

New gastropods from the Jurassic of Orville Coast, eastern Ellsworth Land, Antarctica

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Abstract: The Latady Group (southern Antarctic Peninsula) hosts the most diverse assemblage of Jurassic molluscs from this continent. A new gastropod mollusc, *Silberlingiella latadyensis* sp. nov. and three forms assigned to Rissoidae, Pseudomelaniidae and Bullinidae from the Middle–Late Jurassic, Bathonian–Kimmeridgian Hauberg Mountains Formation, Ellsworth Land, Antarctic Peninsula are described here. *Silberlingiella* is transferred to Eustomatidae and is the first confirmed record of this family in the Southern Hemisphere, indicating a much more widespread Jurassic distribution. The Triassic and Jurassic species of *Silberlingiella* are compared with the coeval European genus *Diatinostoma*. Eustomatidae is proposed as an ancestral group for Potamididae and Batillariidae. The composition of the gastropod association described herein differs markedly from the only other Antarctic Jurassic fauna from Alexander Island.

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Introduction

Gastropods form a minor component of Antarctic Mesozoic faunas, but are found locally abundant at a number of localities. Especially diverse and well-studied are Cretaceous gastropods (e.g. Stilwell & Zinsmeister 2002, 2003 and references therein) while Jurassic and Triassic forms have been studied to a much lesser extent. The first documented occurrence of Jurassic forms from this continent is from Early Jurassic, Sinemurian (originally considered to be Triassic) shallow-marine deposits of the Le May Group, Lully Foothills, central Alexander Island, where Edwards (1980, pp. 36–45, fig. 2a–i, fig. 3a–d) recognized ten forms from eight genera. The specimens were of small size and incompletely preserved as external moulds lacking apertural detail. The next mention of Antarctic Jurassic gastropods was by Thomson & Tranter (1986) who recollected the locality of Edwards (1980) and described a new form tentatively identified as *Katosira* sp. and noted another similar to *Omphaloptycha* (?) sp. of Edwards (1980, fig. 3d). Antarctic Jurassic gastropods were also recorded by Quilty (1977) and Kelly *et al.* (1995), but no taxonomic analyses were made. Described herein is a new species of *Silberlingiella*, which is transferred to Eustomatidae (Cerithioidea) and three forms from the Rissoidae, ?Pseudomelaniidae and ?Bullinidae respectively from the Hauberg Mountains Formation, Latady Group, Antarctic Peninsula (Fig. 1a & b).

Stratigraphy and locality

The Latady Group (Hunter 2003, Cantrill & Hunter 2005, Willan & Hunter 2005) is a thick (~2.8–6 km) sequence of minor terrestrial, shallow water and fossiliferous marine sandstones and mudstones, cropping out between eastern Ellsworth Land and the southern Black Coast (Fig. 1b). Strata of the Hauberg Mountains Formation crop out in the Hauberg Mountains, the southern part of Mount Hirman and Quilty Nunataks (Willan & Hunter 2005, figs 2, 4, 5d, and Fig. 1c). A latest Bathonian–Kimmeridgian age for the formation is inferred from ammonites and bivalves (Quilty 1977, p. 1042, table 2, Crame 1981, p. 9, Crame 1982, p. 773, table 1A, Thomson 1983, Hikuroa 2005, pp. 220–223, fig. 12).

Material and methods

Jurassic gastropods are rare and poorly preserved in Antarctic rocks but the localities are remote and are unlikely to be re-visited in the near to medium-term future, so description of the material at hand is believed to be justified. Specimens were collected in the 1999–2000 Antarctic Field Season by Dan Hikuroa and are housed at British Antarctic Survey (BAS), Cambridge, UK. Additional specimens collected from the Hauberg Mountains Formation in 1965–1966 and currently housed in the Geology Department, University of Tasmania (UTGD) were also examined by Hikuroa. The majority of fossils found in the Hauberg Mountains Formation are internal and external

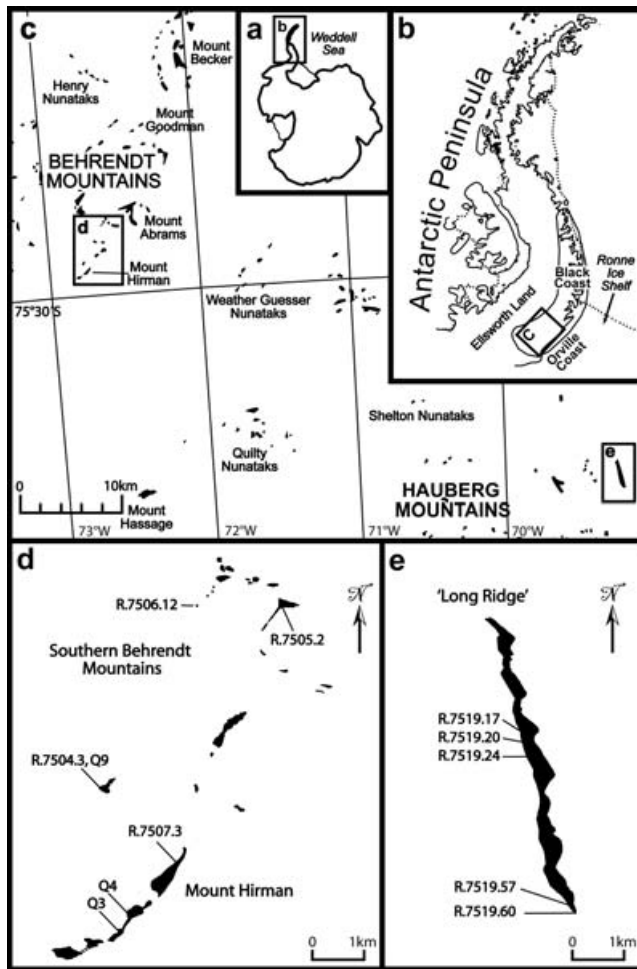


Fig. 1a & b. Locality maps of Antarctic Peninsula, and Ellsworth Land. **c–e.** Locality and outcrop maps of collection sites of gastropod specimens described here. Localities prefixed with R collected by Hikuroa 1999–2000, those pre-fixed with Q collected by Quilty 1965–1966.

moulds, resulting from the leaching of shell carbonate, so descriptions are based primarily on latex casts. The large specimens were photographed at the University of Auckland and the Photo Lab in the Institute of Paleobiology PAS, Warsaw, Poland. Specimens have been coated with ammonium chloride sublimate prior to macrophotography. Small casts were coated with gold or platinum and examined on Philips XL20 scanning electron microscope at the Institute of Paleobiology PAS, Warsaw. The labeling system is that of the British Antarctic Survey (BAS) and is explained as follows: R.7519.57.22a; R = rock sample, 7519 = unique outcrop, 57 = unique horizon within outcrop, 22 = individual rock sample; where several fossils specimens occur on the same rock sample they are labelled a, b, c, etc.

Systematic palaeontology

Phylum MOLLUSCA Linné, 1758
 Class GASTROPODA Cuvier, 1797
 Subclass PROSOBRANCHIA Milne Edwards, 1848
 Order CAENOGASTROPODA Cox, 1959
 Superfamily Cerithioidea Fleming, 1822
 Family Eustomatidae Cossmann, 1906

Remarks: The family Eustomatidae was erected by Cossmann (1906, as Eustomidae) for gastropods having characters of both Cerithioidea and Stromboidea (“Alatacea” of Cossmann 1906). According to the Cossmann’s (1906, p. 10) diagnosis Eustomatidae have cerithiid-like whorls and a strombid-like expanded aperture. In this Cossmann (1906) followed Piette (1855) who erected the type genus of the family *Eustoma*. As this generic name was already preoccupied, Cossmann (1905) proposed a replacement name *Diatinostoma* for the genus, with the type species *Eustoma tuberosum* Piette, 1855. Piette (1855) did not provide an illustration of his new species, so we have followed the illustrations given by Cossmann (1906, pl. 5: 1–5). According to these and the descriptions of Piette (1855) and Cossmann (1906), the whorls of *Diatinostoma tuberosum* (Piette, 1855) are ornamented by pustulose tubercles just above the suture and additionally by some spiral cords. The pattern and type of ornamentation seen in some species of *Diatinostoma* [e.g. *D. nodostriata* (Peters, 1855); cf. e.g. von Zittel 1873 and Wójcik 1914] is very similar to that of several members of the cerithioid families Potamididae and Batillariidae, for example *Vicarya* d’Archiac & Haime, 1854, *Previcarya* Olsson, 1944, *Granulolabium* Cossmann, 1889 and subgenus *Batillaria* (*Tateiwaia*) Makiyama, 1936 (see e.g. Makiyama 1926, 1936, Takeyama 1933, Wenz 1940, Olsson 1944, Kowalke 2003). Moreover several of those gastropods have a slightly expanded outer lip (compare e.g. Wenz 1940, pp. 736–749). It seems therefore that Eustomatidae and Batillariidae/Potamididae are closely related and most probably the former, mostly Jurassic, is ancestral for the latter, which are first recorded in the Late Cretaceous (Bandel & Riedel 1994, Kowalke & Bandel 1996).

Genus *Silberlingiella* Frýda and Blodgett, 2003.

Emended diagnosis. Elongated turriculate shell with nodose keel in the upper part of the whorl flanks and numerous spiral ribs below the keel. Angulation between lateral flank and shell base demarcated by spiral keel. Base ornamented with spiral ribs (up to 6). Adults with expanded outer lip. No internal plaits.

Type species. *Silberlingiella ornata* Frýda and Blodgett, 2003 from Late Middle Norian, Late Triassic of locality M2554 in Churchill County, Nevada, USA.

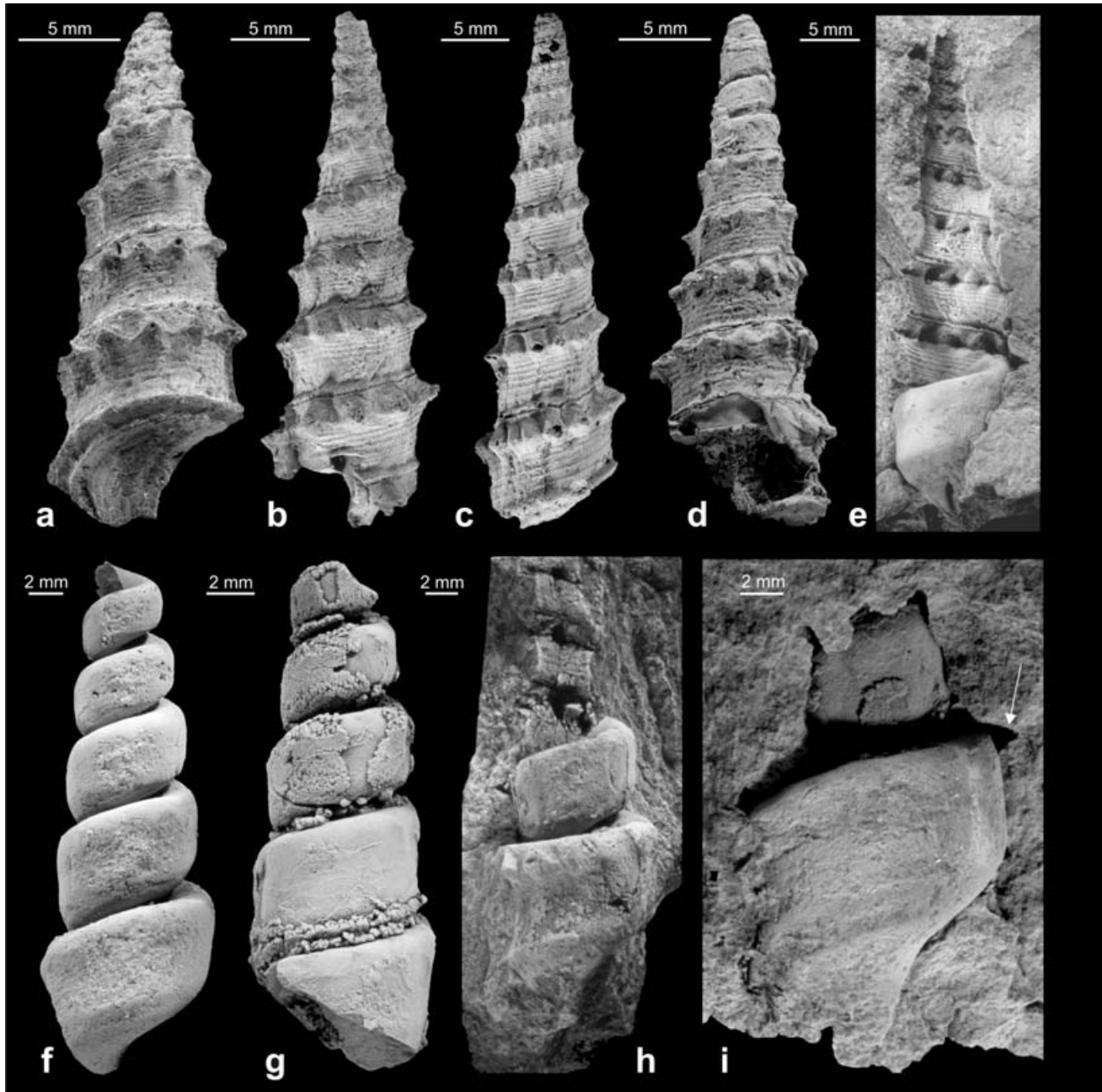


Fig. 2a–i. An eustomatid *Silberlingiella latadyensis* sp. nov. from Middle/Late Jurassic Hauberg Formation of Antarctic Peninsula. Holotype is specimen R.7504.3.110 (Fig. 2b, e, g). **a–d.** latex external casts of specimens R.7504.3.140, 110, 129, 12 respectively. **e, g.** R.7504.3.110 external mould and terminal part of the inner mould and internal mould respectively, the latter verifying lack of internal plaits, **f.** R.7504.3.87 internal mould verifying lack of internal plates, **h.** R.7504.3.135 partial adapical external mould and abapical internal mould. Note expanding last whorl, **i.** R.7504.3.128 internal mould of ultimate and penultimate whorl with expanded outer lip. The arrow indicates the void left by leaching of acute node ornament.

Remarks. The type species of *Silberlingiella* is known exclusively from Late Triassic of Nevada. While describing the new monotypic genus Frýda & Blodgett (2003) classified this gastropod in Purpurinidae based on comparison with Triassic *Andangularia* Haas, 1953 from Peru. The type species of the latter genus, *Andangularia subarmata* (Jaworski, 1923), differs significantly from

Silberlingiella in having acute adapically axial ribs rather than acute nodes on the spiral keel. Furthermore, the shells of Purpurinidae are never as elongated as *Silberlingiella*, have rather fusiform shells (see e.g. Kaim 2004), and no expansion of the outer lip. Therefore we prefer to classify *Silberlingiella* in Eustomatidae, the family that seems to be an ancestral group for batillariid and/or potamidid

cerithioids.

Silberlingiella is most similar to Miocene *Tateiwaia* Makiyama, 1936, (Batillariidae) from North Korea. The latter differs, however, in having smooth early whorls and numerous fine axial ribs making a series of tubercles at the intersections (compare Makiyama 1926). Also similar is the Jurassic–Cretaceous genus *Diatinostoma* Cossmann, 1906 (Eustomatidae), but *Silberlingiella* differs in having a much more elongate shell, acute rather than blunt tubercles, and by the presence of a distinct keel between the shell flank and its base. The Late Cretaceous *Tintorium* Sohl, 1960, (Tonnacea) from the United States is superficially similar to *Silberlingiella*. It differs morphologically however, by the presence of 1–3 teeth above the anterior canal and a much wider shell outline, and also by its younger age. Recent *Granulolabium* Cossmann, 1889 (Potamididae) differs in having blunt, wide spaced tubercles. The Cenozoic *Vicarya* d'Archiac and Gemmelaro, 1854, (Potamididae) is less elongated and its nodes are larger, spine-like and occupy most of the lateral flank of the whorl. Late Cretaceous *Previcarya* Olsson, 1944, (Potamididae) from Peru differs in having large, blunt and widely spaced nodes, which develop only on the adolescent and adult whorls.

Silberlingiella latadyensis sp. nov.
Figs 2a–i

Etymology. After the Latady Group.

Holotype. R.7504.3.110, comprising three separate pieces; an external mould, internal mould, and latex cast of external mould (Figs. 2e, g, & b respectively).

Other material. Numerous poorly to relatively well preserved, fragmentary and complete internal and external moulds: R.7504.3.12, 13, 15, 16, 32, 46, 65, 75, 77, 79, 87–126, 128–144, 169; R.7507.7.2, 29. UTGD 87184c, 87186d, 87187b, 87188b, 87189a, 87190a, 87266b, 87310a, 87353d, 87358a & c, 87360b & d, 87361b, 87366a & c, 87368, 87371d, 87372b, 87373d, 87374a, 87382a & d. Specimens R.7505.2.111, 112, 113; R.7506.12.1 & 2 are poorly preserved and only tentatively included. *Silberlingiella latadyensis* is not found with any other gastropods and at locality R.7504.3 is the dominant taxon.

Some fragmentary specimens displaying little morphology from locality R.7504.3 are included in *S. latadyensis* because of their association with complete material. The five tentatively included specimens from localities R.7505.2 and R.7506.12 are all poorly preserved and incomplete but show the shape, inflation, ornament, and range of size similar to those from localities R.7504.3 and R.7507.7. Furthermore they are from a markedly older Bajocian age locality.

Localities. Six localities from four outcrops in the Behrendt Mountains: R.7504.3, R.7505.2, R.7506.12, R.7507.7 and localities 3, 4, and 9 (= R.7504.3) of Quilty (1977) (Fig. 1d).

Table I. Dimensions of *S. latadyensis* gen. et sp. nov. in millimetres, all considered minima.

Specimen	L	Maximum diameter
R.7504.3.12	31	10.5
R.7504.3.87	40.5	13
R.7504.3.88	43	13.5
R.7504.3.110	41	13
R.7504.3.111	37	12
R.7504.3.129	35	11.5
R.7504.3.140	28	10
R.7507.7.29	34	11

Age. (?latest early Bajocian) latest early Oxfordian – latest early Kimmeridgian based on association with the ammonite *Perisphinctes* cf. *antillarum* (at locality R.7504.3) and bivalve *Retroceramus galoi* (at locality R.7507.7) (Quilty 1977, p. 1078, Hikuroa 2005, p. 252 & table 42). The age range of the former is latest early–middle Oxfordian (Quilty 1970, p. 114, von Hillebrandt *et al.* 1992) and mid middle Callovian – early Kimmeridgian (Hudson 2003, p. 137, table 1) for the latter (the tentatively included material is of latest early Bajocian age).

Diagnosis. Elongated turriculate shell with nodose keel in the upper part of the whorl flanks and numerous, usually 6–7, spiral ribs below the keel. Plain keel angulation between lateral flank and shell base. Base ornamented with 2–4 spiral ribs. Adults with expanded outer lip. No internal plaits present.

Description. Moderate sized turriculate, conical, multispiral shell, of four to at least nine flat-sided whorls; up to 43 mm high, 13.5 mm in width. Apical angle *c.* 15°, sutural angle 20°. Whorls with narrow ramp, rows of tubercles at ramp angle on early whorls which on some specimens partly coalesce on later whorls to form strong nodose keel; tubercles increase in size gradually, regularly. Below this up to 7 spiral threads on early whorls, at least 5 persisting to last whorl, lowest forming anterior keel on body whorl. Base with 2–4 strong spiral threads. Axial ornament confined to faint growth lines. Aperture with sinuous outer lip; anterior margin pronounced, notched to form incipient siphonal canal. Expanded outer lip preserved only on inner moulds (Fig. 2h, i). Protoconch unknown. Dimensions of some of the most complete specimens are shown in Table I.

Remarks. The new material has been compared with undescribed specimens from the Hauberg Mountains Formation loaned from the UTGD collected during the 1965–1966 University of Wisconsin Ellsworth Land Nunataks Expedition. The following morphologic characters were compared: strength of tubercles on equivalent whorls; number of tubercles per whorl; the number of spiral costae; maximum shell size; apical angle; and the inclination of the sutural ramp. The specimens collected in 1965–1966 are identical in respect of these

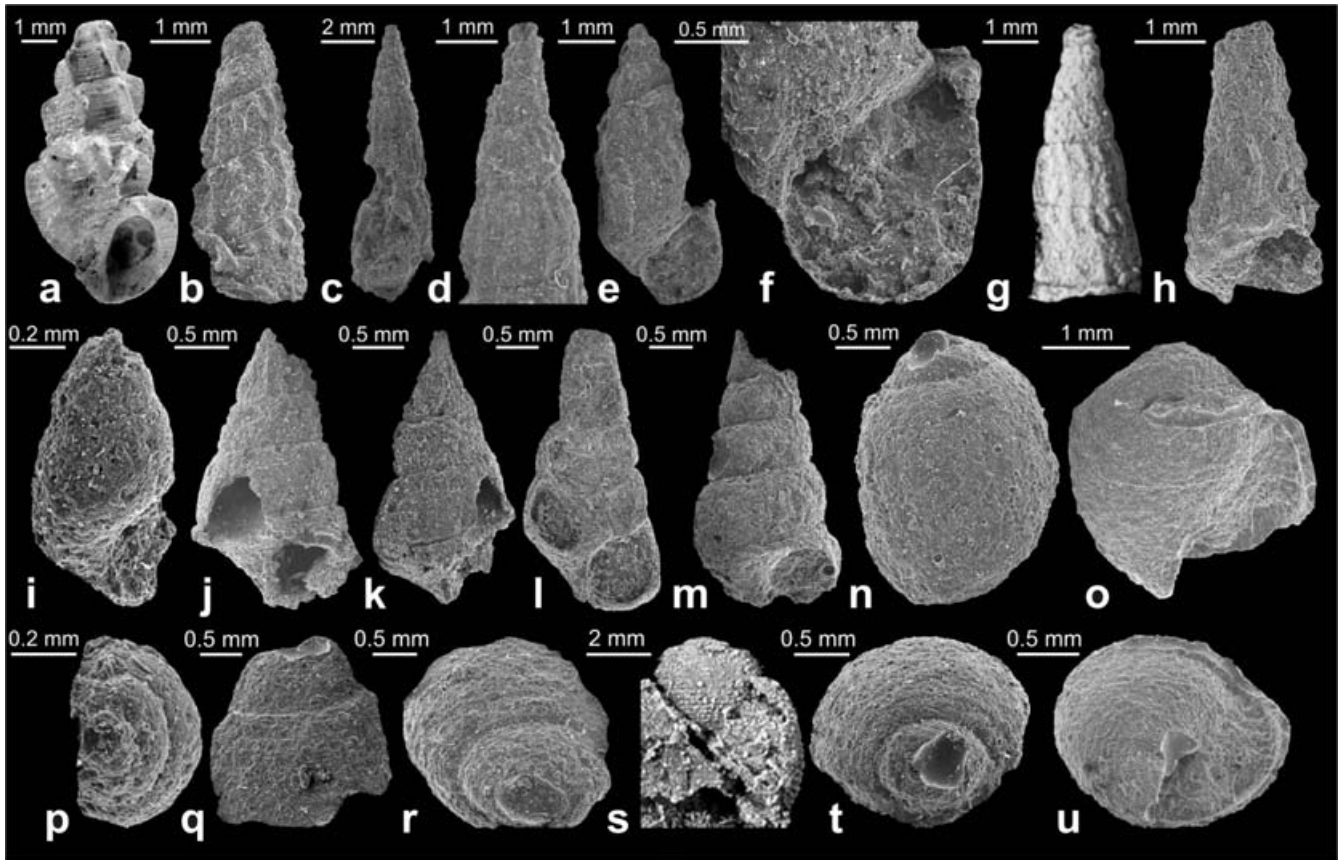


Fig. 3a. *Paracerithium acanthocolpum* Cossmann, 1902; lectotype MNHN R.1 from Hettangian (Early Jurassic) of La Chapelle-Thermes (Vendée), France. **b–h.** Rissoidae gen. et sp. indet. **b.** R.7519.57.53 lateral view, **c, d.** R.7519.60.20 lateral & magnified apex views respectively, **e, f.** R.7519.24.14 lateral view & close-up of aperture respectively, **g.** R.7519.57.59 lateral view, **h.** R.7519.57.22a lateral view. **i–m, p.** ?Pseudomelaniidae gen. et sp. indet. **i, p.** R.7519.57.54a lateral & apical view respectively, **j, k.** R.7519.24.32 lateral views, **l.** R.7519.57.54b lateral cross-section, **m.** R.7519.57.22b lateral view. **n, o, q–u.** ?Bullinidae gen. et sp. indet. **n, r.** R.7519.57.22d lateral & apical, slightly oblique views respectively, **o, u.** R.7519.57.22e lateral & umbilical views respectively, **q, t.** R.7519.57.22f lateral & apical views respectively, **s.** R.7519.57.22c apertural view, note fine spiral ornamentation. All specimens except 3a latex casts.

characters and are clearly conspecific.

Silberlingiella latadyensis closely resembles a coeval gastropod from New Zealand. The material from New Zealand has not been examined as the revision of that fauna is being undertaken by another team and will be published separately. The New Zealand form was referred to as *Cerithinella* sp. (Suggate *et al.* 1978, Speden & Keyes 1981, Grant-Mackie 1958) or *Paracerithium* sp. (MacFarlan 1975 (see synonymy therein), Hudson 1983). The specimen identified as *Cerithinella* sp. illustrated by Suggate *et al.* (1978, fig. 4.61.20) and Speden & Keyes (1981, pl. 14, fig. 20) closely resembles *S. latadyensis*. The poorly preserved specimen of *Cerithinella* sp. figured in Trechmann (1923, pl. 13: 13), Suggate *et al.* (1978, fig. 4.61.19), Speden & Keyes (1981, pl. 14, fig. 19), and re-figured in Marwick (1953, p. 113, Pl. 15, fig. 2), has an outline, apical angle and spiral threads all similar to the new material, but has a different inclination of the sutural ramp, bears no tubercles and may be a different taxon. Trechmann (1923) referred a *Silberlingiella*-like specimen to

Cerithinella sp. and that identification was later extended to the other specimens discussed above. The type species of *Cerithinella*, *C. italica* Gemmelaro, 1878, from Early Jurassic of Sicily, differs significantly from our specimens in having a strongly elongated shell, a row of small nodes immediately below the anterior suture, and, most significantly, no expansion of the terminal whorl. Overall *C. italica* is rather more reminiscent of nerineids than any other Jurassic gastropod group, as already mentioned by Cossmann (1906, p. 32).

One of us (AK) examined the lectotype of the type species of *Paracerithium*, *P. acanthocolpum* Cossmann, 1902, from the Early Jurassic of France (Fig. 3a), and it is highly unlikely that *S. latadyensis* belongs to this genus. *Paracerithium* is a rather small gastropod with only few (up to five) whorls. The whorls are slightly rounded and they are ornamented by sturdy collabral axial ribs. The aperture has an anterior siphonal notch and there is no expanding last whorl (see also Gründel 1997a, pl. 5: 13 & pl. 6: 1–2). In our opinion the species under consideration is much more

Table II. Dimensions of Rissoidae indet. in millimetres. α is apical angle, β is sutural inclination; those in brackets considered minima.

Specimen	α	β	Height	Width	No. of whorls
R.7519.17.11	30	15	5.1	3	4
R.7519.17.24	20	15	(12)	4.8	(4)
R.7519.17.52	30	16	3	1.3	(4)
R.7519.17.53b	20	17	(5)	2	(4)
R.7519.17.59a	20	15	(5)	2	4
R.7519.17.59b	25	15	6.5	3	5
R.7519.17.59c	20	14	11.4	(4)	(5)
R.7519.17.59d	25	17	2.7	1.2	4
R.7519.24.14	28	15	5.1	2	4
R.7519.24.32	30	15	2.7	1.3	3
R.7519.57.20	20	15	6.4	2	6
R.7519.57.52	30	15	3	1.3	4
R.7519.57.54	30	17	3.6	1.6	4
R.7519.60.20	20	14	10.2	(3.6)	(7)
R.7519.60.21	28	15	4.5	2	4
R.7519.60.29a	21	15	9	(3)	5
R.7519.60.29b	22	16	(6.9)	3	(3)

similar to *Silberlingiella ornata* Frýda & Blodgett, 2003 but differs in having more acute but less sturdy tubercles, blunt keel (i.e. no tubercles) between the shell flank and its base, and pronounced spiral ribs.

Superfamily Rissooidea Gray, 1847

Family Rissoidae Gray, 1847

Rissoidae gen. et sp. indet.

Figs 3b–h

Material. Poorly preserved internal and external moulds from outcrop R.7519 (unofficially referred to as “Long Ridge”) in the Hauberg Mountains (Fig. 1e), comprising five localities: R.7519.17.11, 13a, 24, 25, 32, 52, 53b, 59; R.7519.20.1; R.7519.24.14, 32; R.7519.57.20, 22, 52, 54; R.7519.60.18, 20, 21, 29a, b. Four incomplete, poorly preserved, possibly distorted internal moulds are tentatively included in this species: R.7519.17.13b, 25, 32, 53a.

Age. Specimens of a retroceramid identified as *Retroceramus stehni* or closely similar to *R. stehni* occur in association with the new material (Hikuroa 2005, p. 72). *Retroceramus stehni* has a maximum range of latest Bathonian to latest early Callovian (Damborenea 1990, fig. 2, 1996, fig. 2, Hudson 2003, p. 137, table 1) and that age is inferred for the material described below.

Description. Small, moderately slender, conical, multispiral shell of four to at least seven flat to slightly inflated whorls; up to 12 mm high, 4.8 mm wide. Apical angle 20–30°, sutural inclination 14–17°. Protoconch unknown. Teleoconch sculptured with 10–12 opisthocyrt axial ribs per whorl. Aperture appears broadly ovate with a posterior channel; outer lip convex, apparently thickened; slightly convex inner lip broadened and bent abaxially in the umbilical portion. Dimensions of the most complete

material are given in Table II.

Remarks. As the material under consideration is of rather modest preservation, many of the important diagnostic characters are not present. However, the overall shell shape and the type of ornamentation suggest relation to Rissoidae. The most similar form is the European Jurassic *Palaeorissina* (synonymised with *Bralitzia* by Kaim 2004, p. 80). The most recognizable difference from the European Jurassic rissoids is the steeper slope of the whorls and much better developed posterior channel in the new material. Most Jurassic rissoids have rather inflated whorls (e.g. Gründel 1990, 1999, Gründel & Kowalke 2002, Kaim 2004) whereas the new specimens have weakly rounded or almost flat whorl flanks. The Jurassic rissoids with weakly rounded whorls are less common [but see e.g. *Bralitzia obtusa* (Lycett, 1850) in Kaim 2004, fig. 64].

The four specimens tentatively included in this species (R.7519.17.13b, 25, 32, 53a) have ornament and outlines identical to the new material, but slightly differing apical angles and sutural inclination. The variations may be an artefact of minor preservational distortion.

Superfamily Pseudomelanioidae Hoernes, 1884

Family Pseudomelaniidae Hoernes, 1884

?Pseudomelaniidae gen. et sp. indet.

Figs 3i–m, p

Material. Four poorly preserved internal and external moulds from two localities on outcrop R.7519 “Long Ridge” in the Hauberg Mountains (Fig. 1e): R.7519.24.32; R.7519.57.22b, 54a & b.

Age. A latest Bathonian to latest early Callovian age is inferred for Hauberg Mountains Formation (see above).

Description. Shells high-spined, moderately elongated. Whorls weakly rounded, suture weakly incised, no ornamentation visible. Protoconch and aperture not preserved.

Remarks. These juvenile(?) shells with no sculpture are difficult to classify. Due to lack of protoconch detail there are at least four different families that must be considered. Most probable is the *Pseudomelania* group that is usually classified in a separate superfamily (see e.g. Bouchet *et al.* 2005), as its relationship with the other caenogastropods is not fully resolved. Kaim (2004, p. 66, 97) suggested that the pseudomelaniids could have been derived from zygopleurids of the *Azyga* group, the latter differing from the pseudomelaniids only by the protoconch ornamentation (see e.g. Nützel 1998, Kaim 2004). Placement in the zygopleurid *Azyga* cannot be excluded, nor in the heterobranch *Conusella* that differs from *Pseudomelania* only by its heterostrophic protoconch (see e.g. Gründel & Kaim 2006). Another possibility is a rissoid from the *Zebina* group that is recorded from the Jurassic by Kaim (2004).

Zebina can be differentiated from other similar gastropods by its orthostrophic protoconch, thickened outer lip, and characteristic pitted microornamentation (see e.g. Kaim 2004, fig. 72). Given the poor quality of the material, our designation can only be considered tentative.

Subclass Heterobranchia Gray, 1840
 Order Heterostropha Fischer, 1885
 Superfamily Acteonelloidea Gill, 1871
 Family Bullinidae Rudman, 1972
 ?Bullinidae gen. et sp. indet.
 Figs 3n, o, r–u

Material. Four incomplete external moulds R.7519.57.22c–f, from a single slab of rock from “Long Ridge”, Hauberg Mountains (Fig. 1e).

Age. A latest Bathonian to latest early Callovian age is inferred for Hauberg Mountains Formation (see above).

Description. Small, ovate, globose shells; length ranges from 2.4–5.7 mm, width ranges from 2–4.3 mm. Up to four rounded whorls separated by moderate strength suture; final whorl extends c. 95% of shell height; aperture appears narrow. Ornament of fine spiral furrows.

Remarks. The fragmentary nature and poor preservation of the specimens make identification difficult. The specimens are tentatively placed in the Bullinidae based on outline, shape and ornament. The most probable genus is *Sulcoactaeon* that was widespread in the Jurassic seas (Gründel 1997b, Kaim 2004). The family Acteonidae is less likely as Jurassic members of this family are usually more elongate. Jurassic Ringiculidae have rather elongated shells and the globose members of this family are first recorded in the Albian (Popenoe 1957) and became more common in the Late Cretaceous (Squires & Saul 2001, Kaim & Beisel 2005). However, as the main differences between Acteonidae, Ringiculidae, and Bullinidae lies in the architecture of the aperture and presence/absence of columellar folds (characters poorly or not preserved on our specimens), all these families should be taken into consideration.

Discussion

The bulk of modern information on taxonomy and evolution of Jurassic gastropods derives from Europe (e.g. Conti & Fischer 1982, Szabó 1992, Bandel 1993, Gründel 2003, Guzhov 2004, Kaim 2004 and many others). Other continents are much less represented and the material from there is generally rather poorly preserved. The Jurassic gastropods from Asia are known mainly from Russian Siberia (Beisel 1983, Kaim *et al.* 2004, Kaim & Beisel 2005), Middle East (Ahmad 1999, Fischer *et al.* 2001), and India (Das *et al.* 1999). The recent information from Africa comes mainly from Morocco and Algeria (Conti & Monari

2001, Benhamou *et al.* 2003) with an older but important contribution of Cox (1965) from central Africa. Very little new information is available from North America (e.g. Little *et al.* 2004). Jurassic gastropods from the southern hemisphere remain relatively less researched than those from the north, and the existing reports are restricted in number. There are only a few records from South America (Bandel 1994, Gründel 2001, Gründel & Parent 2001, Gründel *et al.* 2004), Antarctica (Edwards 1980, Thompson & Tranter 1986), Australia (see summary in Jell 1998) and apparently nothing from South Africa. The most well researched Jurassic southern gastropods are those from New Zealand (e.g. Trechmann 1923, Marwick 1953, Bandel *et al.* 2000). The presence of a *Silberlingiella* like form in New Zealand suggests a close palaeogeographic relationship between New Zealand and Antarctica. The other gastropods from the Hauberg Mountains Formation - rissoids, pseudomelaniids, and bullinids - belong to groups of worldwide distribution, found both in New Zealand and Europe (compare e.g. Bandel *et al.* 2000 for New Zealand and Kaim 2004 for Europe). The Jurassic gastropods described from Alexander Island (west of Antarctic Peninsula see Fig. 1b) by Edwards (1980) and Thompson & Tranter (1986) need reviewing as some of their identifications are doubtful. Our preliminary survey (of figured material) suggests that *Protofusis* sp. and *Rhabdocolpus* sp. of Edwards (1980, fig. 2a, b respectively) may both actually represent a species of *Paracerithium*. Other procerithiid gastropods of Edwards (1980, fig. 2e, f) seem to be related to *Exelissa* (c.f. e.g. Gründel & Kaim 2006, fig. 23) while *Procerithium* (*Apicaria*) (Edwards 1980, fig. 2i) looks like a juvenile maturifusid shell (c.f. e.g. Kaim 2004, fig. 85C). The alleged turritellids of Edwards (1980, fig. 2g, h) are most likely mathildid-like gastropods, probably related to gordenellids (see e.g. Gründel 2000, pl. 1: 3–11 & 19–20). The specimen identified by Edwards (1980, fig. 2c) as *Katosira* sp. is still likely a zygopleurid, but probably not a species of *Katosira* (see e.g. Nützel & Hornung 2002, pl. 1: 4–5). Another specimen tentatively identified by Thompson & Tranter (1986, fig. 2a) as a species of *Katosira* is better regarded as an unidentified zygopleurid or perhaps a cryptaulacid (compare e.g. Gründel 1976, Kaim 2004, fig. 17–27). To date *Silberlingiella* is not found with any other gastropod, a phenomenon that remains unexplained. Nothing comparable to *Silberlingiella*, which is the most common gastropod in our material, was reported by Edwards (1980) and Thompson & Tranter (1986). Furthermore no rissoids, pseudomelaniids, or bullinids were recorded from the Alexander Island gastropod faunas. The latter shows some affinities with the Late Triassic South American (e.g. Haas 1953) and Early Jurassic New Zealand (Bandel *et al.* 2000) gastropods rather than to the Middle/Late Jurassic fauna from Ellsworth Land (described herein) and New Zealand (Suggate *et al.* 1978). The difference could be due to the

different age of these faunas and/or different palaeoecological setting. Alternatively it is also possible that the differences in faunas may be reflecting translation of crustal blocks along the margin of Gondwana (e.g. Vaughan & Storey 2000, Vaughan *et al.* 2002). This short overview highlights the need for further research on Jurassic gastropods from regions of the world other than Europe, and especially the southern hemisphere and tropics where the number of reports is meagre.

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