The Neritidae of the Barton Group (Middle Eocene) of the Hampshire Basin.

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INTRODUCTION

The family Neritidae is poorly represented in the Barton Group but rare examples do occur in at least three horizons, namely beds A3, E and F of Burton (1933) but these have not been described in any detail. Examination of the material in the Department of Palaeontology, The Natural History Museum, London (hereinafter called: “BMNH”) has shown several taxa to be present including two new species and a subspecies which are herein described. The operculum is often of importance in the classification of the Neritidae but unfortunately no operculum has yet been found, as far as I am aware, in the Barton Group.

Family NERITIDAE Rafinesque 1815

Genus NERITA Linné 1758

Type species, by subsequent designation, M=ontfort, 1810: Nerita peloronta Linné 1758. Recent, marine, Caribbean.

Subgenus AMPHINERITA Martens 1887

Type species, by subsequent designation, Baker, 1923: Nerita umlaasiana Krauss, 1848. Recent, marine, South Africa.

Diagnosis (Keen in Knight et al., 1960: 1282): Smooth or finely striate, oblique; labial area smooth, margin weakly denticate.

Remarks: Martens’ description is brief and of little assistance (Martens, 1887-9: 9) and I have used that given by Keen which appears to be based mainly on the characteristics of the type species. N. umlaasiana is also characterised by a thickened outer lip which is smooth within, lacking any teeth or striations. However, although the septum surface is generally smooth in N. umlaasiana, it is certainly not so in Nerita atrata Chemnitz, 1781 (= Nerita senegalensis Gmelin, 1791) which Martens included in his subgenus Amphinerita.

Nerita (Amphinerita) bartonensis sp. nov.

Pl. 1, figs 2-5

Derivatio nominis: Named after the Barton Group from which all the known specimens have come.

Holotype: BMNH 73209 (F.E. Edwards coll.). An adult of average size. (Pl. 1, fig. 2)

Stratum typicum: “Lower Barton Beds”; Barton Clay Formation, from the condition and matrix, probably Bed A3 of Burton (1933).

Locus typicus: Highcliff, Hampshire.

Paratypes: BMNH GG22556 (H. Eliot Walton coll.), (Pl. 1, fig. 3), BMNH 3414 (Pl. 1, fig. 4), BMNH 3414 (Pl. 1, fig 5).

Diagnosis: A rather small Amphinerita with a smooth exterior to the shell, the initial whorls, but not usually the last whorl, covering the spire. The septum surface has irregular folds and its edge is denticulate. The outer lip is smooth within.

Description: The shell is rather small, ovate in the adult stage, juveniles are broadly ovate in adapatual view. Juveniles are thin shelled but in the adults the outer lip is substantially thickened and bevelled at the edge. The initial whorls are completely obscured by the immediately succeeding whorls, which are entirely convex, but in some adults, including the holotype, the last whorl is slightly concave just below the suture and it does not obscure the penultimate whorl leaving a slightly excerted spire.

The external surface is polished and smooth except for fine, transverse, growth lines. The colour pattern is fairly constant consisting of two or three prominent, continuous, solid, whitish, spiral bands; these are interspersed with spiral strips, often of approximately similar width to the whitish bands but much broader in some specimens, brown in colour with white spots.

The aperture is slightly oblique and semilunar. The septum is broad with irregular folds and/or pustules in the centre of the upper surface. The central half of the septum edge is distinctly concave. The dentition consists of a series of small, regular teeth, up to eight in number, which occupy the concave central section. A very slight upper tooth, immediately adapical to the concave section, is also present in a few specimens. The outer lip is smooth within. There is a small, conoidal, apertural tooth below the abapical end of the septum.

Size: Height 10mm, width 7.6mm (holotype).

Remarks: The colour pattern of N. bartonensis is superficially similar to that of some specimens of Theodoxus passyanus (Deshayes, 1864) and this may be the reason for it having been overlooked as a separate taxon. However the whitish bands on N. bartonensis are solid and continuous whereas in those specimens of T. passyanus which are banded the bands are not always continuous and they are not solid but rather a concentration of white spots. The morphology of the two species is very different: juvenile N.
Type and locus typicus: The holotype was lost in the 19th century according to a manuscript note, “missing June 1889”, alongside the figure of the holotype in the copy of J. de C. Sowerby’s figure of Nerita globulus (J. de C. Sowerby, 1823) Wenz, 1938). The folio edition of this work in the Mollusca Library, BMNH, omits the name of the species shown in fig. 14, presumably due to a printing error. Kennard (1942, 15) states that the caption for fig. 14 was “Nerita globulus”. He also gives the date for publication of Férussac’s livraison 20, which includes the Nerites fossils plate, as 27th September 1823. Cleevley (1974, 444) puts the date of publication of Sowerby’s description of Nerita globula as 1st August 1823. Accordingly, regardless of whether Férussac used the specific name globosa or globulus, Sowerby’s description was published first and is here given priority.

Although Sowerby placed this species in the genus Nerita, he himself commented that “The only circumstance in the form of this shell that induces us to determine it to be a Nerita, is the sulcated surface”. The general appearance of the species shown in fig. 14, presumably due to a printing error. Kennard (1942, 15) states that the caption for fig. 14 was “Nerita globulus”. He also gives the date for publication of Férussac’s livraison 20, which includes the Nerites fossils plate, as 27th September 1823. Cleevley (1974, 444) puts the date of publication of Sowerby’s description of Nerita globula as 1st August 1823. Accordingly, regardless of whether Férussac used the specific name globosa or globulus, Sowerby’s description was published first and is here given priority.

Amended diagnosis: The material from the Barton Group at BMNH includes a single broken specimen, the neotype, which matches closely the description and illustration in Sowerby although what Sowerby describes as “a very obtuse tooth” near the upper end of the septum appears in his accompanying figure (see Text-fig. 1) and in the neotype more as a slight swelling of the adapical end of the septum edge than as a parietal tooth in the usual sense.

In addition to Sowerby’s description of the holotype, the following details are apparent from an examination of the neotype. The whorls are evenly rounded and convex except for a conspicuously concave section immediately below the suture; the suture itself is prominent and quite deep but this could be due to the worn condition of the neotype. The surface is covered by approximately 25 evenly spaced, low, rounded, fairly even sized, spiral ridges separated by narrow, shallow grooves, the ridges becoming flattened and less conspicuous on the upper half of the last 10mm or so of the final whorl; the spiral ridges are crossed by a few prominent growth lines interspersed by very fine, close, transverse lines. The “lamelliform tooth” within the aperture, noted by Sowerby and clearly visible in plate 1, figure 1a, consists of two raised ridges which meet to form two sides of a triangle with the open end towards the aperture and the apex pointing into the interior of the shell; the inner ridge is longer than the outer one and both incease in height as the apex is reached. The colour pattern consists of a dark brown background with white dashes and spots and three whitish, spiral bands.

Size: Height 18.2mm, width 13.8mm (neotype).

Remarks: Accordingly to Sherborne (1926, 2733), Férussac described a Nerita globula at an unspecified date between 1800 and 1850 in his Histoire naturelle générale et particulière des Mollusques, pl. Nerites fossiles, fig. 14. Also, Keen in Knight et al. (1960, 1284) refers to Nerita globula Férussac, 1823. However fig. 14 of the relevant plate shows Nerita globularis (= Neritoplica uniplicata (J. de C. Sowerby, 1823) Wenz, 1938). The folio edition of this work in the Mollusca Library, BMNH, omits the name of the species shown in fig. 14, presumably due to a printing error. Kennard (1942, 15) states that the caption for fig. 14 was “Nerita globulus”. He also gives the date for publication of Férussac’s livraison 20, which includes the Nerites fossils plate, as 27th September 1823. Cleevley (1974, 444) puts the date of publication of Sowerby’s description of Nerita globula as 1st August 1823. Accordingly, regardless of whether Férussac used the specific name globosa or globulus, Sowerby’s description was published first and is here given priority.

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Although Sowerby placed this species in the genus Nerita, he himself commented that “The only circumstance in the form of this shell that induces us to determine it to be a Nerita, is the sulcated surface”. The general appearance of
this species with its rather thin shell, the smooth, narrow septum and the absence of teeth on the outer lip are not at all characteristic of Nerita; also the apertural tooth is different in form from that of Nerita which consists of a single, usually conoidal, projection. The general appearance of the shell is very similar to Neritodryas Martens 1869 which genus also has a thin shell and a smooth, narrow septum and a surface which may be smooth or spirally grooved. However the apertural tooth is again different in Neritodryas.

Although I am satisfied that this species falls within the genus Theodoxus (in the sense used by Vaught, 1989: 13), it does not fit readily within any of the subgenera as currently constituted and it appears to require the erection of a new subgenus. I am unwilling to base a new subgenus on a single, worn and damaged specimen and I consider that this should be left until more material becomes available.

There is some superficial similarity between this species and large specimens of Theodoxus passyanus which raises the possibility that this is a worn or aberrant form of that species. However it differs in a number of important respects from T. passyanus: it is substantially larger than the biggest T. passyanus, the septum is narrow and lacks the typical dentition of T. passyanus, and the conspicuous spiral ridges are continuous, even and well formed showing no sign of having been caused by early damage to the shell; also at least two very similar specimens of this taxa have now been found, namely the lost holotype and the neotype.

This species is very close to Theodoxus dutemplei (Deshayes 1864) from the Sparnacian of the Paris Basin. The latter is also thin-shelled with a narrow, smooth, edentate septum and a prominent, similarly shaped apertural tooth. The size and general shape of the shell are also similar although T. dutemplei has a more prominent spire; the colour pattern of T. dutemplei is variable but often resembles that of T. globosus. However the outer surface of T. dutemplei is smooth and completely lacks the spiral ridges of T. globosus.

Range and distribution: The exact provenance of the holotype is uncertain. The only other known specimen, the neotype, is from the Barton Group at Highcliff, Hampshire; probably bed A3 of Burton (1933).

Subgenus PICTONERITINA Iredale 1936

Type species, by original designation, Neritina oualaniensis Lesson, 1831. Recent, in estuaries and brackish lagoons, Indo-Pacific.

Diagnosis: The shell is small and smooth. The septum is weekly arched with one large and several small teeth.

Remarks: The only description given by Iredale is that “the columellar dentition is very irregular and obscure and the painting consists of streaks” (Iredale, 1936: 288). Iredale mentioned Baker’s inclusion of Theodoxus oualaniensis in his section Vittoclithon but observed that Baker himself had remarked upon the notable differences between the radula of T. oualaniensis and that of other species in this section. (Baker 1923: 156).

In the absence of a more detailed description by Iredale the above diagnosis has been taken from that given by Keen in Knight et al. (1960): 1285). In the type species the large tooth is about a third of the distance from the apical end of the septum with up to 5 small teeth abapical to it. The shell is glossy and the colour patterns are very variable.

Any revision of the classification of the Neritidae is beyond the scope of this paper and I have simply followed that given by Keen in Knight et al. (1960) which in turn is followed, as far as the taxa in this paper are concerned, by Vaught (1989: 13). However I would just mention that Pace considered Pictoneritina to be an unnecessary taxon and followed Baker’s classification (Baker, 1923), leaving T. oualaniensis in subgenus Vittoclithon (Pace, 1973: 22). Also, in showing Pictoneritina as a subgenus of Theodoxus, Keen has apparently disregarded Andrews’ work. Whilst Baker’s classification was based almost entirely on the characteristics of the radula, Andrews’ work involved the study of the reproductive organs (Andrews, 1973a & b). Andrews identified anatomical differences between Clithon and Theodoxus which were considered sufficient by Pace to justify treating them as separate genera (Pace, 1973: 13); Pictoneritina would then become a subgenus of Clithon.

This classification has been adopted by a number of prominent workers on recent freshwater mollusca; for examples see Bentham Jutting (1956: 271), Sturmühliner (1976: 478) and Brown (1994: 43).

Theodoxus (Pictoneritina) passyanus (Deshayes 1864)

Pl. 1, figs 6-8, pl. 2, figs 9-14.

Neritina concava J. de C. Sowerby, 1823: (in part) 4: 118. pl. 385, fig. 2 only.


Neritina Passyi, Desh. Cossmann & Pissarro 1910-1913 2 (1) pl. 6, fig. 39-12.

Neritina Passyana Desh. Cossmann 1925: 218, pl. 5, figs 32, 33, pl. 7, figs 20, 24.

Theodoxus passyanus (Deshayes); Curry, 1960 : 269.


Holotype: Location unknown.

Stratum typicum: “Sables moyens”, (Marinesian).

Locus typicus: Not precisely specified, either Montagny near Gisors, Le Fayel or Auvers, France.

Diagnosis: A medium to large Pictoneritina with a large tooth on the septum edge and several smaller denticulations abapical to it. The colour pattern is very variable.

Description: Shell medium to large for the genus, globular with a low spire. Whorls up to four in number, rapidly increasing in size, convex but slightly concave just below the suture in most specimens. Surface rather glossy in unworn individuals, smooth in appearance but with a sculpture of numerous, fine, closely spaced, transverse lines. Suture sharply defined but shallow.

The colour pattern is very variable: often consisting of dark, wavy lines, which may be very fine and closely spaced or broader and widely spaced, on a whitish background. Sometimes the lines interlace enclosing an irregular network of white spots. Some examples are almost entirely black, others have whitish or light brown splashes, on a darker background; these splashes may almost coalesce to
form two whitish, spiral, bands.

The aperture is oblique and semilunar. The columnellar septum is flat or slightly convex, smooth or with a few faint folds perpendicular to the septum edge. The septum edge is slightly convex in the centre with a prominent tooth at approximately one quarter of the distance from the posterior end and up to four small denticles abapical to it. The dentition is variable with the prominent tooth sometimes much reduced and the small denticles may be faint or even completely absent. However the position of the prominent tooth is always constant and there are never any denticles on the apical side of it. The outer lip is evenly rounded, rather thin and smooth within. The apertural tooth consists of a narrow ridge at right angles to the septum edge, situated below the abapical end of the septum.

**Size:** Deshayes stated that this small shell was extremely rare and the largest specimen was 6mm long, 5mm wide and 3.5mm deep (Deshayes, 1864: 3. 24). Since then the species has been found in greater numbers in the Marinesian of the Paris Basin and a few specimens are considerably larger, that shown at Pl. 2, fig. 9 being 10.6mm in height and 9.5mm in width. Some of the specimens from the Barton Group are even larger measuring up to 15mm high and 12mm wide; the largest illustrated here is 14.3mm high and 11.4mm wide (Pl. 2, fig. 10).

**Remarks:** *Theodoxus passyanus* has been placed by Le Renard & Pacaud (1995: 90) in the subgenus *Vittoclithon* Baker, 1923. Unfortunately Baker in defining his section *Vittoclithon* of subgenus *Clithon* relied mainly on the radula and did not describe the teeth on the septum (Baker, 1923: 134). Keen in Knight et al (1960: 1285) described this subgenus as: “Small, smooth; inner lip weakly arched, with one tooth.” However Baker designated *Neritina meleagris* Lamarck, 1822 as the type species and this species does not have just one tooth on the septum edge but instead four to ten small, irregular teeth (Russell, 1941: 380), which actually matches the illustration (but not the description) of *Vittoclithon* in Knight et al (1960: 1281, fig. 183.12). This does not accord with *T. passyanus*, the principal feature of its dentition being one large tooth and several small ones, but *T. passyanus* does agree with subgenus *Pictoneritina* as described above.

Curry noted the similarity of shape between *T. passyanus* and the species from Barton and Highcliff but was uncertain of the identification as the colour pattern of the English material differed considerably from a series of *T. passyanus* in his collection from Le Quoniam (Val d’Oise, France), (Curry, 1960: 269). Deshayes himself described various colour patterns: sometimes blackish brown, marked with little white splashes, sometimes decorated with an irregular network formed by the interconnection of fine, transverse, lines of dark blackish brown on a fairly white background (Deshayes, 1864: 3. 24). I have examined some 120 specimens of *T. passyanus* from the Marinesian of Le Quoniam (Coll. J-M. Pacaud Lot no. P72956) as well as material from the Marinesian of: Le Ruel, Val d’Oise (Coll. J-M. Pacaud Lot no. P72954), Cresnes, Oise (Coll. J-M. Pacaud Lot no. P70438), Chars, Oise (Coll. J-M. Pacaud Lot no. P72957), Chavènçon, Oise (Coll. J-M. Pacaud Lot no. P72955) and from the Auvervian of Le Gépuville, Val d’Oise (Coll. J-M. Pacaud Lot no. P62952) and Hadencourt-le-haut-Clocher, Oise (Coll. J-M. Pacaud Lot no. P62953). The majority of the specimens which have the colour pattern preserved have wavy dark lines on a light background, unlike most of the English material. Some specimens from Le Quoniam and from Cresnes, however, have the same colour pattern of white splashes on a dark brown background as the majority of the English specimens, (see Pl. 2, fig 9 for a good example). A single specimen from bed E and another from bed F of Burton (1933) have light brown spots on a dark brown background but none exhibits the pattern of fine, wavy lines common amongst the specimens from the Paris Basin.

* T. passyanus also occurs in the Hungarian Eocene along with several similar species. *Theodoxus csolnokensis* Bartha, 1963, from the Middle Eocene, was described as being close to *T. passyanus* in form but different in ornamentation with bold, dark, transverse stripes (Bartha & Kecskeméti-Környedi, 1963: 465). However, dark, transverse lines are characteristic of *T. passyanus* from the Paris Basin and the thicker lines on *T. csolnokensis* could be just an extreme example of typical *T. passyanus* ornamentation. *Neritina lutea* Zittel, 1862, from Dudar in Hungary, is also very similar to *T. passyanus* but differs in the distinctive spiral banding, which is more pronounced than in those examples of *T. passyanus* which have spiral lines of white dots, and in having more teeth on the septum edge than *T. passyanus* (Oppenheim, 1892: Pl. 31, figs 13a, 13b). Finally *Neritina dudariensis* Strausz, 1966, from the Lutetian of Dudar, also resembles *T. passyanus* (Strausz, 1966: Pl. 4, figs 6-8) but differs, according to Kecskeméti-Környedi, in having a higher spire and only minute teeth on the septum edge (Kecskeméti-Környedi, 1972: 219).

**Ecology:** Most of the largest English specimens from the Barton Group have a more or less pitted surface to the spire consistent with living in soft, fresh water which leaches calcium carbonate. This is not the case with the material from the Paris Basin, where many specimens are worn but not pitted. On the other hand some English specimens show repaired damage to the outer lip consistent with failed

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**Plate 1.**

1. *Theodoxus globosus*, neotype, a. apertural, b. apical views, x2.5. Barton Clay Formation. BMNH GG22558 (A.G.Davis coll.)
attacks by a durophagous predator (for examples see Pl. 2, figs 10b, 11b & 13b), which is more typical of salt water. (Paul Jeffery, pers. comm.).

**Range and distribution:** The Barton Group, Hampshire; mostly from the lower beds at Highcliff. Those precisely recorded are from beds A3, E and F of Burton (1933). A single, small, juvenile specimen of *T. passyanus* was found by Jon Todd at Studley Wood in unit SW1 of the Studley Wood Member of the Selsey Formation and I believe this to be the only record of this species occurring in England outside the Barton Group. In France it is found in the Marinesian and the Auversian of the Paris Basin. In Hungary it occurs in the Middle Eocene of the Dorog Basin.

*Theodoxus (Pictoneritina) passyanus denslatus subsp. nov.*

Pl. 3, figs 15-17

**Derivatio nominis:** Latin “broad tooth”; a reference to the broad projection on the septum described below.

**Holotype:** BMNH 72306 (F.E. Edwards coll.), (Pl. 3, fig. 15).

**Stratum typicum:** “Lower Barton Beds”; Barton Clay Formation, from the condition and matrix, probably Bed A3 of Burton (1933).

**Locus typicus:** Highcliff, Hampshire.

**Paratypes:** BMNH 72306 (F.E. Edwards coll.), (Pl. 3, fig. 16); BMNH 72306 (F.E. Edwards coll.), (Pl. 3, fig. 17).

**Diagnosis:** A distinctive subspecies in which the prominent tooth of the typical *T. passyanus* is extended adapically to form a single broad projection occupying the adapical quartile of the septum edge.

**Description:** A rather small shell, the largest in the BMNH collection being a little over 7mm in height and 6mm in width. The general shape and colour pattern are as in typical *T. passyanus* from the Barton Clay. The form is characterised by the broad tooth occupying the upper quartile of the septum edge and separated from the outer lip by a shallow gutter. Abapically the broad tooth is followed by another narrow gutter after which the septum edge may be smooth or occasionally may bear one or two very slight teeth. The septum callus is virtually flush with surface of the adjoining whorl and appears to have been etched into it; this results in the septum surface being flat or slightly concave unlike the convex surface of the typical *T. passyanus*.

**Size:** Height 7.3mm, width 5.5mm (holotype).

**Discussion:** This form is almost as frequent in the BMNH collection as the typical *T. passyanus* but I have not found it in the collections from the Paris Basin which I have examined. The features described above, in my view, merit description as a subspecies but are not, in themselves, sufficient to justify allocation to a higher rank. However comparison of opercula, if ever found, might show this to be a separate species or even genus.

**Range and distribution:** Apparently restricted to the Barton Group in the Hampshire Basin. Those specimens with more detailed provenance are from bed A3 of Burton (1933) or from the “lower Barton beds at Highcliff”.

*Theodoxus (Pictoneritina) waltoni sp. nov.*

Pl. 3, figs 18-19

**Derivatio nominis:** Named after H. Eliot Walton from whose collection the holotype is derived.

**Holotype:** BMNH GG22554 (H. Eliot Walton coll.), (Pl. 3, fig. 18).

**Stratum typicum:** Barton Clay Formation, possibly, from the state of preservation, Bed A3 of Burton (1933).

**Locus typicus:** Highcliff, Hampshire.

**Paratype:** BMNH GG22553 (C. D. Drake coll.), (Labelled “Beds B-D”), (Pl. 3, fig. 19).

**Diagnosis:** A medium sized, rather high spired *Pictoneritina* with a large tooth on the septum edge and several smaller teeth on each side of it. The colour pattern consists of narrow, closely spaced, wavy lines broken by two or three white, spiral bands.

**Description:** The shell is of medium size for the subgenus, ovate, with a prominent spire the apex of which has been eroded in the only known specimens. The external surface is glossy and smooth, except for faint growth lines; the whorls are convex becoming distinctly concave immediately below the suture. The suture is well defined but shallow.

The colour pattern consists of fine, close, wavy, dark lines on a whitish background, the lines sometimes merging in places to form a fine network of white spots on a dark background; with two or three white, evenly spaced, spiral bands.

The aperture is very oblique and semilunar. The columnellar septum surface is slightly convex with
prominent, curved, parietal folds in the central area. The septum edge is slightly concave with a prominent tooth at about a quarter of the distance from the apical end, two or three smaller but clearly defined teeth adapical to it and three to five similar size teeth abapical to it, of the latter some may be bifurcate. The outer lip is rounded, rather thin and smooth within. The apertural tooth, situated below the abapical end of the septum, is in the form of a ridge describing a parabola with the open end facing the aperture and the adapical side longer than the other.

**Size:** Holotype, height 7.8mm, width 6.1mm. Paratype, height 11mm, width 8.1mm.

**Remarks:** This species is unlike any other of the Neritidae from the Barton Group or the Martianesian of the Paris Basin. There is considerable similarity in the shape of the shell and the colour pattern to large specimens of the Palaeocene species *Theodoxus pisiformis* (Ferrusac, 1825). However *T. pisiformis*, as well as being smaller, has less pronounced septum teeth and lacks the prominent parietal folds of *T. waltoni*.

**Range and distribution:** Barton Clay Formation of Highcliff, Hampshire. The holotype possibly from bed A3 of Burton (1933) and the paratype from a higher level between beds B to D inclusive, according to its label.

**Doubtfull Species**

*Theodoxus planulatus* (Edwards 1866)

A tube of mainly *Theodoxus passyanus* (BMNH 72306 F. E. Edwards coll.) contains two specimens of *Theodoxus planulatus*. This species is common in the Hatherwood Limestone Member of the Headon Hill Formation where molluscs are usually exceptionally well preserved. The state of preservation of the two specimens of *T. planulatus* is entirely consistent with material from the Hatherwood Limestone and I think it is likely they were indeed from there and were wrongly included with *Theodoxus* from the Barton Group.

*Theodoxus concavus* (J. de C. Sowerby 1823)

A tube labelled “Highcliff” (BMNH - A. G. Davis coll.) contains four specimens each of which is *Theodoxus concavus*. The matrix in the aperture of one specimen and that these specimens are from the Colwell Bay Member where this species is common. I think it probable that this single specimen came from the Colwell Bay Member and was inadvertently mixed with material from the Barton Group.

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**REFERENCES**


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**Plate 3.**

15. *Theodoxus (Piconteritina) passyanus denslatus*, holotype, a. apertural, b. apical, c. abapertural views, x5. Barton Clay Formation. BMNH 72306 (F. E. Edwards coll.).


17. *Theodoxus (Piconteritina) passyanus denslatus*, a. apertural, b. apical, c. abapertural views, x6. Barton Clay Formation. BMNH 72306 (F. E. Edwards coll.).


