

ON A SKULL OF A SIRENIAN FROM THE EARLY PLIOCENE OF SIENA, TUSCANY

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Riassunto. Viene descritto un cranio di Sirenide raccolto a Ruffolo (Siena) in sabbie marine litorali contenenti Mammiferi terrestri del Rusciniano superiore e attribuito a *Metaxitherium gervaisi* (Capellini, 1872). Il reperto fornisce informazioni più dettagliate su questa specie, che era stata basata su materiale più frammentario. Confronti con altre specie mostrano che i Sirenidi della Francia meridionale e dell'Italia formano un cronocline caratterizzato da un aumento progressivo di dimensioni da *M. serresi* del Rusciniano inferiore (la specie più piccola) a *M. forestii* del Pliocene superiore (la specie più grande) attraverso *M. gervaisi*. Nell'Europa meridionale i Sirenidi non sono più segnalati dopo la fine del Pliocene.

Summary. A fine skull of a sirenian from Early Pliocene littoral sands with Late Ruscinian terrestrial mammals near Siena is referred to *Metaxitherium gervaisi* (Capellini, 1872); it provides detailed information on the characters of this species, which was originally based on more fragmentary material. Comparison with other species shows that sirenians of southern France and Italy represent a chronocline characterised by a progressive increase in size, from the Early Ruscinian *M. serresi*, the smallest species, through *M. gervaisi* to the large *M. forestii*, of Late Pliocene age. In southern Europe sirenians are not recorded after the end of the Pliocene.

Introduction.

History of the finding and geological setting.

In 1969, following an indication by Mr. Speroni, a skull of a sirenian was collected at Ruffolo, a hamlet 2.5 km SE of Siena (Fig. 1). The excavation was carried out by Mr. Fabio Cozzini, at that time technician of the Institute of Geology and Palaeontology of the University of Florence and now on the staff of the Museum of Geology and Palaeontology of the same University. The specimen is now in this Museum, registered Igf 13747. The site is registered No. 95.

The skull was collected in marine sands with clay lenses overlying Early Pliocene clays of the *Globorotalia puncticulata* zone (De Giuli et al., 1983). The exact age of the sands in which the skull was embedded could not be determined owing to the poorly diagnostic character and littoral facies of the marine fossils. The skull is in fairly good condition and is not deformed; it lacks the mandible and when collected it was heavily encrusted with oyster shells in a very hard sandy matrix.

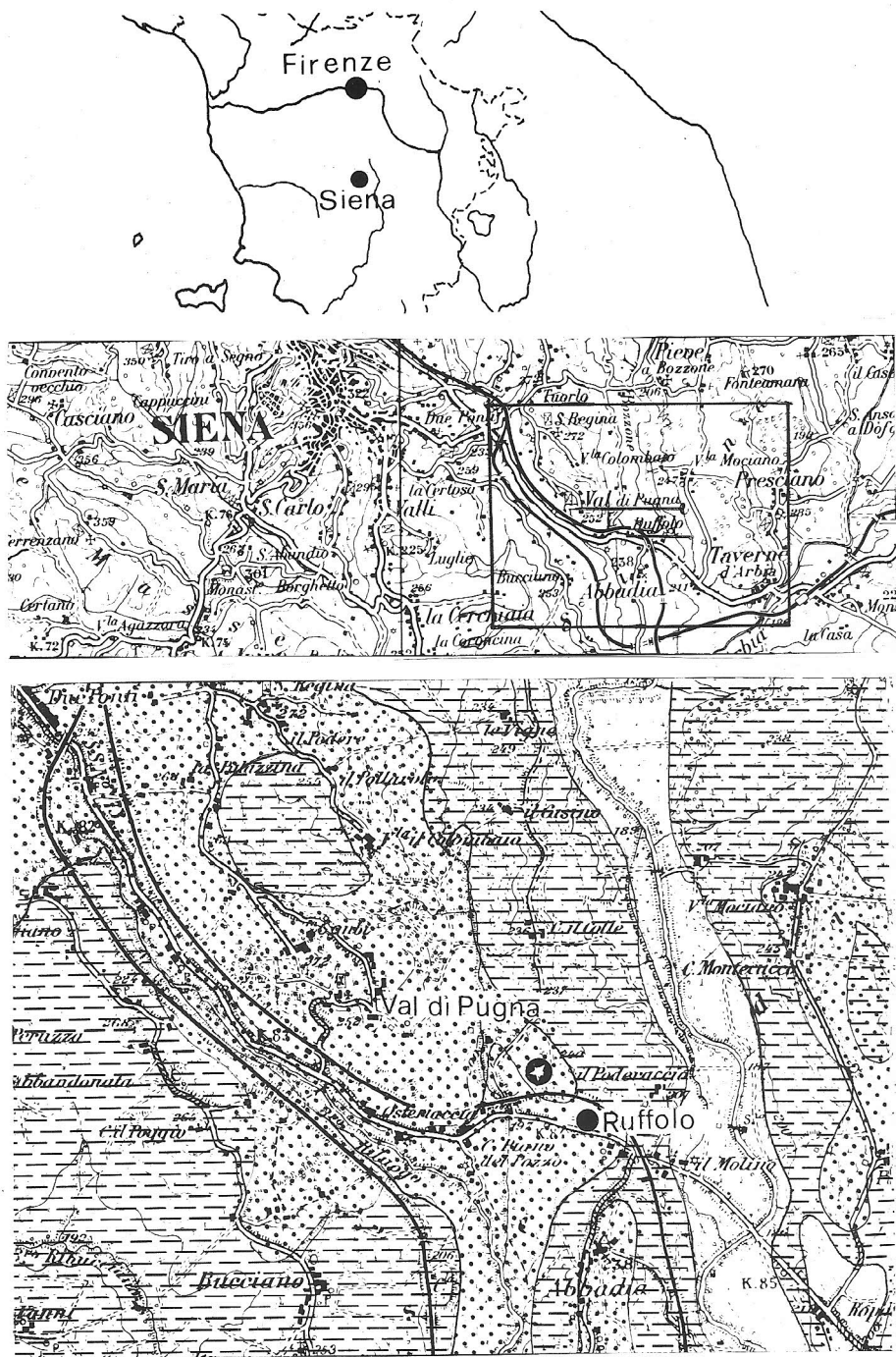


Fig. 1 – Sketch map. Dotted: littoral sands; hatched: marine clays. Site of the skull I 13747 indicated by asterisk.

In a farm called Val di Pugna, about 1 km from Rúffolo in the direction of Siena and in the same sandy horizon, other vertebrate fossils were collected in 1863 by Mr. Monti of Bologna, were taken to the Museum of the Accademia dei Fisiocritici of Siena and were later described by G. Capellini (1872), who recorded *Felsinotherium gervaisi* n. sp., *Rhinoceros megarhinus* or *leptorhinus* (limb bones) and *Sus* sp. (a skull). Remains of bovids were also collected in the area.

Cusciani Politi (1979) recorded *Parabos boodon* (= *Alephis lyrix* Gromolard, 1980), associated with marine shells, from Val di Pugna. The suid was identified as *Sus minor* Dépéret by Azzaroli (1975), a species ranging from Late Ruscianian to Early Villafranchian (Perpignan and Triversa faunal units). The rhinoceros may belong either to *Dicerorhinus megarhinus*, a Ruscianian species, or *D. jeanvireti*, a species recorded in France from the Early Villafranchian (Guérin, 1972), but *Alephis lyrix* unquestionably defines a Late Ruscianian (Perpignan) age.

Another species collected near Siena in old times is the primitive elephant *Archidiskodon gromovi*, which entered Italy only in the later part of the Early Villafranchian (Montopoli unit). There are however no detailed records of its occurrence and it may be safely assumed that this species does not come from the same level as the Rúffolo and Val di Pugna fossils.

Pliocene sirenians from Italy and southern France.

Sirenians are fairly common in shallow marine Pliocene deposits of Italy. Capellini (1872) based on them his new genus *Felsinotherium* (from Fèlsina, the Etruscan name of Bologna) and distinguished two species: *F. forestii*, based on a skull with mandible and partial skeleton from Riosto, S of Bologna, and *F. gervaisi*, based on a fragmental skull and jaw from Val di Pugna near Siena.

Cheirotherium subappenninum from Montiglio, Piedmont, described by Bruno (1839), is another sirenian species based on fragmentary material and may be considered a «nomen dubium»; according to Capellini it is a probable synonym of *F. forestii*.

De Zigno (1878) added a new species, *F. gastaldii*, based on a skull from Bra, Piedmont; this was considered a junior synonym of *F. forestii* by Abel (1904).

Fondi and Pacini (1974) described other remains (fragments of the skull, jaw and several postcranial bones) from San Quirico d'Orcia, S Tuscany, and concluded that:

1) The genus *Felsinotherium* Capellini, 1872 may be considered a synonym of *Metaxitherium* De Christol, 1840.

2) In the Pliocene of Italy and France this genus is represented by two species: *M. serresi* (Gervais, 1859) and *M. forestii* (Capellini, 1872). *Felsinotherium gervaisi* Capellini, 1872 is a junior synonym of *M. forestii* (the latter has page priority).

I agree with the proposal to unite the two genera *Felsinotherium* and *Metaxitherium*, but the skull from Rúffolo does justice to the view of Capellini, that *forestii* and *gervaisii* are two distinct taxa.

The fossils recorded above are only the most significant specimens. Fragments, mainly of ribs, occur scattered in the Pliocene sands around Siena and in several other sites of central and northern Italy.

Description and comparisons.

The skull from Rúffolo (Fig. 2, 7 (n. 2); Pl. 39, fig. 1–3; Pl. 40, fig. 2–4) is in fairly good shape and not deformed; the ventral side is however encrusted and partly covered by the very hard matrix. Only the last two molars are preserved, those of the right side broken at the root, the left ones partly hidden by the matrix. The zygomatic arches are somewhat damaged but nearly complete. Of the hearing apparatus only the incus bones are visible (Pl. 40, fig. 2). The praemaxillaries form a rather close angle with the skull axis (117°) and bear two short, conical tusks gently curved forward. In general shape this skull does not differ appreciably from those of Riosto and Bra, and conforms well in size with the partial skull (braincase, with the right pterygoid) from Val di Pugna, the type of *M. gervaisii* (figured by Capellini, 1872). The main difference from the skulls of *M. forestii* lies in size and in the somewhat lesser development of muscular attachments.

The type of *M. forestii*, from Riosto, is complete with mandible (Fig. 3a, 4a, 5b, 7 (n. 3, 8)). It is somewhat deformed by lateral compression and is larger than the skull from Rúffolo. The left praemaxillary bears a short conical cusp, broken at the tip; the right alveole is damaged, its dental cavity widens upwards to about 50 mm in diameter.

The skull from Bra is still larger (Fig. 3b, c, 4b, 7 (n. 4)) and bears a thick right tusk, worn at the tip into a blunt point directed downwards, without any trace of forward curvature. The praemaxillaries form an open angle with the cranial axis (131°). This may be a sexual character, linked with the downward curvature and great development of the tusks. Whether such a difference occurs also in the two sexes of other Pliocene species of *Metaxitherium* remains to be seen: if it does, the Rúffolo skull, so closely similar to the specimen from Riosto in morphology, should belong to a female.

The specimen from San Quirico d'Orcia described by Fondi and Pacini was found in clays referred to the Early Pliocene. It is very fragmentary: the right ear ossicles, few upper cheek teeth, the mandible (damaged and largely restored, Fig. 5c, 7 (n. 6)), portions of vertebrae and of ribs, parts of a scapula, a radio-cubitus and few other fragments. This fossil is puzzling, the mandible exceeds in size both the specimens from Val di Pugna (*M. gervaisii*, type) and from Riosto (*M. forestii*, type), while the teeth of these specimens display more

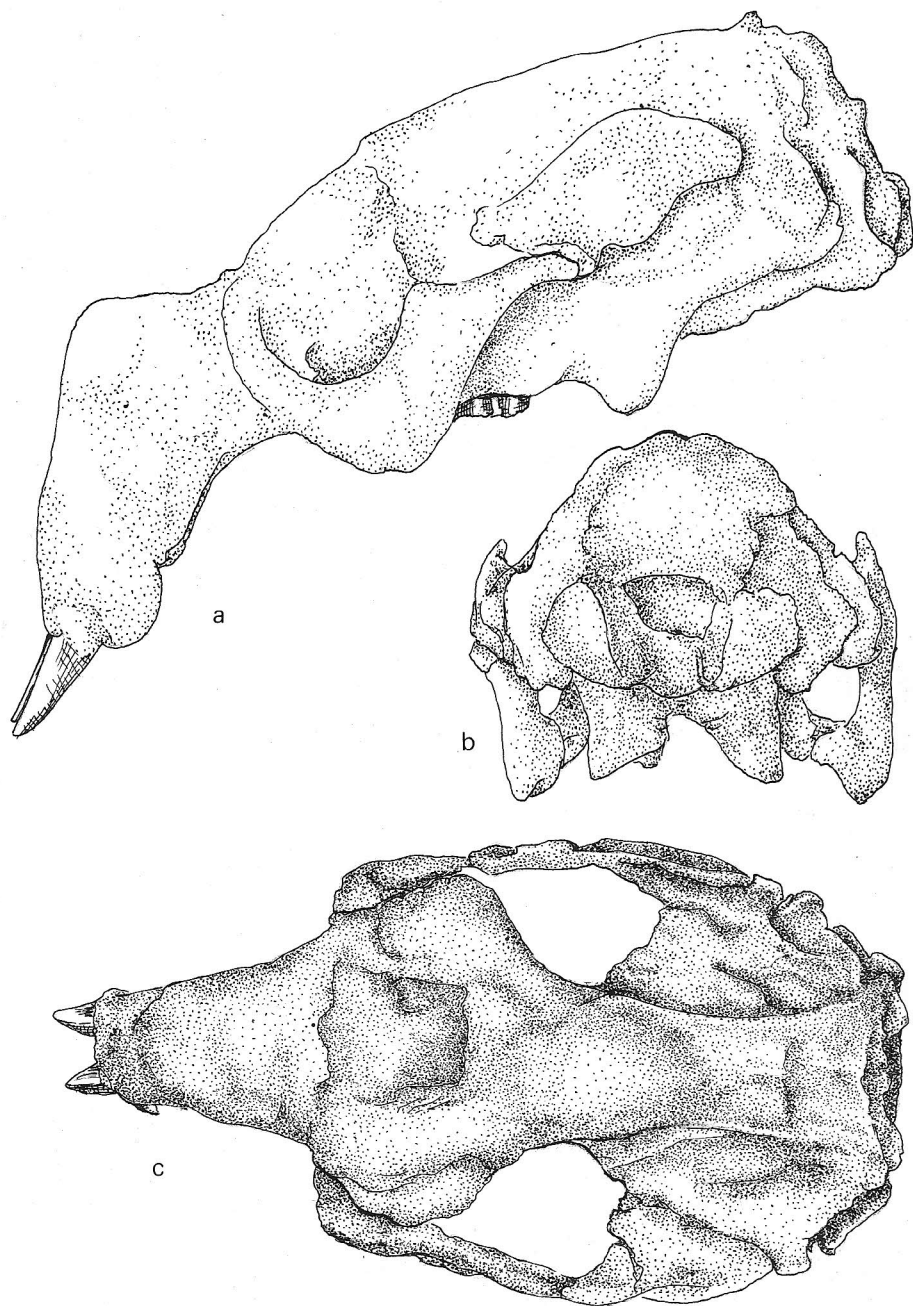


Fig. 2 – *Metaxitherium gervaisi* (Capellini). Rúffolo, Igf 13747. Lateral, occipital and dorsal views; about 1/4.

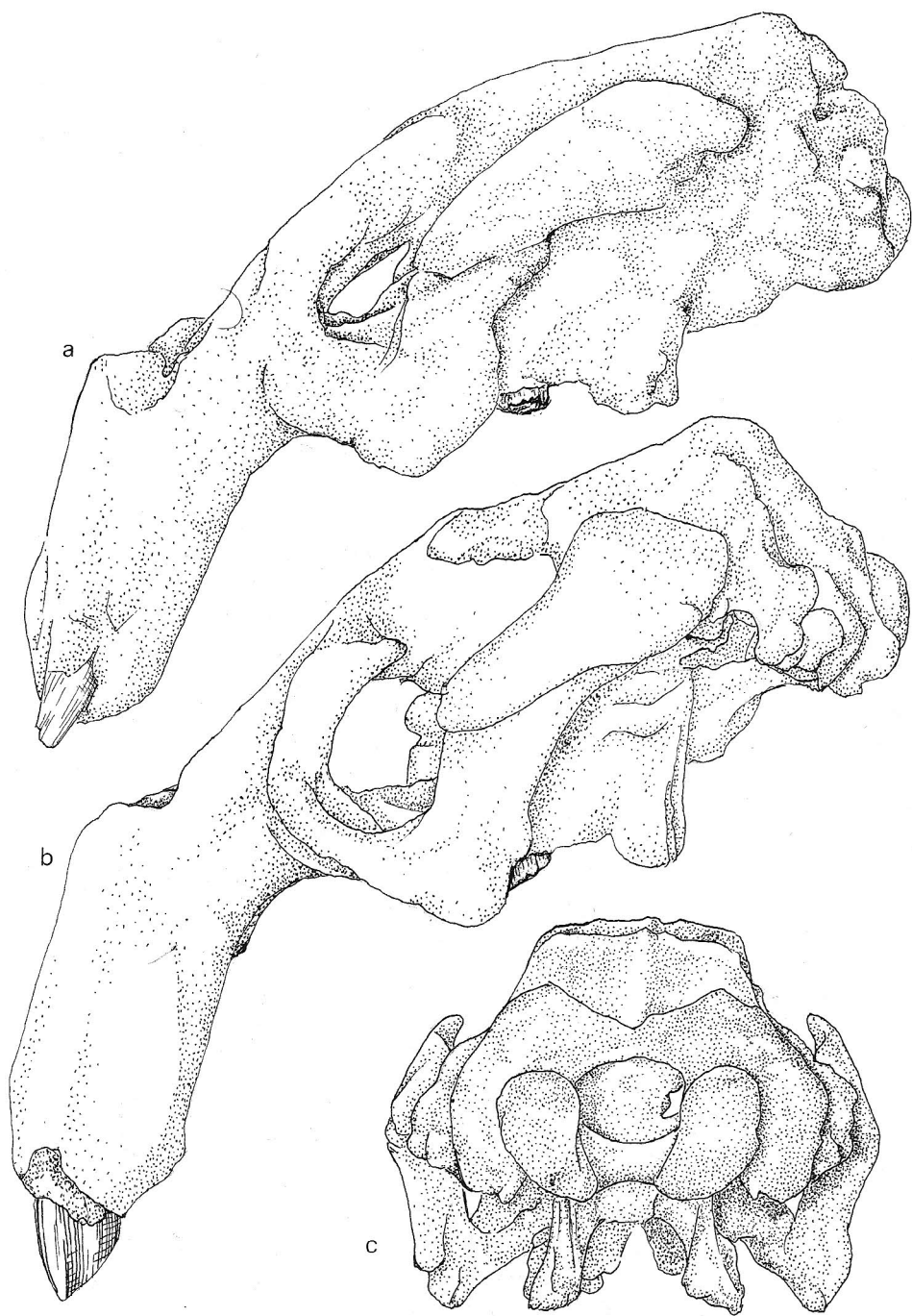


Fig. 3 — *Metaxitherium forestii* (Capellini). Skulls. a) Riosto (type), lateral view; b, c) Bra (type of *Felsinootherium gastaldii*), lateral and occipital views; about 1/4.

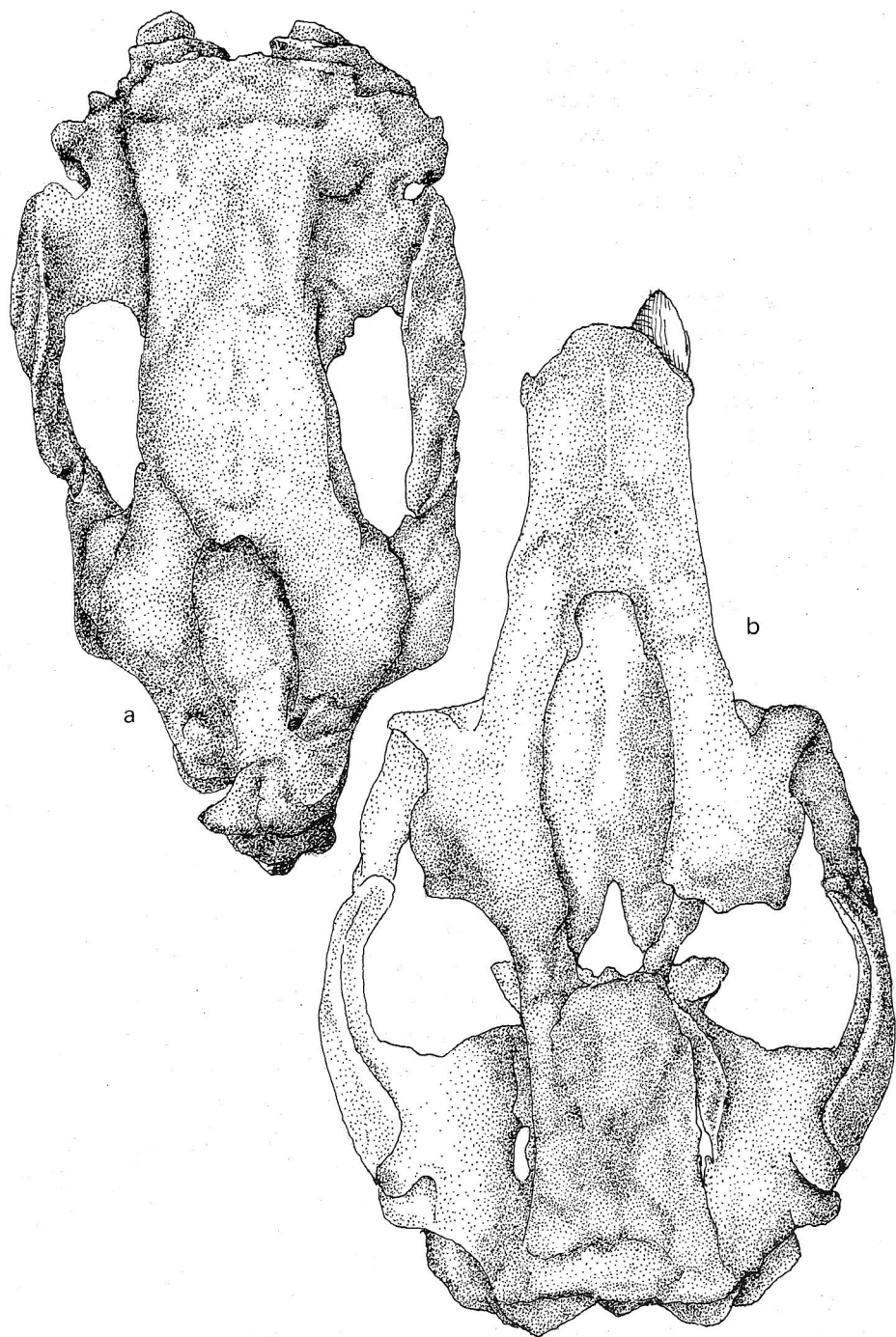


Fig. 4 – *Metaxitherium forestii* (Capellini). Skulls, dorsal views. a) Riosto; b) Bra (type of *Felsinotherium gastaldii*); 1/4.

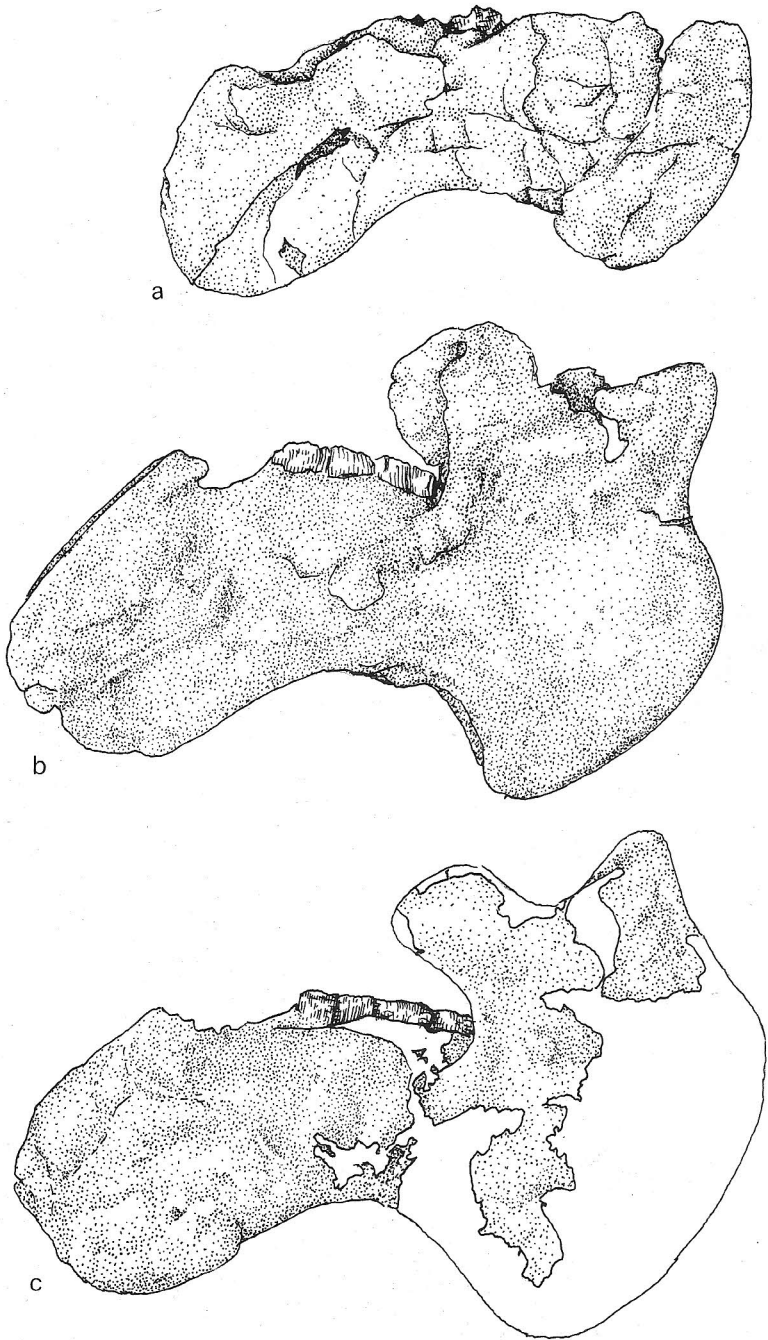


Fig. 5 – *Metaxinerium*, mandibles, lateral views. a) Type of *M. gervaisi*, Val di Pugna; b) type of *M. forestii*, Riosto; c) *M. forestii* (?), San Quirico d'Orcia; 1/4.

erratic differences (Fig. 7, n. 7, 3, 8). The fragmental atlas is also larger than the Riosto specimen. In size the San Quirico d'Orcia fossil seems to conform to a male *M. forestii*, but such an attribution is in contrast with the reported Early Pliocene age of the sediment.

M. serresi, from the Early Ruscinian of Montpellier, France (Fig. 6) was described in detail by Déperet and Roman (1920). It is much smaller than the other two Pliocene species, with a relatively flat skull, praemaxillaries forming an open angle with the cranial axis (135°) and two small, sharply pointed tusks. It is also distinguished by a small dentition (Fig. 7, n. 1, 5).

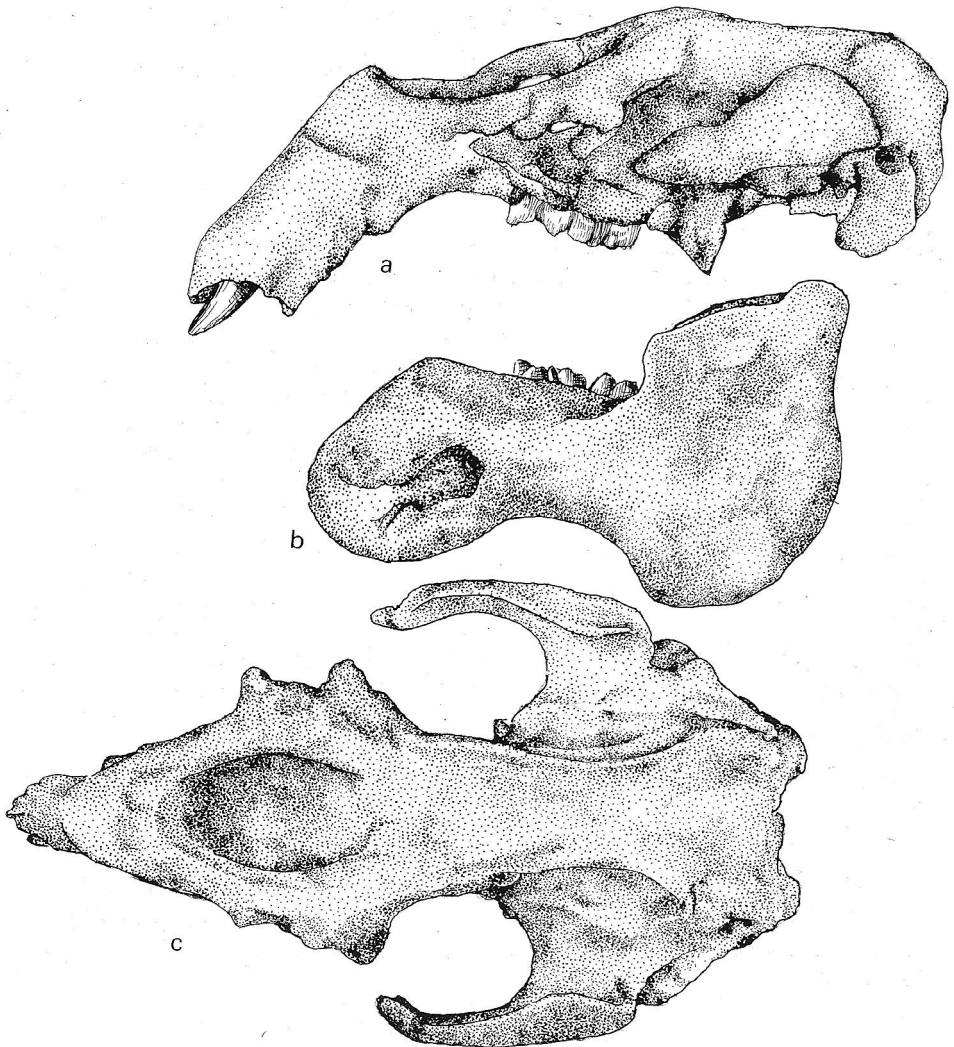


Fig. 6 – *Metaxitherium serresi* (Gervais). Type. Early Pliocene, Montpellier. Skull and mandible; about 1/4. Redrawn from Déperet & Roman (1920).

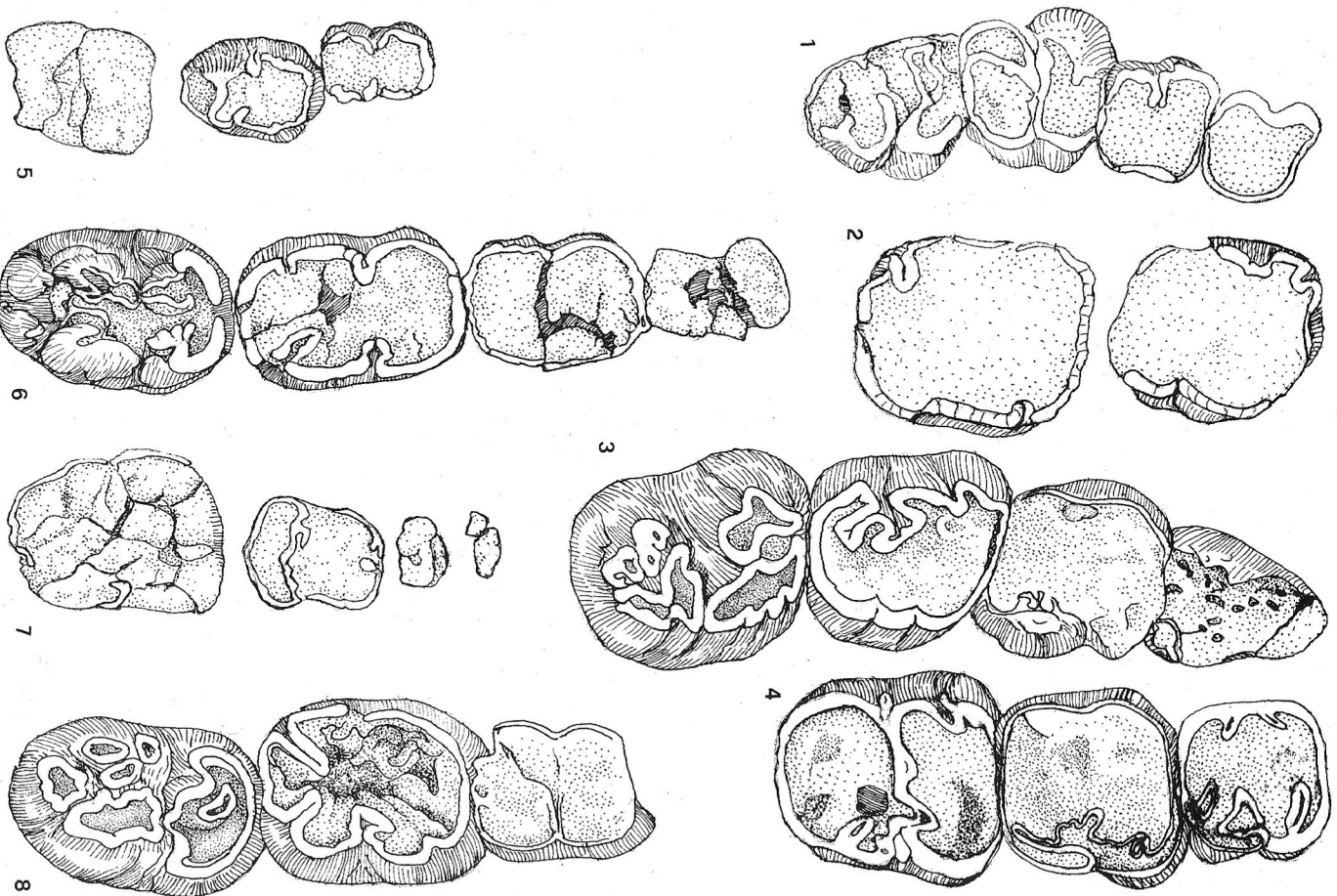


Fig. 7 — Dentitions of *Metaxitherium*, natural size. N. 1, 5) *M. serresi*, Montpellier. N. 2) *M. genvasi*, Ruffolo. N. 3, 8) *M. forestii*, Riosto. N. 4) *M. forestii*, Bra. N. 6) *M. forestii* (?), San Quirico d'Orcia. N. 7) *M. genvasi*, Val di Pugna. Nos. 1—4) upper cheek teeth; Nos. 5—8) lower cheek teeth.

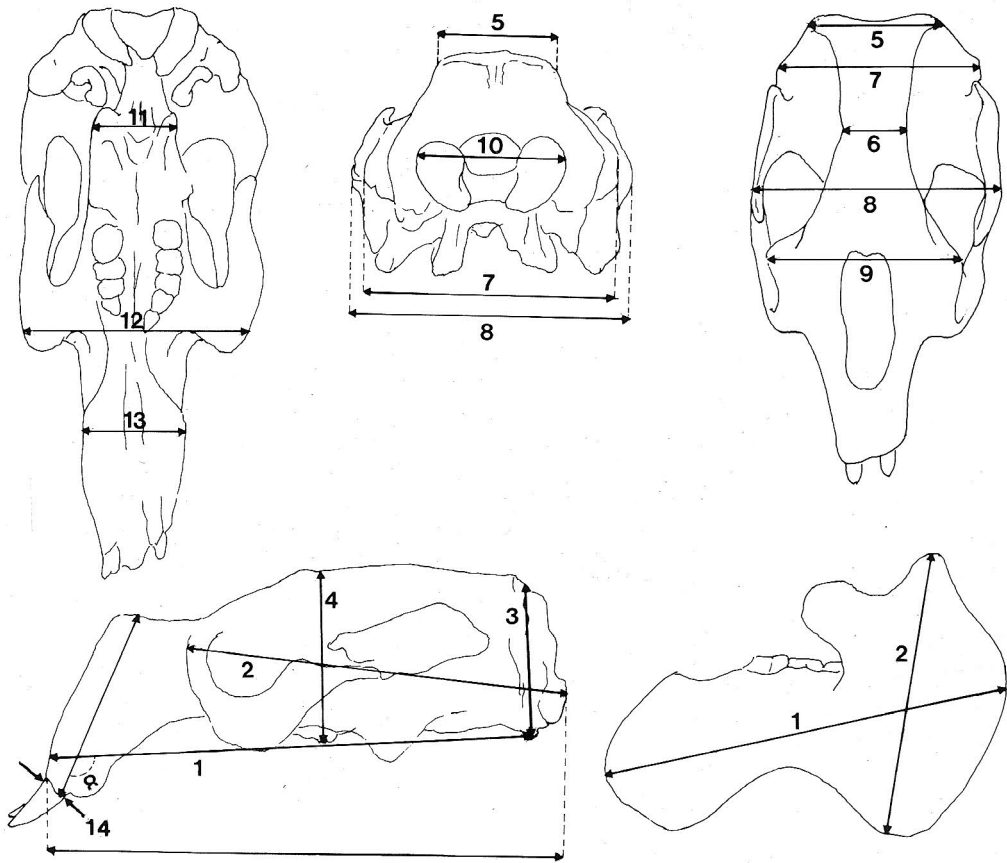


Fig. 8 — Key to measurements.

Table of measurements.

Skulls	1	2	3	4	5	6	7	8	9	10	11	12	13	α	14
Rúffolo Igf 13747	518	369	153	174	103	60	238	237	206	142	126	236	98	117°	28
Riosto Bra	543	367		178	106	72		250					103	123°	25
	581	376	180	198	115	74	264	296	206	146	141	259	103	131°	56

Jaws

	1	2
Val di Pugna	320	
Riosto	361	247
San Quirico d'O.	380	260

Final remarks.

The Pliocene representatives of *Metaxitherium* from southern France and Italy form a chronocline characterised by a progressive increase in size, accompanied by a deepening of the skull and greater development of muscular attachments. *M. serresi*, from the Early Ruscianian, is the smallest species. *M. gervaisi*, from the Late Ruscianian, is larger and more progressive in skull shape. The Late Pliocene *M. forestii* is larger still; inasmuch as Abel's interpretation (1904) is correct, it displays a marked sexual dimorphism, but altogether it differs from *M. gervaisi* much less than the latter differs from *M. serresi*.

The specimen from San Quirico d'Orcia requires further investigation both concerning its systematic position and geological age.

In the Pliocene of Italy sirenians are not rare, although their occurrence is sometimes documented by poorly diagnostic fragments of ribs, less commonly of other bones. In contrast with their rather wide dispersal in the Pliocene there is no record of sirenians in Pleistocene marine deposits, so that this family may safely be assumed to have become extinct before the end of the Pliocene.

Aknowledgements.

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REFERENCES

- Abel O. (1904) - Die Sirenen der mediterranen Tertiärbildungen Österreichs. *Abh. Geol. Reichsanst. Wien*, v. 19, n. 2, pp. 1-223, 26 fig., 7 pl., Wien.
- Azzaroli A. (1975) - Remarks on the Pliocene *Suidae* of Europe. *Zschr. Säugetierk.*, v. 40, pp. 355-367, Hamburg.
- Bruno G.D. (1839) - Illustrazione di un nuovo cetaceo fossile. *Mem. R. Acc. Sc. Torino*, s. 2, v. 1, pp. 143-160, 2 pl., Torino.
- Capellini G. (1872) - Sul felsinoterio, sirenoide halicoriforme dei depositi littorali pliocenici dell'antico bacino del Mediterraneo e del Mar Nero. *Mem. R. Acc. Sc. Ist. Bologna*, s. 3, v. 1, pp. 605-648, 8 pl., Bologna.
- Cuscani Politi P. (1979) - Cranio di *Parabos* proveniente dalle formazioni plioceniche di Val di Pugna nei pressi di Siena (Toscana). *Atti Acc. Fisiocritici Siena*, s. 14, v. 11, pp. 1-16, 6 pl., Siena.
- De Giuli C., Ficcarelli G., Mazza P. & Torre D. (1983) - Confronto tra successioni marine e continentali del Pliocene e Pleistocene inferiore in Italia e nell'area Mediterranea. *Boll. Soc. Paleont. Ital.*, v. 22, n. 3, pp. 323-328, Modena.
- Dépéret C. & Roman F. (1920) - Le *Felsinotherium serresi* des sables pliocènes de Montpellier et les rameaux phylétiques des Siréniens fossiles de l'ancien monde. *Arch. Mus. Hist. Nat. Lyon*, v. 12, n. 4, pp. 1-56, 7 pl., Lyon.

- De Zigno A. (1878) - Sopra un nuovo sirenio fossile scoperto nelle colline di Bra in Piemonte.
R. Acc. Lincei, Mem., s. 3, v. 2, pp. 1-12, 6 pl., Roma.
- Fondi R. & Pacini P. (1974) - Nuovi resti di Sirenide dal Pliocene antico della Provincia di Siena. *Palaeont. Ital.*, v. 67, pp. 37-53, 4 pl., Pisa.
- Gromolard C. (1980) - Une nouvelle interprétation des grands *Bovidae* (Artiodactyla, Mammalia) du Pliocène d'Europe occidentale classés jusqu'alors dans le genre *Parabos*: *Parabos cordieri* (De Christol) nov. émend., ? *Parabos boodon* (Gervais) et *Alephis lyrix* nov. gen. nov. sp. *Géobios*, v. 13, pp. 767-775, 1 pl., Lyon.
- Guérin C. (1972) - Une nouvelle espèce de rhinocéros (Mammalia, Perissodactyla) à Vialette (Haute-Loire, France) et dans d'autres gisements du Villafranchien inférieur européen: *Dicerorhinus jeanvireti* n. sp. *Docum. Lab. Géol. Fac. Sc. Lyon*, v. 49, pp. 1-150, 6 pl., Lyon.

PLATE 39

Metaxitherium gervaisi (Capellini, 1872).

Fig. 1–3 – Skull, Igf 13747. Early Pliocene, Rúffolo (Siena). Lateral, dorsal and frontal views; about 1/4.

Fig. 4 – Lower dentition, detail of type mandible. Early Pliocene, Val di Pugna (Siena).

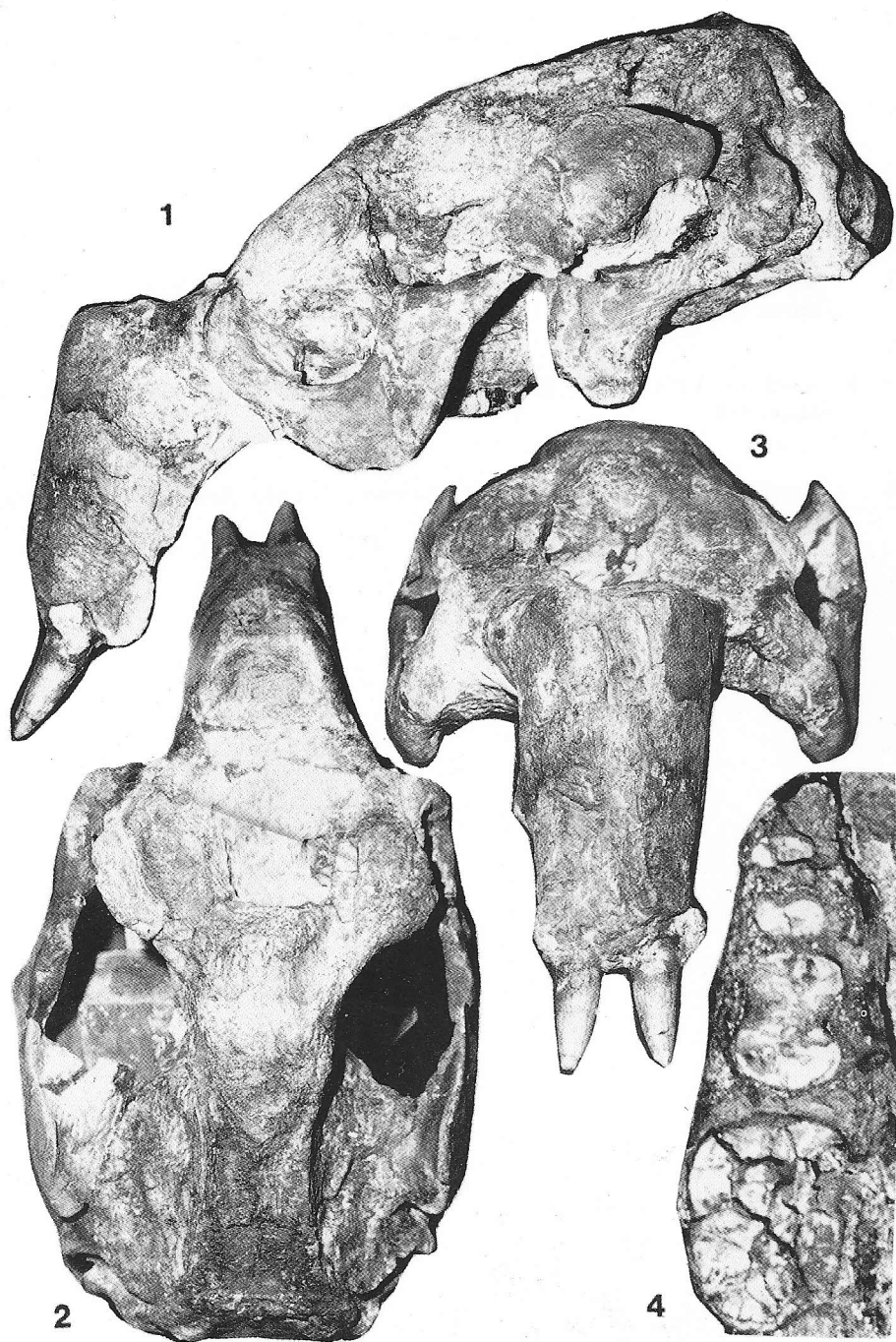


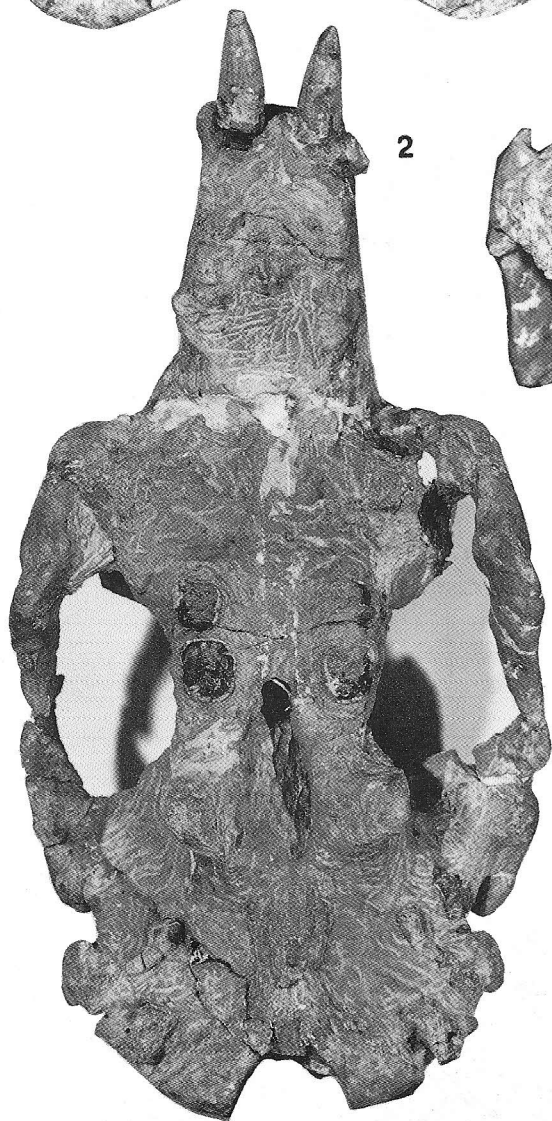
PLATE 40

Metaxitherium gervaisi (Capellini, 1872).

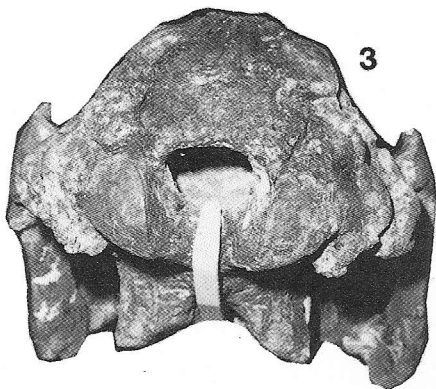
- Fig. 1 — Mandible, type-specimen. Early Pliocene, Val di Pugna (Siena). Lateral view; about 1/4.
- Fig. 2—3 — Skull, Igf 13747. Early Pliocene, Rúffolo (Siena). Ventral and occipital views; about 1/4.
- Fig. 4 — Detail of skull, Igf 13747. Early Pliocene, Rúffolo (Siena). Last right upper cheek teeth; 1/1.



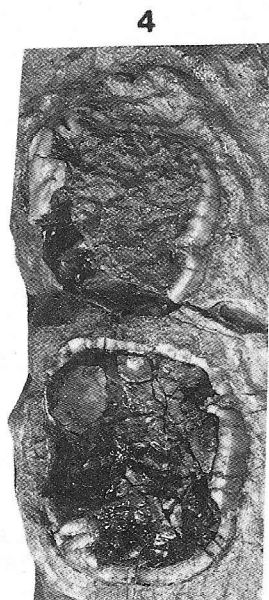
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