A NEW TRIONYCHID TURTLE FROM THE LOWER EOCENE OF KENT

by C. A. WALKER *and* R. T. J. MOODY

ABSTRACT. A trionychid turtle, *Trionyx silvestris* sp. nov., is described from a skull found in the Blackheath Beds (Lower Ypresian, Lower Eocene) of Abbey Wood, Kent. Comparisons are made between this, the first certain example of *Trionyx* from the Lower Eocene of Britain, and other fossil and Recent members of the Trionychidae.

IN the autumn of 1969 Messrs. John James and William George presented the British Museum (Natural History) with the almost complete skull of a trionychid turtle, without the lower jaw, which they had collected from the Blackheath Beds at Abbey Wood earlier that year.

Postcranial elements of trionychid turtles are fairly common at Abbey Wood and other Eocene localities, but this find confirms the presence of the genus *Trionyx*. The specimen was found associated with the typical molluscan fauna of the Blackheath Beds (Wrigley 1931).

Abbreviations. BMNH—British Museum (Natural History).

SYSTEMATIC DESCRIPTION

Suborder CRYPTODIRA
Superfamily TRIONYCHOIDEA Fitzinger, 1826
Family TRIONYCHIDAE Bell, 1828
Genus TRIONYX Geoffroy, 1809

The following generic characters (see Loveridge and Williams 1957) can be seen in the new species:

Skull without maxillary ridging; intermaxillary foramen moderate in size; prefrontal connected to vomer; jugal probably connected to parietal; width of postorbital much less than diameter of orbit; pterygoids do not join opisthotics, therefore fenestra postotica unrestricted.

Trionyx silvestris sp. nov.

Plate 118; text-figs. 1–3

Derivation of name. Latin *silvestris*, found in woods.

Diagnosis. External narial opening large, with snout region short and facial angle rounded; prefrontal slightly larger than frontal; surface of frontals rounded, therefore helping to give skull in frontal aspect a domed appearance (fig. 2); orbit large, height of orbit much greater than height of maxilla beneath; part of maxilla and jugal forming floor of orbit not steep-sided, but sloping gradually from outer rim (fig. 3); anterior end of jugal bar originates below posterior end of orbit; posterior

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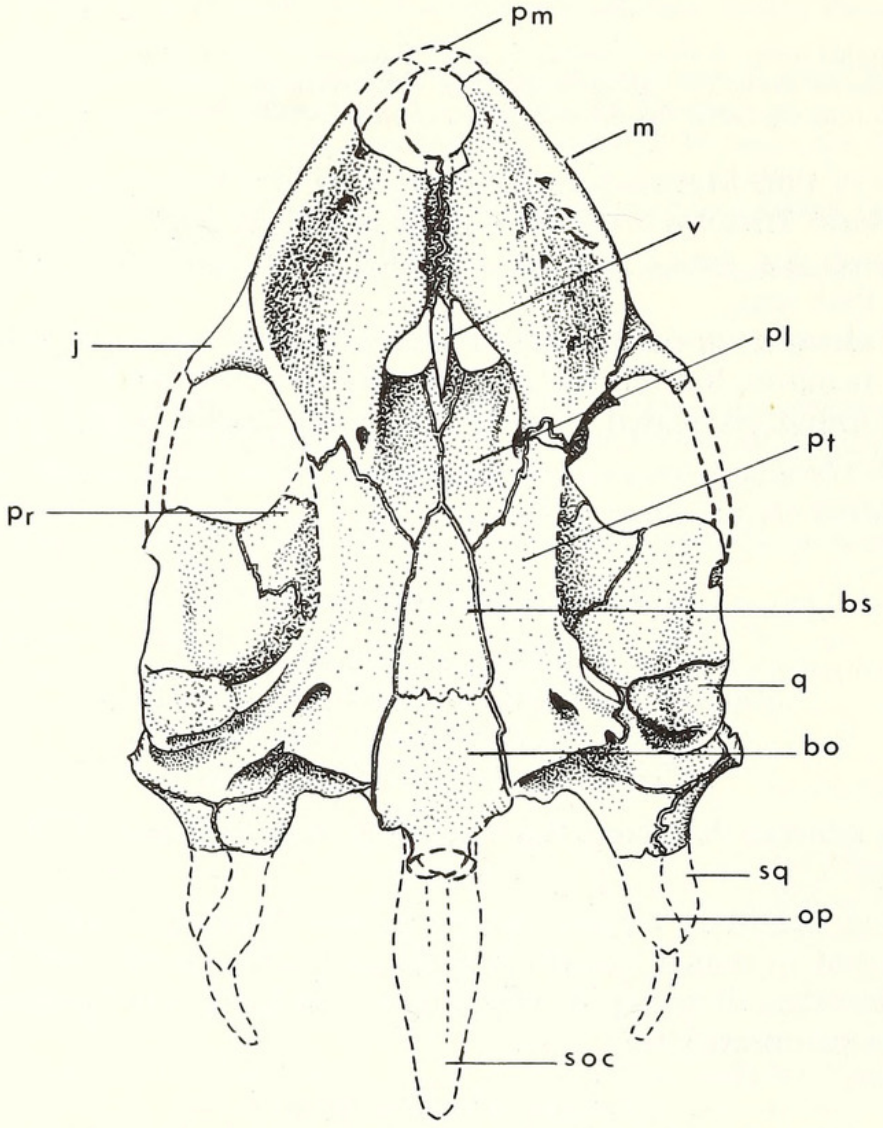
section of parietal crest thick; prootic large; triturating area like that of *T. gangeticus* and certain specimens of *T. triunguis* (BMNH Zool. no. 1909.10.15.3); median groove between maxillae narrow and deep, with moderately sloping sides; lateral walls of parietal steeper and quadrate less concave than in most living species. See Table 1.

Holotype. The unique specimen, BMNH no. R 8567: an almost complete skull without the lower jaw.

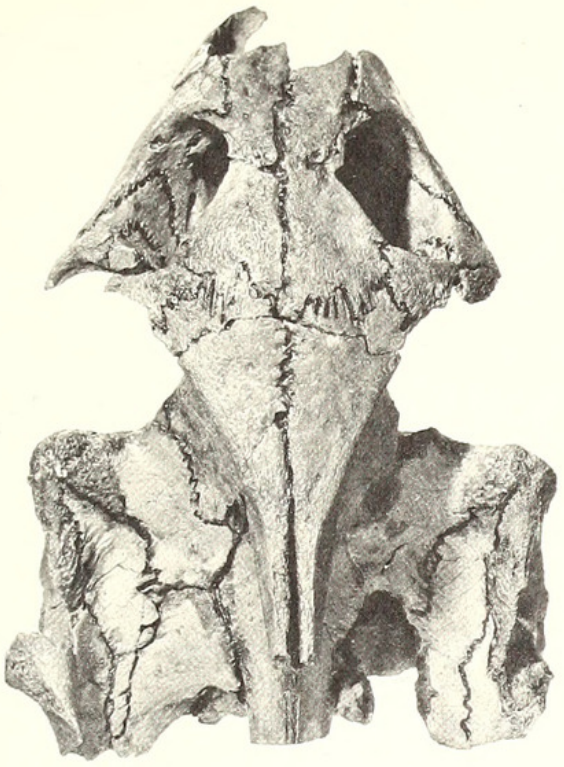
Occurrence. Blackheath Beds, Lower Ypresian, Lower Eocene; Abbey Wood, Kent.



TEXT-FIG. 1. *Trionyx silvestris* sp. nov. BMNH R 8567. Reconstruction of ventral surface of skull, ×1. Abbreviations: bo—basioccipital; bs—basisphenoid; j—jugal; m—maxilla; op—opisthotic; pl—palatine; pm—premaxilla; pr—prootic; pt—pterygoid; q—quadrate; soc—supraoccipital; sq—squamosal; v—vomer.

EXPLANATION OF PLATE 118

Figs. 1–6. *Trionyx silvestris* sp. nov. BMNH, R 8567, ×1. The skull from various aspects.
1, dorsal; 2, ventral; 3, anterior; 4, right lateral; 5, posterior; 6, left lateral.



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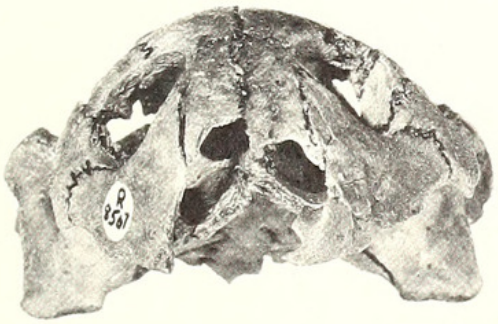

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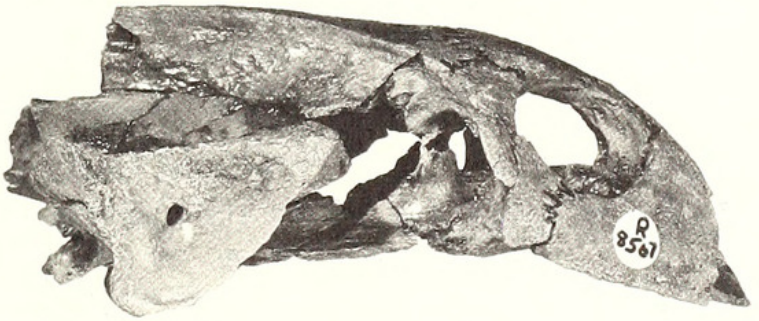

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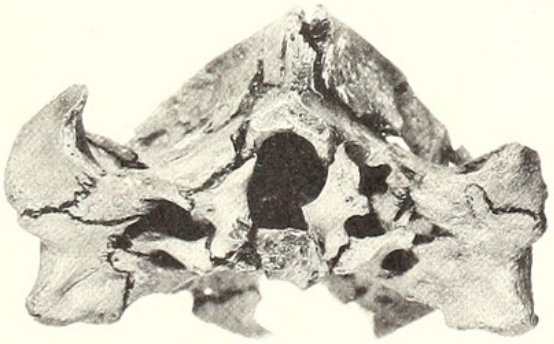

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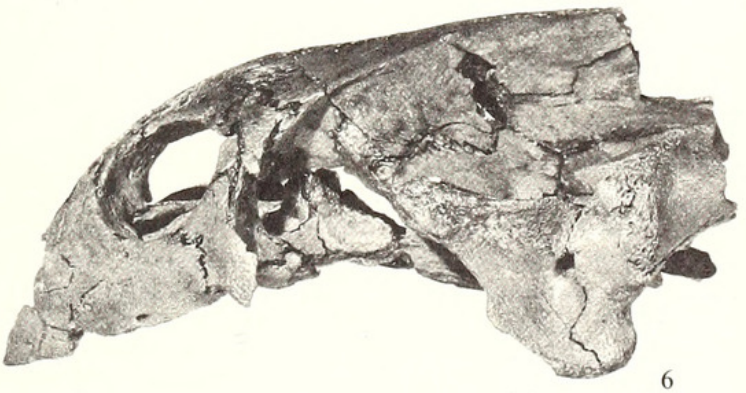

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WALKER and MOODY, *Trionyx silvestris*

Measurements (in millimetres).

Estimated total length from tip of snout to occipital condyle	86
Maximum width across quadrate condyles	56
Estimated width of external nares	16
Estimated height of external nares in mid-line	12
Estimated maximum height of external nares	15
Minimum width of interorbital bar	12
Length of frontal	17
Maximum length of orbit	17
Maximum height of orbit	15
Height of maxilla beneath orbit	9
Estimated length of mid-line from front edge of premaxilla to front of internal narial opening	27
Maximum width of choanae	12
Maximum length of choanae	6
Length of intermaxillary suture	18
Maximum width of jugal-maxillary suture	44
Maximum width of masticatory surface	36

Condition of preservation. The specimen is almost entire, uncrushed and with most of the sutures clearly visible.

The premaxilla is missing and the right prefrontal is imperfect. Although the parietals are perfect on both sides the supra-occipital part of the dorsal crest is broken off. The post-orbital bar is broken on both sides and the jugals, quadratojugals, and squamosals are incomplete. All elements visible in palatal view are damaged, with the articular areas of the quadrates being especially eroded. The basioccipital condyle is preserved but detached. Posteriorly all the elements are complete except for the major part of the right opisthotic.

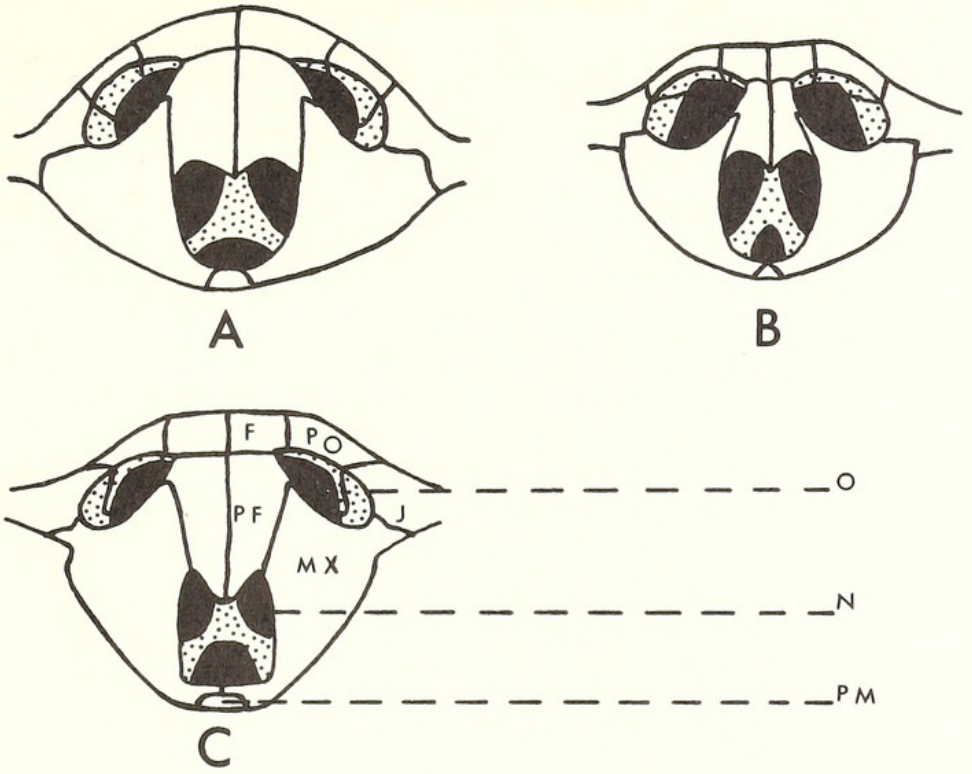
Description. The skull of *T. silvestris* is that of a small individual which in most respects resembles many of the living species of *Trionyx*.

A dorsal view of the skull (Pl. 118, fig. 1) shows that the snout would have been fairly narrow, tapering to a rounded tip with large external nares. The prefrontals are slightly longer than the frontals, the latter being distinctly domed. The parietal crest is thick.

Ventrally, what is left of the border of the anterior foramen shows that it would have been almost circular in outline. The cutting edges of the maxillae face slightly outwards and the lingual surface forms a wide angle with the more medial masticatory surface. The maxillae are fairly broad, each reaching its maximum width just anterior to its junction with the jugal. The intermaxillary suture is typical of many species of *Trionyx* in that it is longer than the choanae. The groove formed at the junction of the two maxillae, however, is unlike that in any other species of *Trionyx* examined, being steep-sided so as to form a V- rather than a U-shaped groove.

The frontal view (Pl. 118, fig. 3) shows the rounded nature of the cranium, and the low position of the jugal bar (text-fig. 2A).

Lateral views of the specimen (Pl. 118, figs. 4, 6) show that the facial profile is rounded with the curvature of the skull roof continuing towards the region of supra-occipital crest. The orbit also appears to be proportionately larger than in most species of *Trionyx*, and its ventral margin is divided by the maxillary-jugal suture, a condition witnessed in *T. triunguis*. The stapedial foramen is in the position normal for the genus, immediately above the articular area of the quadrate. The lateral surface of the quadrate is less concave than in Recent species, and its anterior edge appears to run down to the edge of the articular surface. The squamosal also appears to have been a more massive structure and makes a steeper angle with the quadrate. The maxilla and jugal do not form a vertical wall along the lower rim of the orbit as they do in other species of *Trionyx* (text-fig. 3).

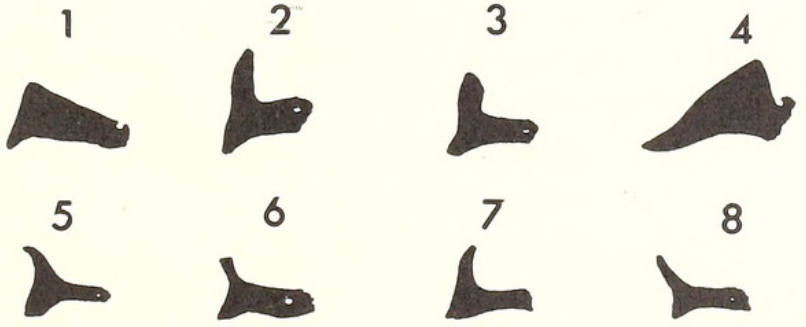


TEXT-FIG. 2. Diagram to show the roundness of the skull in frontal view.

A. *Trionyx silvestris*
B. *Trionyx gangeticus*
C. *Trionyx triunguis*

F—frontal; J—jugal; Mx—maxilla; N—narial opening; O—orbit; PF—prefrontal; PM—premaxilla; PO—postorbital. Various magnifications.

In occipital view (Pl. 118, fig. 5) the specimen again shows the typical *Trionyx* pattern with no ascending pterygoid process. It is difficult to recognize any outstanding specific characters because of the variation that occurs within each single species of *Trionyx*. There are, however, three variations that may be important: the posterior edge of the pterygoid is rather thick, there is no prominent ridge running along the posterior quadrate-squamosal suture, and the lateral side of the parietal is more vertical than in some Recent species.



TEXT-FIG. 3. Diagram to show the cross-sectional profile of the maxilla immediately below the centre of the orbit, viewed anteriorly. 1, *Trionyx silvestris*; 2, *T. gangeticus*; 3, *T. triunguis*; 4, *Eurycephalochelys*; 5, *Chitra*; 6, *Cycloderma*; 7, *Cyclanorbis*; 8, *Lissemys*. Not to scale.

Remarks. It is obvious that the skull belongs to a trionychid turtle and, moreover, to the genus *Trionyx*. As would be expected, it has many characters in common with all the species examined, but it also differed from them in three major features:

1. The absence of an outer, raised lip to the lower margin of the orbit, formed by the maxilla and the jugal (text-fig. 3).
2. A narrow V-shaped intermaxillary groove.
3. A less concave quadrate.

Some of the Recent species examined have a similar facial angle and short prefrontals as in *Trionyx silvestris*, but others like *T. triunguis* (BMNH Zool. no. 1909.10.15.3) have elongate prefrontals and a low facial angle.

TABLE 1. A comparison of various measurements and indices recorded from *Trionyx silvestris*, *T. gangeticus*, *T. triunguis*, and *T. cartilaginens*.

	A	B	B/A%	C	D	D/C%	E	F	F/E%
T. silvestris BMNH R 8567	86(e)	28(e)	33	15	9	60	17	12	76
T. gangeticus BMNH Zool. 48.2.138	78	21	27	14	12	86	15	7·5	50
T. triunguis BMNH Zool. 1909.10.15.3	97	33·5	35	15	10	67	16	13·5	84
T. cartilaginens BMNH Zool. 1929.10.17.6	118	35	30	18	20	111	19	15	79

A—Distance from tip of snout to occipital condyle
B—Distance from tip of snout to internal narial opening
C—Maximum height of orbit
D—Height of maxilla below orbit
E—Length of orbit
F—Width of interorbital bar
(e)—estimated

} All in millimetres

Of the three fossil trionychid skulls examined, two (*T. tritor* Hay and *T. levalensis* Dollo) appear to resemble the majority of Recent species in the three main characters listed above. The third, *Eurycephalochelys fowleri* Moody and Walker 1970, probably had an orbit that could be derived from that of *T. silvestris*, but it differs in many other major characters and cannot really be related.

Conclusions. T. silvestris without doubt belongs to the genus *Trionyx*, but any discussion of its relationships must await a complete analysis of all living and fossil trionychids.

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REFERENCES

DOLLO, L. 1909. The fossil vertebrates of Belgium. *Ann. N.Y. Acad. Sci.* **19,** 99–119.

HAY, O. P. 1908. The fossil turtles of North America. *Publ. Carneg. Inst.* **75,** 529–532, figs. 687–689.

LOVERIDGE, A. and WILLIAMS, E. E. 1957. Revision of the African Tortoises and Turtles of the Suborder Cryptodira. *Bull. Mus. Comp. zool. Harv.* **115,** 164–577, pls. 15–18.

MOODY, R. T. J. and WALKER, C. A. 1970. A new trionychid turtle from the British Lower Eocene. *Palaeontology*, **13,** 503–510, pl. 102, text-figs. 1–5.

WRIGLEY, A. G. 1931. The Lower Eocene Mollusca of Abbey Wood and of High Halstow (Kent). In *The Vertebrate faunas of the English Eocene*, ed. WHITE, E. I. B.M. (N.H.), London, **1,** 110–112.

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