Rhinocerotidae (Mammalia, Perissodactyla) remains from the new Pleistocene locality of Richea (Laconia, Greece)

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Introduction: During the Pliocene and Pleistocene, fossil rhinoceroses have been reported from numerous localities in Greece (Fig. 1). Knowledge about these findings remains limited, due to the scarcity of specimens (Symeonidis et al. 2006, references therein; Athanassiou, in press). The Late Pliocene locality of Milia (Guérin & Tsoukala 2013) is a notable exception and has yielded amble material of the exclusively Pliocene species *Stephanorhinus jeanvireti.* During the Late Pliocene and Early Pleistocene, most rhinocerotid specimens are typically attributed with more or less certainty to *Stephanorhinus* cf. *etruscus*. In most cases, only few dental or postcranial elements have been recovered. Middle to Late Pleistocene remains have been referred to *Stephanorhinus hemitoechus,* and with less certainty to *Coelodonta antiquitatis*. The Pleistocene representatives of the genus *Stephanorhinus* exhibit a considerable morphological and metrical variability and the distinction among the species is very delicate (Guérin 1980, Fortelius et al. 1990, Lacombat 2006).

Figure 1: Distribution of the family Rhinocerotidae during the Pliocene and Pleistocene in Greece. The studied material comes from Richea, a village in Eastern Laconia. The specimens were found during 1981 inside limestone fissures of the Tripolis geotectonic zone. They are preserved at the Museum of Paleontology and Geology of the University of Athens.

Dental elements:

- **D4** (REI10, fig. 2a occlusal): The medifossette is open excluding *S. hemitoechus*. The single crochet, the absence of antecrochet and the protocone constriction characterize all species. The proportions of the teeth are relatively low compared to *S. etruscus* (Lacombat 2006), though a higher range of variability on D4 may be noticed.
- **P2** (REI7, fig. 2b occlusal): The crista is present and single; this character is observed in 40% of *S. etruscus* specimens. The absence of antecrochet is typical for *S. etruscus* and *S. kirchbergensis*. The measurements are comparable with those of *S. etruscus* (Lacombat 2006), except of the lingual length that is higher.
- **M1 or M2** (REI9, fig. 2c occlusal): The tooth is very damaged, so it wasn't possible to take any measurements. The single crochet is typical for all species. The precence of a crista may be variable and 80% of *S. etruscus* specimens do not preserve it in M2.
- **p2** (REI8, fig.2d lingual): The absence of an anterior valley excludes *S. hemitoechus* and *S. kirchbergensis*. The biometrical data mostly agree with the lower limits of *S. etruscus* given by Lacombat (2006).
- **m3** (REI11 and REI18, fig. 2e lingual): Both valleys are V-shaped in REI11, whereas in REI18 the anterior is broad V-shaped. *S. kirchbergensis* tends to preserve U-shaped valleys. The difference of height between the bases of the two valleys (ratio 0,695) excludes *S. hemitoechus* (ratio 0.74 - 0.96), as does the orthogonal-open vestibular syncline. All measurements fall within the range of *S. etruscus* (Lacombat 2006).

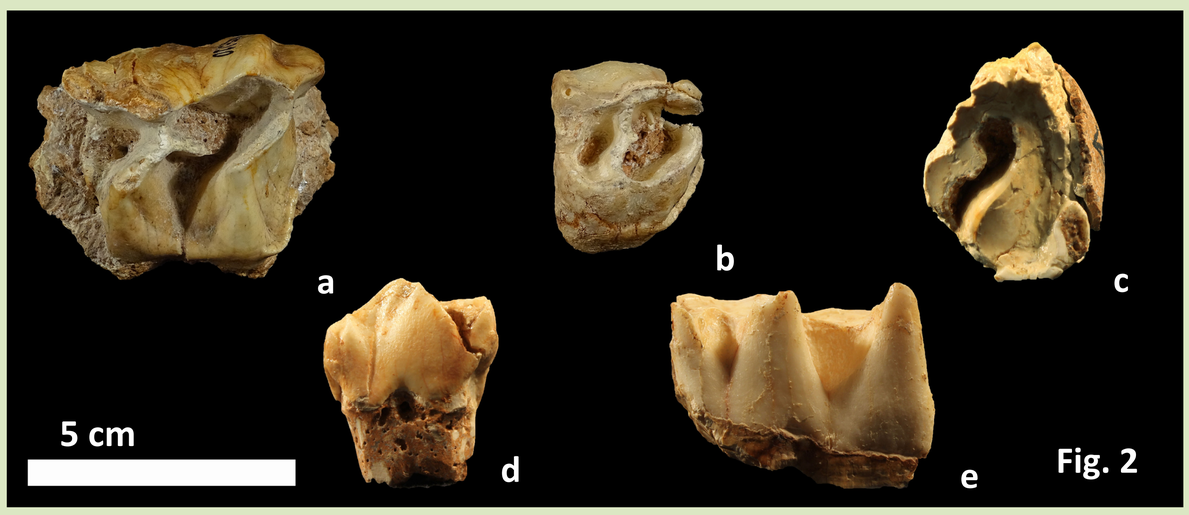

Fig. 2

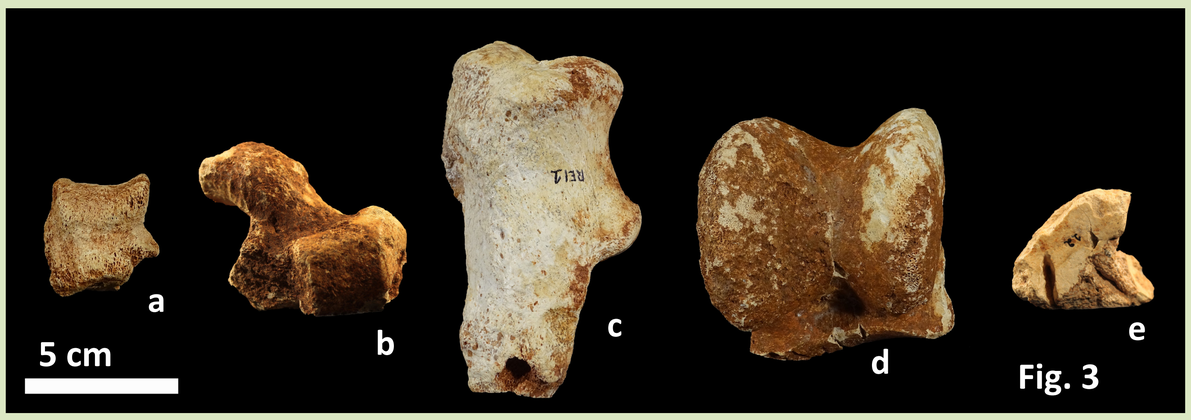

Fig. 3

Postcranial elements:

- **Pyramidal** (REI17, fig. 3a medial): In dorsal view, the convex margin resembles closer *S. etruscus*, excluding both *S. hemitoechus* and *S. hundsheimensis*, whose margin is straight. The convex margin of the medial aspect of the bone also excludes the latter species, since it is straight in *S. hemitoechus,* but slightly convex on its distal part in *S. hundsheimensis*. The pyramidal of *S. hundsheimensis* is longer and less symmetrical. Based on the biometrical data, *S. kirchbergensis* can be excluded.
- **Unciforme** (REI2, fig. 3b proximal): The articular facet for the pyramidal is not narrowing dorso-palmarly, as in *S. hemitoechus* and *S. hundsheimensis*. The specimen is lacking both the medio-later widening and proximo-distal compression observed in *S. hundsheimensis.* Based on the biometrical data, S. *kirchbergensis* can be excluded.
- **Calcaneus** (REI1, fig. 3c lateral): The sustentaculum tali is broken and the articular facet for the talus is poorly preserved, as is the articular facet for the cuboid. The slender body of the calcaneus and the weakly developed calcaneal tuberosity are typical for *S. etruscus,* as compared to *S. hemitoechus* and *S. hundsheimensis*. The ratio DAP.beak/H (50,5%) is the same as in *S. etruscus*, very close to the value for *S. hundsheimensis* (50,8%) and lower than *S. hemitoechus* (55,3%) (after Guérin 1980). The biometrical data, agree with the morphological observations being very close to the mean values of *S. etruscus* reported by Fortelius et al. (1993) and Guérin (1980), and smaller than the mean values of the other species.
- **Astragalus** (REI3, fig. 3d dorsal): The trochlear morphology is more similar to *S. etruscus* than to *S. hemitoechus* and *S. hundsheimensis*. The distomedial tuberosity is not preserved. The breadth is approximately ~80 mm, very close to the mean value for *S. etruscus* (80,9 mm, Guérin 1980 and 80,2 mm, Fortelius et al. 1993). The lateral length is greater than the medial one, typical for *S. etruscus* and *S. hundsheimensis*. The biometrical data exclude *S. kirchbergensis*, due to its much greater size. They resemble closer the values of *S. etruscus* with respect to the other species.
- **Third Metatarsal** (REI12, fig. 3e proximal): Only the proximal part of the bone is preserved. The convex dorsal border of the proximal articular facet for the ecto-cuneiforme is similar to *S. etruscus* and *S. hundsheimensis*. In *S. hemitoechus,* this border is concave on the medial, but convex on the lateral side (Guérin 1980). The shape and position of the two articular facets for the Mt-IV resemble also *S. etruscus*.

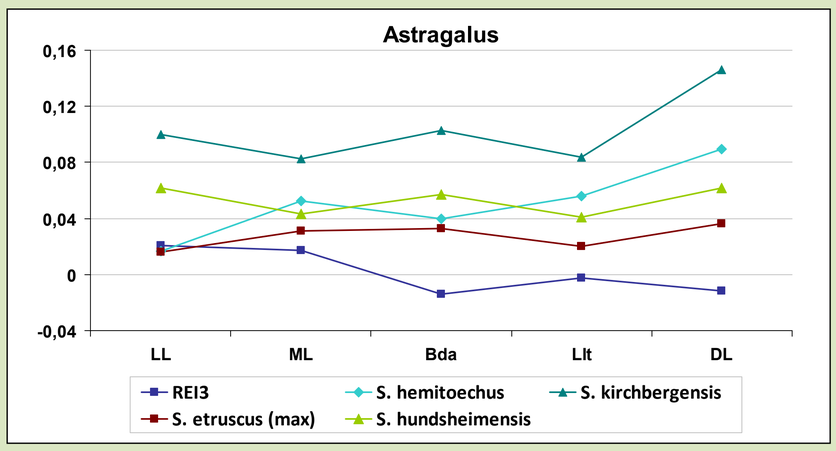

Fig. 4: Logarithmic diagram based on the astragalus measurements of different *Stephanorhinus* species and the astragalus of Richea. Reference: mean values of *Stephanorhinus etruscus* (n=12, Fortelius et al. 1993)

Conclusions: The material under study exhibits clear morphological and biometrical differences from *S. kirchbergensis* and *S. hemitoechus* and shares many characters with the *etruscus*-group. The features observed in the available specimens resemble closer *S. etruscus* and differ from *S. hundsheimensis*. Therefore, the material is provisionally referred to as *S.* cf. *etruscus,* suggesting probably an Early to Middle Pleistocene age for the locality based also on the stratigraphical context of the region.

The presence of the *etruscus*-group has been reported from several localities in Greece, but the exact affinities with respect to the Eurasian populations of the species (Pandolfi et al. 2017) can not be presently assessed due to the scarce material. The specimens from Richea represent the southernmost certain occurence of the genus *Stephanorhinus* in the Balkan Peninsula, to date, thereby giving new insights on the palaeogeographical distribution of the genus in Europe.

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