The *Stegotetrabelodon* remains from Cessaniti (Calabria, Southern Italy) and their bearing on Late Miocene biogeography of the genus

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SUMMARY: Remains of *Stegotetrabelodon* from Southern Italy are reported: and are the first specimen of this genus ever found in Eurasia. The material consists of a mandible and a lower tusk fragment collected at Cava Brunia, Cessaniti (Vibo Valentia, Calabria), in late Tortonian *Clypeaster*-bearing coastal sands. The morphology of the mandible and teeth conforms to the Libyan species *S. syrticus* although it retains some primitive traits. The occurrence of this elephantid and other mammal species with African "affinity" at Cessaniti, suggests the belonging of Calabria-Sicily area to a northern extension of the African continent. The Cessaniti elephantid brings new informations on the morphological variability of *Stegotetrabelodon* and provides clues of an early diffusion of the genus since the Tortonian.

1. Introduction

New remains of *Stegotetrabelodon* from Southern Italy are the first fossils ever found outside of Africa-Arabia of this taxon (Ferretti *et al.*, in press). The material consists of a mandible and a lower tusk fragment collected at Cava Brunia, Cessaniti (Vibo Valentia, Calabria), in late Tortonian - pre Messinian *Clypeaster*-bearing coastal sands (Nicotera 1959; Ogniben 1973; Papazzoni & Sirotti 1999). The occurrence of this elephantid and other mammal species with African "affinity" at Cessaniti, suggests that during Tortonian, the Calabro-Peloritan massif was part of the Northern Africa shelf (Rook *et al.* 2000; Torre *et al.* 2000).

2. Description

The Cessaniti mandible represents a fully mature individual (Figs. 1-3). The specimen differs from other tetralophodont longirostrine elephantoidea (e.g. *Tetralophodon* and "*Mastodon*" *grandicisivus*) for the reduction of the central conules, for the slight separation of the pre and post-trite complex and for the large size of the mesoconelets, resulting in the formation of a primitive plate-like (i.e. elephantine) pattern.

The inner structure of the tusk does not show the tubular pattern typical of "*M.*" *grandincisivus* (Tobien 1978; Tassy 1985) and it also differs in its elliptical shape from the sub-circular section of *Tetralophodon longirostris*.

The symphysis, although incomplete, clearly shows the marked downward bending typical of *Stegotetrabelodon*, that contrast with the condition known from *Tetralophodon* and *M. grandincisivus*.

The characters displayed by the mandible (long and down turned symphysis), the molars (in particular the number and structure of the plates) and the lower incisor (oval cross section, lamellar inner structure) are diagnostic of *Stegotetrabelodon*.

Stegotetrabelodon is currently represented by two African species, namely *Stegotetrabelodon syrticus* Petrocchi (1941) (=*Stegotetrabelodon lybicus* Petrocchi 1943, and *Stegolophodon sahabianus* Petrocchi 1943) and *Stegotetrabelodon orbus* (Maglio 1970).

The Cessaniti specimen favours a close comparison with *S. syrticus*. The retention of some

Fig.1 - *Stegotetrabelodon* cf. *syrticus* from Cessaniti. Mandible (MFE 935) in occlusal aspect. Scale bar represents 10 cm.

Fig.2 - *Stegotetrabelodon* cf. *syrticus* from Cessaniti. Mandible (MFE 935) in left lateral aspect. Scale bar represents 10 cm.

Fig.3 - *Stegotetrabelodon* cf. *syrticus* from Cessaniti. Mandible (MFE 935) in frontal aspect. Scale bar represents 10 cm.

plesiomorphic features, such as, the orientation of the mandibular rami, a lesser downward deflection of symphysis, and some dental traits, suggests caution in the attribution to this species, even if these differences could represent intraspecific variability.

3. Conclusive remarks

Stegotetrabelodon syrticus was originally known only at Sahabi, a late Miocene locality from northern Libya, and it has been recently recorded also at Abu Dabi (Tassy 1999). *Stegotetrabelodon orbus* was defined on material from Lothagam 1 (Kenya; Maglio 1970, 1973) and has been recorded also in other East African localities ranging between late Miocene and basal Pliocene: Lower Adu Asa (Middle Awash, Etiopia), Mpesida (Baringo basin, Kenya) (Kalb & Mebrate 1993) and Lubeho (Ibole Mbr, Manonga valley, Tanzania) (Sanders 1997).

The age of the Cessaniti *Stegotetrabelodon* (Tortonian, Late Miocene; Fig. 4) is comparable to that proposed by Tassy (1999) for the *Stegotetrabelodon syrticus* from Abu Dhabi

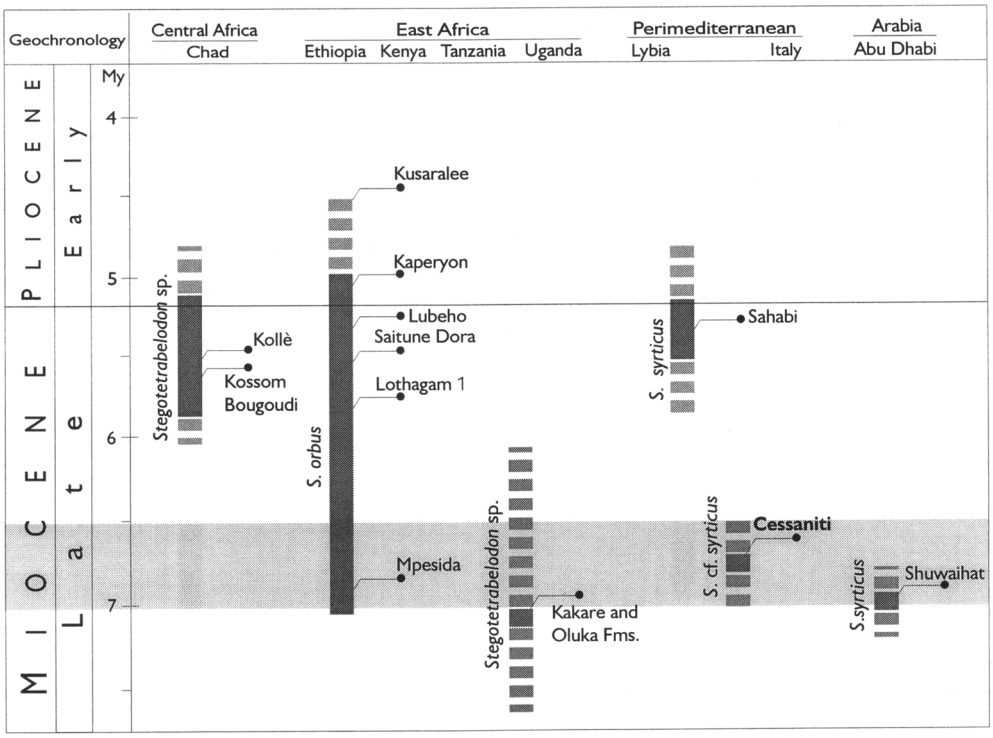

Fig. 4 - Temporal and geographical distribution of *Stegotetrabelodon* (data from Maglio 1973; Geraard 1989; Kalb and Mebrate 1993; Tassy 1995; 1999; Mackaye 2000).

and matches that of *Stegotetrabelodon orbus* from Mpesida (Kenya; Bishop 1976; Bishop *et al.* 1969).

Stegotetrabelodon sp. from the Kakara and Oluka Formations in Uganda (Tassy, 1995) may be slightly older, but the time range given for this levels does not exclude the possibility that the Ugandan sites are actually contemporaneous with the other cited localities (Fig. 4). There is evidence thus that *Stegotetrabelodon* was already widespread in the Tortonian, around 7 Ma, from Uganda to northern Africa and eastward to the eastern shore of the Arabian platform.

4. References

Bishop, W.W. 1976. Pliocene problems relating to human evolution. In G.L.I. Issac & E. R. McCown (eds) *Human Origins*: 139-153. Benjamin, Menlo Park.

Bishop, W.W., Miller, J.A. & Fitch, F.J.. 1969. New potassium-argon determinations relevant to the Miocene mammal sequence in East Africa. *Amer. J. Sci.* 267: 669-699.

Ferretti, M., Torre, D. & Rook, L. in press, *Stegotetrabelodon* cf. *syrticus* (Proboscidea, Elephantidae) from the Upper Miocene of Cessaniti (Calabria, southern Italy) and its bearing on Late Miocene Paleogeography of central Mediterranean. *J. Vert. Paleont.*

Geraads, D. 1989. Vertebres fossiles du Miocène supérior du Djebel Krechem El Artsouma (Tunisie centrale). *Géobios* 22: 777-801.

Kalb, E.J. & Mebrate, A. 1993. Fossil elephantoids from the hominid-bearing Awash Group, Middle Awash Valley, Afar Depression, Ethiopia. *Trans. Am. Phil. Soc.* 83: 1-114.

Mackaye, H.T. 2000. Les proboscidiens du Mio-Plio-Pleistocene du Tchad: biodiversite, biochronologie, paleoenironnement. *Abstracts 5th European Workshop on Vertebrate Paleontology* 1: 49, Karlsruhe.

Maglio, V.J. 1970. Four new species of Elephantidae from the Plio-Pleistocene of northwestern Kenya. *Breviora* 342:1-43.

Maglio, V.J. 1973. Origin and evolution of the Elephantidae. *Trans. Am. Phil. Soc.* 63 (3): 1-144.

Nicotera, P. 1959. Rilevamento geologico del versante settentrionale del monte Poro (Calabria). *Memorie e Note Ist. Geol. Appl. Napoli* 7: 1-92.

Ogniben, L. 1973. Schema geologico della Calabria in base ai dati odierni. *Geologica Romana* 12: 243-585.

Papazzoni, C.A. & Sirotti, A. 1999. *Heterostegina papyracea* Seguenza, 1880 from the upper Miocene of Cessaniti (Vibo Valentia, Calabria, southern Italy). *Boll. Soc. Paleont. It.* 38:15-21.

Petrocchi, C. 1941. Il giacimento fossilifero di Sahabi. *Boll. Soc. Geol. It.* 60: 107-114.

Petrocchi, C. 1943. Il giacimento fossilifero di Sahabi. *Coll. Sci. Document. Min. Afr. Ital.* 12: 1-162.

Rook, L., Mazza, P., Rustioni, M. & Torre, D. 2000. Lands and endemic mammals in the Late Miocene of Italy: paleogeographic outlines of Tyrrhenian and Adriatic areas between 11-9 and 7-4ma. *In ESF Scientific Programme on "Environments and Ecosystem Dynamics of the Eurasian Neogene" (EEDEN). Workshop on "State-of-the-art", University of Lyon, 16-18 November 2000. Abstract book*.

Sanders, W.J. 1997. Fossil Proboscidea from the Wembere-Manonga Formation, Manonga Valley, Tanzania. In T. Harrison (ed.) *Neogene Paleontology of the Manonga valley, Tanzania*: 265-310. Plenum Press.

Tassy, P. 1985. *La place des mastodontes miocènes de l'ancien Monde dans la Phylogènie des Proboscidea (Mammalia): hypothèses et conjectures.* Ph.D. dissertation, University P. and M. Curie. Paris. 862 pp.

Tassy, P. 1995. Les Proboscidiens (Mammalia) fossiles du Rift Occidental, Ouganda. In B. Senut & M. Pickford (eds) *Geology and paleobiology of the Albertine rift valley, Uganda-Zaire. Vol. 2, Paleobiology*: 215-255. Orléans: Centre Int. pour la Formation et les Echanges Géologiques.

Tassy, P. 1999. Miocene elephantids (Mammalia) from the Emirate of Abu Dhabi, United Arab Emirates: Palaeobiogeographic Implications. In P. J. Whybrow & A. Hill (eds.) *Fossil Vertebrates of Arabia*: 209-233. Yale university Press.

Tobien, H., 1978, On the evolution of Mastodonts (Proboscidea, Mammmalia). Part 2: The bunodont tretralophodont Groups. *Geol. Jahrbuch Hessen* 196:159-208.

Torre D., Abbazzi, L. Delfino, M., Fanfani, F., Ferretti, M.P., Ficcarelli, G., Mazza, P., Rustioni, M. & Rook L. 2000. Mammal palaeobioprovinces in the Italian Miocene. *XIth RCMNS Congress, Abstracts* 1: 43. Fez.