

A new species of *Neritodryas* (Gastropoda, Neritimorpha, Neritidae) from the Ypresian (Eocene) of the Paris Basin

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A previously undescribed species in the family Neritidae is introduced from the late Ypresian (Cuisian) of the Paris Basin, France: *Neritodryas marqueti* nov. sp. The likely palaeoenvironments of fossil *Neritodryas* are considered with reference to the habitats of extant species.

KEY WORDS: Neritimorpha, Neritidae, *Neritodryas*, new species, Eocene, late Ypresian, palaeoecology.

Introduction

The primary purpose of this paper is to describe a new species of *Neritodryas* from the late Ypresian of Cuise-la-Motte, France. In addition the likely palaeoenvironments of fossil *Neritodryas* are considered in relation to the habitats of recent members of the genus.

All specimens referred to are held in the Muséum National d'Histoire Naturelle, Paris, France (MNHN), the Department of Earth Sciences at the Natural History Museum, London, England (NHMUK) and Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (IRSNB).

Systematics

Superorder Neritimorpha Golikov & Starobogatov (1975, p. 200)

Order Cycloneritimorpha Bandel & Frýda (1999, p. 220)

Family Neritidae Rafinesque (1815, p. 144, as Neritina)

Genus *Neritodryas* von Martens (1869, p. 22)

Type species – *Nerita cornea* Linnaeus, 1758, by subsequent designation, Baker (1923, p. 153); Recent, freshwater, Indopacific.

Diagnosis (emended from Symonds & Pacaud, 2010, p. 60) – Moderately large neritid, up to 40 mm in height, thin shelled, smooth or spirally ribbed, spire blunt; labial area smooth, sometimes with small teeth on the septum edge; operculum with ribbed apophysis.

Neritodryas marqueti nov. sp.

(Pl. 1, fig. 1)

Type material – Holotype IRSNB IST 7644 (R. Marquet leg.) (Pl. 1, figs 1a-c), maximum dimension 17.0 mm.

Type locality – Rue des Boulands, Cuise-la-Motte, Oise, France. 49°23'00.5"N 2°59'59.7"E (estimated from Google Earth).

Type stratum – Eocene, late Ypresian (Cuisian), Sables de Cuise.

Etymology – Named after my colleague Robert Marquet, an eminent Belgian palaeontologist, who found the holotype.

Diagnosis – Medium sized, globose *Neritodryas* with about forty prominent, closely spaced spiral ribs, septum edge with a poorly defined tooth.

Description – Shell medium sized, Protoconch eroded, details not visible. Teleoconch about two and a quarter whorls, globose, spire rather low but clearly defined, last whorl large, rounded. Whorls convex, a short concavity below impressed suture. Thirty-nine prominent, rounded spiral ribs on last whorl, broader and wider apart at periphery; rib immediately below suture particularly large, somewhat distorted in places. Interspaces narrower than ribs; distinct collabral lines crossing interspaces and ribs. Aperture broad; septum narrow, worn, revealing small, shallow umbilicus; septum edge somewhat concave in centre, a slight, rounded swelling approximately in the middle, otherwise edentate. Gutter between the

adapical end of septum and outer lip which is thin and smooth within. Apertural tooth below abapical end of septum conspicuous, consisting of two curved ridges forming two sides of a triangle, open end facing aperture, apex pointing into interior; inner ridge the larger, both increasing in height towards apex. No colour pattern visible, occasional traces of dark brown, apparent in places.

Distribution – Known only from the type locality.

Discussion – The holotype is the only known specimen of *N. marqueti* and accordingly the description does not allow for any intraspecific variation which may occur. However, it is sufficiently distinct from all other *Neritodryas*, extant and fossil, to merit description as a new species.

The prominent apertural tooth is a characteristic which *Neritodryas marqueti* shares with the other fossil species and most of the extant ones. Three species of fossil *Neritodryas* have been described. Two occur in the early-middle Ypresian (Sparnacian) of Pourcy, Marne, France (Spijkerman *et al.*, 2015, p. 171): *Neritodryas dutemplei* (Deshayes, 1864) and *N. guillioui* Symonds & Pacaud, 2010. The teleoconch of the former is virtually smooth with, at most, only very poorly defined spiral ridges in contrast to *N. marqueti* with its numerous conspicuous ribs. *Neritodryas guillioui* does have ribs but they are low and up to eighteen in number whereas in *N. marqueti* the ribs are higher and there are thirty-nine on the holotype. The other known fossil species, *N. globosa* (J. de C. Sowerby, 1823) from the Bartonian (middle-late Eocene) of the Hampshire Basin, England, is the most similar to *N. marqueti*. However, compared to *N. marqueti* the ribs on *N. globosa* are more regular in size, closer spaced, flatter and fewer in number, there being about twenty-five ribs on the neotype (Symonds, 2002, p. 2), less on the missing holotype if Sowerby's figure is reasonably accurate (J. de C. Sowerby, 1823, 5: pl. 424, fig. 1) and a specimen in the private collection of Adrian Smith of Sway, Hampshire, England, figured by Morton (2016), has twenty-four ribs. Also the collabral lines are much finer and less obvious in *N. globosa*.

Of the recognised extant species of *Neritodryas*, *N. dubia* (Gmelin, 1791) and *N. simplex* (Schepman, 1919) both have smooth teleoconchs without spiral ornamentation. *Neritodryas chimmoi* (Reeve, 1956) and the rather similar *N. notabilis* (Riech, 1935) both have ribs but they are broad and low unlike those of *N. marqueti*. *Neritodryas chimmoi* has only about twenty-seven ribs and although *N. notabilis* has a greater number, thirty to thirty-five, it also has fourteen to twenty small teeth on the septum edge (Duchamps, 2008 p. 36) in contrast to the almost edentate septum of *N. marqueti*. Moreover both species lack the apertural tooth (pers. obs.) which is a significant feature of *N. marqueti*. *Neritodryas cornea* (Linnaeus, 1758) and *N. subsulcata* (Sowerby, 1836) have about twenty and thirty ribs respectively (Delsaerd, 1998: 22) which are also lower and broader than those of *N. marqueti*. An undescribed species of *Neritodryas* from Java

and Thailand has twenty-two to twenty-five ribs but they are also low and often indistinct (Eichhorst, in press).

Palaeoecology of *Neritodryas*

Neritodryas is unlike other genera within the Neritidae in that adults of extant species live most of their lives out of water, often on trees (Cowie & Smith, 2000, p. 98). The arboreal habitats of *Neritodryas* have been known for a long time. Sowerby (1849, p. 518), under his description of *N. cornea*, noted: "Mr Cuming took specimens from leaves of palms, twenty feet high, in woods, at Puerto Galero, Island of Mindoro." Similarly, Reeve (1855, pl. 2, sp. 7), in reference to *N. cornea*, stated that it was found by Mr Cuming in the Philippine Islands, eighteen feet high in palms, a quarter of a mile from any river. Martens (1879, 141-142) also refers to *N. cornea* being collected from leaves of *Pandanus* and other trees high above the ground and a long way from the nearest stream. Smith (1885, 603-604) wrote about *N. cornea* from the Solomon Islands: 'Found living on the stems of tree-ferns, betel-nut palms, &c., in a marshy district in the interior of the Shortland Islands, Bougainville Straits: also from a stream in Choiseul Bay, and from the vicinity of Star Harbour on the south-east coast of San Christoval, found living on the trunks of trees 300 feet above the sea and about 150 feet above an adjacent stream'. However, his figure of *N. cornea* (pl. 37, figs 7-7b) shows that he was in fact referring to *N. notabilis*; as noted by Riech (1935, p. 242).

More recently Delsaerd (1998, p. 24) described finding *N. subsulcata* on a tree hundreds of meters from a small river. Garcia (1997, p. 15) collected *N. cornea* eight to ten feet from the ground on *Heliconia* leaves with no water in the vicinity. Brandt (1974, p. 8) commented that *Neritodryas* 'were never found in fresh or running water ... but seem to live only on trees in the mud flats somewhat above the water mark'.

The ontogeny of *Neritodryas* is not fully known; it is clear that the adults must return to freshwater to deposit their eggs and it seems likely that there is a pelagic larval stage but it is not certain whether the larvae are lecithotrophic or planktotrophic (Symonds & Pacaud, 2010, p. 60).

Of the fossil species, *Neritodryas globosa* is extremely rare, known only from the holotype, which was lost in the nineteenth century (Symonds, 2002, p. 2), the neotype and a third specimen referred to above. The exact provenance of the holotype is uncertain, the neotype is from Highcliff, Hampshire, probably bed A3 of Burton (1933) (Symonds, 2002, pp. 2-3) and the third specimen is from the lower beds of the Barton Group at Highcliff. The beds of the Barton Group in the Hampshire Basin are 'mostly sands and clays of predominantly marine origin' (Chatwin, 1960, p. 68). Fresh or brackish water species such as *Clithon passyanus* (Deshayes, 1864) are uncommon in A3 and their presence is probably the result of their being swept downstream to the sea, particularly during storm events. On the other hand, land molluscs, such as *Rillyarex* sp., are rare, which is to be expected as they

would first have to fall or be washed into rivers before being carried out to sea. In this respect the rarity of *N. globosa* suggests a terrestrial environment and supports the possibility that *N. globosa* led an arboreal lifestyle similar to extant *Neritodryas*.

The Pourcy faunas include marine, euryhaline and terrestrial species and they have been interpreted to represent a tropical coastal setting, probably with mangroves (Spijkerman *et al.*, 2015, p. 177). Numerous specimens of *Neritodryas*, mainly *N. dutemplei*, have been found at Pourcy. Spijkerman *et al.* list thirty-two from studied collections (2015, p. 171), but they are not as common there as other neritids, some of which are abundant. A bulk sample from an excavation beside the track to Moulin de l'Ardre Farm in 2008 yielded approximately five thousand seven hundred neritids of which only seven were *Neritodryas*. The relative scarcity of *Neritodryas* indicates that they were not occupying the same fresh or brackish water habitats as the other neritids and again a terrestrial environment is a distinct possibility.

The faunal assemblage in the Sables de Cuise at Cuise-la-Motte also includes marine and brackish water molluscs as well as freshwater species carried down by rivers (Pomerol & Feugueur, 1974, p. 119). Although the holotype of *Neritodryas marqueti* is broken this appears to be a fresh break, perhaps caused when the specimen was excavated. In all other respects the shell is in good condition and the ornamentation on the teleoconch shows little sign of wear, precluding any realistic prospect of reworking from an earlier deposit. The unique holotype contrasted with the common euryhaline species could well be the result of a predominately terrestrial palaeoenvironment with *N. marqueti* only returning to the water briefly to reproduce.

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Plate 1

1. *Neritodryas marqueti* nov. sp.; a-c: **holotype** IRSNB IST 7644 (R. Marquet leg.), maximum dimension 17.0 mm. Ypresian, Rue des Boulands, Cuise-la-Motte, Oise, France.
2. *Neritodryas globosa* (J.D.C. Sowerby, 1823); a-c: **neotype**, NHMUK GG 22558 (A.G. Davis coll.), height 18.2 mm, width 13.8 mm. Bartonian, Highcliff, Hampshire, England.
- 3-4. *Neritodryas guillouvi* Symonds & Pacaud, 2010; 3a-c: **holotype**, MNHN A31490 (Faullummel coll.) height 15.0 mm, width 16.0 mm. Ypresian, Pourcy, Marne, France; 4a-c: **paratype**, MNHN A31491 (Faullummel coll.), height 14.5 mm, width 15.0 mm. Both from Ypresian, Pourcy, Marne, France.
5. *Neritodryas dutemplei* (Deshayes, 1864); a-c: MNHN A31493 (Faullummel coll.), height 9.0 mm, width 9.1 mm. Ypresian, Pourcy, Marne, France.

