

A proposed solution to a lengthy dispute: what is *Leptinaria (uni)lamellata* (Mollusca, Gastropoda, Achatinidae)?

Abraham S.H. BREURE^{1,2}, Jonathan D. ABLETT² & Cédric AUDIBERT³

¹ Royal Belgian Institute of Natural Science, Vautierstraat 29, B-1000 Brussels; ashbreure@protonmail.com (corresponding author)

² Natural History Museum, Cromwell Road, SW7 5BD London, U.K.; j.ablett@nhm.ac.uk

³ Musée des Confluences, Centre Louis Lortet, 13A rue Bancel 69007 Lyon, France; cedric.audibert@museedesconfluences.fr

Abstract – The taxonomic position and the publication dates of both *Achatina lamellata* Potiez & Michaud, 1835 and *Helix unilamellata* d’Orbigny, 1835 are discussed. The dispute concerning the correct publication date of Potiez & Michaud is analysed and a collation of their Atlas is compared to the sheets of their main text, leading to the most likely scenario that the name *Achatina lamellata* became available in October 1838. The discovery of material *ex auctore* of this taxon enables us to establish it as a junior synonym of d’Orbigny’s taxon, which was published in March 1838. The correct name is thus *Leptinaria unilamellata* (d’Orbigny, 1838).

Key words – Gastropoda, Subulininae, dates of publication, synonymy.

Résumé – La position taxinomique et les dates de publication d’*Achatina lamellata* Potiez & Michaud, 1835 et d’*Helix unilamellata* d’Orbigny, 1835 sont discutées. Le différend concernant la publication de Potiez & Michaud est analysé et une collation de leur Atlas est comparée aux feuillets avec le texte principal, conduisant au scénario le plus probable selon lequel le nom *Achatina lamellata* est devenu disponible en octobre 1838. La découverte de matériel *ex auctore* de ce taxon nous permet d’établir la synonymie avec le taxon de d’Orbigny, devenu disponible en mars 1838. Le nom correct est donc *Leptinaria unilamellata* (d’Orbigny, 1838).

Mots-clés – Gastropoda, Subulininae, dates de publication, synonymie.

Introduction

The species of the subulinid group within the land snail family Achatinidae are often difficult to distinguish, partly because they are morphologically poor in taxonomic characters and continue to grow the shell after reaching sexual maturity (MEDEIROS *et al.*, 2015). This makes it difficult to differentiate between intraspecific variation based on life stage and interspecific variation. Within the Neotropics two taxa have been described which are very similar in their morphology, their names based on the lamella on the parietal wall: *Leptinaria unilamellata* (d’Orbigny, 1838) and *Leptinaria lamellata* (Potiez & Michaud, 1835[?]). In a recent paper by HORSÁK *et al.* (2020: 126) on land snails in European greenhouses, it is concluded that “it is not clear if *Achatina lamellata* Potiez & Michaud, 1835, is conspecific with *Helix unilamellata* d’Orbigny, 1838 [sic], and ... the exact publication year of Potiez & Michaud’s *A. lamellata* is still debated”. Consequently the possible synonymy and priority of names is a dispute that calls for a resolution. The finding of new material in the Musée des Confluences, Lyon, allowed us to try to resolve this issue.

Material and methods

This study is based on (type) material housed in two museums and records taken from literature sources. Shell measurements are given in mm following the method in Fig. 1; the way aperture height and width are measured is consistent with MEDEIROS *et al.* (2015). The following depository abbreviations are used: MHNL, Musée des Confluences, Lyon, France; NHM/NHMUK, Natural History Museum, London, U.K.

Original publications

D’Orbigny travelled through South America between 1826–1833 (d’ORBIGNY, 1846; BREURE, 1973). He described the molluscs he collected initially only briefly in a journal (d’ORBIGNY, 1835) and then later on

with more extensive descriptions and illustrations in a book (d'ORBIGNY, 1834–1847). In the journal he described the species "*Helix unilamellata* Férussac" (d'ORBIGNY, 1835: 9) without giving a diagnosis; only a shell height and diameter were mentioned as "Longit. 12 millim.; latit. 11 millim.". The publication of this taxon thus has to be considered as a *nomen nudum* (cf Art. 12.1 Code; ICZN, 1999). In his book the same species is fully described as "*Bulimus unilamellatus*" (d'ORBIGNY, 1834–1847: 257) but no figure is provided. The type locality was given as "au pied de la côte de Petaca, non loin des rives du Rio Piray, à vingt lieues de Santa-Cruz de la Sierra" in Bolivia.

Potiez & Michaud described their taxon "*Achatina lamellata*" in their books on the Mollusc collections housed in the Douai museum, with a full description (POTIEZ & MICHAUD, 1838: 128) and a figure (POTIEZ & MICHAUD, 1835?: pl. 11 figs 7–8); see below for a discussion of the date of publication. The type locality was stated as "?".

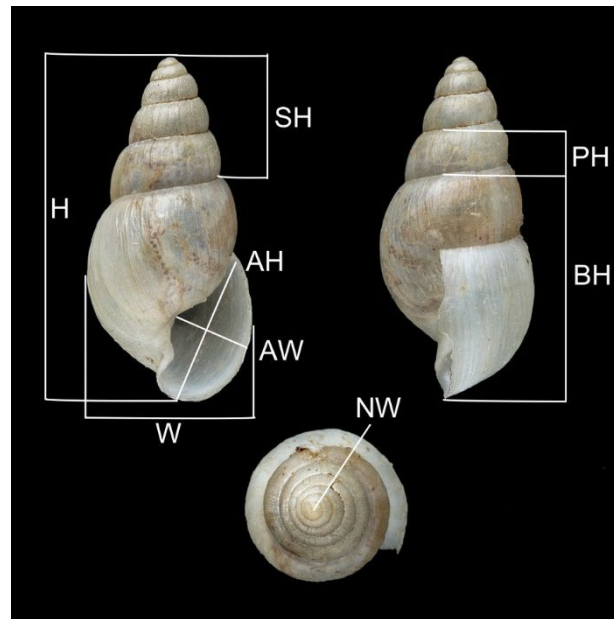


Figure 1. Way the measurements were taken. Abbreviations used: AH – aperture height; AW – aperture width; BH – body whorl height; H – shell height; NW – number of whorls; PH – penultimate whorl height; SH – spire height; W – shell width.

Dating of publications

d'Orbigny's book was collated from several sources by COAN & KABAT (2020), from which the date of publication of *Bulimus unilamellatus* d'Orbigny is shown to be 30 March 1838.

The publication of the books by Potiez & Michaud have been discussed by FALKNER *et al.* (2002), KADOLSKY (2012), and WELTER-SCHULTES (2012). They all refer back to a letter from Michaud to Paulucci, in which he stated: "Le premier volume de la Galerie des Mollusques du Muséum de Douai fut, dans son entier, publié en 1838; mais les livraisons successives parurent en même temps que les planches, dont la première fut éditée en septembre 1835, ainsi que cela est constaté par l'inscription qui est imprimée en tête de chaque planche. Sur la XI^e planche jusqu'à la XV^e sont figurées les Testacelles, les Ambrettes, les Hélices, les Agathines et les Bulimes, qui furent publiées en novembre et décembre 1835" (PAULUCCI, 1879: 11) [The first volume of the Galerie des Mollusques of the Douai Museum was published in its entirety in 1838; but successive issues appeared at the same time as the plates, the first of which was published in September 1835, as can be seen from the inscription printed at the head of each plate. On the 11th plate up to the 15th are the Testacelles, the Ambrettes, the Helicides, the Agathines and the Bulimes, which were published in November and December 1835]. This gives the publication date of the figures of *Achatina lamellata* POTIEZ & MICHAUD as "9^{bre} 1835", i.e. November 1835 (Fig. 2). FALKNER *et al.* (2002: 103) stated "On ne connaît actuellement plus aucun exemplaire en livraisons originales, mais une autopsie de plusieurs exemplaires (dont deux non reliés) montre effectivement des changements de papier, de composition typographique et même de format des planches, qui suggèrent qu'il y a tout lieu de croire les indications de Michaud" [No copies of the original issues are currently known, but an autopsy of several copies (two of which are unbound) does indeed show changes in the paper, the typographical composition and even the format of the plates, which suggest that there is every reason to believe Michaud's indications]. KADOLSKY (2012: 83–84) interpreted this statement as "FALKNER *et al.* (2002) have (...)

assumed the dates engraved on the plates represent the publication dates of both the plates and the pertinent text, without, however, providing a breakdown of the dates of the text". Our conclusion is that these authors agree that the Atlas was issued in parts on the dates printed on each of the plates. The explanation of each plate, which gave the Latin names of the shells depicted on them, were however printed together in two series: plates I–XXXVII (page 5–56 of the Atlas text, corresponding with Part 1 of the main text) (Fig. 3), and plates XXXVIII–LXX (pages 57–79 of the Atlas text, corresponding with Part 2 of the main text). Thus this does not satisfy the requirements of “the proposal of (...) a new species-group name in association with an illustration of the taxon being named” (italics added) to be an available indication (ICZN, 1999: Art. 12.2.7). Since no copies of the original issues are known, it is impossible to reconstruct on what dates these two series of plate explanations, nor the main text with the full description of the taxa were published if this was done in issues. On the other hand it seems odd to publish only the plates during the years 1835–1839 without any legend. WELTER-SCHULTES gave as his opinion to one of us (pers. commun. to C.A., 23 January 2020) “Il est possible que les planches étaient accompagnées de notices non conservées, ou d’une lettre de l’éditeur indiquant que le texte sera publié suivant les planches. Telles formes de publication étaient normales à cette époque” [It is possible that the plates were accompanied by unpreserved notices, or a letter from the publisher indicating that the text would be published following to the plates. Such forms of publication were normal in this epoch]. WELTER-SCHULTES (2012) has noticed that the change in paper which FALKNER *et al.* (2002) referred to, occurs at the end of the first series of plates, thus April 1837. If we assume that the first series of plate explanations were also issued at that date, one would expect to find references in the contemporary literature. As KADOLSKY (2012: 83) has shown, this is not the case. This leads us to the scenario expressed by Welter-Schultes (2012) “Following PAULUCCI (1879: 11) the first [text] volume was entirely published in 1838, but the plates and the corresponding text livraisons appeared subsequently in livraisons (Lieferungen) at the time of the date quoted on the plate, the text passages were also delivered at the dates indicated for the plates”.

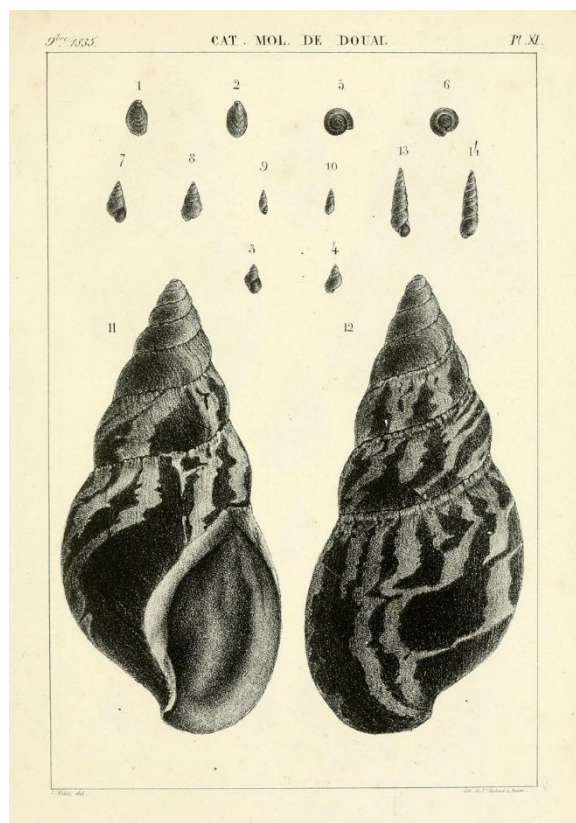


Figure 2. Plate 11 from the Atlas of Galerie des mollusques..., showing the date in the upper left corner.

There is one puzzling footnote on p. 120 of the main text in the first volume, viz. “Nous ajoutons ici les espèces qui nous sont parvenues pendant l’impression du catalogue, et après le tirage de la 7^e feuille” [Here we add the species that we have received during the printing of the catalogue, and after the printing of the 7th sheet]. If we look at the numbering of the sheets in Tome 1, p. 120 is indeed in the 8th sheet and the footnote refers to species 141–159, which are not figured on the corresponding plate 11, among which

the *Helix balmei* POTIEZ & MICHAUD about which PAULUCCI (1879) inquired MICHAUD. This suggests that the printing of the main text took some time, progressed sheet by sheet, and was done after the plates were already issued.

Therefore, we concur with WELTER-SCHULTES (2012) that the most likely scenario, by lack of any other evidence, is that the plates were issued in parts between September 1835 and December 1839 (Table 1), and the explanations together with the main text of the first volume containing the description of *Achatina lamellata* were published before 27 October 1838, as evidenced by the listing in Bibliographie de la France (KADOLSKY, 2012: 83). PUSATERI *et al.* (2018: 225) stated that the Atlas “should be attributed to Potiez who was commenting on the Michaud collection bought by the Douai Museum”. We prefer to attribute the Atlas, however, to both Potiez and Michaud.

DES PLANCHES.	Pag.	No.	11
CRÉSEIS DE CHATEL, <i>Creseis Castellii</i> , Nob.	44	15.	
11 Vue longitudinalement, l'ouv. en haut et très-grossie.			
12 Vue de grandeur naturelle.			
15 Variété, près. un bourrelet dans le milieu, très-grossie.			
14 Vue de la variété, grandeur naturelle.			
SIPHONAIRE DE LESSON, <i>Siphonaria Lessoni</i> ,			
Boissy.	55	2.	
15 Vue en dessus et de grandeur naturelle.			
16 Vue de profil, pour montrer la hauteur.			
17 Vue en dessous.			
SIPHONAIRE ALTERNICÔTE, <i>Siphonaria alterniscosta</i> , Nob.	55	1.	
18 Vue en dessus et de grandeur naturelle.			
19 Vue de profil, pour montrer l'élevation.			
20 Vue en dessous.			
PLANCHE XI.			
TESTACELLE DE MAYERON, <i>Testacella Ma-theronii</i> , Nob.	65	1.	
1 Vue en dessous de grandeur naturelle.			
2 Vue en dessus.			
AMBRETTE DES SABLES, <i>Succinea arenaria</i> ,			
Bouch.	67	5.	
5 Vue du côté de l'ouverture, grandeur nat.			
4 Vue du côté opposé et présentant le dos.			

12	EXPLICATION	Pag.	No.
	HELICE RUBÉLARITE, <i>Helix ruderalis</i> , Nob.	108	110.
5	Vue en dessus et de grandeur naturelle.		
6	Vue en dessous.		
	AGATHINE LAMELLÉE, <i>Achatina lamellata</i> , Nob.	128	6.
7	Vue de grand nat. et présentant l'ouverture.		
8	Vue du côté opposé.		
	AGATHINE LUBRICOÏDE, <i>Achatina lubricoides</i> ,		
	Fér.	129	7.
9	Vue de grandeur naturelle, du côté de l'ouverture.		
10	Vue du côté opposé.		
	AGATHINE MAURITIENNE, <i>Achatina mauritiana</i> ,		
	Lam.	129	8.
11	Vue de grand. naturelle, et montrant l'ouverture.		
12	Vue du côté opposé, et présentant le dos.		
	AGATHINE OCTONE, <i>Achatina octona</i> , Chemm.	129	9.
15	Vue du côté de l'ouverture, de grandeur naturelle.		
14	Vue du côté opposé.		
PLANCHE XII.			
	AGATHINE FLOGÈRE, <i>Achatina flogera</i> , d'Orb.	127	5.
1	Vue de grandeur naturelle, présentant l'ouverture.		
2	Vue du côté opposé.		

Figure 3. Explanation of plates with the sample of plate 11, showing that the explanation was not per individual plate.

Systematics

It is good practice to search for type material before concluding that two taxa are synonyms. In this case the type material of *Bulimus unilamellatus* d'Orbigny is housed in the NHM (registration number NHMUK 1854.12.4.84). Potiez & Michaud described their species from the collection of the Douai museum, which was bombed during World War 2 and despite the assertion by Dance (1966: 298) that their types “are probably still extant”, this material is generally considered as lost (e.g., GOLDING *et al.*, 2007; PUSATERI *et al.*, 2018). In the MHNL (registration number 45047078) two specimens were found in the collection of Victor Bollinger, from Michaud, with a manuscript indication that the specimen was obtained by Michaud (Fig. 4). These specimens *ex auctore*, give the collection locality as “Guadeloupe”, which does not agree with the unknown type locality stated in POTIEZ & MICHAUD (1838). However, this material is as close as one can get to the original source.

Comparing the two species (Fig. 5) we are of the opinion that they are conspecific. Fred Naggs, an expert on this group, is of the opinion “It’s difficult to base an identification on two specimens rather than a series when they look somewhat different. The lower specimen (see Fig. 5) is clearly an older individual and, taking this into consideration, I’m reasonably confident that they belong to the same species” (pers. commun. to A.B., 10 September 2020). MEDEIROS *et al.* (2015) have studied the shell growth of this species in different populations in Brazil. They found that differences in growth allometry indicated that the

whole shell forming process is different among the populations, not only the final form of the adult's shell. Their results showed that some allometric relationships indicated that, during the snails' development, the increase in shell width is not proportional to the increase of the width and height of the shell aperture, and the reproductive strategy may be a possible explanation (MEDEIROS *et al.*, 2015). The material of d'Orbigny and Michaud is from populations very distantly apart, but their measurements fall into the distribution of those in MEDEIROS (2015: Table 2).

The revised classification thus should be as follows:

***Leptinaria unilamellata* (d'Orbigny, 1838)**

Helix unilamellata d'Orbigny, 1835: 9 [*nomen nudum*]

[*Achatina lamellata*] Potiez & Michaud, 1835: pl. 11 figs 7-8 [figure only, no name]

Bulimus unilamellata d'Orbigny, 1838 ["1835-1847", 30 Mar 1838]: 257.

Achatina lamellata Potiez & Michaud, 1838 [27 Oct 1838]: 128, explanation plates p. 12. (Junior subjective synonym).

The measurements of the material examined are presented in Table 2.

Discussion

The wide distribution range of this species and its occurrence as a greenhouse species outside its native range makes it desirable to solve the taxonomic status. The characteristic life history of this species shows great longevity, short juvenile phase, early maturity, and repeated reproductive events, combined with differences in shell morphology among populations (MEDEIROS *et al.*, 2015). This makes it difficult to compare specimens from different populations of presumably different age. The dispute on the publication date of one of the taxa concerned has invoked us to carefully inventory all the 'knowns' and 'unknowns'. It is hoped that our evidence is convincing enough to resolve this dispute and stabilise the taxonomy of the species.

Acknowledgements

We are grateful to Thierry Backeljau (Brussels) who initially asked us for advice on the dispute, to Fred Naggs (London) who gave us his opinion about these two taxa, and to Francisco Welter-Schultes for his bibliographical information.

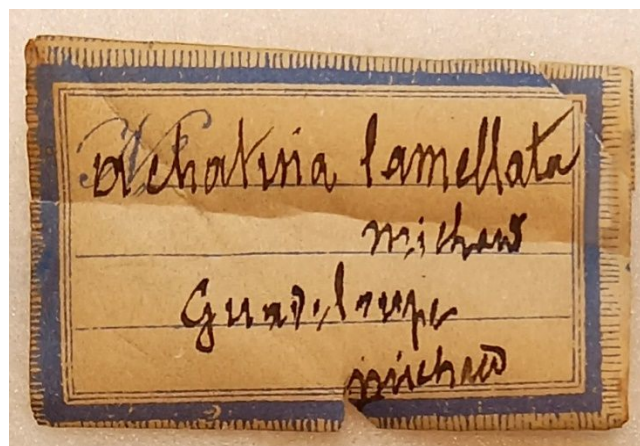


Figure 4. Label of *Achatina lamellata* Potiez & Michaud, MHNL 45047078.



Figure 5. A-D, *Achatina lamellata* Potiez & Michaud, MHNL 45047078. E-H, *Bulimus unilamellatus* d'Orbigny, NHMUK 1854.12.4.84.

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Table 1. Collation of the Atlas with the dates as given on each plate. The page numbers refer to the main text and have been extracted from the plate explanations. Genera are those illustrated on the plates.

Date	Plates	Page ref.	Genera
September 1835	1	3-5	<i>Bellerophon</i>
	2	10	<i>Nautilus</i>
	3	12-14	<i>Scaphites, Ammonites</i>
	4	15-17	<i>Ammonites</i>
	5	17	<i>Ammonites</i>
	6	18	<i>Ammonites</i>
	7	18	<i>Ammonites</i>
	8	19-24	<i>Ammonites, Belemnites, Nodosaria</i>
	9	25-28	<i>Fronicularia, Textularia</i>
October 1835	10	34-55	<i>Operculina, Nummulina, Triloculina, Alveolina, Creseis, Siphonaria</i>
November 1835	11	63-129	<i>Testacella, Succinea, Helix, Achatina</i>
	12	127-138	<i>Achatina, Bulimus</i>
	13	138-150	<i>Bulimus</i>
December 1835	14	132-151	<i>Bulimus</i>
	15	152-159	<i>Bulimus</i>
February 1836	16	159-169	<i>Pupa</i>
	17	169-178	<i>Pupa, Clausilia</i>
March 1836	18	178-184	<i>Clausilia</i>
	19	185-194	<i>Clausilia</i>
April 1836	20	195-206	<i>Vertigo, Partula, Auricula</i>
	21	207-214	<i>Planorbis</i>
May 1836	22	216-227	<i>Limnaea, Physa</i>
	23	228-234	<i>Helicina, Cyclostoma</i>
June 1836	24	234-243	<i>Cyclostoma</i>
	25	245-251	<i>Paludina</i>
July 1836	26	251-257	<i>Paludina</i>
	27	258-265	<i>Melania</i>
August 1836	28	269-295	<i>Rissoa, Littorina, Ampullaria, Natica</i>
	29	300-325	<i>Nerita, Phasianella, Turbo, Monodonta, Solarium, Bifrontia</i>
September 1836	30	328-338	<i>Trochus</i>
October 1836	31	344-372	<i>Scalaria, Melanopsis, Tornatella, Pyramidella, Cerithium</i>
November 1836	32	374-388	<i>Buccinum</i>
December 1836	33	392-417	<i>Terebra, Purpura, Columbella, Murex</i>
January 1837	34	426-438	<i>Ranella, Fusus</i>
February 1837	35	444-508	<i>Pleurotoma, Rostellaria, Cypraea, Mitra, Marginella, Sigaretus, Velutina</i>
March 1837	36	512-522	<i>Calyptrea, Crepidula, Pileopsis, Emariginula, Fissurella</i>
April 1837	37	432, 523-536, 640	<i>Patella, Chiton, Dentalium</i>
May 1837	38	5-12	<i>Terebratula</i>
July 1837	39	16-20	<i>Terebratula</i>
August 1837	40	21-25	<i>Spirifer</i>
September 1837	41	25-28	<i>Productus</i>
October 1837	42	26-29	<i>Productus, Gypidia, Strophomena</i>
November 1837	43	31-57	<i>Orbicula, Crania, Anomia, Ostrea, Gryphaea</i>
December 1837	44	58	<i>Gryphaea</i>
January 1838	45	59-63	<i>Gryphaea, Exogyra</i>
February 1838	46	62-64	<i>Exogyra, Podopsis</i>
March 1838	47	68	<i>Hinnites</i>
April 1838	48	69-76	<i>Pecten</i>
May 1838	49	77-79	<i>Pecten</i>

Table 1 continued			
Date	Plates	Page ref.	Genera
June 1838	50	80-82	<i>Pecten</i>
July 1838	51	85-87	<i>Pecten</i>
August 1838	52	88-96	<i>Pecten, Plagiostoma, Lima</i>
September 1838	53	99-122	<i>Vulsella, Avicula, Pectunculus, Trigonina</i>
October 1838	54	123-138	<i>Mytilus, Modiola, Tichogonia</i>
November 1838	55	141-146	<i>Anodonta, Iridina</i>
December 1838	56	147-148	<i>Iridina, Unio</i>
January 1839	57	149	<i>Unio</i>
February 1839	58	150-153	<i>Unio</i>
March 1839	59	155-156	<i>Unio</i>
April 1839	60	158	<i>Unio</i>
February 1839	61	160-196	<i>Cardita, Astarte, Dicerias, Cyclas, Donax</i>
June 1839	62	204-214	<i>Lucina, Mesodesma, Tellina</i>
July 1839	63	216-231	<i>Tellina, Psammocola, Venus</i>
August 1839	64	235-237	<i>Venus</i>
September 1839	65	237-252	<i>Venus, Mactra, Lavignonus, Pleripoma</i>
October 1839	66	255-257	<i>Pholadomya</i>
November 1839	67	257-259	<i>Pholadomya</i>
December 1839	68	260-266	<i>Pandora, Solen, Bysomya, Saxicava</i>
	69	266-271	<i>Saxicava, Jouannetia, Teredina</i>
	70	282-285	<i>Conia, Tubicinella, Balanus</i>

Table 2. Measurements of the material examined; abbreviations see Figure 1. Specimens where the protoconch is damaged are indicated with 'n/a'.

	H	W	AH	AW	BH	PH	SH	NW
NHMUK	12.9	6.4	5.6	3.0	8.5	2.2	4.4	6.3
	12.3	5.8	5.5	3.0	8.1	2.2	4.2	5.9
	10.5	5.7	5.0	2.6	7.5	1.9	3.0	4.9
	10.3	5.5	5.2	2.5	7.6	1.8	2.7	n/a
	11.7	5.7	5.0	2.5	8.1	2.0	3.6	n/a
	10.1	5.4	5.0	2.4	6.9	1.8	3.2	n/a
MHNL	11.0	5.3	5.0	2.6	7.4	1.6	3.6	6.2
	9.4	5.5	5.0	2.6	6.5	1.2	2.6	5.5