

MARINUS OF TYR

(SOME ASPECTS OF HIS WORK)

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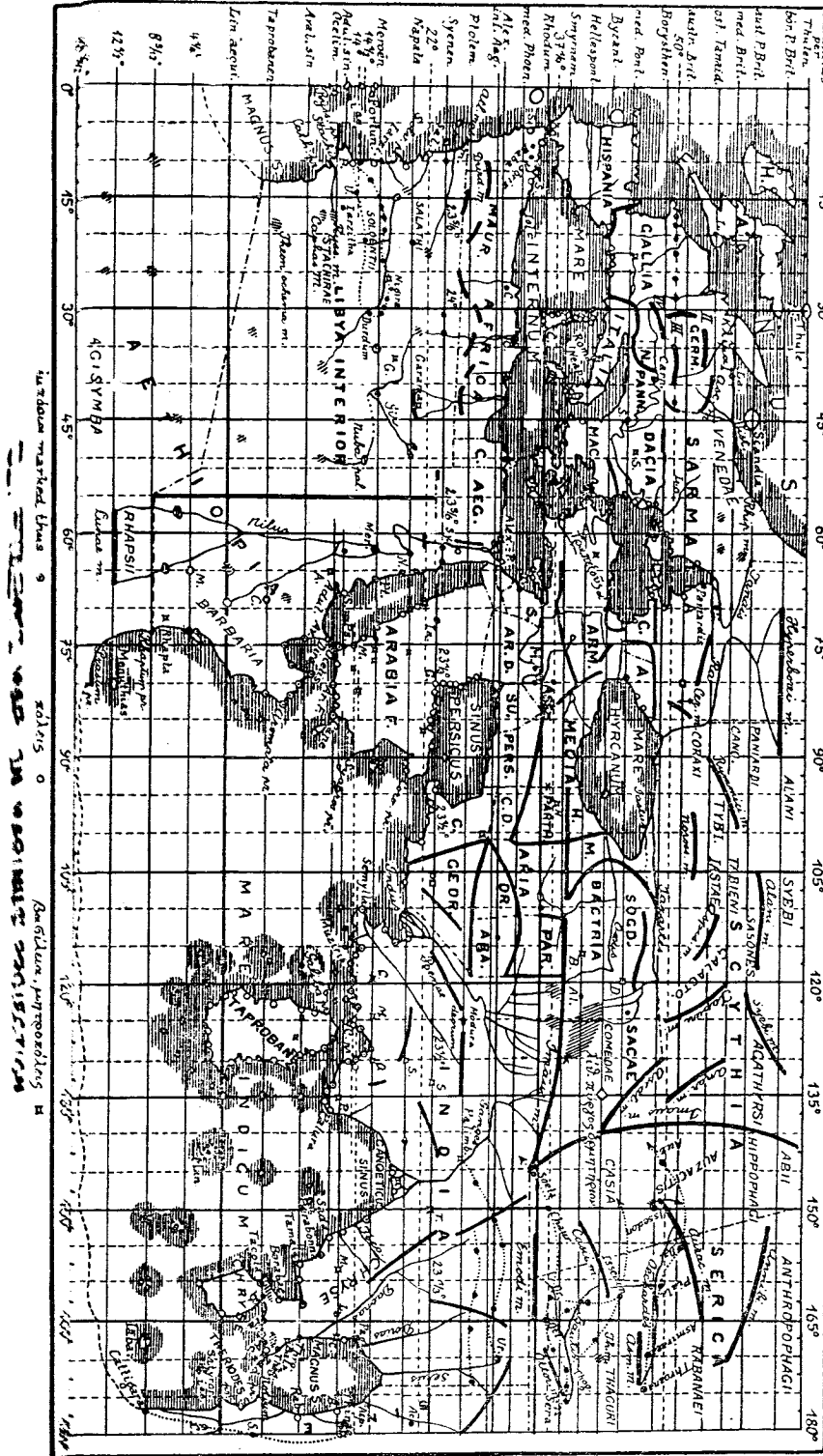
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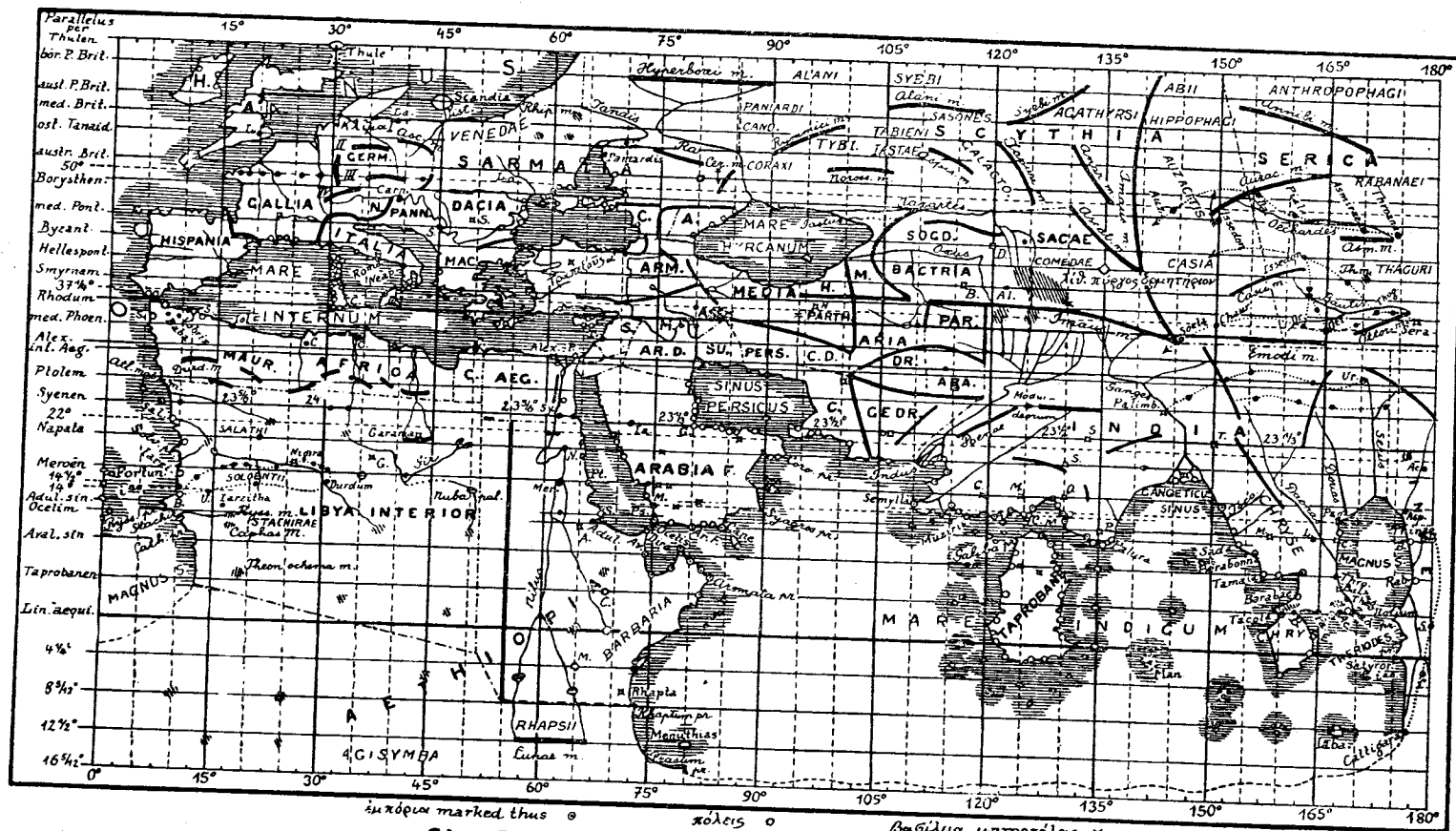
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I. The Question of the Diorthōsis.

We learn from Geogr. I, 6, 1¹) of Marinus that he ever did his best to keep his geographical work quite up-to-date. The very fact that there were several *ἐκδόσεις* of his 'Amendment of the Geographical Table' afforded a tell-tale evidence to the never ceasing zeal he displayed both in exerting his criticism on the views of the day whenever they proved to be inconsistent with fresh information, and in improving, or renouncing on the same score the views he had himself advocated at the outset (*τὸ πρῶτον*). A thorough scrutiny of Ptolemy's critical review (Geogr. I.) as well as special studies made in various parts of his map of the world concur in making probable the following theory of the way in which the geographical work of Marinus was formed:

1. The current interpretation of the term *ἡ τελευταία ἐκδοσις* (I, 17, 1) is that it is intended for 'the last edition' in the modern restricted sense.²) However, not only blunders of the character of those blamed in I, 15, 6—10 are quite unlikely to have escaped the author's attention in a book revised several times, but the translation also fails to do justice to the meaning of the other term *ἡ τελευταία* (or *ἡ ὑστάτη*) *σύνταξις* that stands for the former in I, 6, 2, and I, 18, 3; without some amount of stretching,³) the latter designation is far from conveying the idea of the revision and re-edition of a work already published, as the term *σύνταξις* (i. e. '*compositio*') is mostly used by Ptolemy to denote the individual sections, or volumes,⁴) of the work of Marinus that in turn, considered as a whole, is termed *ὅλη ἡ σύνταξις* (I, 19). The conclusion is that by the words *ἡ τελευταία ἐκδοσις* we have to understand that volume of the work that was issued last of all so as to close the entire series of the individual *συντάξεις* (volumes). Consequently the more indifferent terms 'issue', 'publication', and the like seem to render the Greek word *ἐκδοσις* in more adequate equivalents.⁵)

2. As for the map the improvement of which formed the topic of Marinus' 'Amendment', his far-going departure from the deeply rooted cosmographical ideas of his contemporaries seemed to encourage the assumption of an imaginary world-map embodying the average notions of the contemporaneous geography. But be it remembered that whatever hypothesis we may form of the true meaning of the term *ἐκδοσις*, the scientific career of Marinus must have embraced many years, or even decades, and that we find in Ptolemy's Prolegomena no means of ascertaining that far-going alterations of the geographical theories then current were proposed as early as in Marinus' first publication. Quite the contrary, the wording of the critical passage in I, 6, 1 (*τὰ πεπιστευμένα καὶ ὑπ' ἐκείνων καὶ ὑπ' ἐαυτοῦ*) is rather suggestive of the alternative hypothesis that our cartographer had started with the accustomed tenets of his predecessors and that it was until at a later stage of his work that he changed his

creed. At any rate, we are expressly told that he was ever busy with improving the views he had himself entertained at the outset. This makes us ask if it was not rather a world-map of his own to which the words 'Geographical Table' refer. He might have first issued an Atlas reproducing the original map in several sheets, attended, perhaps, by a descriptive text. Later, the work having in the meantime aroused much interest in the Roman Orient⁶⁾, and heaps of fresh evidence from many quarters of the *habitabilis*, notably the opening up of the Far East implying more or less considerable alterations both in the individual positions and in the general outlines of the coasts, our author might have resolved to keep his public in touch with the progress of enrichment and improvement of the original map by publishing in several issues his 'Addenda et Corrigenda' (*Diorthōsis*), each issue portraying one of the several successive stages of his scientific development.

One may take a twofold way to put to the test the fore-sketched theory. Ptolemy gives us a summary of what probably formed Marinus' crowning achievement in the field of geography (I, 7—14); he also has preserved several fragments from various departments of the last issue (I, 15—16), and one may therefore try to detect therein hints to what was the true aim of the *Diorthōsis*. Secondly one may undertake to search in Ptolemy's map itself for proofs of successive improvements that on our theory the map necessarily underwent.

3. Before trying the first method of approaching the problem let us consider that Ptolemy's critical remarks in I, 7—16 refer to the last, that is to say, to the third (I, 7, 4) issue, for before entering on his criticism he expressly states that it is the last *syntaxis* to which he has to object on the following pages (I, 6, 2), and no sooner he has arrived at the end of his many charges against the shadows of Marinus' methods and results than he tries to explain a great deal of them from certain peculiarities of the last *ἐκδόσις* (I, 17, 1). The latter comprised a number of subdivisions; there was a treatise on the problem of the length and width of the explored part of the world (I, 6—14); there were other sections registering raw statements of sailors and travellers, or more accidental mentions in historical works (cf. the cases of Noviomagus I, 15, 7, and Satala I, 15, 10) whilst still others allotted them more or less definite positions in the geographical net. In particular it was the chapters on the *klimata* as well as those on the parallels where blunders of an embarrassing kind were common. Take the particular case of Trapezus and Satala (I, 15, 10). We may take it for granted that in the course of his work the author succeeded in obtaining a number of statements bringing Trapezus into special relations with other points, coastal and inland. One of them that is requoted by Ptolemy from the last *syntaxis* made the town of Satala lie 60 Roman miles to the south of Trapezus. In another subdivision it was postulated that Trapezus should be placed on the parallel of Byzantium. Strangely, in the section dealing with the latter parallel, Trapezus was omitted and Satala was entered instead of it. The consideration of the case is useful on several lines. Along with the location of all the inland towns of Thrace north of the parallel of Byzantium (I, 15, 9), as well as the case of Amphipolis and the adjacent country (I, 15, 8), it discards the theory of the repeated editions of the book under discussion. Further on, everyone sees that a world-map before his eyes, the author never would have thought of placing Satala on the parallel of Byzantium, or all the inland topography of Thrace north of the line aforesaid. Accordingly the chapters concerned here must have derived their

material, or a part of it, from some sort of written notes rather than directly from a map of the world. Also consider the psychological aspect of the fact that while the author was going to follow the course of the parallel of Byzantium, the association of Trapezus with Satala presented itself alone to his consciousness and this with a force sufficient to make him guilty of a perplexing slip. Now Satala became first widely known through the Armenian campaign of the Emperor Trajan in the closing years of his reign (C. Müller, *Ptol. Geo.*, p. 884, *ad. p.* 3), and the distance given in Roman miles is much suspect of coming from an historical account of Roman's expedition. Considering the scantiness of hints to the latter half of Trajan's reign, and to the days of Hadrian in Ptolemy's book⁷⁾, I may date the mention of Satala as late as the close of Marinus' activity and claim it accordingly as a supplementary statement. For other suggestions I may claim an emendatory character, the latter being very obvious in the case of the course of the upper Nile (I, 15, 11) though it is a matter of difficulty to make out if the author here goes to improve his own previous design, or rather the trivial notions of the earlier geographers. A kindred example, only differing in its scale, is afforded by his eastward and southward extension of the *terra cognita*, whilst no justifiable conclusions can be drawn from the petty instances of Noviomagus and Trapezus. Viewing the nature of the slips recorded by Ptolemy, it may in the first place be questioned if there were in the last *syntaxis*, in addition to the case of Satala, other particulars on the distance-relations of Trapezus. Other blunders are apt to throw some light (however thin) on the question what the chapters on the *klimata* and the *ὥραια διαστήματα* were probably like. E. g. the town of Ravenna was entered in a paragraph devoted to the fourth *ὥραιοιν* (limited by the meridians 45° and 60° long.); this, as well as the transplantations in wrong *klimata* of complex sets of geographical details (cf. the cases of parts of Macedonia, I, 15, 8, and the interior of Thrace I, 15, 9) seem to preclude the theory of a systematical and detailed description of the 'climates' and the 'hour columns' in the last *syntaxis*. More likely, the towns of Thrace seem to have been mentioned in much the same general terms as quoted by Ptolemy (*τῆς Θράκης πόλεις μεσόγειοι ἀπασαι*) in what was properly speaking a very condensed and superficial summary of the *klima* concerned. A Mariniian passage borrowed from the last *syntaxis* and quoted in I, 17, 1, teaches what was the essential aim of these summaries. Being not in the position, says he, to draw a world-map also for the last issue,⁸⁾ he only subjected to due corrections the *klimata* and the hour-columns, (or, more appropriately, his previous descriptions of these zones). Not only the confessed need for improving his former statements tallies right with our theory, but it clearly indicates that it is the 'Amendment' (*Diorthōsis*) of the *klimata* and never a 'Description' of them from which Ptolemy's quotations are derived. — Besides such general expressions as regard the towns of Thrace and northern Macedonia, the Amendment of the *klimata* must have listed a number of individual place-names (e. g. Noviomagus), presumably those that either were introduced for the first time, or the positions of which were to be corrected.

4. It is, however, the second method above suggested that furnishes us with ample evidence to a gradual development of Marinus' map of the world from an initial Ocean stage.

Before entering on the subject let us catch a glimpse of what we are taught by Ptolemy's map of South Africa, structurally a result of

the Marinian underlayer having been subdued by Ptolemy's ideas of the countries under consideration, the Ptolemaic stratum embracing a reduction of latitudes as well as the remodelling of the coast of Barbaria after a new periplus quoted at great length in I, 17, 5. The chief points of difference from the Marinian design are the shortening of the entire tract between the headlands Prasum and Aromata (I, 8, 1; I, 10, 1); the displacement of the latter from $4\frac{1}{4}^{\circ}$ to 6° N lat. (I, 14, 4, and IV, 7, 3), attended, perhaps, by a westward shift; the however slight differences in the orders of the individual points (I, 17, 5): a different measure in the evaluation of the equivalent of 24 hours' sail in the units of length (*ibid.*); the quite different trends of the coast in both maps (*ibid.*); and Ptolemy's location of the Central lakes deep inland (*ibid.*). The displacement of the Aromata made it necessary to revise the coast-line between the cape and the straits of Dire.⁹

There are two things of particular interest in the way taken by Ptolemy in his adjustment of the Marinian stage to his shortening and distorting of the coast-line; I mean the positions of the island of Menuthias as well as of a tribe of the name 'the Rhapsii'. The relative position of Menuthias (85° long., $12\frac{1}{2}^{\circ}$ S lat.) in reference to the Ptolemaic position of Rhapta (71° long., 7° S lat.) and Rhaptum prom. ($73\frac{5}{8}^{\circ}$ long., $8\frac{5}{12}^{\circ}$ S lat.) is a notorious failure (cf. *Peripl. M. Er.* 14—16), the island being placed at an exaggerated distance from the shore and at the same time to the south (instead of to the north) of the latitude of Rhapta. Again, the name of the Rhapsii being obviously intended for the inhabitants of Rhapta, it is a little startling to see their abodes spread all along the northern foot of the Moon mountains (57° long., $12\frac{1}{2}^{\circ}$ S lat. to 67° long., $12\frac{1}{2}^{\circ}$ S lat.), to wit, far away in the interior of Africa and at the same time sensibly below the level of their capital; in short, far enough from the latter to be enregistered in another *ἡθις* (*Aethiopia interior*: IV, 8, 2). Both of these instances exemplify the effect resulting from the succession of the mentioned stages of development. As seen from Ptolemy's abstract from the periplus used by him (I, 17, 5), and as confirmed by the position assigned by him to the island, the periplus did not mention Menuthias; it is Marinus to whom Ptolemy is indebted for this detail. Now in Marinus' opinion the coast stretched along the meridian of the cape Aromata (5000 stadia to the east of the straits of Dire, I, 15, 11) straightway to the cape Prasum that he placed on the southern tropic (*ca* 24° S lat., I, 7, 2); at the same time he assented to the statement of Dioscorus that Rhapta is situated about 5000 stadia to the north of Prasum (I, 9, 3; I, 14, 3). Making the probable supposition that Marinus disposed of a report bringing Menuthias into a definite relation with Rhapta (much as does *Periplus M. E.*), he must have laid down the island somewhere about the parallel really assigned to it by Ptolemy. In lack of reliable means of adapting the position of the island to the withdrawal of the coastal elements, Ptolemy did not feel justified to involve it in the shortening; presumably the longitude too has suffered but a slight change, if any.

The association of the Rhapsii with the Moon mountains is another survival of the pre-Ptolemaic stage. Marinus had placed the whole Central lakes region close to the coast of Azania (a little north of Rhaptorum prom.), in dependence upon the odd story of the sailor Diogenes (I, 9, 1). In the Ptolemaic stage, the Nile lakes system (of which the Moon mountains formed part) was subjected to a considerable westward thrust (I, 17, 5), and a simultaneous differential displacement of

the coast towards the north with reference to the Moon mountains resulted in placing the capital somewhat in advance of the tribe to which it appropriately belonged.¹⁰

Doublets of the same, or of an akin class, e. g. a river and a homonymous tribe a long distance of it, are quite commonplace occurrences in Ptolemy's maps, and the cases just produced are fairly illustrative of the way in which conflicting localisations like the mentioned ones sometimes might have arisen. We have possibly a large-scale example in the map of Libya interior, notorious for its wonderful patchwork of repetitions from Roman Africa, combined, however, with valuable information on trading-routes to the oasis of the Nigritii. Not a few of the maritime elements between Atlas maior and the cape Catharum are repeated in the same geographical order from N to S farther inland. The coastal series includes Salathus (a town and a river), Solventium prom., Iarzitha (a town), Rhyssadium prom. ($11\frac{1}{2}^{\circ}$ N lat.), the river Stachir, and Catharum prom. ($9\frac{1}{2}^{\circ}$ N lat.). The inland series comprises the Salathi (a tribe), the Soloentii (*dtto.*), Iarzitha (a town), Rhyssadius mons (11° N lat.), the Stachirae (a tribe), and Caphas mons (10° N lat.). The inland specimen of Iarzitha is obviously the same with the maritime town of this name, and the Rhyssadius mons may mark the former position of the Rhyssadium prom. Further north, from the straits of Gades down to Atlas maior mons, three capes out of six bear the title 'mons'; there is no instance south of the Atlas, but it was perhaps otherwise in the supposed former stage. Similarly, in consideration of the phonetical resemblance, Caphas mons may be a duplicate of Catharum prom. The possibility of the eastern series having preserved a preceding stage of the design of the coast is in my view worth considering in more elaborate studies to be looked for in the future.

So much for Ptolemy's Africa. Turning to his maps of the Far East, I find it necessary to commence with a succinct sketch of the main steps of progress in the ancient geography of East Asia down to the Marinian age, for an unbiassed insight in this line has been up to the present day checked by such doubtful assumptions as were the Sero-Chinese theory and the still more shortsighted theory claiming Maës Titianus as Marinus' and Ptolemy's chief authority on the geography of Serica, as well as by the almost general disregard of Pliny's interesting description.

II. The Structure and the Development of Ptolemy's Maps of the Far East.

1. The scientific achievements of the Asian campaign of Alexander the Great, as well as those of the embassies to the court of the Maurya kings must have already been shown in the more modern specimens of maps when Eratosthenes undertook to introduce his innovations. The old maps made the eastern continuation of the Taurus swing northwards so as to assume a NE trend, and the mountain range being taken as the boundary-line between Scythia and India, the latter country came to lie on, and even north of, the level of the Mediterranean (Strabo 68). To adapt the maps to the statements of Patrocles and to the astronomical observations pretended to have been made at the southern extremity of India, he stretched out the whole orographical back-bone of Asia all along the parallel of Athens. Daring no scepticism as to the significance of the Emodus and Imaus as a barrier severing Scythia from India, he banished from the first mentioned country all the out-of-date lumber, to retain but the well-authenticated tribe of the Sacae, his farthest ethnonym E of Sogdiana (Strabo 513—14). The reason for his having allotted no separate area to the Seres is easily found. The earliest allusions to the Seres can be traced back to the time of Alexander's conquests in Punjab; it was there that Nearchus became acquainted with the Seric stuffs (*τὰ σηρικὰ*) which word is obviously a derivation from the ethnonym (Strabo 693). Strabo's account of India is practically founded upon Eratosthenes, Megasthenes, and the writings of Alexander's historians; Artemidorus and Apollodorus are his latest, though quite subordinate authorities. From someone of the named writers must come two his allusions to the longevity of the Seres, both of them allowing of no doubt that the Seres are comprised in the number of the Indian tribes (Strabo 701, 702). Apparently this was also the view of Eratosthenes.

On the other hand, this geographer has got a very dim knowledge of a portion of the coast of Further India, for he traced the eastern coast of India as continuing its northward course past the mouth of the Ganges as far as the headland of Tamarus, the extreme point of the Taurus system. The name is spelt Tamus by Mela (III., 68; 70), and Samarae prom. by Orosius (Hist., I., 2); it reappears in Ptolemy's Geography in the form of Tamala VII., 2, 3; Tamara VII., 2, 24; and Tameræ Anthropophagi VII., 2, 16. Henceforth the coast took a NW course till the supposed narrow outlet of the Caspian sea. His Ocean theory acted centuries long as a hindrance to a critical interpretation of sailors' reports; no true discovery within the compass of the *habitabilis* was to be looked for in the future, and the progress of knowledge only helped the orthodox disciple to design in more detail the coasts already known.

2. The next important step was the insertion between Scythia and India of a wedge-shaped area, the homes not only of the Seres but also of their faithful allies the Tochari (Thocari) and the Fruni (Fauni, Funi). Mela was probably prevented by the very narrow scope of his book from naming the complete trio; it appears, however, in Pliny, Dionysius Perieg., and Ravennas (here under the disguise of India Serica and the provinces of Hyrcania: Tocarion and Erurion). The maps of Honorius and Orosius belong to the same set, which probably also holds of the Commentaries of M. Agrippa whose term 'Oceanus Sericus' (Plin. N. H. VI., 37; Divis. orb. t. 18) for a part of the Eastern Ocean bears a clear witness to his conception of Serica as an independent country outside of India, and in the days of Horace the recognition of the Seres as an independent tribe must have been quite common (Carm. I., 12, 55—6). In addition to the Seres, Tochari, and Fruni there are so many other points of contact between most of the authors named as to give proof of their coming from a common source. Now we are told by Strabo (518) that Apollodorus of Parthia, a Parthian Greek by birth, had mentioned in his 'History of Parthia' the extension of Bactria's sway under Demetrius and Menander as far as the confines of the Seres and the Fauni; he also named the Tochari among the hordes from beyond the Iaxartes whose inroads ended in overthrowing the Hellenic rule in Bactria (*ibid.* 511). He might have added hints upon the former seats of the Tochari just by the side of the Seres and the Fauni; be it as it may, his Bactrian episodes were to become the principal authority of the Romans on the tribes of East Turkestan. For by the Seres we have evidently to understand, in these early days at least, the intermediaries of commerce in Chinese commodities (silk and cast-iron of a superior quality) that they sold to the western merchants by the double way of India and Bactria; evidently they had in their hold the cross-roads of commerce between Iran, India, and China, that is to say, the oases in the south of the Tarim Basin. By an error, so commonly met with on every page of the history of the commercial geography, the go-betweens in the silk-trade passed for the producers of the goods they sold.

The statements of Apollodorus occasioned an important departure from the map of Eratosthenes. Somewhere east of the Iaxartes, i. e. north of India and the Taurus ridge, room was to be fitted for the Seres, a non-nomadic nation of some standard of civilisation (which was the natural inference from the technical skill displayed in their supposed productions), and, as a consequence, the southern limit of the uncivilised peoples of Scythia retired once more to its pre-Eratosthenian position. This in my mind encouraged, on the part of some authors, a partial return to the pre-Eratosthenian maps of Scythia, the more so as the heaps of geographical details they yielded of an area almost left blank by Eratosthenes could not fail to baffle the minds of less critical students. Hence we find in the works above quoted the Apollodoric trias (or single members of it) associated with a cluster of archaisms coming from the graphic picture given by Herodotus of the northern bordelands of Scythia, as are the savage Androphagoe (Mela III., 7; Anthropophagi Scythae: Pliny N. H. VI., 53; J. Honorius *rec.* A 13; cf. Herod. IV., 18); the land of the wild beasts (cf. Herod. IV., 22; 109), extensive barren tracts (cf. Herod. IV., 17, 18, 22), and a land where life cannot subsist for snow (cf. *ibid.* IV., 31). The Scythae Sagae (= Sacae) are the only true Asiatics in this uncouth assemblage (Mela, *ibid.*). The line of separation between Scythia and the Apollodoric area is formed by a mountain-chain (*iugum incubans*

mari quod vocant Tabim, Pliny *ibid.*, Mela *ibid.*), and no matter what is the real descent of the word *Tabis*¹¹), the mountain-chain thus designated bounds Scythia in the SE just as the Taurus (Imaus) did in the old maps.

Another characteristic feature that the maps and other works of the discussed class have in common is the antiquated conception of the Caucasus as a NE-stretching off-shoot of the Taurus, running parallel to the coast of the Caspian sea¹²), as opposed to the more modern notion of Eratosthenes and Strabo (197) both of whom have figured it as going eastwards across the Ponto-Caspian isthmus. A strong meridional component in the trend of the Caucasus as represented by his authority caused Agrippa to take the Caucasus as the eastern boundary of Sarmatia (Dimens. prov. 6, 9; Div. orb. t. 15, 18), and both Mela (I., 109) and Pliny (VI., 15; V., 97—99) agree in making the Caucasus join the Rhiplean mountains of the extreme north.

As set forth, there was probably a causal connection between the introduction of the Apollodoric ethnonyms and the reinstallation of the elder conception of Scythia. The vital question is who was the author who has ventured the fatal step backwards. Of the series of the successors of Eratosthenes, Artemidorus may be eliminated at once, for his attitude towards the pretended knowledge of the northern countries was that of a sound scepticism (Pliny II., 246). We have to search for an author that unknown to (or at any rate disregarded by) Strabo, managed to influence all the Roman geographers starting with P. Mela, or even with Agrippa. Both the scanty evidence and general considerations are in favour of Isidorus Characenus. In fact, his name immediately precedes the names of Amometus and the authorities on India in the *Index auctorum Graecorum* at the head of Pliny's book VI., in perfect agreement with the actual arrangement of Pliny's description of East Asia (see the description of Scythia and Serica in VI., 53—54; the mention of Amometus in VI., 55; and the description of India in VI., 58 *seq.*). Both the exhaustive descriptions of the coast of Scythia by Mela (III., 59—60) and Pliny (VI., 53) render the same line of notions but mostly in different words,¹³) suggesting parallel translations from a common source. In either case the translations are nearly literal in the two initial sentences to become slightly abridged in the rest of Mela's account. To all appearance, the original was composed in Greek, as shown by the form *Androphagoe* (Mela) and, perhaps, by the term *Theriodes* that stood for 'the land swarming with wild beasts' in the map exploited by J. Honorius (see below, p.); at the same time it treated the Oceanus Eous as a unity unlike the procedure of M. Agrippa who has applied to the northern part the name 'Oceanus Sericus'. Now Isidorus was the most distinguished Greek geographer after Artemidorus; much circumstances joined to recommend him to the Romans, and at the same time he is never quoted by Strabo. Being well up in the geography of Parthia, he wrote *Παρθίας περιγητικός* (Athenaeus, quoted by E. H. Bunbury, *op. cit.*, II., p. 164), and a Parthian itinerary still extant goes by his name (C. Müller, *Geogr. Gr. min.*, I., p. 247); hence his familiarity with the historical work of Apollodorus is beyond doubt. A general text-book of geography he had issued was a marvel of diligence from the point of view of Roman geographers (*situs diligentissimus auctor*, Pliny VI., 141; *sequentium diligentissimi*, *ibid.* VI., 219). As to his material contributions, we learn that he among other things boldly resumed the problem of the width of the *habitabilis*. Basing upon the computation of Artemi-

dorus, he added the distance from the mouth of the Tanais to the parallel of Thule that he estimated at 1250 Roman miles (Pliny II., 246). It was evidently him who has supplemented the set of parallels that he inherited from an earlier author (most likely Artemidorus; Pliny VI., 221—218) by introducing three additional parallels going through the extreme north of Europe (Pliny VI., 219—220), the northernmost parallel running through Thule and the Rhipleans; the latter fictitious ridge was evidently reentered by him in the map of the world. He mentioned the Amber islands (*ibid.* IV., 103) and adopted Pytheas' figure for the circumference of Britannia (*ib.* IV., 102), and is apparently identical with the Greek authority of Pliny on the length of the coast of Germania (*ib.* IV., 102); he therefore must have formed a definite notion of the eastern terminus of Germania. Hence it was probably him who before Agrippa (Dimens. prov. 8, 19; Divis. orb. t. 11, 12; Pliny IV., 81) made the river Vistula separate Germania from what he described as Sarmatia, having seemingly got knowledge of trading-routes to the countries of the Venedae, Sciri, and Hirri (i. e. Phinni?; Pliny IV., 97; note Strabo's ignorance of the whole Vistulan complex). All this tends to show that contrary to the reserved attitude of Artemidorus, his hobby it was to gather and to exploit the evidence regarding the extreme north.

During the reign of the emperor Augustus, Rome's interest never ceased to be focussed at the affairs of Parthia and the many Oriental embassies, as well as the military events in Northern Europe, and a special geographer of Parthia, presenting in another work his readers with a very detailed though largely confused and even fanciful picture of Serica, Scythia, Sarmatia, Germania, and the discoveries of Pytheas must then have found his public. Later on, an Oriental campaign being in preparation, he was appointed expert in Oriental geography by the emperor which presumably added much to his credit (Pliny VI., 141).

3. From the fall of the Graeco-Bactrian kingdom onwards the unveiling of remote parts of Asia went on by leaps and bounds. Through Chang-ch'ien's mission (ab. 126 B. C.) China became known in Eastern Iran and before long she contrived to get a rather firm footing in East Turkestan for over a century long. Envoys from various quarters of Central Asia to the imperial court at Chang-ngan came and went,¹⁴) and presumably it was in this way that exaggerated rumours of a great centre of the Chinese, protected by ramparts all of bronze, for the first time reached India. It seems that even at a later period when it no longer was the residence, Chang-ngan¹⁵) continued to be celebrated all over Asia as 'the city of the Chinese' (Thina, Periplus M. E. 64; Sinae, Marinus in Ptol. I., 11. 1; Thinae, Ptol. VII., 3, 6).

On the other hand, the rise of a new power in Central Asia passed unnoticed in the literature of the Greeks and Romans, nor is there any evidence to the name of the Seres having been during this prolonged period conferred upon the Chinese. The contemporaneous geographers (Strabo) either content themselves to requote the tales of the longevity of the Seres, or rely upon Apollodorus whose record, however, refers to a period previous to the crossing by Chinese armies of the bend of the Yellow River near Lan-chow (121 B. C.). The only fresh evidence is afforded in some panegyrics of the Augustan era. These have been ordinarily inspired by the splendid outward aspects of Augustus' reign; the defeat of Cotiso, the conquests in Spain and Germany, the triumphs over the Caramantes and the Danube tribes, the Arabian expedition, Rome's intermeddling in the internal troubles of Parthia, and the receipt

of Indian and Scythian envoys are the main events reflecting upon the exaggerations of Horace and Virgil. What had entitled Horace to include repeatedly the Seres (Carm. I., 12; 3, 29; 4, 15), is made clear to us by Florus who mentions the arrival of an embassy despatched by the Seres (Epit. IV., 12). We are not allowed to confound the Seres of Horace and Florus with the Chinese who never in this epoch entered into diplomatic relations with Rome. Evidently the vassal states of the Tarim Basin (the Land of the Seres) made their best of China's advance and protection and continued, more intensely than ever before, to profit from the lucrative trade in silk and iron-ware, notably by way of India. Nor can we do without their rôle as intermediaries in the days of Pliny, that is to say, after the downfall of China's influence in Turkestan.¹⁶⁾

Meanwhile the exploration of Further Indian coasts made a considerable advance, and an historian of the ancient geography will find a thing of extraordinary interest in the stubborn tenacity with which the Ocean theory has faced, and even contrived to assimilate, such a first-class discovery and so likely to disprove the theory in its trivial form as was the doubling of the Further Indian peninsula by Indian (and Arab?) vessels.

There is first Pliny's description of Further India, so unduly ignored by most of the modern students. It is fitted in the Eratosthenian frame of Asia (only supplemented with the Apollodoric area and the museum of Scythian curiosities) and comes most probably from the geography of Isidorus. Steering from the mouth of the Ganges due north (VI., 55, 54), you first round the cape Imavus at the end of the Taurus mountains; the gulf to come next happens to adjoin the seats of a Central Asian tribe (the Attacores; i. e. the Uttara Kuru); then comes the river Atianos and the Cynaba gulf. After rounding the Golden cape (promunturium Chryse), you successively pass the mouths of the rivers Lanos, Cambari, and Psitharas, still of the coast of the Seres, till you reach at the Tabis the confines of Scythia. So it appears that as early as in the first decades of the principate it was possible to an active oriental geographer to obtain information from foreign sources, covering a great deal, if not the whole of the coast of Transgangetic India, and that the mouth of the river Aspithras (Ptol. VII., 3, 2; corrupted into Aspitharas in most MSS; Pliny's Psitharas), and the homonymous town (*ibid.*), or even some great mart farther beyond, acted as the ultimate goal of the Indian navigation in those early times. It is quite in the line of the Ocean theory then fashionable that in the description the ethnic names of the innermost Asia meet with the physiographical details of the Transgangetic periplus.

Still more bewildering is the unshaken adherence to the same theory by the anonymous author of the *Periplus M. E.* For he is apparently well aware that as far as the farthest points of which accurate information was him available, both the coasts of Azania and India take courses quite different from those prescribed in the contemporaneous charts; yet these termini (Rhaptum pr., Sopatma, and Chryse) once reached, he makes the less explored or altogether unknown continuations of the coasts suddenly turn to comply with the tradition. He is, however, the first, and the alone, author to give a clear account of the Chinese origin of silk; he places both the people and the capital of Thina far up in the north, near the pretended outlet of the Caspian (*Peripl.* 64). As suggested by many modern students, the record possibly dates from the rather brief second period of China's supremacy over the lines of

traffic in Chinese Turkestan (ab. 100 A. D.), and to the same period I may refer the common archetype of the two maps of the joined Tarim and Su-lo-ho basins that I have shown in my Czech paper to make up the main body of Ptolemy's *Serica*.¹⁷⁾ In fact, China's liberal policy during this period towards the admission of foreign caravans deep inland, as well as measures she took to make the traffic safe and easy created conditions most favourable to the geographical exploration of the Tarim basin.

By and by the darkness concealing the remote countries beyond the Gangetic delta dispersed and gave way to a better understanding of their major geographical lineaments, and repeated statements that the voyage to Sada, Chryse, and China is towards the east, conjointly, perhaps, with vague reports that *Serica* instead of being washed by the waves of the *Oceanus Sericus*, borders in the east on another land yet to be explored (cf. Ptolemy's Indian authorities, I., 17, 4), led Marinus to a more agnostic point of view,¹⁸⁾ to be soon surpassed in the re-edition of his work by Ptolemy who ventured to turn the former pet theory upside down. Now our object is to show that certain features of Ptolemy's maps of the Far East cannot be explained unless we assume that Marinus had started as a staunch adherent of the geographical ideas then current.

4. We first note in Ptolemy's map many unmistakable relics of the traditional frame-work that served Marinus and Ptolemy to fix upon rich supplies of recent geographical information. The Persian gulf is a fair instance of this twofold structure. As demonstrated by A. Sprenger,¹⁹⁾ it preserves the traditional shape and dimensions as recorded by the admirals of Alexander centuries ago despite the very ample resort to recent peripli, attested by the heaps of recent place- and river-names all along its shores. Further there are left in Ptolemy's map extensive remnants of the Eratosthenian Taurus, deflecting, however, from Sogdiana onwards from the parallel of 39° N lat. to take in the Imaus range a direction SE by E. Both the position of Bactra on the parallel of the Hellespontus (cf. Strabo 68) and the arrangement of Bactria, Sogdiana, and the land of the Sacae from W to E along the northern side of the Taurus system (*ibid.* 513-14) go back to the map of Eratosthenes, only the uppermost course of the Jaxartes (that hitherto was designed as rising in the Taurus, Strabo 510; Arriani *Anab.* 3, 30) had to clear room for the newly introduced hilly tract of the Comedae. Marinus has ransacked for cartographical materials nearly all the earlier literature (I., 6, 1); so we may safely hope to disclose ample evidence to his familiarity with the, *situs diligentissimus auctor*', so congenial with him both in his diligence and in his lack of criticism in compilation. Indeed, Ptolemy's maps have many an interesting feature in common with the Roman set of geographers. Like in the map of Agrippa (cf. *Dimens.* prov. 19), the eastern boundary of Germania is formed by the river Vistula and the southeastern arc of the Hercynian ring;²⁰⁾ but contrary to Agrippa who has inserted Dacia as an independent regional unit between the Vistula and the *deserta Sarmatiae* (*Dimens.* prov. 8; *Div. orb.* t. 14; cf. Pliny IV., 81), Marinus makes Sarmatia border directly on Germania in close agreement with the authority of Mela (I., 3; III., 3-4; and Pliny? IV., 97). The Rhipeans and their duplicate the Hyperborean mountains at once recall the old-fashioned maps of Scythia; so also does the alignment of the Ceraunii, Rhymmici, Alani, and Syebi montes

in a sigmoidic curve attended all along by Sarmatian and Caucasian names (cf. A. Hermann, *Σαυρίται*, Pauly-Wissowa R-E, 2. R., 2. Hb., 1920, p. 2134-38; Syebi = Suevi Hiberi Tab. Peut. X., 4; Alani; Sasonesarmatae Tab. Peut. X., 5; Paniardi; Conadipsas = Conapseni; Coraxi; Vali). In my view this points to an antiquated representation of the Caucasus, unearthed by Isidorus from pre-Eratosthenian maps, rather than to a dissected design of the Ural mountains as was suggested by Kieszling.²¹) Probably it lay outside the ken of our cartographer to realize the conflict between Isidorus and Eratosthenes in point of the Caucasus, both notions fraternally co-existing in his map of the Ponto-Caspian isthmus.

The erosion of the northern coast of Asia entailed a large extension of Scythia to the very edges of the map; this mobilised a great deal of the Scythian elements and caused some disorder in their relative positions. Still several of the names straggling near the parallel of Thule (I quote the Men-Eaters, the Agathyrsi, and the Homeric trio of the Galactophagi, Abii, and Hippophagi) may be claimed as coming from the archaistic inventory of the maps of the early class. The Tabis appears only under the garb of an ethnic name (Tabieni; cf. Tybiacae), but so far the corresponding mountain chain is concerned, the question may be left *sub iudice* if the north-stretching duplicate of the Imaus is, or is not, taken from some specimen of the pre-Eratosthenian cartography. Marinus' mechanical methods of 'making geography' are clearly portrayed in the maps of Serica, Scythia extra Imaum, and the land of the Sacae. In the east, the Emodi montes continue to buttress the land of the Seres as they did in the map of Isidorus from which they have been borrowed. Further west the map is controlled by the just contradictory prescriptions of Eratosthenes. Most likely it is to satisfy his conception of the Taurus as a barrier between India and Scythia that Scythia extra Imaum was created. Eratosthenes is responsible for the western and the southern boundaries of the land of the Sacae, and Marinus' quest for a natural boundary-line in the north was rewarded by the discovery in some earlier map (likewise exploited, directly or indirectly, by the author of the Peutinger Table) of the Mons Catacas (Ascatacas Ptol. VI., 13) as a means of separation between the Sagae Scythae and the Abyoscythae (= Ptolemy's Sacae and Abii; cf. Tab. Peut. XII., 2-3). This heterogeneous frame was later on subjected to several alterations on the strength of the Seric itinerary of Maës (I., 11-12) whose track inevitably crossed the map of the discussed country though there are no indications that the Sacae were ever mentioned in the document. The recorded distance of 876 *schoeni* from the Euphrates ferry brought the Stone Tower to the very centre of the territory. Entrapped in an area encompassed on all sides by mountains, this place, evidently a point of some importance, proved a puzzle to modern interpreters, most of which have placed it still within the heights of the Pamirs, inconsistent though it is with the statements in I., 12, 7, that the way to the Tower is by a gorge leading out of the uplands of the Comedae to lowlands (*πεδία*; one would expect to read *ὄρηπεδία* should some elevated plains be indicated); and east of the Tower the mountains are said to keep still apart of the route till they meet with the Imaus coming to there in a northward course from Palimbothra (I., 12, 8). Now considering the general neglect of bearings in ancient itineraries,²² the presence of any such indications in the Seric itinerary may be justly disputed. Nevertheless, in Marinus' review of the itinerary in question one section of the route

was described as running SE (I., 12, 7). Accordingly the suspicion is strong that the original notes of Maës were in this review mixed up with the cartographical representation of the Seric route by Marinus. He probably made the route run in zigzag for no other reason than to avoid the paradox representation of a route, covering more than 100° long., in a straight line. I am not sure of whether his physiographical description of the region east of the Tower is due to a combination of a real information on the Sero-Indian route (that had its starting-point at Palimbothra and must have crossed the Imaus in a northward course, cf. Ptol. I., 17, 4), with the Imaus of the pre-Eratosthenian geography; but after all Marinus' queer description is so inconsistent with what he quotes from the itinerary of the orographical relations west of the Tower that we hardly need to be too scrupulous about it. The name of the Stone Tower is in my opinion the Greek rendering of some vernacular name, belonging to that town at the bottom of the western Tarim basin where Maës' people halted for rest after the exertions of the passage of the Pamirs (the uplands of the Comedae), before starting for the march to Sera.

When describing the land of the Sacae, Ptolemy must have had before him a map made either by himself or by another draughtsman (cf. I., 18, 3) after the latest suggestions of Marinus. Granting the first case, there must have been some lapse of time between the design and the description, for in his book he is not aware that the words, the starting-point (*ἀρχηγήριον*) of merchants going to Sera' (cf. the embarking-place of those who sail for Chryse' VII., 1, 15) that stood in the map to the right of the Stone Tower (just as they do in a map reconstructed from his statements) merely point out the significance of the latter place; and they fit it as fairly as one may wish, in view of the play acted by it in Marinus' account as the starting-point of the seven months' journey. Hence he connected them a wrong way, viz., with the point of junction of the Ascatacas with the Imaus, without adding any hint whatever if the point in question is to be marked with the sign of a town or otherwise. —

5. On the foregoing pages we have made out the close dependence of the mountain-skeleton as well as of the territorial frame of Marinus' map of the world on the achievements of his great predecessors. Now we turn to the Ptolemaic representation of the eastern coasts. The most salient features to be noticed are the manifold intrusions of Central-Asian and Scythian elements into the periplus of Further India and China, and *vice versa*. Let us pay attention, first, to the coast of the Great gulf. It begins with a nameless cape in W to end in the South Cape (Notium pr.) in E, and by the rivers Daonas (cf. Lanos, easily to be emended into Damos) and Aspithras (= Psitharas) it reminds one of the portion of Pliny's periplus between the capes Chryse and Tabis. Making a tour round the gulf from W to E, the details to be well remembered are the towns of Thagora and Throana, the mouth of the river Serus, and the town of Rabana. The very obvious assumption that the name Sêrus is a derivative from the famous Central Asian ethnonym was of late years contested by A. Hermann²³), but the objections raised by him are much weakened by an appeal to Pliny's description of the entire tract from the Golden Cape till beyond the Psitharas as the coast of the Seres. The river is the one exotic element. Now going northwards along the eastern edge of Ptolemy's map of Serica, the names we successively read are as follows: the tribe of the Thaguri (and the homonymous mountain), Throana (in the land of the Throani), and the tribe of the Rabanaei (Rabanae v. l.). The

parallelism of the two series of corresponding names is striking, nor does the list of the correlations like the mentioned ones end with the dyad Rabana-Rabanaei. The cartographical basis of the geographical chapters in the History of Orosius (Hist. I., 2) figures Asia in the way accustomed in Roman maps. The Seres are not directly mentioned by the writer, but Agrippa's designation of the Seric Ocean is quoted and shows sufficiently that the Seres were accorded a separate area in the north of the Imavus. Both the Funi Scythae and the town of Ottorogorra are placed in much the same positions above the Imavus as the Funi and the Attacores in Pliny's description. Three rivers are described as discharging into the Ocean north of the Imavus mountains; the Ottorogorras bears a Central-Asian name much as the river Serus in Ptolemy's map of the world; the Chrysorhoas is probably a hint to someone of the Transgangetic Eldoradoes; and the river Boreus discharges near the *promunturium Boreum* in the northeastern corner of Asia; to all appearance this North Cape is the name applied to the extremity of the Tabis mountains. It is therefore not only by its position beyond the river Aspithras but possibly by the very name that Ptolemy's South Cape is closely related to the promontory of the Tabis mountains. The South Cape in turn guards the entrance to another gulf, the Gulf of the Wild Beasts' (*Theriodes sinus*). Now in Isidorus' map the Tabis was adjoined in NW by a *regio feris scatens* and both Pliny's and Mela's translations are suggestive of some indentation of the coast in the region concerned. In the following I give the details of the coast of Scythia as enumerated by

Pliny (N. H., VI., 53)

and

Mela (III., 59—60):

Anthropophagi Scythae

Scythae Androphagoe

vastae solitudinis ferarumque multitudinis quia feris scatet inhabitabilis

Scythae

Scythae Sagae

deserta cum beluis

vasta loca, beluae

iugum quod vocant Tabim

mons nomine Tabis.

From the symmetrical reappearance of the land of the wild beasts on both sides of the Sagae it probably follows that the map constructed and described by Isidorus showed a deep notch the innermost angle of which was occupied by the Sagae whilst the opening and the opposite shores of it were crossed by the label Theriodes, still preserved in the Cosmography of J. Honorius.²⁴) Granting that Marinus was in possession of a copy of this map, he might most easily have mistaken the adjective for the name of the gulf. But what on earth might have induced him to convert the northeastern headland of Asia into his South Cape, and to transplant the Scythian zoo in the equatorial regions while he made its neighbours the Cannibals move to the extreme north of Serica?

6. The explanation covering the whole series of the exoticisms above produced is that they are the natural outcome of the purely mechanical way in which Marinus has accomplished the adjustment of his map to his own conversion from the Ocean theory to his later heretical ideas. A child of his age, he for a long time looked up to the great founders and furtherers of his cherished science; this is borne out by the many relics in his maps of the traditional representation of Asia. He then probably copied the eastern coast of Asia from Isidorus, only content to enlarge the inherited store of geographical knowledge from fresh sources whose influx into the seaports of Egypt and Syria was in steady increase in his days, owing to the stimulus given to the Roman navigation by the brave

feat of Hippalus. Tales of a dumb barter on the banks of an anonymous river of the Seres were well-known as early as the reign of Claudius (Pliny VI., 88); anxious to secure any however dubious increment, Marinus entered in his map the river Serus, giving it a course towards the East Ocean, as very naturally implied by the seaward location of the Seres. Still before the close of the first period of his activity he succeeded to procure a valuable map of the Tarim Basin where the river bore the name of the Oechardes. Compared with the other map of the same country (the Bautis-map that presents in excess some further communications), the Oechardes-map appears to have been drawn from a prototype representing a complete net of communications between Iran, India (Palimbothra), and Tung-huang, but being only destined to serve as a guide to caravan-leaders engaged in the trade with Khotan (Asmiraea, the same with Ottorocorra of the other map; of yore an important centre of trade where the three routes from Iran, India, and China meet), it gave no intermediate stations for the remainder of the way between Khotan and Tung-huang (Throana). The Oechardes (= the Tarim and the Su-lo-ho) was in the map represented as a desert-river, but features like this were already familiar to the cartographer from Syria, Palestine, Iran, and Inner Libya. In his reproduction of the sketch-map Throana came to lie a short way from the coast, and there are indications that the whole Oechardes-complex was then situated $6\frac{2}{3}^{\circ}$ lat. or so to the south of its final position, the Bautis-complex being one of the later introductions.²⁵)

Now A. H e r r m a n n²⁶) has justly drawn attention to a number of the Great Gulf elements being repeated in the same order further west, as shown in the following synoptical table:

(The western series):

(The eastern series):

A nameless cape SW Berabae (= Pliny's Golden Cape =) a nameless cape SE Zabae

Tacola empur.

Thagora

Balonca

Balonga metr.

Pagrasa

Pagrasa

Acadra

Acadra (an inland town).

The eastward alignment of the first series obviously meets the requirements of the statements of Alexander (I., 14, 1), apparently one of the latest authorities consulted by Marinus, though other authorities, including Ptolemy, probably contributed to the detailed design of this tract. Most strangely and unlike the eastern series, the western line goes at Balonca across the isthmus of the Golden Chersonese, and above the latter there rise several ridges feeding the drainage-system of the peninsula (VII., 2, 12). Now geological evidence is in favour of a recent formation of the isthmus between Kedah and Singora, the agents involved being both diastrophism and the gradual silting up of the former succession of narrow straits with intervening rocky islets that once separated the mainland from the present southern portion of the Malay Peninsula²⁷). Gerini is inclined to correlate with the geological event under consideration the conflicting traditions of the ancient geographers, the insular conception of Chryse representing the earlier stage whilst Marinus' and Ptolemy's maps of the Golden Chersonese portray the later outline.²⁸)

A corroborating evidence seems to be afforded by the different representations of the same route in the Great Gulf element (coming from the early period of Marinus' studies) on the one side and farther west on the second, whilst the position of Balanca seems to indicate that in Ptolemy's times it was still customary to cut short on foot the circumnavigation of the Malay Peninsula, the low-lying isthmus presenting an easy passage to the shore of the Gulf of Siam. Presumably it was the orographical axis north of the isthmus that in the earlier stage of Marinus' map bore the name of the Thagurus mons and was associated with the town of Thagora (Tacola) and the tribe of the Thaguri whilst further up the coast of the Ocean another town gave name to the Rabanaei.²⁹)

It was not before a rather advanced stage of the making of his map that Marinus realized, at length, the fallacies of the Eratosthenian conception of the *habitalis*. It would be a hopeless attempt to deduce from Ptolemy's map all the further stages of development though it may appear plausible enough to imagine that Marinus first became aware of the southeasterly trend of the coast from the Ganges delta to the Golden Peninsula previous getting in his possession Alexander's inquiries on Zabae and Cattigara and the sail thither. It may be that at one of these intermediate stages he took the length of the *terra cognita* as equalling 180° long, as made probable by E. Honigmann.³⁰) The ultimate result of all the innovations applied by him as well as by Ptolemy to his picture of East Asia is before us and I cannot but point out the utmost simplicity of the methods employed. He was confronted with the delicate task of unravelling the chaos created through the age-long practice of confounding the sailors' reports on the Transgangetic regions that were based upon experience with the inferred coast of Serica which was a product of speculation. He did not see the advisability of re-examining, one by one, the descents of all the individual features making up his geography of East Asia. He found it easier and quite satisfactory as well to turn downwards the coast-line of Scythia, Serica, and a part of India, using the Ganges delta as a pivot, and in this rotation he involved indiscriminately all the coastal points up to the *Theriodes sinus*, including the mouth of the Serus; incidentally he interpreted the name of Throana in a twofold way so as to create a Further Indian duplicate of Tung-huang. Both the other victims of the same operation, the Thaguri and the Rabanaei, were stripped of the coast they legitimately owned and left behind in the north whilst there are no ethnic names to replace them in the respective parts of the Great Gulf coast south of the rivers Daonas and Ambastus.

Obviously any attempt would be futile to find out in modern maps an actual correspondent to the Great Gulf, in truth, like its Aethiopian namesake (IV., 8, 1), but an artificial by-product of the great reversal of the geographical views of Marinus. It remains to take notice of several further peculiarities about the Great Gulf, stamping it as a structural unit that stands by itself in the complex structure of Ptolemy's East Asia. Outside the Great Gulf coast we miss any affinities with the toponymy of Scythia and Serica; then there is a different way of treatment of the ethnographical aspect of the description inasmuch as the tribes round the Great Gulf are listed apart from the coastal topography (VII., 2, 20 and VII., 3, 4) contrary to the practice generally employed in the rest of the Indian periplus. Another point of interest is the lack of the title *emporium* in the rather long list of place-names in the Great Gulf area which seems to agree with still another observation. Ptolemy's *θέσεις* of Further India and China are remarkable for plenty of notes on the nature

and productions, as well as on the racial characters of the natives inhabiting the countries described. The interest taken by the Alexandrian to garnish with them his dry lists of positions despite the maxim announced in II., 1, 7, is likely to prove that they are his own contributions, and by their confinement to the western and to the southern parts of Further India we know that his Indian informers had nothing to tell him of the many tribes round the Great Gulf which area lies outside the sphere of his contributions. On the other hand, he has found it necessary to apply corrections to the Marinian coordinates. Like the Moon mountains, the Great Gulf extends over exactly 10° long. (167°—177° long.) and had accordingly been first mapped down between two meridians of the hour system before being subjected to a horizontal shift by an unknown amount (cf. the part III. of the present paper). His are also the latitudes in the Great Gulf coast; the easternmost traces of the Marinian parallel of Ocelis die out at Sada (11½° N lat.) to become superseded in the rest of Further India by the parallel of the Adulitic Gulf (12½° N: Sadi fl. ost., Mareura metr., Lasypa, Cordathra metr., and Bramma), and the corresponding minor parallel (14½° N: Tocosannae fl. ost., Pagrasa; see Part II.). Whilst both Palura and Sada show by their being assigned the parallel of Ocelis that Ptolemy has left their latitudes unchanged, it is otherwise with the commencement of the Golden Chersonese at Tacola. In Marinus' representation the two distances Sada-Tamala and Tamala-Chryse, both keeping the same courses due SE, stood in the mutual ratio 7 to 3 (cf. I, 13, 7—8); in Ptolemy's map, however, the second figure is nearly double the Marinian amount. Taking the Marinian position of Sada in 11½° N as firmly established and remembering that Ptolemy takes in these low latitudes one degree of longitude as equal to one degree of latitude (I, 13, 3), we see that according to the figures adopted by him in I, 13, 7—8, he ought to have placed Tamala in 8½° N lat. and Tacola in about 6½° N lat. With this, like with many other suggestions made in Book I, his cartographical representation is at variance. Tacola coming in his map to lie on the parallel of Taprobane (4¼° N lat.). He therefore must have moved, perhaps on the strength of some subsequent information he obtained by his Indian authorities, all the coast-line from Tacola to the entrance to the Great Gulf from its Marinian position, and most likely this is why the readjustment of the Marinian latitudes in the Great Gulf area became indispensable.

In his *ἐκδόσεις τῆς διορθώσεως* Marinus made it his business to improve *τὰ πεπιστευμένα καὶ ἐπ' ἐλείων καὶ ὑπ' αὐτοῦ τὸ πρῶτον* (I, 6, 1). Ptolemy's words seeming to convey the meaning the views accepted both by other scholars and — in the first phase of his work — by Marinus himself, we tentatively made the inference that the object of the successive *ἐκδόσεις* was to give account of the gradual advance in the development of his map of the world from an initial Ocean stage. Now thanks to his most primitive methods of adapting the map to his changing views, the overlap of a succession of improvements could not efface all the absurdities of the Ocean theory; traces of this primordial phase are still easily detected in Ptolemy's map and I may trust that they lend sufficient strength to the theory advanced in the first part of the present paper.

III. The Question of the Coordinates.

1. Under this heading I intend, availing myself of all the helps afforded by Ptolemy's review of Marinus' book (I, 6—I, 21) as well as by his own catalogs of coordinates (II—VII, 4), to scrutinize the vexed problem if the geographical net employed in Marinus' lists of coordinates (I, 18, 4—5) formed a frame of reference sufficiently dense to yield adequate means of the reconstruction of Marinus' map of the world. It seemed to be evinced by Ptolemy's meagre references in Geogr. I. that Marinus' geographical net comprised not more than 16 meridians, each pair of neighbouring meridians differing by one hour in the time of their respective sun-sets, and at best some few parallels (to be more fully treated below); and that it accordingly was quite incompetent to embrace more than a small fraction of all the thousands of details exhibited in Marinus' world-map. This seemed to favour the assumption that Ptolemy was obliged to draw himself the maps he describes mainly from raw materials amassed and published in the work of his predecessor, a theory that nowadays has been once more maintained in E. Honigmann's excellent summary on Marinus.³¹) Strangely the objections raised by Ptolemy (I, 18, 4—5) to the deficiencies of the Mariniian lists of coordinates are not to this effect. He strives to demonstrate that the usefulness of Marinus' work is much diminished by the inconvenient system therein adopted, as well as by the draw-backs adhering to his catalogs of coordinates; but far from accusing that a vast majority of details are neither entered in the Descriptions of Parallels nor in the Descriptions of Meridians, he is only in the position to point out that of any pair of coordinates one is usually missed.

Indeed, it must ever be borne in mind that the last issue from which Ptolemy's quotations in I, 6—16 come, probably possessed some peculiarities of its own which the earlier Diorthosēs had not; in particular the limited scope of the booklet where an Amendment of the *Klimata* was of necessity accompanied by an Amendment of the Base-Parallels. Notwithstanding, on a closer examination of the suite of the Mariniian longitudes that are directly or indirectly quoted by Ptolemy there is no mistake about Marinus' use of several more refined systems of meridians. In I, 12, 10 Ptolemy gives in degrees of longitude the individual distances of Marinus' fundamental points on the parallel of Rhodes, which he has confessedly worked out from the mileage given by Marinus. The Mariniian longitudes implicitly given by Ptolemy are as follows:

1. <i>Fortunate islands</i>	0°	long.
2. <i>Sacrum prom.</i>	2½°	»
3. <i>Baetis fl. ostia</i>	5°	»
4. <i>Calpe mons</i>	7½°	»
5. <i>Carallia</i>	32½°	»
6. <i>Lilybaeum prom.</i>	37°	»

7. <i>Pachynus prom.</i>	40°	»
8. <i>Taenarum prom.</i>	50°	»
9. <i>Rhodes</i>	58¼°	»
10. <i>Issus</i>	69½°	»
11. The passage of the Euphrates	72°	»
To these may be added:		
12. <i>The sources of the Indus</i>	125°	» (I, 14, 7)
13. <i>Sera, Sinæ, Cattigara</i>	225°	» (I, 11, 1)

Out of the total number of longitudes, nearly three quarters are closely related to the hour system of meridians (they are printed in italics in the above list). I conclude that Marinus was wont to associate a great deal of the fundamental points of his map with three sets of meridians belonging to the hour system, viz.:

1. *the hour meridians*, spaced at intervalls of 15° long; see numbers 1 and 13 of the list;
2. *the third-meridians*, distances at 5° (also adopted by Ptolemy I, 23); see the instances 3, 7, 8, and 12;
3. *the sixth-meridians*, spaced at 2½° (see 2, 4, 5).

It is important to note that this triple system of meridians must have formed the pre-established frame of Marinus' map ever since its embryonal stages, previous incorporating such base-points as those of Eratosthenes', Artemidorus', and Marinus' measurements along the axis of the Mediterranean. All of the longitudes listed above (but for the last-mentioned one, of course) reappear unaltered in Ptolemy's book, itself opening up a fruitful field of study apt to demonstrate what a very significant rôle was played by both the base-parallels' and, the meridians of the hour system' in moulding the coast-lines and other major features; in tracing the boundary-lines; in fixing the termini of the mountain-chains as well as of the rivers; in determining the seats of neighbouring tribes, and in intercepting a mass of points of importance from a scientific, or from a political and commercial point of view; rather commonly such points lie at the intersections of the meridians of the hour system with the base- or the allied parallels. I cannot waste time in producing individual instances; I must ask the reader to put himself the test the significance of the hour system e. g. in Ptolemy's maps of Scythia, the Land of the Sacae (the track of Maës' itinerary!), Arabia, Aethiopia interior, the Balkan peninsula, Italy, and Gallia Narbonensis. He may similarly trail in Ptolemy's lists of positions the prominence of the base-parallels (as listed by him in Geogr. I, 23, and Synt. Math. II, 6; cf. Müller's synopsis in his edition of Ptol. Geogr., p. 59). He is advised to try to restore the Descriptions of the parallels of Borysthenes, Byzantium, Hellespontus, Napata, and Meroë; he will find e. g. in the cases of the parallels of Byzantium and Hellespontus that in the case of the towns the precise figures (43½° N and 40½° N lat.) are often in use whilst the physiographical details are commonly assigned rounded figures (43° N, 41° N), the few exceptions (such as the latitude of Talca island) only strengthening the rule. The parallel of Meroë is rendered as 16½° N or 16⅓° N and only in two cases more exactly as 16⅓° N. Much of the towns associated with the base-parallels are re-quoted in Book VIII.

This set of base-parallels, as disclosed and restored through the analysis of Ptolemy's coordinates, is spaced at distances correspond-

ing to the difference by one-quarter of an hour in the lengths of the respective longest days. In the main this rule goes back to the devise of Hipparchus (Strabo 131—135) who of course had not been able to associate more than ten parallels worked out by him with either actual astronomical observations (mostly carried out along the meridian of Rhodes) or more reliable estimates of distances (in the case of the parallel of the Cinnamon country). Later on, the Romans having in the meantime disclosed the countries of Central and Northern Europe, the scheme of the *'dimidia horarum spatia'* was carried on as far north as Thule by Isidorus Characenus (Pliny, N. H., VI., 219—220).

In the lower latitudes the base-parallels are widely spaced, and to keep the density of the system up to the uniform spacing of the meridians at $2\frac{1}{2}^\circ$, the introduction of the median parallels was but a natural contrivance. They run halfway between each pair of neighbouring base-parallels and form a well-defined feature in the maps of Arabia⁸² and India (see below). The reader may note that the latitudes of Tamala ($8\frac{1}{6}^\circ$ N) and Tacola ($6\frac{1}{2}^\circ$ N) as elicited above from Ptolemy's calculations agree nearly exactly with those of the parallel of the Avalitic Gulf ($8\frac{1}{12}^\circ$ N according to Ptolemy) and a median parallel ($6\frac{1}{2}^\circ$ N) mastered by the latter and by the parallel of Taprobane (or Aromata, as it seems to have been denoted by Marinus I., 14, 4; $4\frac{1}{4}^\circ$ N lat.). The coincidence is hardly accidental in origin; it rather seems to show that Ptolemy is here only recovering the Mariniian positions of Tamala and Tacola, which means that the correction-formulas he here has applied are in truth pilfered from Marinus' methodical equipment. — The position of Athens in $37\frac{1}{4}^\circ$ N lat., that is to say, midway between the parallels of Rhodus (36° N) and Smyrna ($38\frac{1}{12}^\circ$ N) makes us guess that even in middle latitudes the median parallels may be in operation; however, the trailing of the significance of the line in question is rendered difficult by the close crowding of geographical data all over the Mediterranean area. It is rather within the outer zones of the geographical horizon where all the elements of the astronomical net are easy to trail, the imperfect state of knowledge, notably the scantiness of numerical data, having created there a play-ground of theories as well as encouraged arbitrary localisations. Still it seems that the parallel of Athens is of some importance in Spain; it also passes through Ottorocorra, an important knot of communication in Serica.

In addition, there are well-marked vestiges of parallels of another sort that while defying the Hipparchian principle rank with the parallels of the Hipparchian set (viz., the base- and the median parallels) in their leading positions, probably on account of their having been established by the most exact methods available. The parallel of Alexandria (31° N) governs the coasts of Cyrenaica, Marmarica, and Lower Egypt; the parallel of Lysimachia ($41\frac{1}{2}^\circ$ N), first introduced by Eratosthenes (Strabo 134) prevails in the maps of the Balkan as well as of the province Asia; and the parallel of Ocelis whose latitude is given as $11\frac{1}{2}^\circ$ N in a passage literally requoted from Marinus (I., 7, 4) is a very dominant feature in the configuration of the coasts of Asia. Its most singular relation to the Hipparchian system of parallels is worth a while's consideration.

The southeastern coast of Arabia Felix (VI., 7) is made up of three horizontal sections linked up between them by roughly meridional off-sets. The former cling to the respective parallels of $11\frac{1}{2}^\circ$ N (Posidium pr. 75° long.⁸³), Arabia emp. 80° , Cane emp.); 14° N (Moscha. Syagros prom. 90°); and $20\frac{1}{4}^\circ$ N (Corodamum pr.). The latter is the parallel of Napata; $11\frac{1}{2}^\circ$

N (elsewhere written as $11\frac{1}{3}^\circ$ N) is obviously the Mariniian latitude of the parallel of Ocelis, only adjusted to the system of fractions generally employed in Ptolemy's book; and the third parallel, in addition marked by the mart of Muza and the capital city of Sapphar, bisects the distance between the parallels of Ocelis and Meroë. Most remarkably, a counterpart of the Arabian coast is met with on the coasts of Carmania, Gedrosia, and India that are under the controll of the same trias. The reason for the remarkable congruence in latitudes of the cape Syagros and a large portion of the coast of Malabar is obviously found in mariners' reports on a regular traffic by the help of the summer monsoon from Syagros to Muziris and all the other marts of Malabar (cf. Pliny, N. H., VI., 100—104; Periplus M. E. 57), the *hippalus* being apparently defined as a seasonal westerly wind. Conversely it is much tempting to draw inferences on the principal sea-routes in Marinus' days, firstly, from the identical latitudes of the Corodamum and the Iranian coasts as far as the Indus, and secondly from the still more interesting track of the parallel of Ocelis. East of Cane it may be traced past the northern extremity of Taprobane (Vangana ins., Galiba prom.) and past the extreme south of India (Maesoli ost., Cantacossyla emp., Coddura 135°) as far as Palura and Sada, two of the base-points of the southern line of Marinus' measurement (I., 13, 4—6). Probably the parallel of Ocelis provides us a key to the cause of the wonderful misfiguration of India in Ptolemy's map. The shape of South India seems to have been determined by a number of reports on such high-sea routes like the inferred ones; especially on a route from Ocelis to Sada (at themouth of the Sadus, i. e. the Irawaddy?) by way of Cane, Ceylon, the mouth of the Maesolus, and Palura. Marinus' description of the coast of Azania (cf. p.) fairly illustrates the fact that it was such vague statements of bearings in the most general terms that helped him to form a notion of the major features of the surroundings of the Indian Ocean (I., 9, 1), and in the case of the route to Sada he seemingly had got a quite as laconic account of its course due east as was that of Ptolemy's authorities on the sail for China (I., 17, 4).

Perhaps the most bewildering peculiarity of the parallel of Ocelis is that it is everywhere attended by a median parallel of its own (14° N), starting from the coast of Inner Libya (IV., 6, 2) till the coasts of the Gangetic Gulf (Mandae fl. ost.); insofar it behaves like a true base-parallel. The parallel of the Adulitic Gulf ($12\frac{1}{2}^\circ$ N) is in turn accompanied by the median parallel of $14\frac{1}{2}^\circ$ N lat. In Further India and China the relation of the former set ($11\frac{1}{2}^\circ$ N, 14° N) to the Hipparchian set ($12\frac{1}{2}^\circ$ N, $14\frac{1}{2}^\circ$ N) is that of a replacement (see p.). In Cisgangetic India it is the co-operation of both sets we witness, many important points of Malabar, as well as the mart of Subura (130°) lying in $14\frac{1}{2}^\circ$ N lat., and while the parallel of Ocelis supports the southernmost coast of India, the parallel of the Adulitic Gulf passes through Pitura metr. (135°) and the North Cape of Taprobane. In Arabia the Hipparchian set is much eclipsed by the rival dyad; without affecting the delineation of the coast, it is marked chiefly by Pseudocelis ($12\frac{1}{2}^\circ$ N; recently unmasked by E. Honigmann⁸⁴) as meaning 'the misplaced position of Ocelis', and the royal residence of Are ($14\frac{1}{2}^\circ$ N). On the other hand, it has left no traces of it on the coast of Inner Libya.

Turning to the maps of the Southern Hemisphere (mostly worked up afresh by Ptolemy) we find the southern correspondents to the parallels of Taprobane ($4\frac{1}{4}^\circ$ S lat.), the Avalitic ($8\frac{1}{12}^\circ$ or $8\frac{1}{2}^\circ$ S lat.) and the Adulitic ($12\frac{1}{2}^\circ$ S) Gulfs; there is, however, no counterpart to the

parallel of Ocelis which thereby turns out to act as a valuable guide in the question of the extent of Marinus' immediate share in Ptolemy's design of the Indian Ocean.

The mart of Ocelis being placed apart from the homonymous parallel (viz., in 12° N lat.), some doubts might easily arise of the adequacy of the name. Here a passage, quoted, as it seems, from Marinus' account of the southern line of measurement (I, 15, 11) helps us to settle the question. Ocelis is there alluded to as a peninsula and not as a mart. Indeed, an anonymous salient of land projecting into the straits of Dire is still present in Ptolemy's map; its southern extremity lies on the parallel of Ocelis; its name is Posidium prom., formerly Acila, i. e. Ocelis (Artemidorus in Strabo 769; cf. *emporium* Acila, Pliny, N. H. VI, 152). Therefore it was the peninsula and the cape from which the parallel drew its name.

Now $11\frac{2}{5}^{\circ}$, the figure assigned by Marinus to the parallel of Ocelis, is the polar distance of α Ursae Minoris as measured by Hipparchus ($12\frac{2}{5}^{\circ}$, see I, 7, 4) less one degree. The great astronomer had deduced from his measurement that if going from the Equator northwards we reach in $12\frac{2}{5}^{\circ}$ N lat. the southernmost limit of that zone where all the stars of the constellation never set, α Ursae Minoris being in his days the southernmost star of 'the tail'. Relying upon the distances given in Eratosthenes' account of Arabia (Strabo 767—769), he made the parallel of $12\frac{2}{5}^{\circ}$ N lat. cross the Cinnamon country in the present Somali-Land (ibid. 132—133). Subsequent observations partly enlarged the error, since we are told by Marinus that the Hipparchian phenomenon is observed 500 stadia ($\approx 1^{\circ}$ lat.) to the north of the parallel of Ocelis. In my belief Marinus (or rather Diodorus Samius, his authority on the celestial phenomena in the intratropical belt?) was in possession of an actual, though utterly erroneous report of an observation pretended to have been made at Sabat ($12\frac{1}{2}^{\circ}$ N lat. in Ptolemy's map), a little north of the Adulitic Gulf. This aided him in establishing the latitude of the straits of Dire as well as of Ocelis, the starting-point of a sea-route to Further India and accordingly the clue to the configuration of a great part of Asia. But the case of Pseudocelis and its position in $12\frac{1}{2}^{\circ}$ N lat. which is according to modern maps the true latitude of the Straits of Dire, as well as the creation of a median parallel related to a non-Hipparchian master-parallel form a puzzling problem. Are we to assume that in the first stages of Marinus' map Ocelis was placed in the position of Pseudocelis, i. e. in $12\frac{2}{5}^{\circ}$ N. lat., upon the strength of some fairly accurate observation, and Syagros on the corresponding median parallel ($14\frac{1}{2}^{\circ}$ N), and that Marinus only at a later stage obtained the misleading statement that Ocelis lies south of the Hipparchian limit?³⁵⁾

2. On the preceding pages we essayed to show that the world-map of Marinus Tyrius was since the very beginnings covered by a number of hour meridians intercalated with secondary and tertiary lines; and that the outstanding position of the parallels of $37\frac{1}{4}^{\circ}$ N (?), 22° N, $14\frac{1}{2}^{\circ}$ N, and above all of the parallel 14° N lat., governed by the unquestionably Mariniian parallel of Ocelis, lends support to the recognition of what I have taken the liberty to designate as the median parallels.

It remains to take up the more difficult problem if, contrary to the views of K. Müllenhoff³⁶⁾ and E. Honigmann,³⁷⁾ use was ever

made in Marinus' catalogs of coordinates of the still denser net of the degree-system. Unfortunately, Ptolemy's references are to the last Diorthosis only where the 'astronomical net', that of the base-parallels and the hour-meridians, played the leading part, and accordingly yield but a few contributions to the problem. Dependent as was the system of base-parallels (and possibly that of the hour-meridians alike) on the achievements of Hipparchus, Marinus' familiarity with the arc-units is beyond question. In fact, he adopts the Hipparchian definition of one degree of the arc (I, 7, 1; I, 11, 2; so does Ptolemy I, 19; cf. Strabo 132), and he makes one degree of the Earth's great circle equal 500 stadia (I, 11, 2). From Marinus' figures for the latitudes of Thule (I, 7, 1), Rhodes (I, 20, 5), Ocelis (I, 7, 4), and Aromata (I, 14, 4) we see that he gave in degrees and in fractions of a degree the latitudes of the principal parallels, though on the whole he preferred the units of length to the use of the degrees throughout the explanatory part of his last *syntaxis*. This does not, however, preclude his use of the degree system; if wanting to make himself understood by the general reader, he might well have defined, say, the degree-meridians in terms of length units, as spaced at intervals of 400 stadia (which is his equivalent of one degree of longitude, cf. I, 20, 5).

Above I have essayed to interest the reader in the remarkable suite of the Mariniian longitudes quoted in Geogr. I (see p.). Eliminating those that belong to the hour system, we get only four positions in all that don't seem to be in a simple relation to the system, two of them falling on degree-meridians (Lilybaeum prom., the Euphrates ferry) which is possibly more than a freak of chance. But surely the evidence is too meagre to warrant positive conclusions.

There is, however, an indirect method of attacking the problem. It will be shown in a very telling way that in Ptolemy's catalogs both the degree-meridians and the degree-parallels are only second to the astronomical system in their rôles as the favoured lines of reference. Should we succeed to make out the authorship of the maps from which the Ptolemaic positions had been read out, important premises to the solution of the major problem would be gained. Now a careful analysis of the reference system that served Ptolemy to determine the positions of the individual details is very apt to yield the criteria needed.

Any Ptolemaic student knows that the employment of whole degrees as well as of the halves, thirds, fourths, and sixths of one degree is common to nearly all his *ῥέσεις*. The density of the reference system varies with the density all the mapped details; sometimes even within one single *ῥέσις*. All over the maps of Spain, Italy, Greece, Asia Minor, and several other countries fringing the Mediterranean Sea, a relatively dense net is needed to comprise all the heaps of details that are here crowded close together; it is only here that the twelfths of a degree are used to some extent. In most descriptions, however, the twelfth-system is only represented by the following five figures: $43\frac{1}{12}^{\circ}$ N, $40\frac{11}{12}^{\circ}$ N, $38\frac{7}{12}^{\circ}$ N, $16\frac{5}{12}^{\circ}$ N, and $8\frac{5}{12}^{\circ}$ N and S lat., that is to say, it is never employed but for a few base-parallels.³⁸⁾ We see that the author had at his command resources enabling him to determine any position with an amount of accuracy ranging within the limit of $\frac{1}{12}^{\circ}$, or even $\frac{1}{24}^{\circ}$. But it by no means follows that he actually took this advantage on a large scale. To produce a specific instance, in the description of Germania (II, 11, ed. O. Cuntz; see Table I) there are 143 elements in all the positions of which are indicated. Now nearly one-half of the

Map of		Longitudes										Latitudes									
		whole degrees	1/6° 1/4° 1/3° 1/2° 2/3° 3/4° 5/6°					twelfths	whole degrees	1/6° 1/4° 1/3° 1/2° 2/3° 3/4° 5/6°					twelfths						
			1/6°	1/4°	1/3°	1/2°	2/3°			3/4°	5/6°	1/6°	1/4°	1/3°		1/2°	2/3°	3/4°	5/6°		
Albion	—	62	4	4	17	21	9	12	2	—	31	6	5	15	31	25	14	4	—	—	
Germania	Physiography	34	1	1	2	9	2	—	—	—	21	—	4	6	11	5	—	2	—	—	
	Topography	35	1	6	4	30	10	5	3	—	24	5	5	10	24	9	7	0	—	—	
Dacia	Total	69	2	7	6	39	12	5	3	—	45	5	9	16	35	14	7	12	—	—	
	—	14	1	8	5	14	5	3	2	—	11	3	8	5	10	9	5	1	—	—	
Italy	—	71	19	19	51	75	43	25	22	13	44	20	21	37	51	42	40	22	64	—	
Sarmatia in Europe	—	34	—	—	5	27	2	2	2	—	19	1	5	3	25	11	5	3	—	—	
Candia	—	10	5	5	7	10	5	7	5	11	9	8	6	6	5	6	7	5	13	—	
Inner Libya	—	70	—	2	4	19	4	—	—	—	54	1	6	2	21	13	—	2	—	—	
Cappadocia	—	56	8	14	31	47	15	11	10	3	30	16	15	27	29	19	30	7	19	—	
Arabia Felix	Periplus	34	1	9	11	18	11	2	—	—	21	7	7	7	22	10	11	1	—	—	
	Inland physio + islands	19	—	2	2	7	4	2	—	—	14	1	1	3	9	6	2	—	—	—	
India	Inland topography	23	9	9	12	27	19	4	—	—	21	6	19	19	17	12	6	2	1(?)	—	
	Total	76	10	20	25	52	34	8	—	—	56	14	27	29	48	28	19	3	1(?)	—	
India	Periplus	32	1	4	12	18	17	4	1	—	19	1	3	14	25	10	5	6	—	—	
	Inland physio + islands	52	—	1	4	23	1	—	—	—	51	—	9	1	18	5	—	—	—	—	
Within Ganges	Inland topography	106	—	25	15	46	12	7	2	—	59	5	22	37	49	20	5	16	—	—	
India Beyond Ganges, Sine	Total	190	1	30	31	87	30	11	3	—	132	6	34	52	92	35	10	22	—	—	
	—	85	—	5	14	29	8	—	—	—	64	—	13	14	26	14	4	5	1	—	
Taprobane	—	48	—	1	5	7	5	—	—	—	20	—	8	9	16	11	1	1	—	—	

Table I.

longitudes (69 in number) are in whole degrees, one-fourth (39) in half degrees, and only the remaining 33 of them are expressed in thirds ($\frac{1}{3}^\circ$, $\frac{2}{3}^\circ$), fourths ($\frac{1}{4}^\circ$, $\frac{3}{4}^\circ$), and sixths ($\frac{1}{6}^\circ$, $\frac{5}{6}^\circ$) of the degree, the thirds being in turn in a sensible preponderance over the fourths, whilst out of 143 longitudes but five are given in sixths. Besides, let the reader note in Table I that in the case of the physiographical details the wholes are sensibly more favoured than in the case of the place-names. The latitudes are under the control of the same rules, the majority of them being in wholes and halves; the thirds range next, but it is a point of considerable importance to note that the fractions of the degree are employed on a distinctly larger scale in latitudes than in longitudes, and that for 108 longitudes there are no more than 80 latitudes that are given in whole and half-degrees.

A glance upon the statistics arranged in Table I. where a small choice of samples from sundry parts of Ptolemy's map of the world are given shows cogently enough that the rules controlling the positions in Ptolemy's Germania are 'world-wide' in their validity. Everywhere the prevalence of wholes and halves is the most impressive feature, proving that all the maps that formed the basis of Ptolemy's catalogs had complete nets of degree-meridians and degree-parallels ruled on them; inserted between them were the halving lines, both systems being used in much the same manner as the astronomical net. I may refer to the design of the Euphrates-route from Sinera down to Zeugma, so stiffly adhering to the meridians of 71° , $71\frac{1}{2}^\circ$, and 72° long. C. Müller's Ptolemaic Atlas, Map 29; or to the heaping of place- and other names in strings on the meridians $6\frac{1}{2}^\circ$ (Baetica), 23° (Gallia Narb.), $28\frac{1}{2}^\circ$ (Italy), $31\frac{1}{2}^\circ$ (Germania), $38\frac{1}{2}^\circ$ (Africa), 56° , $58\frac{1}{2}^\circ$, and 64° (Sarmatia, Crimea), and 79° (Arabia Des., Babylonia); as well as on the parallels $37\frac{1}{2}^\circ$ N (Greece), $39\frac{1}{2}^\circ$ N (Cappadocia), $43\frac{1}{2}^\circ$ N (Via Aemilia, Pontus et Bithynia); 46° N (Pannonia), and $53\frac{1}{2}^\circ$ N (Gaul). It has been observed since long ago that Ptolemy likes to write in whole degrees the coordinates of important points (A. Sprenger, *op. cit.*, p. 6).

The track of the well-known Dacian itinerary from Sarmizegethusa to Paralissus³⁰) is likely to shed some light upon the question what the fractions of other kinds than the halves are meant for (cf. Table II., and Tab. Peut. VII., 5—VIII., 3). The latitudes assigned to the eight stations of the route are in whole degrees and in the halves, thirds, fourths, and sixths respectively. The longitudes are worth a closer examination. The entire route has been resolved into three columns, evidently because of the distorting effect of the three meridians to which the longitudes are referred (49° , $49\frac{1}{4}^\circ$, $49\frac{1}{2}^\circ$). The cartographer seems to have chosen a degree-meridian (49°) to place on it the one terminal point, and the other terminus was assigned a place on the next auxiliary line ($49\frac{1}{2}^\circ$); he then drew a straight line between them in the direction NW by N, and put down the intervening stations. — The resort to the meridian $49\frac{1}{4}^\circ$ alone in a $\theta\epsilon\sigma\iota\varsigma$ where the thirds and sixths of a degree were, in addition to fourths, the available resources (cf. Table I.), serves as a safeguard against too high an estimate of the degree of accuracy generally achieved in Ptolemy's lists; as a matter of fact, the statistics show an exceptionally rare use of the sixths in a great deal of the $\theta\epsilon\sigma\iota\varsigma$ and worse still, there are $\theta\epsilon\sigma\iota\varsigma$ where the fraction-scale practically ends with the thirds, and in other cases the latter are almost invariably preferred to the fourths of the degree.

Generally it appears that the accurateness in stating the coordinates of the inland physiographical elements is below the average standard, though occasionally they come to be described more satisfactorily. Exceptions like such ones seem to teach that the design, say, of the rivers was in truth distinct and definite enough to permit accurate measurements; there only lacked the will to make them. The same pair of coordinates (35° long., 47° N lat.) are given to the German town of Vehium (II., 11, 12) as well as to Arelate on the opposite bank of the Danube (II., 13, 3), and

Table II.

49° long	$49\frac{1}{6}^{\circ}$	$49\frac{1}{4}^{\circ}$ long	$49\frac{1}{3}^{\circ}$	$49\frac{1}{2}^{\circ}$ long
Paralissum (48° lat.)				
Napuca ($47\frac{2}{3}^{\circ}$ lat.)				
Patavissa ($48\frac{1}{3}^{\circ}$ lat.)				
		Salinae ($47\frac{1}{6}^{\circ}$ lat.)		
		Apulum ($46\frac{2}{3}^{\circ}$ lat.)		
			Germizirga ($46\frac{1}{4}^{\circ}$ lat.)	
			Aquae ($45\frac{1}{3}^{\circ}$ lat.)	
			Sarmizegethusa regia ($45\frac{1}{4}^{\circ}$ lat.)	

the western headwater of the river Vistula is said to rise in $40\frac{1}{6}^{\circ}$ long. (II., 11, 2). Thus it appears that so far the rivers are concerned the maxim of the $\psi\lambda\alpha\iota\ \rho\alpha\mu\mu\alpha\iota$ (I., 1, 5) was probably more than a mere programme. As to the mountain-chains, there is only one single instance where one of the termini is determined with a preciseness exceeding one-fourth of a degree (viz., the Libyan mountains, IV., 5, 10; the SW terminus lies in $60\frac{1}{6}^{\circ}$ long.). The centres of those mountains that don't stretch in linear ranges, as well as of lakes and the groups of small islets, are commonly noted with a pardonably rough approximation; yet the positions of the Sirenessae insulae in $39\frac{9}{12}^{\circ}$ N lat. (III., 1, 69), of the Stymphalus mons in $50\frac{1}{6}^{\circ}$ long. (III., 14, 35), and of the Dead Sea in $66\frac{5}{6}^{\circ}$ long. and $31\frac{1}{6}^{\circ}$ N lat. (V., 15, 2) show that in rare instances a seemingly higher degree of accuracy was achieved. But save for rare exceptions, the interior physiography of all the individual countries has been worked up from a uniform point of view and independently form the more painstaking treatment of the periplus and the inland topography.

The last rule to be discussed is the sensible excess of fractions in the lists of the geographical latitudes in comparison with the longitudes; from this rule there are found no exceptions throughout the whole of the $\delta\phi\eta\gamma\gamma\iota\sigma\iota\varsigma$. Not only the latitudes are generally indicated with a better approximation but also the share of the degree-parallels in shaping the coasts etc. is somewhat inferior to the significance of the degree-meridians. In the description of the coast of Barbaria (IV., 7, 4) the credit of which unquestionably belongs to Ptolemy himself (see p.) the peculiarity is

due to the use of the three base-parallels $4\frac{1}{4}^{\circ}$ N, $4\frac{1}{4}^{\circ}$ S, and $8\frac{5}{12}^{\circ}$ S lat. in addition to a simple reference system of wholes and halves (Rhaptum alone coming to lie in $73\frac{5}{6}^{\circ}$ long.). This explanation however fails in countries extending in the same level with Germania where the base-parallels coincide with the degree- and the half-degree-parallels; nor does it apply in all the other $\theta\epsilon\sigma\epsilon\iota\varsigma$. Very obviously we here see the effect of the projection here employed upon the texture of the net-work of coordinates. Any other ratio than 1:1 once adopted for the length of one degree of longitude as compared with one degree of latitude, the lines are more widely distanced in the one set than in the other, and a more ample use of fractions is encouraged in the former set. Now on Marinus' would-be projection (II., 20, 4—8) the rectangular frame of the world-map (cf. I., 7, 1—2; I., 11, 1) is covered with parallels and meridians drawn in straight lines parallel to each other in either set. The parallel of Rhodes served as a sort of a prime parallel and the proportion of its length to the length of a great circle of the Earth was taken as 4 to 5. The nature of the rectilinear scheme implies the uniform validity of the mentioned proportion all the map over so that any distance near and parallel to the Equator falls short by one-fifth of the true quantity (I., 20, 7).⁴⁰⁾

Ptolemy points out the distortion caused by such a proceeding which—after he devises two methods of his own; the one represents the parallels as curved and the meridians as straight lines; the other makes the meridians too describe curves (I., 21; I., 24). Unfortunately, it is more than probable that the maps described by him were neither drawn in the one nor in the other way. In fact, viewing the generally programmatical character of the Preface (book I.) as well as the many preliminary suggestions given therein but never to be carried out in the $\delta\phi\eta\gamma\gamma\iota\sigma\iota\varsigma$ proper (II.—VII.), it may be taken as granted that Ptolemy wrote his severe criticism before setting about his main task; little did he then think of the many difficulties to be overcome in his endeavour to improve Marinus' work.⁴¹⁾ Hence there is no great surprise to witness his retreat in books II.—VIII.; the third method now admitted, or rather proposed by him for the delineation of special maps is a far-going concession to the Marinian way. We now hear our ruthless critic repeatedly say that in special maps this projection is liable to cause but an immaterial amount of deformation (II., 1, 9; VIII., 1), a statement which may hold of the maps of some European provinces of the Roman Empire but is far from truth in the case of Further India whose surface covers no less than 46° of lat.

This being the only direction for the design of special maps repeatedly given in those parts of Ptolemy's book that obviously render the conclusive formulation of his views and suggestions, and the eighth book being partly intended to furnish such data as are required on this mode of projection, one might be easily led to believe that Ptolemy only recommends the method actually applied in his maps'. To this, however, our analysis of Ptolemy's system of reference is strongly apposed. He proposes (VIII.) nets that in equatorial countries are either exactly or nearly so square-nets, the ratios suggested being 1:1 for Taprobane, Libya interior, and Aethiopia sub Aegypto; nearly the same for Further India; and 11:12 for Arabia Felix and India Within Ganges. These postulates, however, were never followed in the maps described by him; inconsistently with any Ptolemaic method, but conformingly to the most salient features of the Marinian projection, the maps must have shown rectangles stretched uniformly southwards all over the *terra cognita*,

including the tropical zone; this holds even for the map of Taprobane on the very Equator.⁴²⁾

Now our examination of Ptolemy's reference-system has brought forward irresistibly that these maps were provided with a system of degree-parallels and degree-meridians in addition to the 'astronomical system' of lines, and the pattern still glimmering out from our statistics arranged to this purpose is that of the Marinian network. I therefore must insist on Marinus' paternity to the maps from which Ptolemy's positions have been taken, as well as on his use of the degrees, the half-degrees, and possibly also of the thirds and the fourths of the degree in his lists of the coordinates (one would expect the sexagesimal system, that is to say, the minutes instead of fractions should the main bulk of the positions be the astronomer's work). Before our scrutiny of Ptolemy's fraction-system, the testimony of the four Marinian longitudes standing outside the hour-principle seemed to be far from conclusive (p.); now the expression of two of them in whole degrees, of another one in halves, and still another one in fourths turns out to tally perfectly with what we have made out of the rules governing the distribution of fractions in Ptolemy's coordinates. The way in which Marinus' coordinates came to be re-embodied in Ptolemy's book is described in Ptolemy's programme as unfolded by him in I., 19. His book aims:

a) to preserve, save for indispensable corrections and a general rearrangement of the topics, the entire store of knowledge amassed by Marinus, and

b) to supply *τὰ μὴ παρ' αὐτοῦ* (sc. *Μαρίνου*) *δὴλα γινόμενα*. To attain this second goal, he makes recourse to the travellers' reports in the first place, and to the *ἀκριβέστεροι πίνακες* in the second.

In order to understand what is meant by the words *τὰ μὴ . . . γινόμενα* let us remind that:

a) in I., 17, 2—5 Ptolemy boasts that new reports drawn from Roman and foreign sailors have enabled him to give a fuller account of India, Serica, China, and Barbaria; and

b) that his charges against the lamentable deficiencies of Marinus' catalogs immediately precede the passage under discussion; this suggests that the missing coordinates are too included.

To restore the longitude of a town whose latitude alone was entered in the catalogs, a good Marinian atlas was for obvious reasons the most helpful resource imaginable, and admittedly superior to any travellers' reports and to any non-Marinian map alike. Accordingly H. Berger⁴³⁾ was presumably right in explaining the *ἀκριβέστεροι πίνακες* as the less deteriorated copies of the world-map of Marinus. Both the physiological and the ethnographical aspects of the single provinces were easy to survey in these maps and Ptolemy hardly omitted to take this advantage in the respective subdivisions of the individual *θέσεις*; but as the coordinates are concerned, the maps acted as a second-class authority, as Ptolemy confessedly felt but little esteem for the more or less superficial productions of the copyists (I., 18, 3), and only the failure of the lists of coordinates (probably attached to the atlas and repeatedly augmented and corrected in the first two Diorthoses) would induce him to resort to the less vitiated specimens.⁴⁴⁾

Notes.

¹⁾ The quotations from Ptolemy's Geography refer to the following editions: C. Müller's for books I, II, 1—6, III, 2—15, IV—V.; O. Cuntz's for II, 7—16, III, 1; F. G. Wilberg's for VI.; and L. Renou's for VII, 1—4.

²⁾ Cf. Letronne, *Journal des Savans*, 1831, p. 240; E. H. Bunbury, *A History of Ancient Geography*, vol. II., London 1883, p. 520; E. Honigmann, *Marinus v. Tyrus*, Pauly-Wissowa R.-E., 2. R., 14. Bd., 1930, p. 1769; A. Herrmann, *Marinus von Tyrus* (Erg.-h. 209 zu Peterm. Mitt., Gotha 1930), p. 45. Wilberg's and Müller's editions.

³⁾ See C. Müller's explanation, *Ptol. Geogr.*, p. 15 ad v. 9.

⁴⁾ Note the plurals *συρτάξεις* I. 15, 1; I. 17, 1; I. 18, argum.; I. 18, 4.

⁵⁾ Recently a similar view has been advocated by E. Šimek, *Velká Germanie Klaudia Ptolemaia I.*, Prague 1930, p. 17.

⁶⁾ Cf. I. 18, 3.

⁷⁾ To O. Stein's paper we owe the dating of the mention of Tiastanes (*Philologus* 1925, p. 117); E. Honigmann has drawn the attention to the case of the Antinoites nomus (Pauly-Wissowa, R.-E., 14. Bd., 1930, p. 1768); he rightly points out that such instances like the two mentioned ones are no conclusive evidences as to the date of Marinus' activity since they may be Ptolemy's additions. I add the case of Mursia (II., 15, 4); its designation as a colonia comes from the days of Hadrian.

⁸⁾ Perhaps on account of the fixed size of his original map (possibly a wall-map) allowing of no further extension sideways, to meet the requirements of new evidence. — The relative position of the adverb *μόνος* in the sentence suggests that it probably stands for *μόνον*. — The MSS read *δι' οὗ* which seems to convey no reasonable sense; I read *δι' οὗ* in accord with H. Berger, *Gesch. d. wissensch. Erdk. d. Griech.*, Leipzig 1903, p. 615.

⁹⁾ The entire Ptolemaic tract from Dire to Rhapta abounds (with 'emporium' in striking contrast with the coast of Troglodytica where not even Adulis was considered worthy of this title. Remarkably none of Marinus' fundamental points of the southern line of measurement (I., 13—14) are designated as emporia; in Ptolemy's quotations they go as *πόλεις* and retain this title in Ptolemy's periplus of India (VII., 1—2). The distribution both of the *πόλεις* and of the emporia is shown in the accompanying map; the latter are confined to some coasts of the Indian Sea while they eschew the Marinian area of the Great Gulf, the western coast of the Gangetic Gulf, the main bulk of Taprobane, the coasts of Ariana and Arabia (save for 4 exceptions near the straits of Dire). In the case of Semylla (I., 17, 3), the word 'emporium' has been possibly supplied by Ptolemy. Probably the distribution of the 'emporium' tells us something of the special districts of which Ptolemy had the opportunity to furnish new information (cf. I., 17, 4).

¹⁰⁾ In Ptolemy's map the Moon mountains continue to cover ten degrees of longitude, a length obviously influenced by the hour system of meridians (see Part III.), though the terminal points (57° and 67° long.) are no longer associated with the meridians of the system; this also points to an horizontal movement.

¹¹⁾ Cf. E. H. Bunbury, *op cit.*, II, p. 414.

¹²⁾ Cf. Herod. I., 203—4.

¹³⁾ Consequently I cannot assent to the views of D. Detlefsen (*Die Anordnung der geogr. Bücher des Plinius*, etc., Berlin 1909, p. 124—3).

¹⁴⁾ A. Herrmann, *Die alten Seidenstrassen*, etc. I., Berlin 1910, p. 4.

¹⁵⁾ Ptolemy mentions a route from Thinae to the sea-port of Cattigara (I., 17, 4); in his map the route seems to be marked with Thinae, Saraga, ? the passage of the river Saenus (Sinus after a plausible emendation by L. Renou), Coccoranagara, and Cattigara in the Gulf of China. Most remarkably the second name (meaning 'silk' in several Asian tongues) survived to reappear under the form

Saragh (i. e. Lo-yang?) in the Nestorian tablets (H. Yule, Cathay etc., 2nd ed. by H. Cordier, I, London 1915, p. 108-9). The existence of a regular route between Cattigara and Thinae seems to preclude the popular localisation of the first-named town on the coast of Tong-king, and R. Hennig (Der Hafen Kattigara etc., Klio XXIII., Leipzig 1929, p. 256) is quite right in claiming Cattigara as the sea-port of the capital city of China. It must also be kept in mind that it is the achievements of the Indian (and not of the Roman) naval enterprise we witness in Alexander's and Ptolemy's vague and second-hand statements; that the pioneers of India and Arabia must have been in advance of the Roman achievements every moment, in particular of both of the stages recorded in Chinese annals, viz., the landing in Jihnan 166 A. D., and founding a settlement in Canton in subsequent decades. Alexander's statement that after finishing the coasting sail to Zabae (... τοὺς πλείονας παρ' αὐτὴν sc. γῆν ... I, 14, 1) the ships bound for China have to steer across the open sea (... διὰ τὴν ὁδὸν ...) must likewise be taken into account. — As for the etymology of the place-name Urathenae (VII., 2, 22), see W. Volz, Südost Asien bei Ptolemäus, Geogr. Zeitschr. 17, Leipzig 1911, p. 37.

¹⁶⁾ However adapted may be Pliny's picture of the outward appearance of the Seres (VI., 88) to the theory of Posidonius, the presence in his days of a vigorous Aryan element among the populace of the Tarim basin is ascertained e. g. for the Hsiao-yue-chi in the eastern part. The Yeh-kiang (Ptolemy's Bautae-Oechardae), seated along the SE border of the area were of course a branch of the Tibetan stock, and a tongue likewise monosyllabic in nature seems to have been spoken in the kingdom of Khotan (F. W. Thomas, The Language of ancient Khotan, Asia Major II., Lipsiae 1925, p. 529).

¹⁷⁾ The almost generally adopted assumption that Ptolemy's Serica goes back to the so-called itinerary of Maës has led the interpretation of Ptolemy's map into a blind alley. On this theory the interpretation has for its object to find out from the map the succession of stations visited by Maës' envoys firstly on their march to Sera, and secondly on their way homewards. Small wonder that the theory failed when confronted with the actual disposition of towns in the map of Serica. Instead of presenting one or two east-running strings of place-names, diverging somewhere in the west and rallying at Sera, the map shows in excess another rival terminus by the name of Throana, and the existence in the map of two identical oro- and hydrographical frames, each suggesting the idea of the drainage of an arid basin (evidently the Tarim Basin) formed another puzzle that the pet theory left unsolved. The latter did not justice to the different strains of the respective toponymies of Serica and the Land of the Sacae; the former is in Asian vernaculars and free of the lengthy Greek names that being descriptive in character and inspired by Greek disdain for barbarian names, are characteristic of Marinus' and Ptolemy's representation of the results of Maës' expedition (cf. my 'Rozbor Ptolemaiov osm mapy Asie', Chotěboř 1926, Summary p. 35, foot-note 3). By a still grosser oversight, the theory takes up no attitude towards Ptolemy's criticism of the account given in the itinerary of the pretended seven months' march from the Tower to Sera (I., 11). Unlike his proceeding in the analysis of the western part of the silk-route (I., 12, 3-8) he is not in the position to support his demand for a still more radical shortening of the remainder of the way (from the Tower to Sera) by following the individual circuits of the route; he only can adduce the difference in latitudes of both the terminal points (I., 12, 1), and as this implies but a moderate amount of reduction, he proceeds to attack the very foundation of Marinus' reckoning. An unbroken 7months' journey is in the middle latitudes rendered impossible by the protracted winter season. Furthermore, merchants like to report tales, and generally inuch caution is needed in evaluating their stories; but in the particular case we now consider there is an additional admonishment that makes us distrust, namely the astounding fact that throughout the pretended seven months' march, nothing else (αὐτὴν ἄλλο) was deemed worth notice by Maës' envoys (I., 11, 7). We perceive that Marinus' review of the itinerary in question made it to Ptolemy clear that save for the rude statement of the distance and possibly one detail between the Tower and Sera recorded in I., 12, 8 (cf. p.) no particulars whatever were given of the route. F. H. Bunnury whose keen examination of Ptolemy's criticism unfortunately failed to attract the attention it deserved makes the interesting inference that the Stone Tower was the farthest point actually reached by Maës' agents who might there have obtained an exaggerated hear-say information of the distance of the Seric capital (o. p. cit., II., p. 531). I may propose an alternative hypothesis; disposed as Marinus is to stretch the evidence to suit it to his preconceived postulates (of which his interpretation of Alexander's words ἡμεῖς αὐτοὶ is a convincing instance, I., 14, 1-2), and at the same time credulous enough to add no query to the odd story of Diogenes (I., 9, 1), he is

possibly misinterpreting what in reality was a statement of the time consumed in the whole journey from Syria to Sera. In any case, an account of a seven months' journey devoid of any particulars whatever is itself an enigma rather than a key to solve such ones, and in the point of the Seric problem it values nearly naught. The lots of details presented by Ptolemy in his eighth map of Asia can impossibly be derived from Maës' itinerary, as they never would have entitled Ptolemy to accuse the meagreness of the document. Apart from the Emodi montes, borrowed from elder maps, and several other names, the eighth map of Asia is built up of two sketch-maps placed side by side, both depicting the same physiographical frame (the Tarim and Su-lo-ho-Basin) and the associated lines of communication as far as Tung-huang (Throana in the Oechardae- and Sera in the Bautis-map). Very obviously the Ottorocorran trio (a town, a tribe, and a mountain) of the southern complex is replaced with the Asmiraeae group (a town, a country, and a mountain) in the northern one, the Casian group corresponds to the Auzacian set, the Bautae to the Oechardae, Issedon reappears in both maps, etc. Evidently both maps have sprung from a common prototype, whose outline has been somewhat simplified in the Oechardae-map and the original toponymy has been in both copies differently adapted to the needs of different caravans, speaking different tongues.

¹⁸⁾ In the final stage of the map of Marinus both the southern and the northern sides of the frame are crossed by the African and Chinese coasts; whilst Ptolemy's Indian Sea forms an inland sea spreading all within the frame of the map.

¹⁹⁾ A. Sprenger, Die alte Geographie Arabiens, Bern 1875, p. 110-112.

²⁰⁾ The notion of a timbered Hercynian ring encircling the fertile former homes of the Boii is best conveyed in Strabo 292 and Velleius Pat. II., 108; furthermore, there are allusions to individual portions of the same scheme in other authors (Caesar B. G. VI., 25; Dimens. prov. 19; Tac. Germ. 28). In Ptolemy's map the ring is dismembered and displaced, this being the common run with long mountain-chains (cf. Kieszling's articles on Ra and the Rhipae mountains in Pauly-Wissowa, R.-F., 2. R., 1. Halbbd., 1914); yet it still preserves traces of its schematic eastern convexity in the trends of the Asciburgium and the Sarmatian mountains which latter name had been long ago recognized for an artificial name (K. Müllenhoff, D. A., II., 1887, p. 333). Asciburgium (and possibly Melibocum too) would be but a place-name that happened to stand close to the design of the ridge and was mistaken for its name. Let us not be deluded by the resemblance with the actual trend of the Sudetes; we hardly are allowed to believe that Marinus was ever in possession of so a fair information on the existence, names, and trends of the individual ridges of inner Germania.

²¹⁾ Kieszling, Ra, op. cit. p. 6.

²²⁾ In the maps of Spain, Africa, Asia Minor, etc., the physiographical aspect of the outline is overpowered by masses of towns, but the original alignments of the individual itineraries are mostly all topsy turvy owing to the subsequent displacements. These were in my opinion due partly to the corrections' successively introduced in the Diorthoses, partly to the incomplete state of Marinus' catalogs of positions (I., 18, 4-5) and to the distortion of some amount of which not even the ἀκριβέστεροι πίνακες were free (cf. p.). Rarely the original design escaped any change; in such cases the track of the itinerary either closely follows the sinuous course of some well-explored river, or else it is in a primitive line betraying no acquaintance with the individual bearings. The first-mentioned case is best exemplified by the fine design of the Danube route from the delta upstream as far as Carnuntum. On the other hand it is easily perceived that Marinus must have possessed but a quite summary statement that the routes between Syene and Meroë keep closely to the windings of the Nile, the misplacement of Napata making it certain that a strict correlation with the reversed N of the river was beyond his resources. Straight lines were employed in considerable portions of the Via Aemilia and of the route Poetovium-Mursia, in the case of the Dacian itinerary (p.), and in the routes Arelate-Lugdunum, Carnuntum-Meliodunum, Meroë-Daron, etc. The route Nicaea-Tatavium-Dablis-Dadastana-Iuliopolis swings in a smooth curve, and similar alignments in Eastern Germania turn their convex sides eastwards, as shown in the disposition of towns between Osanda and Rugium, or between Leucaristus and Laciburgium.

The points where two routes or more meet or cross may be expected to cause more or less abrupt deviations in the schematic alignments. Often a town happens to be entered twice in different positions, and like in Tab. Peut., such pairs occasionally indicate knots in the net of communications. E. g. Carrodunum appears to have been situated at the point of junction of the Dniester-route (III., 5, 15) with one of the amber-routes of Germania (II., 11, 14).

A slightly disturbed specimen may be quoted from Asia Minor. The route from Nicaea to Ancyra by way of Pessinus may be easily identified by aid of Tab. Peut. (IX., 2-3) and Itin. Ant. (201-03). It describes a simple arc insignificantly roughened through the distorting effect of the thin system of parallels here applied, the latitudes being written in thirds and halves of the degree, with the sole exception of Nicaea ($41^{\frac{11}{12}}^{\circ}$ N lat.; Agrilium $41^{\frac{9}{12}}^{\circ}$ N; Dorylaeum $41^{\frac{1}{12}}^{\circ}$ N; Midaum $41^{\frac{1}{12}}^{\circ}$ N; Tricomia $41^{\frac{1}{12}}^{\circ}$ N; Pessinus $41^{\frac{1}{12}}^{\circ}$ N; Germa $42^{\frac{1}{12}}^{\circ}$ N; Vindia $41^{\frac{1}{12}}^{\circ}$ N; Ancyra 42° N). Germa does not keep in the general line; its longitude is correctly given as intermediate between those of Pessinus and Vindia, and its northward displacement is possibly owed to a later information on its being situated near the great bend of the river Sangarius. — The longitude of Congustus in its relation to the well-marked line Pessinus-Tyana, or the still more impaired line Philadelphia-Esbuta-Medaba-Rabathmoba-Characmoba (Arabia Petraea) are examples of how great the displacements occasionally are.

²³) A. Herrmann, Seros (Pauly-Wissowa, R-E., 2. R., 2. Bd., 1923, p. 1737-8).

²⁴) Rec. A, 6, 7, 38 (ed. Riese).

²⁵) In the sequel (Part III.) we shall learn of Marinus' and Ptolemy's predilection for placing the most important points, notably those in the remotest countries, on the principal parallels of the geographical net. The Bautis complex yields abundant evidence to that effect, nine elements out of twenty being situated on such favoured lines, viz., in 36° , $37^{\frac{1}{2}}^{\circ}$, $38^{\frac{1}{2}}^{\circ}$, 41° , 43° , and 45° N lat. respectively. From the thirteen details making up the Oechardes-complex only the northern terminus of the Auzacian mountains and Issedon Scythica are positive instances whilst Throana, apparently the most distinguished element of the entire group, falls outside the system much contrary to the accustomed practice. Now subtracting 6° lat. from the respective latitudes of Damna ($51^{\frac{1}{2}}^{\circ}$ N), Auzacia and Piala (49° N), and Throana ($47^{\frac{1}{2}}^{\circ}$ N), all the four towns come to lie on the parallels of Pontus Euxinus (45° N), Byzantium (43° N), and Hellespontus (41° N). At any rate the differences by exact numbers of degrees in the latitudes of the principal stations of the Oechardes-route point to some vertical displacement. In my opinion the complex was raised as a unity by 6° lat. (rather than by 4°) from the parallels formerly occupied by it which movement obviously had for its purpose to provide space for the insertion of the newly acquired Bautis-map. Presumably it was on the same account that the eastern extremity of the Indian Imaus (on whose position depends the southern limit of Serica) went down (cf. Note 41), the schematic trend of the route from Ottorocorra to the west by Orosana, Chaurana, and Soeta suggesting close relations of the Bautis-system of communications with some Indian starting-point (most likely Palimbothra, cf. I., 17, 4). Of the Oechardes-complex, Issedon was raised less than the amount given above, evidently to prevent its escaping from the homes of the Issedones and from the vicinity of its namesake in the Bautis-area. — In my Czech treatise (*op. cit.*) I held that the incorporation of both the maps into the map of Marinus is due to Ptolemy's credit, but the case of Throana and the northward displacement of the Oechardes-complex make me now believe in the Marinian descent of the latter. As for the Bautis map, there are indications of its having been procured by Ptolemy; from his acknowledgments to his Indian authorities (I., 17, 4) we know that in addition to the Sero-Bactrian route they reported on a Sero-Indian line with Palimbothra as the starting-point, and what else should have compelled him to enlarge the area of Serica by his southward shift of the eastern terminus of the Imaus (attended by subordinate movements of the ravine of the Comedae, as well as of Sera in the same direction) but the need of space to enter his own additions? From his map we see that besides Palimbothra and the rectified position of Sera, the Marinian specimen of Issedon served him as a means of correlating his own contribution with the previous contents of the map of Marinus.

²⁶) A. Herrmann, Die alten Verkehrswege etc., Zeitschr. d. D. Ges. f. Erdk., Berlin 1914, p. 783.

²⁷) G. E. Gerini, Researches on Ptolemy's Geogr. of Eastern Asia (Asi. Soc. Mono I.), London 1909, p. 77-80, 106-107; J. B. Scrivenor, The geol. Hist. of the Malay Pen., Qu. Journ. Geol. Soc. 69, London 1913, p. 362.

²⁸) *Op. cit.*, 77-80.

²⁹) In my 'Rozbor' I correlated the Thaguri with the Seric town of Thogara (i. e. Thocara, Tochara); there is, however, no correspondent to the Thagurus mons in the Oechardes complex and the ethnonym itself is more closely related to Thagora. — Rabana reminds one of Bē-rabonna and Bē-rabae, i. e. Ramanna (-desa), or Pegu and the Peguans. For the prefix Bē- (so frequent in Ptolemy's toponymy of a part of Further India), see G. E. Gerini, *ibid.*, 728-9.

³⁰) E. Honigmann, Marinos v. Tyros, Pauly-Wissowa, R-E., 14. Bd., 1930, p. 1779.

³¹) *Ibid.* It must, however, be remembered that whilst the periplus were in Marinus' work dealt with methodically, the relative positions of the inland towns to one another or to maritime towns were 'nowhere' (*μηδευή*, I., 18, 5) indicated; here the shortcomings of the lists of coordinates were felt most. This presents a difficulty for the raw-material-theory.

³²) It is the parallels $14^{\frac{1}{2}}^{\circ}$ N lat. (and 14° N, see below), and 22° N lat.

³³) Only those longitudes are indicated that enter into definite relations to the hour system.

³⁴) E. Honigmann, Zur Geogr. des Ptol., Klio XX., Leipzig 1926, p. 209.

³⁵) The place-name of Sachle, i. e. 'shore' (A. Sprenger, *op. cit.*, p. 82) falls long way of the shore of Arabia. Like Pseudocelis, it may be a relic of the elder stage. — N. B. Ptolemy writes the latitude of the tropic as $23^{\frac{1}{2}}^{\circ}$ N lat.: Really the parallels $23^{\frac{1}{2}}^{\circ}$ N and 24° N lat. play an important part in his geography of Africa; farther east, however, they are void of place-names of importance, and the line to take lead (without, however, affecting the position of the associated parallel of 22° N lat.) is $23^{\frac{1}{2}}^{\circ}$ N lat. in Ariana and Cisangetic India, $23^{\frac{1}{2}}^{\circ}$ N in Arabia and Further India (Tosale metr.).

³⁶) K. Müllenhoff, *op. cit.*, I., 363.

³⁷) E. Honigmann, Marinos etc., p. 1780.

³⁸) Occasionally it enables us to exterminate some wrong readings of the MSS and of the modern editions. Müller's figures of $50^{\frac{1}{2}}^{\circ}$ N for the latitude of Traiana (II., 9, 8), $45^{\frac{1}{2}}^{\circ}$ N for Visontium (II., 14, 4), and $44^{\frac{1}{2}}^{\circ}$ N for Tarsium (II., 15, 4) have already been replaced by O. Cuntz (Die Geographie des Ptolemaeus, Berlin 1923, p. 54, 74, and 76); the mention of an $\epsilon\phi\alpha\chi\eta$ in $55^{\frac{1}{2}}^{\circ}$ N lat. (II., 3, 4) is quite suspect to have intruded in the periplus of Britain from elsewhere (cf. II., 11, 2) as it is missed in a great many MSS, and $53^{\frac{1}{2}}^{\circ}$ N for the latitude of Noviomagus (II., 3, 4) is written on conjecture. Drusomagus alone remains in Central Europe, the latitude of which is given as $46^{\frac{1}{2}}^{\circ}$ N in all the MSS consulted by Müller and Cuntz. The vicinity of Italy caused it to be included in the area of the twelfth-system. — Again, L. Renou's text of Ptolemy's India (La géographie de Ptolémée, L'Inde, Paris 1925) is mainly based on the text of the MS Vat. 191, the coordinates being most unfortunately supplied from the much corrupted MS Vat. Palat. 388. Now in Ptolemy's book VII. the thirds of the degree are lavishly employed; unfortunately, for over 200 cases where the MS reads, 'one-third of the degree' ($= 20'$) there is in the whole book only one where it reads $40'$ ($32^{\frac{1}{2}}^{\circ}$ N lat., *op. cit.*, p. 13), the copyist having made no distinction between $7'$ and $70'$. In the present paper only the *lectiones* yielded by the MSS of the group ω (*op. cit.*, p. XV.) are respected.

³⁹) Both the general alignment of the itinerary in Ptolemy's map of Dacia and the disturbed order of the longitudes in the MSS (see Müller's edition, p. 449) prove that the longitude of Sarmizegethusa (47° in the MSS) is to be substituted for that of Argidava ($49^{\frac{1}{2}}^{\circ}$) and reciprocally.

⁴⁰) But there are some slight indications that in the last Diorthosis, at least, all along the southern line of measurement, one degree of longitude was reckoned at 500 stadia.

⁴¹) The case of the Golden Chersonese has been already discussed. Besides, it may be noted that in book I. the following positions are either accepted or proposed at variance with the final representation in II.—VII.: Prasmus pr. $16^{\frac{1}{2}}^{\circ}$ S lat. (I., 10, 1; 15° S lat.: IV., 8, 1); Aromata $4^{\frac{1}{2}}^{\circ}$ N lat. (I., 14, 4; 6° N lat.: IV., 7, 3); the Stone Tower 132° long. (I., 13, 3-9; 135° : VI., 13); the ravine of the Comedae $40^{\frac{1}{2}}^{\circ}$ or 41° N lat. (I., 12, 7; 39° N: VI., 13). In I., 16 the southernmost parallel crossing the Land of the Sacae is the parallel of Hellespontus; in VI., 13 the same area is passed through by the still lower parallels of Smyrna and Rhodes, as the result of a twist of the Imaus ridge. The case of Semylla (I., 17, 3) is a trivial topic in modern studies dealing with Ptolemy's relation to his principal authority.

⁴²) The parallels of Taprobane ($4^{\frac{1}{2}}^{\circ}$ N lat.) and Ocelis ($11^{\frac{1}{2}}^{\circ}$ N lat.) have concentrated at and near themselves several points of Taprobane (VII., 4) which tends to enhance the frequency of fractions in the latitudes. This was more than counterbalanced by the attractive effect of the parallels $12^{\frac{1}{2}}^{\circ}$ N, $8^{\frac{1}{2}}^{\circ}$ N, 0° (and $11^{\frac{1}{2}}^{\circ}$ N), which is in favour of the wholes and the halves. Again, the meridians of the hour system (120° , 125° , 130° , $132^{\frac{1}{2}}^{\circ}$, and 135° long.) influenced the longitudes to the same effect. Excluding all the points whose either longitude or latitude makes them suspect of being influenced in their positions by the lines of the astronomical net-work we get 30 and odd points placed safely outside it, and

there is still in them a very marked surplus of thirds, fourths, and sixths at the side of the latitudes.

⁴³⁾ *Op. cit.*, p. 645.

⁴⁴⁾ When arranging the preliminary list of his own contributions to the map of the world (I, 17), Ptolemy seems to have attached the main importance to his improvement of the map of Barbaria, the periplus of which he quotes at full length, placing it at the close of his list as his culminating achievement. Later he applied several other corrections (see Note 41), but after all his map of the world is in the main identical with that of his predecessor, apart from some subordinate additions. Being for a long time a foreigner in the realm of geography (cf. W. Kubitschek, *Karten*, Pauly-Wissowa R-E., X., 1919, p.), he had an ample opportunity of learning Marinus' methods of working in the course of his occupation with the work he was going to re-edit; he soon mastered them, adopted the fraction system, and conformed to the Marinian method of projection even in the areas of his own cartographical work. — N. B. The sixths of the degree are so small in number and so sparsely distributed over the ~~vicinity~~ of the extra-Mediterranean countries, furthermore they occasionally make their appearance in so whimsical a manner in cases where one is rather expecting a quite crude degree of approximation*) as to make us ask if it was not Ptolemy himself who had introduced them. In fact, in his own map of Central Africa we fall in with one instance of a strange painstakingness in noting the quite arbitrary position of an imaginary point, namely the common vertex of Inner Libya, Inner Aethiopia, and Aethiopia sub Aegypto ($51\frac{1}{4}^{\circ}$ long., $3\frac{1}{2}^{\circ}$ S lat.; IV., 6, 1), and Rhaptum prom. is another instance of Ptolemy's use of the sixths.

*) The reader may compare the longitude of the western source of the river Vistula ($40\frac{5}{8}^{\circ}$) with the rest of the physiography of Germania, and the longitude of Characmoba ($66\frac{1}{8}^{\circ}$, evidently displaced) with those of the other stations of the route from Philadelphia (68° and $68\frac{1}{2}^{\circ}$ long.; cf. Note 22). The case of the Libyci montes has been quoted on p.