An unusual *Nystia* species (Gastropoda, Truncatelloidea) from the early Rupelian of the Isle of Wight (Hampshire Basin, England)

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In the lower part of the Hamstead Member of the Bouldnor Formation (lower Rupelian, Oligocene) in the Isle of Wight (Hampshire Basin, England) a common gastropod has hitherto been incorrectly identified as *Lutetiella conica* (Prévost, 1821), a hydrobioid species from Lutetian (middle Eocene) strata of the Paris Basin. We have re-assessed its relationship and describe it as *Nystia conoidalis* n. sp. in the family Emmericiidae. Recognition of its relationships had been obscured by the vestigial development of the terminal varix and the less frequent and less severe occurrence of shell decollation.

Key words: Emmericiidae, *Nystia conoidalis* n. sp., *Lutetiella conica*, Oligocene, Bouldnor Formation, Hamstead Member, *Nematura* Bed.

Introduction

The Bouldnor Formation (upper Priabonian and lower Rupelian) is the upper part of the Solent Group of sediments in the Hampshire Basin, England, and is exposed only on the Isle of Wight. It consists of a series of freshwater, brackish water and near-marine clays, silts, sands and limestones. The Bouldnor Formation consists of three members, the Cranmore Member at the top, a mostly brackish water to marine series of sediments, underlain by the Hamstead and Gurnard members, a series of mostly freshwater to brackish water sediments. The Bouldnor Formation itself rests on the underlying Bembridge Limestone Formation, a freshwater limestone. A description of the stratigraphy and lithographic characteristics of the Bouldnor Formation is given by King (2016). Molluscs are a prominent component of the brackish faunal associations (Forbes, 1856; Morris, 1856; Sandberger, 1872–1873; Wood, 1877; Wenz, 1926; Munt & Barker, 1996; Symonds, 2006; Munt, 2014; see also the website by Morton (2022) for a summary of the stratigraphy, a brief bibliography, and illustrations of characteristic mollusc species (www.eocenefossils.uk)) Characteristic of the Hamstead Member is, *i. a.*, *Nystia duchastelii* (Nyst, 1836) a common gastropod with a wide distribution in western Europe. Another gastropod, which is restricted to a single layer in the Hampstead Member, has to date been associated variably with the genera *Assiminea* Fleming, 1828 (family Assimineidae), *Bithynia* Leach, 1818 (family Bithyniidae) or *Peringia* Paladilhe, 1874 (family Hydrobiidae), and with the species "*Paludina*" *conica* Prévost, 1821 from Lutetian strata of the Paris Basin. Newly collected material enabled us to redescribe this species and assess its taxonomic relationships.

Taxonomy

Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox, 1960
Cohort Sorbeoconcha Ponder & Lindberg, 1997
Subcohort Hypsogastropoda Ponder & Lindberg, 1997
Superfamily Truncatelloidea Gray, 1840
Family Emmericiidae Brusina, 1870
Genus *Nystia* Tournouër, 1869

Type species (by monotypy) – *Cyclostoma duchastelii* Nyst *in* Van Der Maelen, 1835 (p. 62, no. 181).

Remarks

1. Suprafamilial classification according to Bouchet *et al.* (2017).
2. The name *Cyclostoma duchastelii* Nyst, 1835 was regarded as a *nomen nudum* by, *e.g.,* Wenz (1926: 2157) and Schlickum (1968: 41), but a brief remark by Nyst (1835) contains a descriptive character and thus makes the name available: *"Les grands individus sont constamment tronqués."* [The large specimens are always truncated]. Nyst (1836: 163, pl. 1, fig. 56) figured and described the species as *Paludina duchastelii*.
3. The familial classification of *Nystia* has been uncertain for a long period: Hydrobiidae: Fossarulinae Wenz, 1926 (a synonym of Bithyniidae according to Bouchet *et al*. 2017: 345) by Wenz (1926: 2157); ques-

tionably in Hydrobiidae: Emmericiinae (now a family in its own right) by Wenz (1939: 345); in Truncatellidae by Kadolsky (1989: 102) and Kadolsky (1993: 359); in Pomatiopsidae by Kadolsky & Piechocki (2000: 229) and Marquet *et al*. (2008: 52). The discovery of the protoconch microsculpture of predominantly spiral elements (Kadolsky, in preparation) suggests its place should be in the Emmericiidae. This is consistent with the similarly sized and shaped protoconch in the emmericiid genera *Schuettemmericia* Schlickum, 1961, *Staadtiellopsis* Schlickum, 1968, *Emmericia* Brusina, 1870 and *Zilcheuchilus* Schlickum, 1965. In this family it is the only genus living in a brackish habitat; all others are freshwater dwellers.

***Nystia conoidalis* n. sp.**
Figs 1-3

1866 *Hydrobia conica* (*Bithynia*) – Lowry: pl. 2 [non *Paludina conica* "Brard" Férussac, 1814 *nec* Prévost, 1821].
1889 *Bythinia conica* – Reid & Strachan: 187, 191 [non *Paludina conica* Prévost, 1821, *nec* Férussac, 1814].
1891 *Assiminea conica* – Newton: 226 (Hempstead Beds: Hempstead; Headon Beds: East Cowes) [non *Paludina conica* Prévost, 1821, *nec* Férussac, 1814].
1921 *Bythinia conica* – Osborne White: 141 (Hamstead: *Nematura* Bed. Lower Hamstead Beds) [non *Paludina conica* Prévost, 1821, *nec* Férussac, 1814].
1926 *Peringia* cf. *conica* – Wenz: 1980 (partim, only Hempstead [Beds]) [not *Paludina conica* Prévost, 1821, *nec* Férussac, 1814].
1962 *Peringia* cf. *conica* – Glibert: 33 (Hamstead) [non *Paludina conica* Prévost, 1821, *nec* Férussac, 1814].
1994 *Bythinia conica* – Osborne White: 128 (Hamstead: *Nematura* Bed. Lower Hamstead Beds) [non *Paludina conica* Prévost, 1821, *nec* Férussac, 1814.]

Holotype – NHMUK no. PI TG 27264, here Fig. 1.

Type locality – Bouldnor, Isle of Wight, England. 50°42'37"N, 1°28'04"W.

Type stratum – "*Nematura* Bed" (lowermost Rupelian), Hamstead Member, Bouldnor Formation (King 2016).

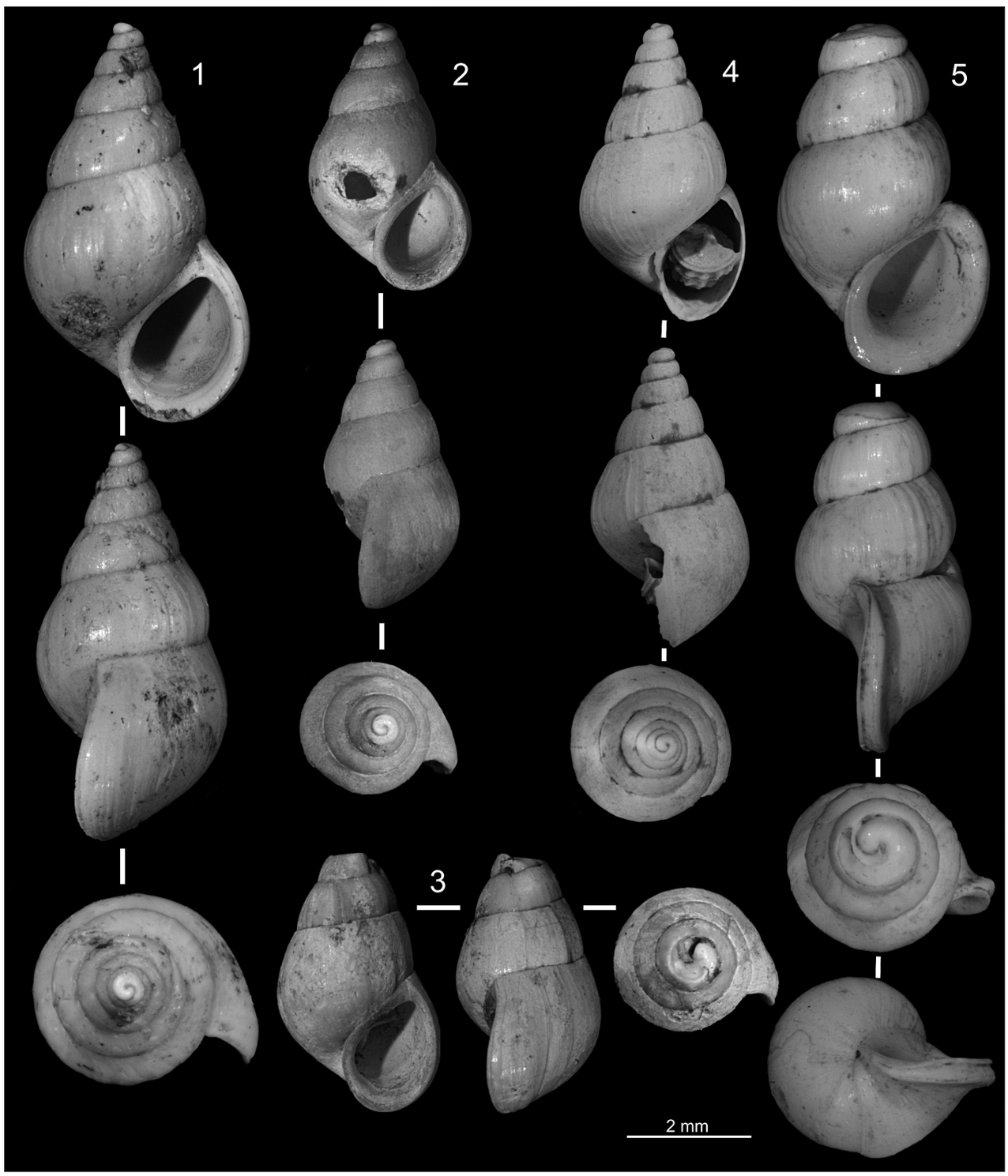
Paratypes – NHMUK no. PI TG 2765 (Fig.2). PI TG 27266 (Fig.3), PI TG 27267(1-150); coll. Alan Morton (c. 1000 specimens), coll. Kadolsky (16 specimens), all from the type locality and stratum.
Hampstead or Hempstead (now Hamstead) without further details: Museum Wiesbaden, 1 specimen; unknown origin; NHMUK PI OR 72203(1-22): 22 specimens, coll. Edwards; NHMUK PI TG 27263 (1-5): 5 specimens, coll. Keeping (acquired 1858).
"Pit 2" [no further information; sediment is blackish-grey pyritic silt] NHMUK PI TG 26504 (1-8): 8 specimens, coll. Edwards.
East Cowes, "Headon Beds" (NHMUK PI TG 26502–26503: 2 specimens, coll. Edwards, (purchased 1872–73).
Note: Despite intensive field work by AM on the Isle of Wight at a variety of sites including East Cowes, *N. conoidalis* was never confirmed in the Headon Beds. The origin of this East Cowes material is likely to be an outlier of the Hamstead Member of the Bouldnor Formation ("Hempstead Beds") from a well dug on the Osborne Estate just East of East Cowes as described by Wilkins (1861). Newton (1891) listed from East Cowes the additional species in the Edwards collection: *Cyrena semistriata* (Deshayes, 1831) [= *Polymesoda convexa* (Brongniart, 1823)], *Bithinella pulchra* Deshayes, 1862 var. [= "*Hydrobia*" *pupa* Forbes, 1856] and *Neritina tristis* Forbes, 1856 [= *Clithon* (*Pictoneritina*) *bristowi* (Wenz, 1929)]. This assemblage indicates the presence of the Bouldnor Formation, and specifically of the "*Nematura* Bed", at East Cowes. Edwards may have ignored or overlooked Wilkins' report and assigned the material to the Headon Beds.

Diagnosis – A species of *Nystia* of conical shape, often decollating, with moderately convex whorls, vestigial collabral ribbing or growth striae only, terminal varix very weak, peristome slightly expanded and slightly opisthocline-concave.

Description – Shell conical, with an obtuse apex. Protoconch 530–570 µm wide, with 1.1–1.2 whorls; nucleus 140–180 µm wide; whorls strongly convex, glossy, initial half almost in a plane; the entire protoconch is often lighter coloured than the teleoconch, although it is unknown whether this is caused by a difference in original pigmentation or by secondary alteration of different shell material. Boundary to teleoconch marked by the onset of growth striae. Teleoconch whorls moderately convex, with weak growth striae, orthocline-concave on middle whorls, opisthocyrt on last quarter of last whorl; weak collabral ribs may be present on any part of the whorls. Suture simple, but whorls slightly appressed to the preceding whorl. A very weak terminal varix is present just before the peristome. Aperture obliquely roundish pear-shaped, with a long, strong and straight parietal callus grading gently into the curved and callous columellar margin; palatal margin regularly curved. Peristome slightly expanded, separate from the terminal varix, its inside thickened with a rounded palatal lip which merges into the columellar and parietal calluses. The adapical part of the peristome forms a broad and shallow sinus which reduces the width of the terminal varix. Inside the aperture, and separated from the palatal lip, is a very weak ridge which continues on the inside of the columellar and parietal calluses.

Variability – Shells reach maturity at quite different sizes corresponding to different numbers of whorls, *e.g.* the shell in Fig. 1 has 6.0 whorls, and the shell in Fig. 2 has 5.0 whorls. Up to 70% of the specimens decollate (Fig. 3).

Relationships – *Nystia duchastelii* (Nyst, 1835) (Figs 4–5) occurs in the same formation, but not in association



Figs 1–3. *Nystia conoidalis* n. sp. Isle of Wight, Bouldnor, Bouldnor Formation, Hamstead Member, "*Nematura* Bed"; lower Rupelian. Alan Morton leg. **Fig. 1**. Holotype, NHMUK PI TG 27264. **Fig. 2**. Paratype. Small specimen with intact apex. NHMUK PI TG 27265. **Fig. 3**. Paratype. Small decollate specimen. NHMUK 27266.

Figs 4–5. *Nystia duchastelii* (Nyst, 1835). Belgium, Limburg, Alden Biesen, castle park. Borgloon Formation, Alden Biesen Member; lower Rupelian. Coll. Kadolsky 4537a, b. **Fig. 4**. Immature specimen with preserved apex. **Fig. 5**. Medium sized mature specimen.

with *N. conoidalis*. The shells of immature specimens with preserved protoconch are often more slender and have more convex middle whorls, but broader specimens with only moderately convex whorls (Fig. 4), which differ hardly from similarly sized whorls of *N. conoidalis*, are not rare either. The terminal varix and the expansion of the peristome are fully developed in mature *N. duchastelii* (Fig. 5). The shallow adapical palatal sinus

is more conspicuous, and a similar abapical sinus is also evident (Fig. 5, view of umbilical side); the columellar callus grades with an obtuse angle into the basal margin. *Nystia duchastelii* is almost always decollate except in rare dwarf forms; it sheds a variable but usually much larger part of its shell than does *N. conoidalis*.

All of these differences between *Nystia duchastelii* and *N. conoidalis* are differences of degree, not justifying a separate genus for *N. conoidalis*.

Due to the striking habitus differences between *Nystia duchastelii* and *N. conoidalis* previous authors did not suspect a relationship between these species, but sought it with *Lutetiella conica* (Prévost, 1821), a species of Lutetian age from the Paris Basin, which was redescribed by Kadolsky (2015) and placed in the then new genus *Lutetiella* Kadolsky, 2015. *L. conica*, as well as the type species *L. hartkopfi* Kadolsky, 2015, have a much smaller protoconch 1 with a hydrobiid microsculpture, and a protoconch 2; their shells do not decollate, they do not have collabral riblets, no terminal varix or just an extremely weak one, a much weaker internal lip and no internal ridge.

Remarks – Reports of *N. conoidalis* from the Eocene Headon Formation are incorrect. In the case of East Cowes the formation was incorrectly identified, see above. In other cases there may be misidentifications (Sandberger (1872: 212–213 and 1873: 267) as *Assiminea conica* from Headon Hill; Wood (1877: 338, pl. 34 figs. 8a–b) as *Bythinia conica* from Hordle and Headon Hill. Wood's fig. 8a,b shows a shell with much more convex whorls than *N. conoidalis*.

Distribution – N. conoidalis is only known from the "*Nematura* Bed" of the Hamstead Member of the Bouldnor Formation, formerly the Lower Hamstead (or Hempstead) Beds at Bouldnor, Isle of Wight. The age of this bed is oldest Rupelian, between a layer with mammal remains of the mammal zone MP20 below and MP21 above (King, 2016).

Ecology – Nystia conoidalis is a frequently-occurring component of the shell-beds of the "*Nematura* Bed", which contains a transgressive brackish water assemblage dominated by the bivalve *Polymesoda convexa* (Brongniart, 1823) and the gastropod "*Hydrobia*" *pupa* (Forbes, 1856). Note this species is not related to *Stenothyroides pupa* (Nyst, 1836) and not even a member of the Stenothyridae, but has formerly been referred to as *Nematura pupa*, giving its name to the bed. Other species that are frequent in the "*Nematura* Bed" are the bivalve *Semimodiola prestwichii* (Morris, 1856), and the gastropods *Granulolabium plicatum moniliferum* (Deshayes, 1834), *Mesohalina labyrintha* (Nyst, 1836)[1], and *Clithon* (*Pictoneritina*) *bristowi* (Wenz, 1929).

Conclusions

The species hitherto attributed to *Nystia* (see Kadolsky, 1993 for descriptions and illustrations of the majority of species) show a similar habitus, *viz*. a strongly developed terminal varix and decollation of >90% of mature shells. The only exception is *N. integra* Kadolsky, 1993, which very rarely is decollated, but still has a distinct terminal varix. *Nystia conoidalis* was not recognised as a member of the genus *Nystia* for a long time because the rudimentary development of the terminal varix and the less frequent and less severe decollation give it a very different aspect. The origin of *N. conoidalis* remains unclear. Its restriction to a single layer where it occurs without being accompanied by *N. duchastelii* could be interpreted as an indication that *N. conoidalis* is just a particular morph of *N. duchastelii*, but this interpretation is not consistent with the fact that intermediate forms have nowhere been observed, although *N. duchastelii* shows considerable variability throughout its range (see Kadolsky, 1993: 375–376, figs 68–80). Likewise, other *Nystia* species do not show any variants that could be seen as intermediates towards *N. conoidalis*.

In Belgian Limburg, *N. duchastelii* is associated with common *Stenothyroides pupa*, *Granulolabium plicatum moniliferum*, *Mesohalina labyrintha*, and *Polymesoda convexa*, *i.e.* with a similar faunal assemblage of similar age as the "*Nematura* Bed" in the Isle of Wight. A potentially significant difference is that *Stenothyroides pupa* (Nyst) is absent in the "*Nematura* Bed", where "*Hydrobia*" *pupa* (Forbes) is abundant, while the latter is absent in Belgium.

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[1] The original binomen and spelling by Nyst (1836) is *Cerithium labyrinthum*. This is misspelled Latin: the noun is *labyrinthus*, and the adjective is *labyrinthe|us*, *-a*, *-um* (labyrinthic). Presumably Nyst did not want to say that this "*Cerithium*" is a labyrinth, but that its surface ornamentation is labyrinthic. The gender agreement between *Cerithium* and *labyrinthum* is consistent with this assumption. The species epithet '*labyrinthum*' is thus a misspelled adjective, which the Code does not allow to correct.

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