	Ρανδαμαρκοττα	172°	28°	2.23
354	Chanthaburi	Ασπιθρα	175°1/2	16°1/4	3.5
355	Phnom Penh	Θιναι	180°	13°	3.6
356	Saigon	Καττιγαρα	177°	8°1/2r	3.3
357	Batavia, Java	Αργυρη, Ιαβαδιου	167°	-8°1/2	2.29

Table 26: Asia 12 Ceylon [Sri Lanka]

D#	Site	*GD* Name	*B*	*L*	G7
358	Point Pedro	Ταλακωρυ	126°1/3	11°2/3	4.7
359	Trincomalee	Ναγαδιβα	129°	8°1/2	4.7
360	Minneriya	Μααγραμαμμον	127°	7°1/3	4.10

Table 24: Asia 10 India

G8.26	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
3	12^h3/4	-3^h1/3	12^h11/12c	-3^h1/3	51°	51°1/3
4	12^h5/6	-3^h3/4	12^h5/6	-3^h5/6	53°1/4	54°1/2
5	12^h11/12	-4^h5/6	12^h11/12c	-4^h7/12	49°1/2	47°3/5
6	12^h2/3	-5^h1/15	12^h103/150	-5^h1/9	61°5/6	62°1/2
7	14^h1/4x	-4^h5/12	14^h1/12c	-4^h1/2c		
8	14^h1/4	-4^h1/3	14^h1/4c	-4^h11/30		
9	14^h	-5^h1/2	13^h3/4c	-5^h8/15		
10	13^h5/12	-3^h1/2	13^h1/3c	-3^h1/2	19°	23°5/6
11	13^h1/3	-3^h1/2	13^h5/12	-3^h11/20	27°1/2	18°2/3
12	13^h1/12	-3^h1/2	13^h1/12c	-3^h11/20	42°1/2	41°2/3
13	13^h5/6	-3^h3/4	13^h1/4c	-4^h	32°1/4	31°
14	13^h1/8	-3^h3/4	13^h1/8c	-3^h5/6c	39°1/2	38°1/4
15	13^h1/6r	-4^h	13^h1/6	-4^hc	35°2/3	34°1/3
16	13^h	-3^h5/6	13^h	-3^h14/15	46°	45°1/3
17	13^h	-3^h1/4	13^h	-4^h1/3	46°	45°1/3
18	13^h	-4^h2/3	13^h	-4^h2/3	46°	45°1/3
19	12^h3/4	-5^h	12^h3/4	-5^h1/30	57°1/2	60°

Table 25: Asia 11 Southeast Asia

G8.26	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
3	12^h1/4	-6^h2/3	12^h1/4	-6^h2/3	79°1/2	80°
4	12^h1/4	-7^h1/5	12^h1/4	-7^h13/60	78°1/2	78°2/3
5	13^h1/2	-6^h	13^h1/2c	-6^h	0°	4°1/3x
6	13^h1/4	-6^h1/8	13^h5/12c	-6^h1/6	31°1/2	13°
7	13^h	-6^h1/4	13^h1/8c	-6^h4/15	43°3/4	39°
8	12^h3/4	-6^h1/2	12^h3/4	-6^h8/15	57°1/2	60°
9	13^h3/4	-7^h5/12	13^h5/6c	-7^h1/2c		
11	13^h1/8	-7^h2/3	13^hc	-7^h7/10	39°1/4	45°2/3
12	13^h5/8	-8^h	13^h3/4	-8^h	63°2/3	58°
13	12^h1/2	-7^h3/4	12^h3/4	-7^h13/15	68°3/4	70°c
10	12^h1/2	-7^h2/3	12^h1/2	-7^h49/360	68°3/4	70°c

Table 26: Asia 12 Ceylon [Sri Lanka]

G8.26	M_{XZ}	A_{XZ}	M_{UNK}	A_{UNK}	S_{XZ}	S_{UNK}
4	12^h2/3	-4^h5/12	12^h2/3	-4^h2/5	60°	62°
3	12^h1/2	-4^h17/30	12^h1/2	-4^h3/5	68°1/2	70°c
5	12^h11/12	-4^h5/12	12^h5/12	-4^h1/2c	71°1/2	72°2/3c

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