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Lower Cretaceous Ammonites from the Miyako Group

Part 4. *Pseudoleymeriella* from the Miyako Group

Ikuwo Obata*

Abstract

This paper describes two new species of *Pseudoleymeriella*, a Lower Cretaceous ammonite genus, from the Miyako Group of Northeast Japan. It has become clear that *Pseudoleymeriella* was distributed not only in the Mediterranean region during the Upper Aptian age but also in the Pacific region during the Lower Albian.

INTRODUCTION

Some species of the Lower Cretaceous ammonites from the Miyako Group were described and discussed in my previous papers (1967a, b; 1969). In the present part, I describe two species of the genus *Pseudoleymeriella* which was established by Casey in 1957. The genus comprises only several species so far as known, but is important in that the genus seems to occupy a problematical systematic position (Casey, 1957; Wiedmann, 1966).

I wish to record here my cordial thanks to Professor Kotora Hatai of Tohoku University, who has provided the specimens kept at the University on loan for the present study. Thanks are also due to Dr. Tetsuro Hanai of the University of Tokyo and Dr. Itaru Hayami of Kyushu University, for their kind cooperation in the field work and in various other ways. I express my sincere thanks to Professor Tatsuro Matsumoto of Kyushu University, who encouraged me during the course of this study. Thanks are extended to Miss Reiko Fusejima of the National Science Museum, for her help in many ways. Financial support was defrayed by the Ministry of Education in the form of the Grant in Aid for Scientific Researches.

SYSTEMATIC DESCRIPTION

Order Ammonoidea
Superfamily Douvilleiceratacea
Family Trochleiceratidae Breistroffer, 1952
Genus *Pseudoleymeriella* Casey, 1957

Type species: – *Hoplites haidaquensis* Whiteaves, 1893 (designated by Casey, 1957).

Remarks: – This genus was proposed by Casey (1957, p. 35) with a brief description of its differences from *Leymeriella*. Recently, Wiedmann (1966, p. 38, p. 57) clearly defined the genus, to which a few species were referred (1966, p. 57). He carefully examined the sutural development of the genus and other related genera, and noted the close relationship between *Pseudoleymeriella* and *Trochleiceras*.

There is much to be done for proper understanding of the natural history of *Pseudoleymeriella*. The genus varies to some extent in compression and involutions of whorls and in the ornamentation.

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Pseudoleymeriella hataii, sp. nov.
Pl. 34, figs. 1, 2, 4, 5, 7, 8; Text-figs. 1, 2

Material: – Holotype, NSM-P_1 7282, from loc. Hn. 0650.

Paratypes, NSM-P_1 7283, 7287, 7288, 7290, 7291, from the same locality as the holotype; NSM-P_1 7285, from loc. Hn. 6201 (Obata and Hayami coll.); NSM-P_1 7289, from loc. Hn. 0679 (Hanai, Obata and Hayami coll.). In addition, about 30 fragments from locs. Hn. 0650 and 6201 are referable to this species.

Description: – The shell is small, the largest specimen in the collection being about 2 cm in diameter, and others mostly less than 1.5 cm. The inner whorl is moderately overlapped by the outer whorl, with nearly a half involution. The whorl is nearly as high as broad, with the maximum breadth at the mid-flank. It has a rounded venter and gently inflated flanks. Width of umbilicus is moderate or fairly narrow. Umbilical wall is low and steeply inclined, becomes rounded upward, passing into umbilical shoulder. Apertural margin is unknown.

The ribs are almost rectiradiate or only slightly flexuous on the flanks and slightly projected forward on the venter, forming an obtuse arch, but are interrupted by a shallow sulcus on the mid-venter; they consist of single primary ribs and inserted secondary ribs, being about thirty in number per whorl. The primary ribs start from the umbilical shoulder, slightly concave or almost rectiradiate on the flank, but gently projected on the ventro-lateral area. Between the two primary ribs there are a few inserted ribs, which are nearly equal to the former in strength at the ventro-lateral area but decrease toward the inner side and almost disappear at the inner half of the flank. There are ventral bullae at the periphery of all ribs. Peripheral tubercles on both sides of a median ventral groove are in a corresponding position. At the ventro-lateral shoulder below one-third of the height small tubercles occur occasionally.

The suture line is preserved on some specimens (e.g., NSM-P_1 7283). It is rather simple and consists of E, L, U and I. E is deep and of rather narrow breadth. L is broader than but nearly as deep as E, and is tripartite at the base. U is shallower than L. The first lateral saddle between E and L is the tallest, massive, asymmetric in outline, with a steeper ventral slope, divided with a small lobule at the top. The saddle between L and U is small.

Measurements: –

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
NSM-P_1 7282	14.8(1)	4.8(0.32)	5.2(0.35)	5.0(0.33)	0.96
NSM-P_1 7283	12.2(1)	4.2(0.34)	4.9(0.40)	5.1(0.41)	1.04
NSM-P_1 7285	11.4(1)	3.9(0.34)	4.5(0.39)	4.4(0.38)	0.97
NSM-P_1 7287	9.5(1)	3.0(0.31)	3.7(0.38)	4.5(0.47)	1.21
NSM-P_1 7288	8.3(1)	3.0(0.36)	3.5(0.42)	4.3(0.51)	1.22
NSM-P_1 7290	6.9(1)	2.0(0.28)	2.6(0.37)	3.1(0.44)	1.19
NSM-P_1 7291	6.9(1)	2.1(0.30)	2.7(0.39)	3.2(0.46)	1.18
For comparison:					
P. haidaquensis [Whiteaves, 1893, p. 444, pl. 7, figs. 2, 2a-b; Casey, 1957, pl. 7, figs. 1, 1a, 1c]					
	29.0(1)	10.0(0.34)	11.0(0.38)	12.0(0.41)	1.09
P. iberica [Wiedmann, 1966, p. 59]					
GPIT Ce 1310/53					
	8.0(1)	2.5(0.31)	4.0(0.50)	4.0(0.50)	1.00
P. collignoni [Wiedmann, 1966, p. 59]					
Collignon coll. no. 987/47A					
	—	—	8.0	9.1	1.13

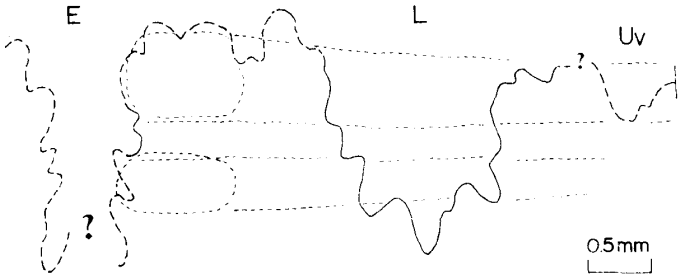

Fig. 1. *Pseudoleymeriella hataii* Obata. Last suture, at whorl-height=3.0 mm., breadth=3.5 mm., of the specimen, NSM-P_1 7283, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone", Iwate Prefecture.

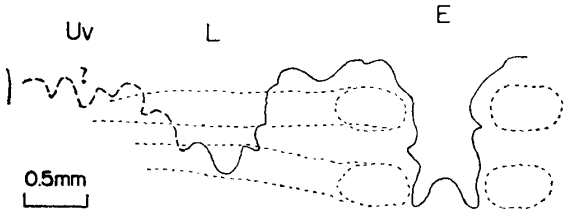

Fig. 2. *Pseudoleymeriella hataii* Obata. Suture, at whorl-height=2.1 mm., breadth=2.6 mm., of the specimen, NSM-P_1 7288, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone", Iwate Prefecture.

Ontogeny: – The whorl at the stage below 10 mm in diameter is slightly depressed, and becomes as high as broad or very slightly compressed than broad with growth of the shell.

Variation: – The ratio of the umbilicus to the total diameter seems to vary to some extent with individual, as the measurements indicate.

Remarks: – The holotype and the paratypes are small specimens like those of the known foreign species, but are distinguished from the latter by their morphological features.

Comparison: – The described species resembles *Pseudoleymeriella haidaquensis* (Whiteaves), the type species of the genus, from the Lower Albian of Canada (Whiteaves, 1893, p. 444, pl. 7, figs. 2, 2a-b; Casey, 1957, pl. 7, figs. 1, 1a, 1c), in the rounded whorl, shallow ventral groove, rows of ventral tubercles on two sides of the shallow sulcus, as well as the general pattern of the sutures. The Japanese species is distinguished, however, from the Canadian species in that it has much smaller shell and denser ribs (with about 30 per whorl for 22 in the latter), consisting of the primary and the secondary ones, than the latter. Furthermore, there are some lateral tubercles in the Japanese species.

Pseudoleymeriella iberica Wiedmann from the Upper Aptian of Spain (Wiedmann, 1966, p. 58, pl. 5, fig. 4) has some similarity with the present species. The latter species has slightly projected primary and secondary ribs. In comparison with the specimens having the same diameter, the present species has less numerous ribs and slightly more depressed whorl. There are some lateral tubercles in the present species. In the less dense ribbing, consisting of long main ribs and short inserted ones, the described species seems to be closer to *Pseudoleymeriella collignoni* Wiedmann (Collignon, 1962, p. 37, pl. 230, fig. 987; Wiedmann, 1966, p. 59, text-fig. 41) from the Upper Aptian of Madagascar, than to the Spanish specimen. Since the holotype of *P. collignoni* is rather fragmentary and the suture is unknown, an exact comparison between the two species under consideration cannot be expected. The major difference between the Japanese and the Madagascar

species is the presence of lateral tubercles in the former. Furthermore, in the Japanese species, the whorl at the young stage of about 5 mm in height is as high as broad or slightly more compressed than broad, while in the Madagascar species the whorl is slightly depressed even at the stage of 8 mm in height.

Occurrence: – Loc. Hn. 0650, the *Orbitolina*-bearing calcareous sandstone exposed at the southern extremity of the Aketo coast. The sandstone belongs to the upper part of the "*Orbitolina* Sandstone". Together with this species, *Valdedorsella* cf. *akuschaensis* (Anthula), *V.* cf. *getulina* (Coquand), *Hypophylloceras* sp., *Hulenites* sp., *Pictetia* sp., *Ptychoceras* sp., and other uncoiled ammonites are sporadically contained in the same concretion.

Locs. Hn. 6201 and 0679, greenish gray fine-grained sandstone bed exposed at the Hiraname coast, north of Raga, Tanohata village, Shimohei County, Iwate Prefecture. This bed belongs to the lower part of the Aketo Formation. Together with this species, *Cymatoceras pseudoneokomiense* Shimizu, *Hulenites* (?) sp., *Eotetragonites* sp. and heteromorph ammonites are sporadically found in the same bed.

All the above localities are in the north of Raga, Tanohata village. From the biostratigraphic facts the fossiliferous bed at these localities is referred to Lower Albian (Obata, 1969).

Pseudoleymeriella hiranamensis, sp. nov.
Pl. 34, figs. 3, 6

Material: – Holotype, NSM-P_1 7284, from loc. Hn. 0650. Paratype, NSM-P_1 7286, from loc. Hn. 6201 (Obata and Hayami coll.). In addition, five fragments from locs. Hn. 0650 and 6201 are referable to this species.

Description: – The shell is small, the larger specimen in the collection being about 13 mm in diameter. Nearly a half of the inner whorl is overlapped by the outer whorl. The whorl is fairly compressed, with the maximum breadth at the mid-flank. The flank is very gently inflated and gradually decreases in breadth at the ventro-lateral shoulder, showing a rather subelliptic outline of section. Width of umbilicus is fairly narrow or moderate; umbilical wall is low and steep. Wall becomes rounded upward, passing into umbilical shoulder. Apertural margin is unknown.

There are numerous delicate ribs, which are almost rectiradiate or feebly flexuous on the flank, being slightly prorsiradiate at the ventro-lateral area. All the ribs start from the umbilical shoulder, and terminate at the bullate tubercles which are located on both sides of a median ventral groove. The tubercles on two rows are in a corresponding position to those on two sides of shallow sulcus. Unfortunately the sutures are not clearly exposed.

Measurements: –

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
NSM-P_1 7284	13.1(1)	4.4(0.33)	5.7(0.43)	4.5(0.34)	0.79
NSM-P_1 7286	9.9(1)	2.7(0.27)	4.3(0.43)	3.7(0.37)	0.86

Comparison: – The present species is allied to *Pseudoleymeriella hataii*, but is distinguished from the latter by the dense and elegant ribbing (with about 38 ribs per whorl), absence of short inserted ribs and lateral tubercles. In these characteristics the present species rather resembles *Pseudoleymeriella iberica* Wiedmann from the Upper Aptian of Spain (1966, p. 58, pl. 5, fig. 4). However, the major difference is that the present species has more compressed, less rounded, and more involute whorl than the latter.

Pseudoleymeriella haidaquensis (Whiteaves) from the Lower Albian of Canada (Whiteaves, 1893, p. 144, pl. 7, figs. 2, 2a-c; Casey, 1957, pl. 7, figs. 1, 1a, 1c) has much more depressed whorl and prominent, less numerous ribs than the present species.

Pseudoleymeriella collignoni Wiedmann (Collignon, 1962, p. 37, pl. 230, fig. 987; Wiedmann, 1966, p. 59, text-fig. 41) from the Upper Aptian of Madagascar has more depressed and rounded whorl than the described species. The ribs in the former are less numerous than in ours and there are inserted short ribs.

Occurrence: – Loc. Hn. 0650, the *Orbitolina*-bearing calcareous sandstone exposed at the southern extremity of the Aketo coast. This is in the upper part of the "*Orbitolina* Sandstone". Loc. Hn. 6201, greenish gray fine-grained sandstone bed exposed at the Hiraname coast. This is in the lower part of the Aketo Formation. The above localities are both in Shimohei County, Iwate Prefecture. Together with this species, *Pseudoleymeriella hataii* is found in the same bed at both localities. The other associated species from the same localities have been mentioned in the preceding page under the heading of *P. hataii*.

CONCLUDING REMARKS

Summarizing the result I list here the species of the genus *Pseudoleymeriella*, with the age or stratigraphic position of their occurrence in brackets.

(1) *Pseudoleymeriella haidaquensis* (Whiteaves)
[Lower Albian of Canada]
(2) *Pseudoleymeriella iberica* Wiedmann
[Upper Aptian of South Spain]
(3) *Pseudoleymeriella collignoni* Wiedmann
[Upper Aptian of Madagascar]
(4) *Pseudoleymeriella hataii*, sp. nov.
[Uppermost part of "*Orbitolina* Sandstone" (corresponding to uppermost part of the Hiraiga Formation) and the lowermost part of the Aketo Formation]
(5) *Pseudoleymeriella hiranamensis*, sp. nov.
[Uppermost part of "*Orbitolina* Sandstone" (corresponding to uppermost part of the Hiraiga Formation) and the lowermost part of the Aketo Formation]

Stratigraphically speaking, the two species described above came from a limited sequence of the Miyako Group, as noted in brackets. As *Douvilleiceras mammillatum* (Schlotheim), which may define the upper part of Lower Albian (Wright, 1957; Casey, 1961), occurs in both the upper part of the Aketo Formation and the uppermost part of the Hiraiga Formation, the lowermost part of the former is safely assigned to Lower Albian (Hanai, Obata & Hayami, 1968). Thus, the geological age of the species of *Pseudoleymeriella*, which has been newly recorded from the Miyako Group in Japan, may be referred to Lower Albian.

It is clear that *Pseudoleymeriella* was distributed not only in the Mediterranean region during the Upper Aptian age but also in the Pacific region during the Lower Albian.

Shimizu (1931) described a fragmentary specimen from the Aketo Formation as *Hoplites* aff. *dentatus* (Sowerby). Unfortunately, the illustrated specimen kept at the Tohoku University, Sendai, is missing now. According to Shimizu's description (1931, p. 28, pl. 4, figs. 10, 11), however, the identification seems rather questionable. The specimen probably belongs to a species of *Pseudoleymeriella*, but is distinguished from the specimens described above in that the whorl is considerably higher than broad, ribs are bifurcated at the umbilical tubercles and are less numerous than ours.

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Explanation of Plate

Plate 34

All the figured specimens were collected from the lower part of the Aketo Formation or the uppermost part of the "*Orbitolina* Sandstone", Miyako Group, exposed along the Aketo coast to Hiraname, Tanohata village, Shimohei County, Iwate Prefecture.

Fig. 1. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7282, holotype, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone". Lateral (a, c), frontal (b) and ventral (d) views, × 2.

Fig. 2. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7289, paratype, from loc. Hn. 0679, Hiraname coast, lower part of the Aketo Formation. Lateral (a, c) and ventral (b) views, × 2.

Fig. 3. *Pseudoleymeriella hiranamensis*, sp. nov.
NSM-P_1 7286, paratype, from loc. Hn. 6201, Hiraname coast, lower part of the Aketo Formation. Lateral (a), frontal (b) and ventral (c) views, × 3.

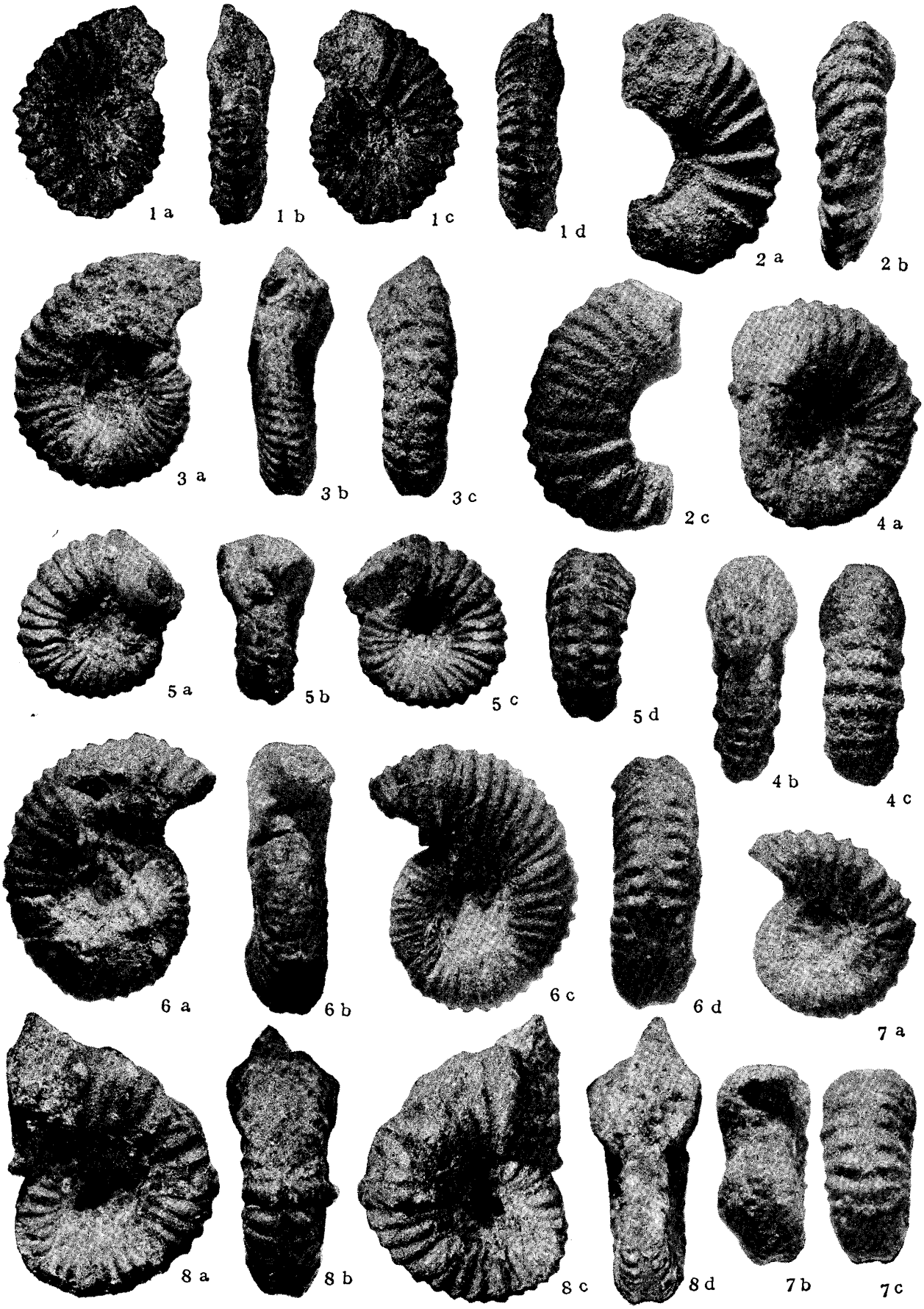
Fig. 4. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7285, paratype, from loc. Hn. 6201, Hiraname coast, lower part of the Aketo Formation. Lateral (a), frontal (b) and ventral (c) views, × 3.

Fig. 5. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7288, paratype, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone". Lateral (a, c), frontal (b) and ventral (d) views, × 3.

Fig. 6. *Pseudoleymeriella hiranamensis*, sp. nov.
NSM-P_1 7284, holotype, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone". Lateral (a, c), frontal (b) and ventral (d) views, × 3.

Fig. 7. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7287, paratype, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone". Lateral (a), frontal (b) and ventral (c) views, × 3.

Fig. 8. *Pseudoleymeriella hataii*, sp. nov.
NSM-P_1 7283, paratype, from loc. Hn. 0650, southern extremity of the Aketo coast, uppermost part of the "*Orbitolina* Sandstone". Lateral (a, c), ventral (b) and frontal (d) views, × 3.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