Description of *Hipparion* from Peloponnese and its palaeogeographical implications

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We describe a hipparion-bearing locality in Hermioni area, Argolis, which is the first so far Neogene land mammal site found on the Peloponnese. The bones recovered include cranial and postcranial specimens of a presumably single juvenile individual of *Hipparion* sp., as well as scarce bones of an indeterminate small bovid.

The upper deciduous teeth are characterised by moderately complex fossette plication, double or triple pli caballin, well-developed hypocone and prominent labial styles. The protocone shape is semicircular to triangular. The lower deciduous molars have shallow and rounded linguaflexids, deep ectoflexids that penetrate the isthmus, well-developed ectostylid and protostylid. There is no pli caballinid. The postcranial bones are characterised by slenderness, as they are juvenile.

Compared to other known hipparionine deciduous toothrows the Hermioni specimens belong to a fairly large-sized hipparion, similar to *H. concudense* from Spain and *H. mediterraneum* from Pikermi. The specific determination is uncertain due to the juvenile status of the available material.

The presence of *Hipparion* indicates a Late Miocene – Early Pliocene age. A Late Miocene age for Hermioni locality is, however, more probable, as a large part of Peloponnese was submerged during the Pliocene.

Paleogeographically, the discovery of *Hipparion* in Peloponnese indicates a wide land connection with the mainland. The additional presence of continental faunas in adjacent islands as Aegina and Crete makes very probable the existence of an extensive Miocene land in southern Greece.
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The material of a *Hipparion* bearing locality in Hermióni area, Argolis, is described. This is the first so far Neogene land mammal site found in Peloponnese. The bones recovered include cranial and postcranial specimens of a presumably single juvenile individual of *Hipparion* sp. (the genus meant in its broader sense of *hipparionine* equid), as well as scarce bones of a small bovid.

The lower dentition does not preserve a D1. The existing left and right deciduous molars (D2–D4) are characterised by shallow and rounded for D3 and 3-5-4-3/2 for D4. The hypocone is well developed (except for the D4, which is less worn than the other two teeth); a hypoconal constriction is present in all teeth, and it is particularly developed in D2. The labial styles are prominent. The protocone is labially flattened and lingually rounded in D2; it becomes almost semicircular in D3, being almost straight lingually; in D4 is more elongate, triangular in shape, flat lingually. The D1 is fairly strong (DAP: 7.8 mm, DT: 4.8 mm).

**Comparisons**

Although the *Hipparion* horses are the most common elements of the Greek Neogene fauna. Nevertheless, the deciduous teeth are not so common as the permanent ones. Moreover, they are not suitable for specific determination, as their morphology is usually quite similar among different species (Eisenmann et al., 1988). A metrical comparison to other known deciduous tooth rows shows that the Hermióni fossils belong to a fairly large-sized *Hipparion*, larger than *H. mutschleri* from the Tourrain of Sants (Gondra, 1971). *H. primigenium* and *H. macedonicum* from the Vallesian locality Ravin de la Pluie (Koufos, 1986). It is, however, smaller than *Hipparion* sp. from Sams (Gondra, 1971). In fact the size of the Hermióni *Hipparion* deciduous teeth falls within the metrical range of Gruppe 1-2 from Sams (Wehrli, 1941), of *H. macedonicum* (upper teeth and *H. brachypus* from Pikermi (Koufos, 1987), as well as of a yet unpublished sample of juvenile maxillae and mandibles from the same locality, kept in the Museum of Palaeontology and Geology, University of Athens (MPGU). The old pikermian collections are, however, most probably mixed, deriving from more than one stratigraphical level, and consequently comprise two or more hippocene species (Theodorou & Nicolaidis, 1988), which cannot be distinguished on the basis of the deciduous teeth characters.

**Biochronology, palaeogeographic implications**

*Hipparionine* horses have been widely used for biostratigraphic purposes. This very diverse equid group has a wide stratigraphical distribution in Europe that spans from the beginning of the Upper Miocene (Vallesian) to the beginning of the Upper Pliocene (early-Villafranchian) (Sen, 1990; Woodburne et al., 1996). The inadequacy of the available material for a specific determination results to the inference of a Late Miocene – Early Pliocene biochronological age for Hermióni locality. A Miocene age is, however, not probable, as the widespread Pliocene marine sediments that cover a great part of Peloponnese indicate a very extensive marine transgression during that epoch that turned Peloponnese to an island, not very suitable for a far ranging genus *Hipparion*. Thus the assumption of a Late Miocene (Villafranchian-Turonian) age for Hermióni locality seems quite plausible.

From a palaeogeographical point of view, the discovery of a Neogene continental fauna in Peloponnese indicates the existence of a wide land connecting it with the mainland. This land would allow terrestrial mammals without good swimming abilities, such as *hipparions*, to migrate and colonise remote peninsulas. It is interesting to note that Fligl et al. (1991) mention the presence of hippo-tooth teeth on the nearby island of Aegina, while even Crete, situated further south, has yielded *Hipparion* of the same age and also of the same species (Theodorou & Nicolaides, 1988), which cannot be distinguished on the basis of the deciduous teeth characters.

**References**


Eisenmann T., Bernor R.L., Swisher C.C. (1996): An appraisal of the stratigraphic and phylogenetic abilities, such as *hipparions*, to migrate and colonise remote peninsulas. It is interesting to note that Fligl et al. (1991) mention the presence of hippo-tooth teeth on the nearby island of Aegina, while even Crete, situated further south, has yielded *Hipparion* of the same age and also of the same species (Theodorou & Nicolaides, 1988), which cannot be distinguished on the basis of the deciduous teeth characters.

**References**


