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POSEIDONIOS AND THE ORIGINAL CAUSE OF THE MIGRATION OF THE CIMBRI: TSUNAMI, STORM SURGE OR TIDES?

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Résumé. – Une tradition antique qui semble remonter à l'époque augustéenne attribue la cause originelle de la migration des Cimbres et des Teutons à l'inondation marine de leurs terres natales. Cependant, le tout premier auteur qui fournit cette interprétation, Poseidonios de Rhodes, philosophe et savant du début du I^er^ siècle av. n. è., semble la rejeter en même temps. Ce paradoxe demeure encore aujourd'hui objet de controverse historiographique, tandis que la question cruciale des causes environnementales éventuelles de la migration n'a pas été reposée à une date récente. Cet article examine ces deux questions essentielles dans le cadre de la formation intellectuelle de Poseidonios, en prenant en compte les avancées des études paléoenvironnementales contemporaines.

Abstract. – An ancient tradition that could hark back to the Augustan period attributes the original cause of the migration of the Cimbri and Teutones to the sea flooding of their native lands. However, the very first author who provides this interpretation at the beginning of the first century B.C.E., the philosopher and scientist Poseidonios of Rhodes, seems to reject it. This paradox still remains controversial in modern historiography; in addition, the key question about the environmental causes has not been posed in recent years. This paper addresses these two issues taking into account the advances of paleoenvironmental studies in the frame of the intellectual training of Poseidonios

Mots-clés. – Cimbres, Jutland, «onde de tempête», paléoenvironnement, Poseidonios de Rhodes, science antique, Teutons, théorie des marées, tsunami.

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The episode of the migration of the Cimbri and Teutones has long attracted the interest of specialists in Roman ancient history in view of its many implications for the history of Rome, to wit: the political and military history of the end of the Republic shows the significant role these events played in the careers of major figures such as Marius, the victor of these «Barbarians» in 102-101, and Cesar who, fifty years on, deftly and brilliantly exploited the fears summoned by the «Germanic» threat[1]. Furthermore, the history of the Celto-Germanic world hails the first mention of the Cimbri at a turning point, the beginning of the first century B.C.E, the time when Greco-Roman historians began to perceive the reality of a Germanic ethnicity to be distinguished within the vast Celtic world[2]. Finally, it provides an introduction to the ethnographic thinking of polymath Poseidonios of Rhodes, to our knowledge the first classical author to have described and commented the events connected to the invasion of tribal peoples from beyond the Rhine.

At the end of the seventies, E. Demougeot had provided an exhaustive probing of the literary sources relating to the history of the Cimbri and Teutones migration; then, in more recent years, specialists seem to have focused their attention on the specific episodes of military campaigns linked to the invasion or even on the role of the Cimbri in the broader ethnographic context of Poseidonios' *Histories*[3]. Conversely, since the end of the eighties[4], the key question of the environmental causes that may have triggered the migration has not been subjected to further enquiry even though they had been raised – to be instantly dismissed – by our first witness to the facts, Poseidonios of Rhodes. In truth, it has now long been noted that

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1. All the more so since some participants in this event, such as the Helvetian chieftain Divico, were still alive in 58 (cf. Caes., *Gal*., I, 13).

2. For memory, in Ephorus' geography (*FGrHist* 70 F30 = Strabo I, 2, 28), the Germans are ignored and the Celts occupy the Northern expanses between the Western Ocean and the land of the Scythians to the East. This information is relayed by Diodorus of Sicily (V, 32, 1-4) who also identifies Cimbri to Cimmerians, according to Poseidonios (F 272 Edelstein-Kidd = Strabo VII, 2, 1). Therefore, even if Diodorus does not quote the polymath as his source, it seems likely that Cimbri are Celts for Poseidonios: cf. F. Jacoby, *FGrHist,* 2, II, C, *Kommentar zu 64-105*, Berlin 1926, p. 48-49; Ch. Van Paassen, *The Classical Tradition of Geography*, Groningen 1957, p. 248; M. Martin, «Cimbri e Germani nelle "Storie" di Posidonio d'Apamea», *Itineraria* 2, 2003, p. 15-30.

3. E. Demougeot, «L'invasion des Cimbres-Teutons-Ambrons et les Romains», *Latomus* 37-4, 1978, p. 910-938. On the political and military aspects: T. Luginbühl, «Les Cimbres et les Teutons, histoire d'une migration», *Chronozones* 2, 1995, p. 14-29; G.P. Givigliano, «Cesare ed il mito eroico dei Cimbri e dei Teutoni», *Miscellanea di studi storici* 12, 2002-2003, p. 35-65; R. J. Evans, «Rome's Cimbric Wars (114-101 BC) and their impact on the Iberian peninsula», *AClass* 48, 2005, p. 37-56. More generally, cf. also D. Timpe, «Kimberntradition und Kimbernmythos» in B. and P. Scardigli ed., *Germani in Italia*, Rome 1994, p. 23-60; T. S. Burns, *Rome and the Barbarians, 100 B.C.-A.D. 400*, Baltimore-Londres 2003, p. 68-87. For the recent studies on Poseidonian ethnography cf. M. Martin, «Cimbri e Germani...», *op. cit*.; S. Giurovich, «Considerazioni sul procedere etnografico posidoniano: ethos vs Historia. L'esempio dei Galli Scordisci e dei Galli Tectosagi», *RSA* 35, 2005, p. 42-52; M. Martin, *Posidonio d'Apamea e i Celti. Un viaggiatore greco in Gallia prima di Cesare*, Rome 2011, p. 383-411 (on the Cimbri).

4. Cf. especially the very interesting article of U. Cozzoli, «Maree dell'Oceano e tradizioni su spostamenti di popoli», *CISA* 15, 1989, p. 103-115.

the archaeological data cannot alone offer conclusive evidence on the changes in land use and occupancy taking place at the supposed time of the migration[5], hence the necessity to turn to sources of another nature. Whilst not claiming to arrive at a final resolution of the problem, we nevertheless venture to think that the advances over recent decades in the knowledge of the sedimentary archives of the North Sea fringes allow for a re-examination of environmental modifications on firmer grounds. On that basis it should become possible to seek to understand the reasons for the apparent contradiction in the testimony of Poseidonios of Rhodes.

I – THE ACCOUNT OF POSEIDONIOS

In his works, Poseidonios addressed the Cimbrian migration question giving it two apparently differing explanations. In fact, his account has reached us via Strabo's *Geography,* in which he reports our philosopher's views on two occasions. The first (II, 3, 6) follows immediately a piece about the myth of the destruction of Atlantis, which he appears to have quoted as an example of seismic activity[6]. There Poseidonios gave as the cause of migration an incursion of the sea: «Poseidonios conjectures also that the migration of the Cimbri and their kin from their native land occurred because of an advancing of the sea which did not take place suddenly» (Εἰκάζει δὲ καὶ τὴν τῶν Κίμβρων καὶ τῶν συγγενῶν ἐξανάστασιν ἐκ τῆς οἰκείας γενέσθαι κατὰ θαλάττης ἔφοδον, οὐκ ἀθρόαν συμβᾶσαν)[7].

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5. The history of the migration of the Cimbri is linked to the very complex question of the identification of a first «Germanic» culture in the framework of the Jastorf culture and its subsequent Ripdorf and Seedorf phases. Cf. B. Krüger ed., *Geschichte und Kultur der germanischen Stämme in Mitteleuropa*, vol. I, Berlin 1986, p. 86-105, 191-240; M. Todd, *The Northern Barbarians 100 BC-AD 300*, Oxford 1987, p. 39-76; T. S. Burns, *Rome and the Barbarians*, p. 79 *sq*.

6. Strabo II, 3, 6 = F 49 Edelstein-Kidd: «Plato says that Solon reported from information from the Egyptian priests that it (*Atlantis*) once existed and then disappeared, no less than a continent in size. **Posidonius thinks it is better to say that** than that its inventor made it disappear, as the Poet did with the wall of the Achaeans» (cf. Posidonius, Vol. III., *The Translation of the Fragments*, I.G. Kidd ed., Cambridge 1999, p. 121). On the myth of Atlantis: Plato, *Ti*. 25d; *Cri*. 109a. Author of a commentary on the Timaeus, Poseidonios credited, according to Strabo, the myth of Atlantis, that Plato situated along the Atlantic coast of the straits of Gibraltar. For the editions of Poseidonios' fragments, cf. Posidonius, Vol. I., *The fragments*, L. Edelstein, I. G. Kidd ed., Cambridge 1972; Poseidonius, *Die Fragmente*, W. Theiler ed., Berlin-New York 1982; Posidonio, *Testimonianze e frammenti*, E. Vimercati ed., Milan 2004.

7. Our own translation. G. Aujac (Strabon, *Géographie*, T. I, 2e partie. *Livre II*., G. Aujac ed., Les Belles Lettres, Paris 1969, p. 67, and commentary p. 146-147), faithful to the manuscript text, accordingly translates the passage in French thus: «Poséidonius conjecture également que l'émigration hors de leurs demeures des Cimbres et des peuplades proches se fit au moment d'une avancée de la mer qui eut lieu progressivement». The latest edition of S. Radt, (*Strabons Geographika*, Band 1. *Prolegomena*. *Buch I-IV*, S. Radt ed., Göttingen 2002, p. 248), also preserves the text of the manuscript (οὐκ ἀθρόαν συμβᾶσαν). By contrast, following other authors, I.G. Kidd (Posidonius, Vol II., *The commentary*. *T. 1 : Testimonia and fragments 1-149*, Cambridge 1988, p. 259-262, with full bibliography), suggested that the negative οὐ was misplaced (cf. *infra*).

However, in another context, Poseidonios offered a thoroughly different interpretation. Indeed in book VII (2, 1-2) of his *Geography*, Strabo, still quoting Poseidonios, mentions the theory according to which the Cimbri may have been forced out of their peninsula by a great flood tide (μεγάλῃ πλημμυρίδι). Following this event, and because of it, they allegedly became a people of nomadic raiders. To Strabo, this theory is pure fiction for, he writes, in his own time, under Augustus, this population is still established in its country, a peninsula the name of which he fails to mention. Furthermore, he adds, «it is a ridiculous hypothesis that they departed from their area through losing their temper at a perpetual natural phenomenon that happens twice a day. And that at some time there occurred an excessive floodtide looks like fiction; for although the ocean admits of increases in severity and slackenings, yet they are ordered and regular when it is affected in this way»[8]. Did these observations result from Strabo's own reasoning or were they included in a theory developed by Poseidonios? The latter seems more likely since at the end of the text, Strabo concludes: «Poseidonios is right to make these criticisms against the historians, and his own explanation is not a bad conjecture, that it was because the Cimbri were piratical and nomadic that they made a campaign even as far as the country round Lake Maeotis, and the Cimmerian Bosporus was named after them»[9].

Actually, the entirety of Strabo's text, barring the short passage relating to events from the Augustan Age, is attributed by modern editors to Poseidonios[10]. However, it is not that easy to distinguish what belongs in Poseidonios' works from what came of Strabo's reworking. Among the diverse authors who have studied the two accounts by Strabo, some have surmised that the geographer had misunderstood Poseidonios or even that the latter had expressed two different opinions concerning the original cause of the migration of the Cimbri: first associated (in his treatise *On the Ocean*) with a cataclysmic tidal wave, the migration received later, in his historic work, an ethnographic interpretation[11].

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8. Strabo VII, 2, 1 = F 272 Edelstein-Kidd (I. G. Kidd's translation). Strabo/Poseidonios continues, deriding the affirmations of historians of the fourth century, Ephorus and Cleitarchus, who made the case for similar phenomena with regard to the Celts and other peoples.

9. Strabo VII, 2, 2 = F 272 Edelstein-Kidd (I. G. Kidd's translation).

10. F. Jacoby, *op. cit.*, p. 179-184 (commentary in 87 F28 and in 87 F31, the former attributed to the treatise *On the Ocean* and the latter to the *Histories*); Theiler F 13 and 44a (both attributed to *On the Ocean*); Edelstein-Kidd F 49 and 272 (the former attributed to the treatise *On the Ocean* and the latter not attributed to a specific book); Vimercati F A129 and A165 (the latter attributed to the *Histories* and the former of unknown provenance). See also, Strabon, *Géographie*, T. IV. *Livre VII*, R. Baladié ed., Paris 1989, p. 185, n. 1 and Posidonius, Vol II., *The commentary. T. 2 : Fragments 150-293*, I.G. Kidd ed., Cambridge 1988, p. 922-932.

11. According to F. Jacoby, *op. cit.*, p. 179-184, in his treatise *On the Ocean*, Poseidonios apparently asserted that the Cimbri had migrated subsequently due to a seismic episode causing a gradual subsidence (hence the reference to Atlantis). In the *Histories*, without having necessarily changed his mind on the original circumstances, he stressed the actual cause, that is, the nature of the people; Strabo could thus have misunderstood him since he refers to an extreme tide whilst Poseidonios had in mind a seismic shift. By contrast, according to U. Cozzoli, *I Cimmeri*, Rome 1968, p. 39-43, Strabo had correctly understood Poseidonios' writing in which the philosopher had indeed given two different causes for the migration in two distinct books, the treatise *On the Ocean* and in the *Histories*. His opinion is shared by S. Giurovich, *art. cit.*, p. 49-52. Cf. also Ch. Van Paassen, *The Classical*

Others have opined that the second of the texts alone reflects the authentic substance of Poseidonios' thought and that the contents of Stabo's book II, 3, 6 must be corrected accordingly. It should be noted that these have been emended numerous times by modern editors who found a contradiction with the text of Strabo VII, 2, 1-2. Some supposed a lacuna in the text or suggested the removal of the negative οὐκ before ἀθρόαν συμβᾶσαν. In this case, the passage would be translated, «as the result of an inundation of the seas that came on all of a sudden»[12]. Others imagined that the negative οὐ could have been misplaced, preceding γενέσθαι κατὰ θαλάττης ἔφοδον and not ἀθρόαν συμβᾶσαν and should be translated, accordingly, «the migration of the Cimbri and their kin from their native land did <not> arise from an encroachment of the sea that flooded all at once» [13].

As we can see, the apparent contradiction between these two texts has exercised specialists' pens a great deal and even today we are not in a position to offer a definitive answer to what actually set off the migration of the Cimbri and the Teutones. Leaving aside the testimony of Poseidonios himself, who, during his visit to Transalpine Gaul between 100 and 90 BCE, may well have come across actual participants in the event, a reliable nucleus endures of a tradition concerning a sea flooding of the Cimbri's territory which harks back to the Augustan period at the earliest. It was recounted in Verrius Flaccus, Timagenes and perhaps Livy[14]. Thus, relying

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Tradition of Geography, p. 335-336. According to I.G. Kidd, (Posidonius, Vol II., *The commentary*, *op. cit.*, p. 928), the two texts "seem" incompatible, for in the treatise *On the Ocean* Poseidonios admitted that the Cimbri's seaboard could be affected by seismic phenomena but in the *Histories* he rejected such a phenomenon as the true cause of the migration. However, I.G. Kidd suggests an emendation to solve this problem: cf. *supra* note 7 and *infra* his translation.

12. Cf. H. L. Jones's edition of the Greek text and translation (Strabo, *The Geography*, vol. I, Loeb Classical Library, London-New York 1917, p. 392-393).

13. Posidonius, Vol. III., *The Translation of the Fragments*, I.G. Kidd ed., *op. cit.*, p. 121.

14. Verrius Flaccus *apud* Festus and Florus explicitly ascribed the migration of the Cimbri and the Teutones to sea flooding, which the former author describes as «sudden» (*subita*). Cf. Fest. p. 15 L.: *Ambrones fuerunt gens quaedam Gallica, qui subita inundatione maris cum amisissent sedes suas, rapinis et praedationibus se suosque alere coeperunt…* Flor. I, 38, 1: *Cimbri, Teutoni atque Tigurini ab extremis Galliae profugi, cum terras eorum inundasset Oceanus, nouas sedes toto orbe quaerebant…* For E. Demougeot, *art. cit.*, p. 917, Florus' account is drawn from Livy from whom we only have the *periochae* for this period. This is feasible but not certain given the author and the period's eclecticism: cf. Publius Annius Florus, *Storia di Roma. La prima e la seconda età*, C. Facchini Tosi ed., Bologna 1998, p. 21-23. Florus and Festus' accounts may have links with Ammianus Marcellinus' testimony (XV, 9, 4) for which the explicitly quoted source is Timagenes, a Greek author of the Augustan period: *Druydae memorant reuera fuisse populi partem indigenam, sed alios quoque ab insulis extimis confluxisse et tractibus transrhenanis, crebritate bellorum et alluuione feruidi maris sedibus suis expulsos*. «The Druids affirm that a portion of the people was really indigenous to the soil, but that other inhabitants poured in from far islands, and from the districts across the Rhine, having been driven from their former abodes by frequent wars, and by flood of tempestuous sea». Cf. also, E. Galletier and J. Fontaine (Ammianus Marcellinus, *Histoire*, T. I, livres XIV-XVI, Les Belles Lettres, Paris, 1968, p. 259-260) who translate *alluuione feruidi maris* as «raz-de-marée d'une mer orageuse». That text does not mention explicitly the migration of the Cimbri and the Teutones, but the terminology, used by Ammianus Marcellinus in another passage (XXX, 5, 12) relating to it (*inundarunt Italiam ex abditis Oceani partibus Teutones repente cum Cimbris*), which mirrors Florus and Festus' accounts, makes it possible to also connect the preceding text to the sea flooding tradition. Particularly noteworthy therein, the reference to the

on information well established in classical tradition, modern authors have held for the theory of an ocean-induced «natural disaster» and, in order to explain it, they have alluded at times to seismic activity causing a collapse of the seaboard, at times to a gradual rise in sea level (Flandrian transgression), or even to a storm surge[15]. The first hypothesis, once championed by F. Jacoby and still repeated thereafter[16], rested essentially on the interpretation of Poseidonios' fragment in the context of what precedes it, namely the examination of the subsidence and uplifting of continents with the exemplar of Atlantis. However other explanations were soon enough put forward that fit better with what is known of ocean dynamics and with the experiences of contemporary history, most notably the storm of 31 January -1 February 1953, which caused thousands of deaths on the North Sea coasts of the United Kingdom and the Netherlands. Nearer to us, however, classical historians delving into the Cimbrian migrations episode have not revisited this aspect of the record in their research. An update would have the advantage of framing the problem in a better-founded context, on the basis of recent advances in environmental sciences and geo-archaeology.

II – THE HOMELAND OF THE CIMBRI

A few prior clarifications are required, however, in order to define a geographic framework for our research. The Cimbri homeland is by and large identified with the Jutland peninsula, from Cape Skagen to Schleswig-Holstein at its southernmost end, with the Teutones as their close neighbours on that same land[17] (fig. 1). The most ancient geographic information on the people living in these regions goes back to the fourth century B.C.E, since Pytheas of Massalia located the Teutones near the estuary of the Northern Ocean called *Metuonis*[18]. The

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«druids' tradition», which could indicate that Timagenes had been able to access some local sources in the same way as Livy and Verrius Flaccus could draw from the previous generation's annalistic tradition, with testimonies from Romans involved in military operations against the «Barbarians». On Timagenes as a source of Ammianus Marcellinus cf. M. Martin, «Fonti per l'etnografia gallica in Ammiano Marcellino (*Res gestae* 15, 9-12)», *Koinonia* 30-31, 2006-2007, p. 87-99 (with earlier bibliography).

15. On the rising of the sea tide relative to the Flandrian transgression cf. L. Harmand, *L'Occident romain*, Paris 1960, p. 17. U. Cozzoli, «Maree dell'Oceano e tradizioni...», *op. cit.*, p. 103-115, likewise evokes this, but makes reference above all to the winter catastrophe of 1953, brought about by «storm waves». Cf. also E. Galletier and J. Fontaine (Ammianus Marcellinus, *Histoire*, T. I, livres XIV-XVI, *op. cit.*, p. 259-260), who translate *alluuione* as «raz-de-marée», *i.e.* tsunami, while specifying in the commentary that the phenomenon in question more closely resembles «storm waves», as in the winter of 1953.

16. F. Jacoby, *op. cit.*, p. 179-184; U. Cozzoli, *I Cimmeri..., op. cit.*; S. Giurovich, *art. cit.*; Posidonius, Vol II., *The commentary*, I.G. Kidd ed., *op. cit.*, p. 928.

17. E. Valgiglio, «Considerazioni sulla storia dei Cimbri e dei Teutoni», *RSC* 3, 1955, p. 3-6; B. Melin, *Die Heimat der Kimbern*, Uppsala 1960; R. Hachmann, «Die Heimat der Kimbern», *Gnomon* 34, 1962, p. 56-65; K. Dietz, art. «Cimbri» in H. Cancik, H. Schneider ed., *Brill's New Pauly*, *Antiquity*, Brill Online, 2006.

18. Pytheas *apud* Plin., *Nat.* XXVII, 35 = F 11a Mette = F 15 Bianchetti. There is no consensus as to the Massaliote mariner's itinerary: the commentators who believe he reached the Baltic Sea place the Metuonis estuary there, whereas those who reckon he did not go beyond Cape Skagen place it in the south-east of the North Sea. The latter opinion is shared by S. Bianchetti, (Pitea di Massalia, *L'Oceano*, S. Bianchetti ed., Pisa-Roma 1998,

Figure 1: the Wadden Sea area and the homeland of the Cimbri.

p. 195-200, with earlier bibliography). It is worth noting that Ptolemy (*Geog*. II, 11, 17) does not place the Teutones in Jutland but further east, near the Suebi, fairly far from the Cimbri who had only settled the northernmost end of the peninsula (*ibid*. II, 11, 12). It is, however, permissible to doubt that his report truly fits the reality of the second century B.C.E. Nor is it unreasonable to wonder whether this could be the ethnic reality of the second century C.E. or a reprise of Pytheas' and Timaeus' Greek geographic tradition of the fourth-third centuries B.C.E., also to be found in Pliny the Elder.

course of the Massaliote mariner's voyage leaving much to speculation, we had best turn to accounts from the Roman era for more reliable information on their precise location. In the Augustan era, Strabo was content to situate the homeland of the Cimbri on a peninsula somewhere between the Rhine and the Elbe. Later, in the first century C.E., this peninsula was equated with Jutland-Schleswig thanks to accounts from Pomponius Mela, Pliny the Elder and Tacitus[19]. Indeed, Pomponius Mela and Pliny place the Cimbri above the Elbe near a *Codanus* Gulf dotted about with islands among which the island of *Scatinavia*, hence the identification of this gulf with the western coast of the Baltic Sea. Pliny the Elder, who mentions the name of Scandinavia, also knew the name of the peninsula where the Cimbri lived, *Tastris*, the headland of which flanked the *Codanus* Gulf. Finally, both Pliny and Tacitus allow for the conclusion that the other coastline of the peninsula where the Cimbri lived faces the North Sea. Tacitus, after mentioning the Frisii from the Rhine estuary and the Chauci of the River Ems, asserts that *eundem Germaniae sinum proximi Oceano Cimbri tenant*, further indicating that their camps, the remains of which are still extant, settled both banks (*utraque ripa castra ac spatia*)[20]. Likewise, Pliny the Elder, having just mentioned the Cimbri's headland at the end of the *Tastris* Peninsula, added that there could be found the twenty-three islands the Romans had come across during their military expeditions (*XXIII inde insulae Romanis armis cognitae*), which never went beyond the Cimbri's headland and the confines of the North Sea[21]. Among those islands lies *Burchana*, also known as *Fabaria*, today's Borkum, westernmost of the East Friesian islands in the North Sea. Also in the North Sea but off the West coast of Schleswig-Holstein, lies the island of Amrum which, linguistic research suggests, draws its name from the Ambroni people, fellow travellers to the Cimbri and the Teutones on their way within the boundaries of

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19. Strabo VII, 1, 2 and VII, 1, 4. Mela III, 31-32: *Super Albim Codanus ingens sinus magnis paruisque insulis refertus est…qua litora adtingit, ripis contentum insularum non longe distantibus et ubique paene tantundem, it angustum et par freto, curuansque se subinde longo supercilio inflexum est. In eo sunt Cimbri et Teutoni*. Plin., *Nat*. IV, 96-97: *mons Saeuo ibi inmensus nec Ripaeis iugis minor inmanem ad Cimbrorum usque promunturium efficit sinum, qui Codanus uocatur refertus insulis quarum clarissima est Scatinauia… Promunturium Cimbrorum excurrens in maria longe paeninsulam efficit quae Tastris appellatur*. Tac., *Ger.* 37. For the Cimbrian peninsula, cf. also Ptol., *Geog*., II, 11, 2; II, 11, 11; II, 11, 33 (its position is compared to the isle of Scandinavia).

20. Tac., *Ger*. XXXVII, 1. It is reasonable that for *sinus* one should read *peninsula*, as is suggested also by J. B. Rives, (Tacitus, *Germania*, J. B. Rives ed., Oxford 1999, p. 270). It is generally considered that *ripa* refers to the banks of a river, the Rhine or the Elbe, or even the riverine border of the Rhine-Danube, (*ibid*., p. 273 *ad loc*.). It is worth noting that *ripa* could also mean «the shelving margin of a sea», in this case it could also refer to the two seashores, on the North Sea and the Baltic, of the peninsula inhabited by the Cimbri. However, it is very difficult to retain this hypothesis, given the obsolete information intentionally used by Tacitus and the lack of reliability of his «subversive geography» of *Germania* (for these aspects see Z. M. Tan, «Subversive Geography in Tacitus' Germania», *JRS* 104, 2014, p. 181-204).

21. Plin., *Nat*., II, 67: *septentrionalis uero oceanus maiore ex parte nauigatus est, auspiciis Diui Augusti Germaniam classe circumuecta ad Cimbrorum promunturium*. That information is confirmed by Tac., *Ger.* 34 and by Augustus himself, *Res Gestae* 26, 4: *ab ostio Rheni ad solis orientis regionem usque ad fines Cimbri nauigavit*. The twenty-three islands of the Frisian region were explored following Tiberius' expedition in 5 C.E. The Roman army of Germanicus found itself in the same area of the mouth of the Ems, after withstanding a formidable storm on 16 C.E., following Tac., *Ann*., II, 23-24.

the Roman Empire[22]. Now, it is precisely in connection with that people, the Ambroni, that the mention of a sudden flood appears in Festus (p. 15 L.). As the Ambroni were much less well known than the Cimbri and the Teutones, we have here a *lectio difficilior* to verify the tradition, which thus would situate the sea flood event on the North Sea coasts. All earlier studies had every justification in seeking along the North Sea coasts the origins of the natural phenomenon that catalysed the migration[23]. Accordingly, we shall in turn focus our attention on the North Sea coastline between Schleswig-Holstein and Jutland's northernmost end.

III – SEA-FLOODING AND PALEO-ENVIRONMENTAL STUDIES

Within the confines of the geographic framework thus established, the hypothesis equating the sea flood that triggered the migration of the Cimbri with the Flandrian transgression begins to appear distinctly less plausible, for several reasons. In the first place, the phenomenon of progressive sea level rise during the Holocene did not proceed uniformly over that space as a whole. Indeed, Jutland's northernmost end was rebounding after the thaw of the ice that had covered it during the ice age, thus evening out the eustatic rise of the ocean: on Skagen Odde, the sea level was dropping until 2000 years ago or thereabouts and stabilized some time thereafter[24]. Elsewhere, from south-western Denmark down to the German coast of Lower Saxony, whilst recent studies confirm a constant rise of sea levels by some 25 m since 7500 B.P., specialists also allow for significant regional variations in the rhythm of the marine transgression[25] with slowdown periods specific to the diverse zones and which may have made the temporary

22. According to Plutarch, *Mar.* 19, the Ambroni had been the most warlike among the Teutones. In Cassius Dio (XLIV, 42, 4 and L, 24, 4), in listing the Germanic enemies of Rome, the Ambroni are associated with the Cimbri. Cf. E. Valgiglio, *art. cit.*, p. 6, for linguistic studies of place-names of the Ambroni, but also of the Cimbri and the Teutones (these last two situated respectively to the southeast and the northwest of Limfjord, on the Jutland peninsula).

23. Also, for example, M. Ihm, art. «Cimbri» in *RE* III, 2, Stuttgart 1899, col. 2547-2553 (col. 2550), which recalls the disastrous flood of 1634, which killed 10,000 persons in Frisia and 15,000 in Schleswig-Holstein.

24. L. H. Nielsen, P. N. Johannessen, «Facies architecture and depositional processes of the Holocene-Recent accretionary forced regressive Skagen spit system, Denmark», *Sedimentology* 56, 2009, p. 935-968. In earlier studies, the sea level had been thought to be falling since 2450 BP with a period of stability starting in 1650 BP: L. B. Clemmensen, N. Richardt, C. Andersen, «Holocene sea-level variation and spit development: data from Skagen Odde, Denmark», *The Holocene* 11, 2001, p. 323-331.

25. Thus, for instance, on the Danish coast of the Wadden Sea, the curve for sea level rise is notably different from that of the German coastline, probably because of the subsidence affecting the south-western part of the Jutland Peninsula: cf. K. Szkornik, W. R. Gehrels, A. S. Murray, «Aeolian sand movement and relative sea-level rise in Ho Bugt, western Denmark, during the 'Little Ice Age'», *The Holocene* 18, 2008, p. 951-965; J. B.T. Pedersen, S. Svinth, J. Bartholdy, «Holocene evolution of a drowned melt-water valley in the Danish Wadden Sea», *Quaternary Research* 72, 2009, p. 68-79. For German coasts of the Wadden Sea cf. G. Gerdes, F. Watermann, «Major and minor effects of Holocene sea-level rise recorded from microfossils and Ca:Sr ratios in coastal sequences of NW Germany», *The Holocene* 13, 2003, p. 423-432; H. Streif, «Sedimentary record of Pleistocene and Holocene marine inundations along the North Sea coast of Lower Saxony, Germany», *Quaternary International* 112, 2004, p. 17-22; K.-E. Behre, «A new Holocene sea-level curve for the southern North Sea», *Boreas* 36, 2007, p. 82-102.

setting in of pedogenesis phases possible here and there. Whereas to the southwest of Denmark the sea-level rise, although fairly slow, does not appear to have experienced any fluctuation between 2500 and 1500 B.P.[26], on the German coast of the Wadden Sea, the sea level seems to have reached its current level circa 3500 B.P. and to have fluctuated up and down ever since[27]. More to the point, for the sector of the Wadden Sea stretching from the Ems estuary in Lower Saxony to Schleswig-Holstein, K. E. Behre had suggested a similar curb, notably including a transgressive phase (corresponding to Dunkirk I), which, starting around 1000 B.C.E., could have peaked between 400 and 150 B.C.E. It is thought that, at the turn of the era, a regression followed, accompanied by the formation of a paleosol and the cultivation of coastal zones. This reconstruction had the further advantage to rely on archaeological data: in the Ems sector the proto-historic sites established along the river banks were indeed abandoned circa 300 B.C.E. for a period that lasted until 100 B.C.E. or so[28]. One might have been tempted to establish a link between this very phase and the migration of the Cimbri and the Teutones; however other studies have shown that the transgressive phase of the 400-150 B.C.E. could only be clearly identified in the Ems region and that it cannot be extended to the whole of the Wadden Sea coasts. On the contrary, all along the coast stretching from Lower Saxony to Schleswig-Holstein, significant differences in the rhythm of the rise of sea levels can be observed for sectors lying at very short distances from one another, as a result of complex interactions between sea-level oscillations and hydrological and morphological conditions[29].

Meanwhile, although these studies on the eustatic rise in sea-levels do not provide for the identification of an accelerated phase that could have set off the flooding of the land inhabited by the Cimbri, they no less inform us on the living conditions and land use on the seaboards of the Wadden Sea. In Lower Saxony, on the banks of the Ems and the Weser rivers, the settlements which were established on natural levees since the late Bronze Age-early Iron Age (10^{th}-9^{th} century B.C.E. until the Roman period) have been covered with tens of centimetres of sediment during the successive flood phases. Starting at the beginning of our era, the colonisation of coastal zones between the Ems and the Elbe began in earnest, proceeding, during the first century C.E., into the south of the Jutland peninsula (Dithmarschen and Eiderstedt): settlements got established on artificial mounds (*Wurten*), the height of which would be raised gradually

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26. J. B.T. Pedersen, S. Svinth, J. Bartholdy, *art. cit.*

27. K.-E. Behre, «A new Holocene sea-level curve...», *art. cit.*

28. K.-E. Behre, «Coastal development, sea-level change and settlement history during the later Holocene in the Clay District of Lower Saxony (Niedersachsen), northern Germany», *Quaternary International* 112, 2004, p. 43.

29. H. Streif, *art. cit.*, p. 22 (which cites also a phase of flooding after 2300 BP at the mouth of the Elbe); D. Hoffmann, «Holocene landscape development in the marshes of the West Coast of Schleswig-Holstein, Germany», *Quaternary International* 112, 2004, p. 29-36; F. Bungenstock, H. J. T. Weerts, «The high-resolution Holocene sea-level curve for Northwest Germany: global signals, local effects or data-artefacts?», *International Journal of Earth Sciences (Geol. Rundsch)* 99, 2010, p. 1687-1706 (with a reasoned critique of the Behre's curb).

to meet successive floods[30]. The chronology of these structures is consistent with the time of Corbulo's expedition against the Chauci settled between the Ems and the Elbe. And it is indeed their *tumuli alti* and their *tribunalia* that Pliny the Elder, a member of the 47 C.E. expedition, describes in his *Natural History*[31]. It may further be surmised that when fourth century B.C.E. Greek authors described the Celts as busy repeatedly rebuilding their dwelling destroyed by the Ocean tides[32], they relied on authentic reports of the coastal dwellings along the North Sea. Sailing along that sea's coasts, Pytheas may well have seen the raised dwellings of the Freesi's ancestors who had settled the seaboard beyond the River Rhine as early as 600 B.C.E.[33].

Classical authors offer a rather dreary vision of the North Sea coastal dwelling populations, totally at the mercy of natural forces and untutored in the art of farming. In fact, in Dutch Friesland, as early as the first century B.C.E., the first dikes were being built to protect arable land: relatively modest in height, the barriers they formed could block floods during the best part of the year barring wintertime, when the sediment deposits from sea floods served to fertilise the cultivation plots[34]. These early practices in soil management and sea defence bear

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30. H. Streif, *art. cit.*, p. 22; K.-E. Behre, «Coastal development…», *art. cit.,* p. 45 *sq.*; D. Meier, «Man and environment in the marsh area of Schleswig-Holstein from Roman until late Medieval times», *Quaternary International* 112, 2004, p. 55-69. The northern Friesian seaboard does not appear to have been colonized before the early Middle Ages but the salt marshes were probably exploited as grazing land by the local populations. For some general information about the *Wurten*: E. Strahl, art. «Wurt und Wurtsiedlung» in *Reallexikon der Germanischen Altertumskunde* 34. 2. Aufl., Berlin-New York 2006, p. 351-358.

31. Plin., *Nat.*, XVI, 1, 2-3: *Diximus esse in oriente quidem iuxta oceanum complures ea in necessitate gentes; sunt uero et in septentrione uisae nobis Chaucorum, qui Maiores Minoresque appellantur. Vasto ibi meatu bis dierum noctiumque singularum interuallis effusus in inmensum agitur Oceanus, operiens aeternam rerum naturae controuersiam dubiamque terrae sit an partem maris. Illic, misera gens, tumulos optinent altos aut tribunalia exstructa manibus ad experimenta altissimi aestus, casis ita inpositis nauigantibus similes cum integant aquae circumdata, naufragis uero cum recesserint, fugientesque cum mari pisces circa tuguria uenantur.* «We have indeed stated that in the east, on the shores of the ocean, a number of races are in this necessitous condition; but so also are the races of people called the Greater and the Lesser Chauci, whom we have seen in the north. There twice in each period of a day and a night the ocean with its vast tide sweeps in a flood over a measureless expanse, covering up nature's age-long controversy and the region disputed as belonging whether to the land or to the sea. There this miserable race occupy elevated patches of ground or platforms built up by hand above the level of the highest tide experienced, living in huts erected on the sites so chosen, and resembling sailors in ships when the water covers the surrounding land, but shipwrecked people when the tide has retired, and round their huts they catch the fish escaping with the receding tide». (H. Rackham's trans., Loeb)

32. According to Ephorus (*FGrHist* 70 F 132 *apud* Strabo VII, 2, 1-3):...ἀφοβίαν οἱ Κελτοὶ ἀσκοῦντες κατακλύζεσθαι τὰς οἰκίας ὑπομένουσιν, εἶτ'ἀνοικοδομοῦσι. «…the Celti trained their fearlessness by enduring the engulfing of their homes and then rebuilding».

33. P.C. Vos, «The Subatlantic evolution of the coastal area around the Wijnaldum-Tjitsma terp» in J.C. Besteman *et al.* ed., *The excavations at Wijnaldum. Reports on Frisia in Roman and Medieval times*, Vol. I, *Balkema*, Rotterdam-Brookfield 1999, p. 33-72. For a general presentation of Dutch *Terpen*, the same as the German *Wurten*, cf. S. Lebecq, «De la protohistoire au Haut Moyen Âge: le paysage des "terpen" le long des côtes de la mer du Nord, spécialement dans l'ancienne Frise» in *Actes des congrès de la Société des historiens médiévistes de l'enseignement supérieur public. 10e congrès 'Le paysage rural: réalités et représentations'*, Lille 1979, p. 125-151.

34. A. Nieuwhof, «Living in a dynamic landscape: prehistoric and proto-historic occupation of the northern-Netherlands coastal area», *Wadden Sea ecosystem* 26, 2010, p.173-178.

out the local peoples' sound adaptability to a very restricting environment at a time approaching that of the Cimbrian migration. Consequently, if the latter should be connected to sea flooding, the origin of the phenomenon is more likely to be found in an exceptionally catastrophic event.

The hypothesis of a sea flood caused by a tsunami can be dismissed *a priori* for, although some seismic activity was indeed extant in the North Sea area, that area, along with the Atlantic zone closest to it, is situated far from fault lines, specifically from the subduction zones liable to cause major tsunamis. As for submarine landslides, likewise responsible for such disasters, although one is known to have caused such a tsunami in the area under scrutiny[35], the low probability of such a phenomenon occurring within that timeframe leads us to think that hypothesis most unlikely for the period at the end of the second century B.C.E.

Conversely, since the last century if not before, the hypothesis of a storm-related sea-flood has been cited with good cause on the basis of History's more or less recent experience[36]. Indeed, since the Middle Ages right up to the current period, the documentation concerning flooding resulting from «storm surges», particularly destructive when associated with equinox tides, is extensive[37]. What is now south-western Denmark and Schleswig-Holstein often fell victim to this type of disaster: in the region of North Frisia, for instance, a catastrophic storm tide («Grote Mandrenke») is recorded in 1362 and later, that of 1634 caused the loss of broad coastal zones producing thousands of victims[38]. By contrast, on Jutland's north-western coasts beyond the Blåvandshuk headland, under the direct effect of oceanic winds and waves, and no longer that of tides, sea floods have, over the centuries, caused the accumulation inland of

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35. Namely the «Storegga Slide» tsunami, resulting from the slide of an enormous underwater sedimentary plate off the Norwegian coast which caused cataclysmic floods *circa* 8200 B.P. It is one of the most important tsunamis recorded for the Holocene, leading to the complete flooding of the Doggerland area, lying in the North Sea between Britain and European Mainland. This event also had a major impact on Jutland's western coastline. Cf. B. Weninger *et al*., «The catastrophic final flooding of Doggerland by the Storegga Slide tsunami», *Documenta Praehistorica* 35, 2008, p. 1-24. In the Shetlands the passage of two other tsunamis have been traced, one towards 5500 B.P., the other towards 1500 B.P.: S. Bondevik *et al*., «Evidence for three North Sea tsunamis at the Shetland Islands between 8000 and 1500 years ago», *Quaternary Science Reviews* 24, 2005, p. 1757-1775.

36. Cf. for ex. M. Ihm, *art*. «Cimbri», col. 2550. Accordingly, H. Lamb, *Historic Storms of the North Sea, British Isles and North-west Europe,* in coll. with K. Frydendahl, Cambridge 1991, p. 3, considers that the history of storm surges «goes back at least to the Cimbrian flood of the coasts about the German Bight around 120 B.C., which set off a migration of the Celtic tribes previously settled there».

37. H. Lamb, *op. cit*., (with earlier bibliography); A. M. J. de Kraker, «Historic Storms in the North Sea Area, an Assessment of the Storm Data, the Present Position of Research and the Prospects for Future Research» in G. Wefer *et al*. ed., *Climate Development and History of the North Atlantic Realm*, Berlin-New York 2002, p. 415-434; A. M. J. de Kraker, «Storminess in the Low Countries, 1390-1725», *Environment and History* 19, 2013, p. 149-171.

38. In 1362 a territory covering about one hundred parishes was flooded. Ancient chronicles talk of 100,000 deaths (30,000 at most, according to specialists). In 1634, a storm surge battered the coast causing land losses comparable to those of 1362, and a large part of Strand Island was engulfed. It also caused the death of 8,000 to 15,000 people according to parish registers, including two thirds of Strand's population. Cf. H. Lamb, *op. cit*., p. 16-17.

sand drifts that have given birth to «dune fields»[39]. At Skagen Cape, at the northern end of the peninsula, sea floods have caused the elongation of the spit with sand accumulation on several levels; the consequences of such a phenomenon have been no less disastrous: from 1591 onwards, the storms have destroyed tens of farms and buried under the sands the ancient town of Skagen[40]. All in all, for the modern and contemporary periods (1532-1981), the tally is of twenty-odd episodes of storm tides on the Schleswig-Holstein and Jutland peninsula coastline in H. Lamb's book dedicated to the storms recorded for the whole of the North Sea in that period[41]. The data in his catalogue also point to a higher incidence of storms during the «Little Ice Age» between the end of the seventeenth and the beginning of the nineteenth century. These conclusions have been since confirmed by the study of coastal sedimentary archives subjected to radiocarbon and optical dating (C_{14} and optically stimulated luminescence/ OSL technologies)[42]. Since it is possible to establish a relation between a whole range of climate phenomena – sea temperature, circulation of atmospheric flows – and the frequency of «extreme» storms[43] for the early modern period, it becomes tempting to find out how the matter stood in classical times. To be sure, our field of research lacks field data with fossil storm deposits precisely dated to the time of the migration of the Cimbri. However a recent scientific study based on the coastal sedimentary archives of seven northern European countries has just shown that the increase in storm activity coincided here with the Holocene's cooling periods, in cycles of around 1500 years. For Jutland's north-western coasts, the increased storm frequency has been associated with periods of strong aeolian activity, which set off the formation of dune fields[44]. And yet, at first sight, these phases of frequent «extreme» storms associated with climate cooling episodes do not appear to coincide with the supposed date of Cimbrian migration around 120 B.C.E., a date very close to the relatively dry and calm period of the «Roman Climate Optimum» conventionally set around 100 B.C.E.[45]. Nevertheless,

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39. Such is the case, for example, at the time of the 1634 flooding of the Skallingen peninsula, in the vicinity of Blåvands Huk: cf. M. Fruergaard *et al*., «Major coastal impact induced by a 1000-year storm event», *Scientific Reports* 3, janvier 2013, n° 1051 (on line: http://www.nature.com/srep/2013/130111/srep01051/full/srep01051.html).

40. H. Lamb, *op. cit.,* p. 19, 44-45, 51.

41. *Ibid*., p. 37, 44-47, 51, 57, 72, 119-120, 142, 147, 149, 153-154, 159-160, 163, 168, 181, 186.

42. M. L.Clarke, H. M. Rendel, «The impact of North Atlantic storminess on western European coasts: A review», *Quaternary International* 195, 2009, p. 31-41.

43. These phenomena operate within the framework of the North-Atlantic Oscillation. During certain periods the drift southwards of sea ice from Iceland could have caused the sea temperature to drop, altering the normal course of Northern Atlantic storms in the summer season.

44. Ph. Sorrel *et al*., «Persistent non-solar forcing of Holocene storm dynamics in coastal sedimentary archives», *Nature Geoscience* 5, 2012, p. 892-896 (the three most recent periods of strong activity are recognized as being between 3300 and 2400 B.P., between 1900 and 1050 B.P., and between 600 and 250 B.P.). L. B. Clemmensen *et al*., «The evolution of Holocene coastal dune fields, Jutland, Denmark: A record of climate change over the past 5000 years», *Geomorphology* 105, 2009, p. 303-313, identify the strong periods of aeolian activity beginning from 2200 and 800 B.C.E., then followed by 100, 1050-1200, and 1550-1650 C.E.

45. M. McCormick *et al*., «Climate Change during and after the Roman Empire: Reconstructing the Past from Scientific and Historical Evidence», *Journal of Interdisciplinary History* 43, 2012, p. 174-180.

some Jutland sedimentary archives show a localised extension of the cool period that ran from 800 B.C.E. to the 110s B.C.E., if not a little later[46]. Furthermore, as the occurrence of huge storms, and more specifically those causing the flooding of low lying lands, hinges on a complex set of factors[47], they may also occur outside the cooler climatic periods. This is confirmed by sedimentary and documentary sources at the end of the period of the «Medieval Climate Optimum» (twelfth-thirteenth century), as well as at the time of the «Roman Climate Optimum». Indeed, Tacitus too describes such a storm which, in 16 C.E., during Germanicus' Germanic expedition, affected more particularly the coastline between the Ems and the Elbe, but appears to have also hit the British coast on the opposite side of the Channel[48].

Following this survey of the current state of knowledge of the interaction between land and sea on the North Sea coasts at the end of the Holocene, it has to be accepted that no ecological disaster seems to have hit the region between the Elbe estuary and the Cape of Jutland between the last decades of the second century B.C.E., whereas climate crises impacting the settlements are recorded in neighbouring regions at the beginning of the Iron Age and at the end of Antiquity at the time of the «great migrations»[49]. The hypothesis of a singular catastrophic event, such as

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46. In some Danish sites, the period of dune formation which had started circa 700 B.C.E. goes on until the turn of the era: cf. L. B. Clemmensen, K. Pye, A. Murray, J. Heinemeier, «Sedimentology, stratigraphy and landscape evolution of a Holocene coastal dune system, Lodbjerg, NW Jutland, Denmark», *Sedimentology* 48, 2001, p. 3-27. It is only at the beginning of the era that a drying out period suddenly occurs: B. Philippsen *et al*., «Mid- to late-Holocene reservoir-age variability and isotope-based palaeoenvironmental reconstruction in the Limfjord, Denmark», *The Holocene* 23, 2013, p. 1017-1027. See also climate data for southern Scandinavia that acknowledge cooling episodes up until 2200-2150 B.P. or thereabouts: S. Bjorckl, L. B. Clemmensen, «Aeolian sediment in raised bog deposits, Halland, SW Sweden: a new proxy record of Holocene winter storminess variation in southern Scandinavia?», *The Holocene* 14, 2004, p. 677-688; R. de Jong *et al*., «Storminess variation during the last 6500 years as reconstructed from an ombrotrophic peat bog in Halland, southwest Sweden», *Journal of Quaternary Science* 21, 2006, p. 905-919. In Brittany and in the Bay of Mount Saint-Michel, storm levels are precisely dated between 128 and 110 B.C.E. within the «La Tène cooling» as well as at the end of the «Medieval Climate Optimum»: B. Van Vliet-Lanoë *et al*., «Middle- to late-Holocene storminess in Brittany (NW France): Part I - morphological impact and stratigraphical record», *The Holocene* 24, 2014, p. 419, 424, 428; B. Van Vliet-Lanoë *et al*., «Middle- to late-Holocene storminess in Brittany (NW France): Part II - The chronology of events and climate forcing», *The Holocene* 24, 2014, p. 443-447.

47. In a given bathymetric and geomorphological context, the height of a «storm surge» and its potential to cause a catastrophic land flood depend first and foremost upon the speed, direction and duration of the wind; weather conditions are also affected by the trajectory of and the speed at which the depression is moving as well as the coincidence of the phenomenon with a period of high tides.

48. Shipwrecked survivors of the Roman army were rescued on the coasts of Britain (*quidam in Britanniam rapti et remissi a regulis*): Tac., *Ann*., II, 22-24. In 55 and 54 B.C.E., Caesar also experienced strong tempests along the coastline of Britain, associated with the effects of high tide: Caes., *Gal*., IV, 28-29; V,10. Cf. also Tac., *Ann*., I, 70 for the effects of great equinoctial tides on the same Germanic coasts in 15 B.C.E.

49. B. Van Geel, J. Buurman, H. T. Waterbolk, «Archaeological and palaeoecological indications of an abrupt climate change in The Netherlands, and evidence for climatological teleconnections around - 2650 BP», *Journal of Quaternary Science* 11, 1996, p. 451-460; B. Zolitschka, K.-E. Behre, J. Schneider, «Human and climatic impact on the environment as derived from colluvial, fluvial and lacustrine archives-examples from the Bronze Age to the Migration period, Germany», *Quaternary Science Reviews* 22, 2003, p. 81-100. It is worth

one resulting from a storm surge, would thus seem the most likely; it would also help to better understand Poseidonios' attitude towards Cimbrian migration accounts and his disputatious references to tidal phenomena.

IV – POSEIDONIOS AND THE SCIENCE OF HIS TIMES

There are strong indications that the reference to the sea flood causing the migration of the Cimbri in the work of Poseidonios of Rhodes was part of a broader reflexion on the movements of seas and oceans. Indeed, we know that Poseidonios was the author of a theory of tides, which he ascribed to the influence of the lunar cycle: his argumentation was preserved for us by Strabo in the third book of his *Geography*[50]. However Poseidonios was also interested in tidal waves, which had occurred in the Mediterranean not long before his time[51] and the fragment in which he compared the flooding of the Cimbri homeland to the Atlantis disaster belongs within that context. In this way, Poseidonios was subscribing to a more ancient tradition harking back to the fourth century at least.

Indeed in his polemic against those who ascribed the Cimbrian migration to the rise of oceanic waters, he referred to Ephorus, according to whom «the Celti trained their fearlessness by enduring the engulfing of their homes and then rebuilding», as well as to an anonymous source claiming that «the Cimbri took up arms against the flood-tides»[52]. The latter quote is in all likelihood a veiled allusion to Aristotle and his school for, already, in Aristotelian texts the reference can be found to the Celts who «take up arms and march against the waves» and «feared nothing, neither earthquakes nor the waves»[53]. This second quote in particular, with the pairing of earthquake and waves, allows for the supposition that indeed the Stagirite had in mind the effects of earthquakes on the seas.

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remembering that at the end of the second century B.C.E., Jutland's northern and western coasts were not densely populated and appear to have been exploited mostly for stock farming. Cf. D. Meier, *art. cit.*; L. B. Clemmensen *et al.* , «Sedimentology, stratigraphy and landscape evolution...».

50. Poseidonios developed more specifically this theory in his treatise *On the Ocean*. We know that this took into account all the cycles—daily, monthly and yearly—of the tides. Cf. Posidonius, Vol II., *The Commentary*, I.G. Kidd ed., *op. cit.,* p. 774-776.

51. He had described one such tidal wave or tsunami that had taken place in his days near the Aeolian Islands. It is undoubtedly a historical fact since the event is the subject of a report from T. Quinctius Flamininus, praetor of Sicily, to the Senate: cf. Strabo VI, 2, 11. = F 227 Edelstein-Kidd. A second episode, a tidal wave that had, around 150 B.C.E., wiped out the fleet of the usurper Tryphon fighting Demetrius II along the coast between Tyr and Ptolemais, is described by Strabo XVI, 2, 26 and Ath., *Deipn*. 8.333c. Cf. also Strabo I, 3, 16 = F 231 Edelstein-Kidd (a Phoenician town drowned after an earthquake). For Poseidonios' interest in seismic phenomena cf. C.-V. Grewe, *Untersuchung der naturwissenschaftlichen Fragmente des stoischen Philosophen Poseidonios und ihrer Bedeutung für seine Naturphilosophie*, Francfort am Main-Berlin-Berne 2008, p. 150-156.

52. Cf. Strabo VII, 2, 1. Eph., *FGrHist* 70 F 132.

53. Arist., *E. E.* 1129b 27-29 and 1115b 27: εἴη δ'ἄν τις μαινόμενος ἢ ἀνάλγητος, εἰ μηδὲν φοβοῖτο, μήτε σεισμὸν μήτε κύματα, καθάπερ φασὶ τοὺς Κελτούς.

The experience of the earthquake followed by a tsunami which in 373 B.C.E. had destroyed and then submerged the city of Helike in Achaea[54] had not escaped Aristotle's notice. He refers to it on two occasions in the *Meteorology* (I, 6 343b and II, 8 368b) in order to illustrate his general theory of earthquakes and their sometimes attendant tsunamis, ascribed to the action of underground winds. Aristotle would have been no older than ten when this disaster struck. Plato, contemporary to that event, makes no open reference to it in his writings but proves no less remarkably well informed of these phenomena: the famous description of the destruction of Atlantis springs to mind, but note also his use of a tsunami metaphor, the treble wave (τρικυμία) of which represents the socio-political upheavals caused by the implementation of his utopian Republic[55].

Whereas the joint action of earthquakes and tsunamis was well known in the Mediterranean before the fourth century, during the last quarter of this same century the spreading of Pytheas' writings, which described the workings of oceanic tides, drew the attention of his contemporaries to a relatively new phenomenon. In the Aristotelian corpus that has reached us, we are hard put to find any trace of an actual theory of tides but, according to a few allusions in the *Meteorology*, it would appear that the Stagirite and his school saw in them the action of the same agent, the wind, or the breath, that instigated earthquakes as well as tsunamis[56]. It is not unreasonable to ask whether, within the Peripatetic School, the issue of a distinction between regular motion and «extreme» motion had been addressed at all. Conversely, it is more than likely that, at the beginning of the first century B.C.E., following a tradition of study and observation of natural phenomena that already went back two hundreds of years, Poseidonios did puzzle over this question. This probing would seem even more justifiable if the flooding of the Cimbri's homeland had been the upshot of a «storm surge» occurring upon an equinoctial tide.

This very type of scientific enquiry can be found in Poseidonios when he describes another episode of coastal flooding which, in that instance, he personally witnessed. Indeed, at the beginning of the first century B.C.E., Poseidonios had been staying in Gades (modern Cadiz)

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54. R. Baladié, *Le Péloponnèse de Strabon*, Paris 1980, p. 145-157; G. Panessa, *Fonti greche e latine per la storia dell'ambiente e del clima nel mondo greco*, I, Pisa 1991, p. 374-392.

55. Atlantis: Plato, *Ti*. 25d; *Crit*. 109a. A. Giovannini, «Peut-on démythifier l'Atlantide?», *MH* 42, 1985, p. 151-156. D. Katsonopoulou, «Helike and her Territory in Historical Times», *Pallas* 58, 2002, p. 175-182. For the τρικυμία cf. Plato, *R*. 472a *sq*.; *Euthd*. 293a and D. Sedley, «Plato's tsunami», *Hyperboreus* 11, 2005, p. 205-215. The term appears already in Eur., *Hyp*. 1213. While Esch., *S. c. Th*. 758-761 and Pind., *Nem*., VII, 17, do not use the term, he appears nonetheless very familiar with the reality of a tsunami. For the use of the term κῦμα in the sense of a seismic wave, cf. also P. Goukowsky, «Flottes antiques et marées subites dans l'antiquité grecque» in J. Jouanna, J. Leclant, M. Zink ed., *L'homme face aux calamités naturelles dans l'Antiquité et au Moyen Age*, Paris 2006, p. 73-80.

56. Cf. Arist., *Mete*., II, 8 366a and 368a-b. Cf. also Aet., *Op. Phil*. III, 17, 1 (*Dox. Gr.* 382) and R. Compatangelo-Soussignan, «La théorie des marées de Poséidonios d'Apamée et les cycles de la nature dans la tradition philosophique des IV^e^-I^er^ s. a.C.» in E. Bertrand, R. Compatangelo-Soussignan ed., *Cycles de la Nature, Cycles de l'Histoire. De la découverte des météores à la fin de l'âge d'or. Actes des Journées d'étude du Mans (9 Novembre 2012 & 8 Novembre 2013)*, Bordeaux 2015, p. 83-96.

where he studied the phenomenon of oceanic tides on the basis of his own observations and measurements as well as data collected from local people. At the time of the summer solstice, he had also witnessed a tidal flood of exceptional dimensions[57]. As it has been already shown, his observations, supported by quantified measurements, raise several questions, specifically that of knowing whether we are dealing with an ordinary phenomenon or an exceptional one of the tsunami type[58]. However, whilst Strabo insists on the fact that the phenomenon was perceived as an exceptional event by the people at the time, the «light mood» of the narration, closer to a *mirabilia* story, is particularly striking and surprising. Clearly, Poseidonios follows in this the paradoxographic tradition that had developed at the beginning of the Hellenistic period after Pytheas' voyage in the extreme North-West and Alexander's conquests in the East[59]. True to the teachings of the Aristotelian school, he attempted to ease an exceptional phenomenon into the «normality» of the natural cycle of the tides[60]. Indeed it seems credible that when trying to integrate his empirical observations within the broader theory of tidal cycles on which he had been working, Poseidonios may have been inclined to minimize the significance of any phenomenon out of the ordinary that did not fit in with his theoretical «model». Likewise, having mentioned the sea flood that set off the Cimbrian migration within a log of seismic phenomena, he sought, on second thoughts, to deny the catastrophic impact of this event in order to make it fit in with the «natural» operation of ocean tidal cycles.

In conclusion, until the sedimentary archives of the North Sea deliver some evidence of a storm surge dated to the period of Cimbrian migrations, there is no denying that the writings of Poseidonios of Rhodes represent the most ancient, direct testimony available to us concerning

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57. According to Strabo III, 5, 9, a few days after the summer solstice, at the moment of lunar conjunction, Poseidonios had observed that the coastal plains were covered by the tide going 30 stadia inland and twice six cubits up.

58. This hypothesis could be corroborated by recent paleo-environmental studies: cf. R. Compatangelo-Soussignan, «Un tsunami antique à l'embouchure du Guadalquivir ? Sources documentaires et archives paléoenvironnementales» in M.-Y. Daire *et al*. ed., *Anciens peuplements littoraux et relations Homme/ Milieu sur les côtes de l'Europe Atlantique*, / *Ancient Maritime Communities and the Relationship between People and Environment along the European Atlantic Coasts*, *Actes du Colloque International Homer,* Oxford 2013, p. 595-604. If the hypothesis of a tsunami is excluded, the high level of the Guadalquivir observed by Poseidonios at *Ilipa* (Alcada del Rio) could also have resulted from a river tide coinciding with a very high sea tide at a time of low flow.

59. No reference can be found in the account to the dramatic impact of an earthquake that would have taken place at the same time. However if this were indeed a tsunami, the epicentre of the attendant quake could be very far removed from the Gulf of Cadiz and if so its effects may have been registered only in the shape of a wave of abnormal proportions. On the tradition of *Mirabilia* stories and Pytheas' travels, cf. S. Bianchetti, *op. cit*., p. 72-80.

60. The Aristotelians sought to bring paradoxical cases into the norm by establishing parallels and analogies with similar phenomena. For *Mirabilia* stories in the Peripatetic school's Hellenistic tradition cf. Arist., *Racconti Meravigliosi*, G. Vanotti ed., Milan 2007, p. 21-32. For tides cf. Ps.-Arist., *Mir.* 55.834b; 130.843a (for tides in Messina's strait); 136 (for tides on Atlantic coasts beyond the straits of Gibraltar).

this event. Its authenticity is indisputable but, for want of a detailed description of the event, its value lies essentially in the insights it offers on the elaboration of a scientific theory and the references to the classical tradition that preceded it.

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