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Silurian Alveolitina (Coelenterata: Tabulata) from the Gionyama Formation, Miyazaki Prefecture

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Abstract Six coral species of the suborder Alveolitina are described from the Gionyama Formation, Miyazaki Prefecture. The upper Wenlock (Lower Silurian) G2 Member occurs diverse alveolitids, including *Grandalveolites saitoi* sp. nov., *Subalveolites ordinarius* Kim, 1971, *Kitakamiia hamadai* sp. nov., and *Gionyamapora kambei* gen. et sp. nov. *Coenites* sp. indet. and *Planocoenites oishinouchiensis* sp. nov. of coenitids are constituents of an assemblage in the lower Ludlow (Upper Silurian) G3 Member. The new genus *Gionyamapora* is proposed for a caliaporine and differs from *Subcaliapora* mainly in having the thick tabular coralla with the proximal prostrate corallites. *Subalveolites ordinarius* is common in the Wenlock of Uzbekistan, Central Asia. Closely related forms with the Gionyama alveolitine fauna were also known from the Kawauchi Formation, Iwate Prefecture and Hitoegane Formation, Gifu Prefecture in Japan, and from the Siberian Platform. On the basis of the intercorallite wall structure, a possibility of polygenesis in Alveolitina is suggested.

Key words: Wenlock, Ludlow, Silurian, tabulate corals, Alveolitidae, Coenitidae, *Gionyamapora* gen. nov., Gionyama Formation, Miyazaki

Introduction

When Niko and Adachi (1999) elected an alveolitid genus *Gokaselites*, the majority of alveolitine corals from the Gionyama Formation in Miyazaki Prefecture, southern Japan left untouched. As the fifth contribution in a series of papers concerning the Gionyama tabulate coral fauna, herein we report remaining six species that include the new genus and species *Gionyamapora kambei* and the three new species *Grandalveolites saitoi*, *Kitakamiia hamadai* and *Planocoenites oishinouchiensis*. The present taxonomic works have result in the identification of the three different types of the intercorallite wall structure in the Silurian Alveolitina; i.e., (1) differentiated into median dark line and stereoplasm of rect-radiate fibers, (2) differentiated into median dark line and stereoplasm of microlamellae, and (3) undifferentiated and microgranular. This suggests a possibility that this group is artificial on the basis of similarity of the corallite shape and have polygenetic origins. All specimens studied are deposited with the paleontological collections of the National Science Museum, Tokyo.

Systematic Paleontology

Order Favositida Wedekind, 1937

Suborder Alveolitina Sokolov, 1950

Family Alveolitidae Duncan, 1872

Subfamily Alveolitinae Duncan, 1872

Genus ***Grandalveolites*** Mironova, 1970

Type species: *Alveolites straeleni* Lecompte, 1939.

Grandalveolites saitoi sp. nov.

Figs. 1-1–4; 2-1

Grandalveolites sp., Adachi and Niko, 1999, p. 130, figs. 1-2, 2.

Holotype: NSM PA14963, from which two thin sections were made.

Other specimens: Twenty-six thin sections were studied from the six paratypes, NSM PA14962, 14966–14970. In addition, the two specimens, NSM PA14964, 14965, were also examined.

Diagnosis: Species of *Grandalveolites* with moderate corallite diameters, 0.9–1.6 mm in width and 0.5–0.8 mm in height, giving form ratios approximately 1.7; intercorallite walls partly thickened at narrow sides of corallite faces, attaining 0.21 mm; septal spines short; tabulae relatively common.

Description: Coralla low domical to thick tabular in growth form, having approximately 82 mm in diameter and 41 mm in height in maximum observed size of largest corallum (paratype, NSM PA14970), alveolitoid. Corallites reclined throughout all growth stages, indicate nearly horizontal to weakly upward, up to 20° in angle to substrate, in growth direction; transverse sections of corallites are semicircular to crescent, fan-shaped, or subtriangular in rare cases; corallite diameters large for family and moderate for genus, with very gradual inflation, 0.9–1.6 mm in width and 0.5–0.8 mm in height; form ratios (width/height) of typical corallites near calice are approximately 1.7; calices shallow, lack calical modification, strongly oblique with usually 20°–30° in opening angle (from corallum bottom) to corallum surface; increase of new corallite not observable in sectioned coralla. Usual intercorallite walls thin for family and moderate for genus, with weak stereoplasmic thickening, range from 0.06 to 0.10 mm in thickness, but abruptly thickened at narrow sides of corallite faces, where intercorallite walls attain 0.21 mm in thickness; no peripheral stereozone developed; structure of intercorallite walls differentiated into median dark line and stereoplasm; microstructure of stereoplasm not preserved; mural pores relatively numerous, situate on narrow sides of corallite faces at/or near angles, and form single low; diameters of mural pores are 0.15–0.25 mm with subcircular profiles; septal spines well-developed, occur on both lower and upper intercorallite walls, short for genus with 0.10–0.15 mm in length; squamula absent; tabulae complete, roughly rectangular to corallite forming weak concavity to proximal direction, relatively common; there are 0–4 tabulae in 2.5 mm of corallite length.

Discussion: The large corallite diameters with usually thin intercorallite walls for the family Alveolitidae and the lack of the peripheral stereozone of the present species confirm the generic assignment to *Grandalveolites*, thus this late Wenlock species represents the oldest and first Silurian records of this genus.

The gross corallite shape and dimensions of *Grandalveolites saitoi* sp. nov. are about equal with those of type species *G. straeleni* (Lecompte, 1939, pl. 9, figs. 1, 1a–d) from the Couvinien (Middle Devonian) of Belgium and *G. goldfussi* (Billings, 1860, fig. 5) from the Givetian (Middle Devonian) of Laurentia and from the Middle Devonian of the Urals and the Siberian Platform (Sokolov, 1952, pl. 22, figs. 1–3). However, this new species is distinguished immediately from the Devonian forms by the presence of the partial intercorallite wall thickening, the shorter septal spines, and the less numerous tabulae.

Etymology: The specific name honors Dr. Masatsugu Saito, who carried out early geologic investigations of the Gionyama Formation in cooperation with Dr. Nobukazu Kambe.

Occurrence: Uncommon in limestone pebbles to cobbles of the upper Wenlock (Lower Silurian) G2 Member at locality 1 (see Niko, 1998, for geographic and geologic information).

Genus ***Subalveolites*** Sokolov, 1955

Type species: *Subalveolites panderi* Sokolov, 1955.

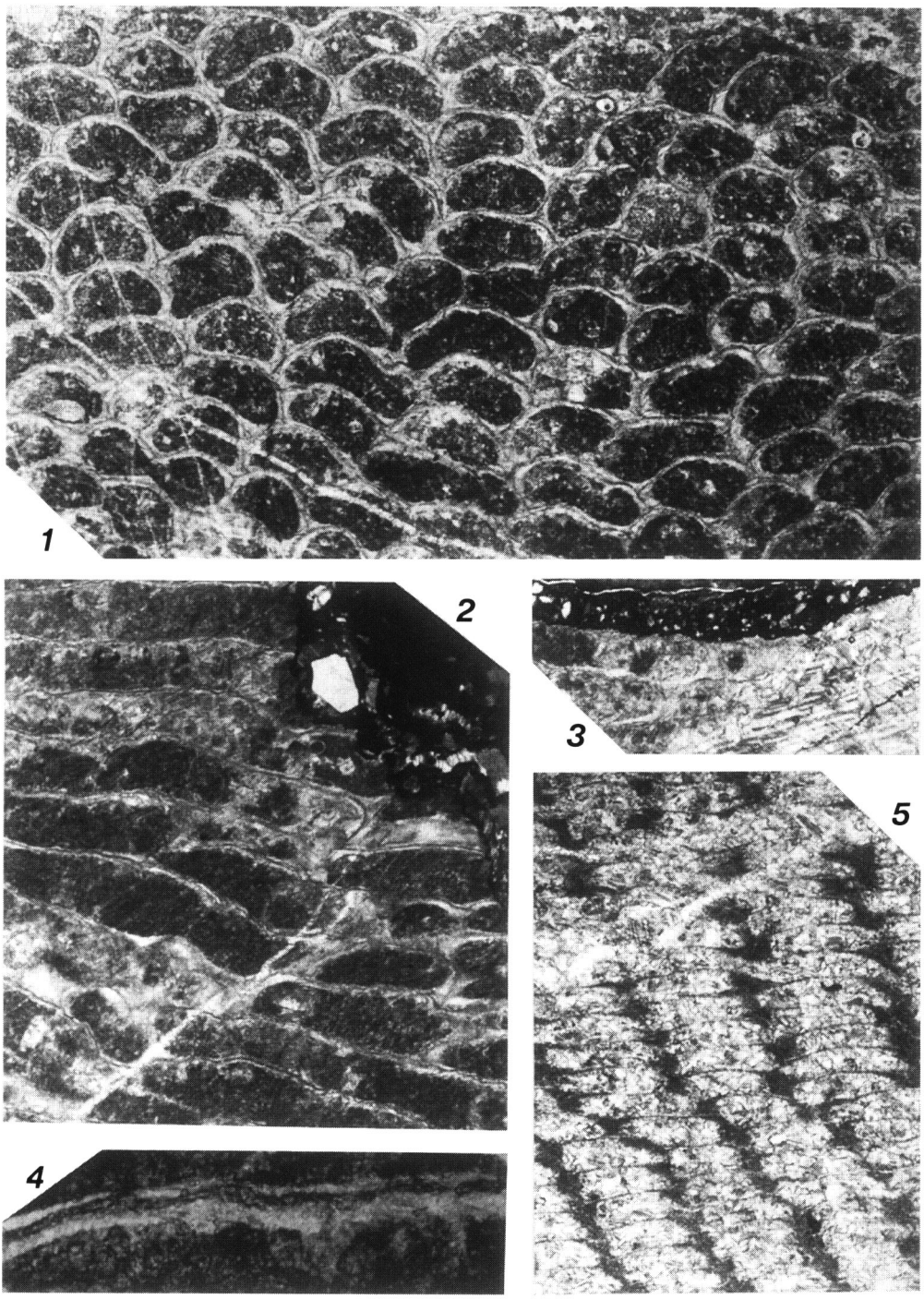

Fig. 1. **1–4**, *Grandalveolites saitoi* sp. nov., holotype, NSM PA14963, thin sections. **1**, transverse sections of corallites, ×14. **2**, longitudinal to oblique sections of corallites, ×14. **3**, longitudinal sections of corallites, showing mural pores, ×14. **4**, partial enlargement to show intercorallite wall structure, ×100. **5**, *Kitakamiia hamadai* sp. nov., holotype, NSM PA14972, transverse thin sections of corallites, note "pillar-like" appearance of thickened intercorallite walls, ×14.

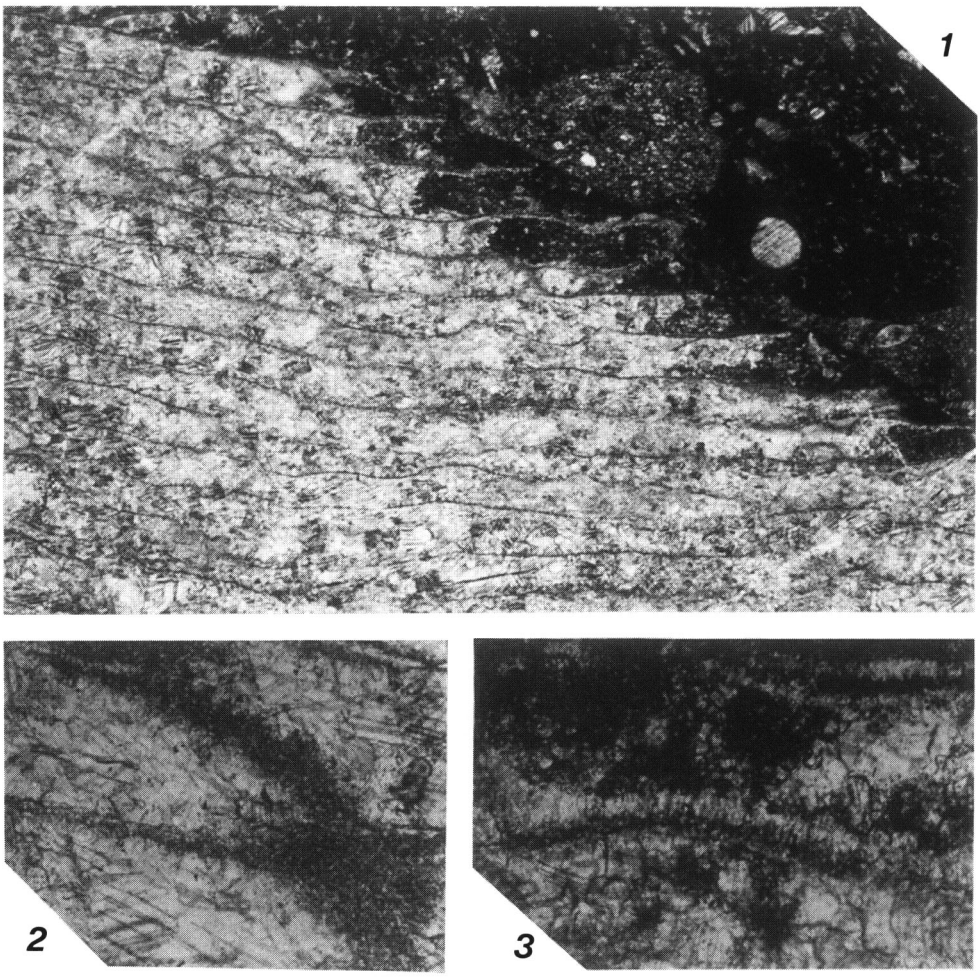

Fig. 2. **1**, *Grandalveolites kambei* sp. nov., paratype, NSM PA14962, longitudinal sections of distal corallites, ×10. **2**, *Kitakamiia hamadai* sp. nov., holotype, NSM PA14972, partial enlargement to show intercorallite wall structure, ×75. **3**, *Subalveolites ordinarius* Kim, NSM PA14976, partial enlargement to show intercorallite wall structure, ×100.

Subalveolites ordinarius Kim, 1971

Figs. 2-3; 3-1–4; 4-1, 2

Subalveolites ordinarius Kim, 1971, p. 136, pl. 27, figs. 2a, b.

Subalveolites sp., Adachi and Niko, 1999, p. 130, 132, 133, figs. 1-3–5.

Material examined: Fourteen coralla, NSM PA14971, 14974–14982, 15004–15007.

Description: Coralla encrusting, tabular to discoid in growth form, reach approximately 33 mm in diameter and 9 mm in height (NSM PA14976) and 35 mm in diameter and 3 mm in height (NSM PA14982) in maximum observed size, alveolitoid; narrow ride-like projections, up to approximately 8 mm in width, rarely developed on corallum surface. Corallites reclined, indicating horizontal direction exclusive of exceptional corallites to form ride-like projections where corallites turn up with approximately 65° in angle to substrate; transverse sections of corallites are usually semielliptical to crescent, or fusiform in rare cases; corallite diameters small for genus, 0.5–0.8 mm in width and 0.2–0.3 mm

in height; form rations (width/height) of typical corallites are approximately 2.7; calices very shallow, lack calical modification, oblique with usually 45°–65° in opening angle (from corallum bottom) to corallite surface; increase of new corallite is lateral, frequent. Intercorallite walls range from 0.04 to 0.08 mm in thickness, but rarely thickened attaining 0.17 mm; no peripheral stereozone developed; structure of intercorallite wall consists of median dark line and stereoplasm of rect-radiate fibers on each side; mural pores numerous at corallite edges, nearly circular profiles with 0.10–0.19 mm in diameter, forming single low; septal spines sporadically occur on lower intercorallite walls, very short with approximately 0.08 mm in length; squamula absent; tabulae complete, rectangular to oblique to corallites, relatively sparse; there are 0–2 (rarely up to 4) tabulae in 2.5 mm of corallite length.

Discussion: The present species is probably conspecific with *Subalveolites ordinarius* Kim, 1971, that occurs in the Wenlock of Uzbekistan, Central Asia. With the exception of difference in the mural pore diameters (0.10–0.19 mm in the Gionyama specimens versus 0.15×0.25–0.2×0.25 mm in the type specimen), most of the measurements given by Kim (1971) fall within the ranges determined for the present specimens.

Occurrence: Common in limestone pebbles to cobbles of the G2 Member at locality 1.

? Subfamily Alveolitinae Duncan, 1872

Genus ***Kitakamiia*** Sugiyama, 1940

Type species: *Kitakamiia mirabilis* Sugiyama, 1940.

Discussion: The subfamily designation of this taxon is in question. The undifferentiated and microgranular intercorallite wall structure of the holotype (IGPS coll. cat. no. 63078) of the type species *Kitakamiia mirabilis* and the present Gionyama species is quite unique for the subfamily Alveolitinae, whose walls are differentiated into the median dark line and the stereoplasm of rect-radiate fibers.

Kitakamiia hamadai sp. nov.

Figs. 1-5, 2-2; 5-1, 2

Holotype: NSM PA14972, from which six thin sections were made.

Other specimen: A poorly preserved specimen, NSM PA14973, was also examined.

Diagnosis: Species of *Kitakamiia* with relatively large corallite diameters, 0.9–1.4 mm in width and 0.3–0.4 mm in height; form ratios of corallites are low, 3.7–4.1; intercorallite walls thick, attaining 0.42 mm; septal spine absent; tabulae common.

Description: Coralla may be thick tabular in growth form, having 83 mm in width and 21 mm in height in maximum observed size of holotype, alveolitoid. Corallites reclined with horizontal direction throughout all growth stages, regularly arranged to form intracolonial columns; transverse sections of corallites are crescent to fusiform; diameters of corallites are relatively large for genus, with very gradual inflation, 0.9–1.4 mm in width and 0.3–0.4 mm in height; form rations (width/length) of typical corallites are low for genus, range from 3.7 to 4.1; calice not preserved; increase of new corallite is rare, intracalicular(?). Usual intercorallite walls thin for family but thick for genus, approximately 0.02 mm in lower and upper sides and abruptly thickened at narrow sides of corallite faces, attaining 0.42 mm in thickness; thickened intercorallite walls form "pillar-like" appearance in transverse section; no peripheral stereozone recognized; structure of intercorallite walls is undifferentiated and microgranular; mural pores numerous at corallite edges, subcircular profiles with approximately 0.18 mm in diameter, forming single low; both septal spine and squamula absent; tabulae common with relatively regular in spacing, complete and roughly rectangular to corallite, usually indicate weak concavity to proximal (?) direction; there are 3–4 tabulae in 2.5 mm of corallite length.

Discussion: *Kitakamiia hamadai* sp. nov. shows close similarities in arrangement of the corallites, microstructure of the intercorallite

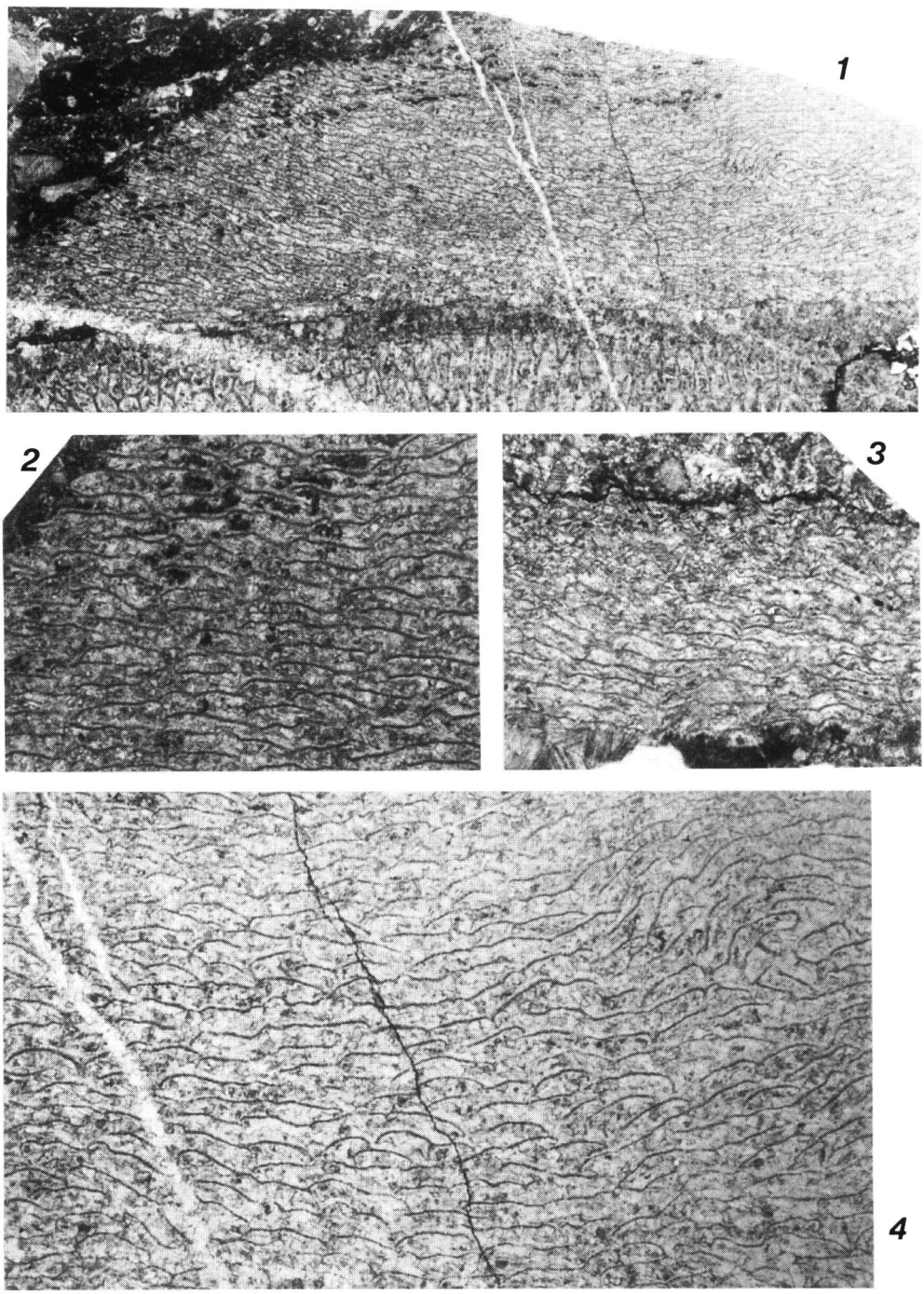

Fig. 3. *Subalveolites ordinarius* Kim, thin sections. **1**, **2**, **4**, NSM PA14976. **1**, longitudinal section of corallum, encrusting on *Gokaselites nodai* Niko and Adachi, ×5. **2**, longitudinal to oblique sections of distal corallites, ×14. **4**, transverse sections of corallites, ×14. **3**, NSM PA14981, longitudinal sections of corallites, ×14.

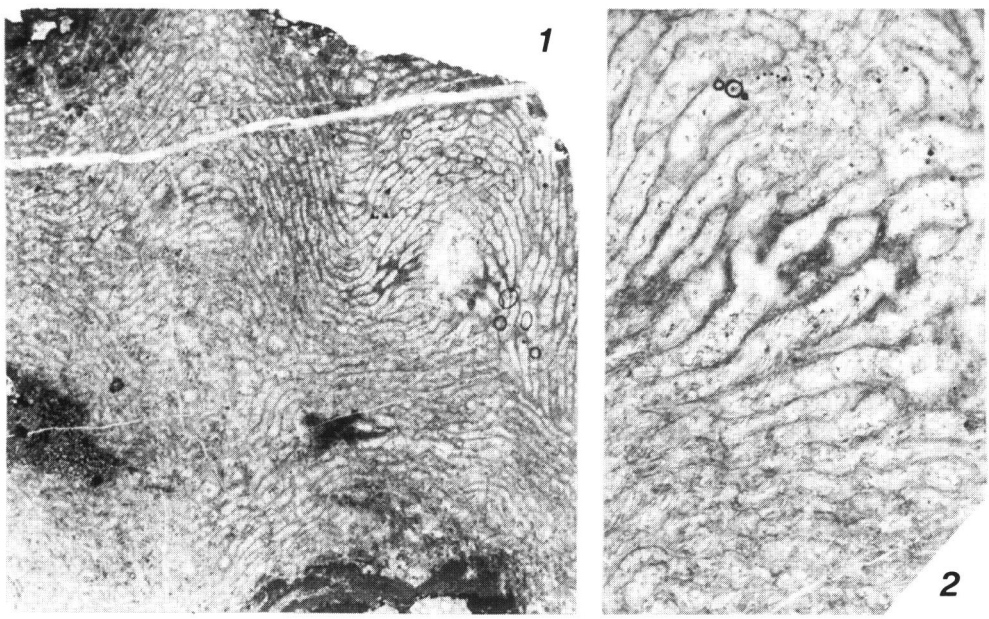

Fig. 4. *Subalveolites ordinarius* Kim, NSM PA14975, thin sections. **1**, longitudinal section of corallum, showing ridge-like projections, ×5. **2**, oblique sections of corallites, showing thickened intercorallite walls, ×14.

walls and absence of the septal spine with the type species *K. mirabilis* Sugiyama (1940, pl. 32, figs. 3–6) from the Ludlow (Upper Silurian) "*Halysites* Limestone" in the Kawauchi Formation, Iwate Prefecture, Northeast Japan. However, this new species differs in that: (1) the larger corallite size, 0.9–1.4 mm in width and 0.3–0.4 mm in height versus approximately 0.9 mm in width and approximately 0.2 mm in height (remeasured from the holotype) in *K. mirabilis*, (2) the lower form ratios, 3.7–4.1 versus usually 4.0–4.9 in *K. mirabilis*, (3) the thicker intercorallite walls attaining 0.42 mm, and (4) more frequent occurrence of the tabulae. The holotype of *Kitakamiia*? *hemispherica* (Chernyshev, 1937, pl. 1, fig. 6, pl. 2, figs. 2a, b) and a similar form had been assigned to this species as the neotype by Chekhovich (1971, pl. 37, figs. 1a, b, v, g, 2a, b, 3a, b, 4) from the Ludlow of Tuva in the Siberian Platform are possessed of the distinct septal spines. The intercorallite wall structure of the Siberian specimens is not well-known.

This Wenlock new species represents the oldest records of the genus, whose previous range, as noted by Hill (1981), was restricted in Ludlow to Frasnian (Late Devonian).

Etymology: The specific name honors Dr. Takashi Hamada, who has described halysitid tabulate corals from the Gionyama Formation and established the stratigraphic subdivisions of this formation.

Occurrence: Scarce in limestone cobbles of the G2 Member at locality 1.

Subfamily Caliaporinae Mironova, 1974

Genus ***Gionyamapora*** nov.

Type species: *Gionyamapora kambei* sp. nov., by monotypy.

Diagnosis: Thick tabular coralla, alveolitoid to rarely cerioid-like, consist of slender corallites; corallites grow upward except for most proximal prostrate ones; intracolonial columns partly developed; intercorallite walls thin, undifferentiated and microgranular in structure; septal spine may absent; squamulae numerous with thickened proximal portion; tabulae well-developed, complete or incomplete.

Etymology: The generic name is derived from the type stratum named Gionyama Formation.

Gionyamapora kambei sp. nov.

Figs. 6-1–6; 7-1–4

Kitakamiia cf. *mirabilis* Sugiyama; Adachi and Niko, 1999, p. 130, figs. 2-1–3.

Holotype: NSM PA15001, from which 29 thin sections were made.

Other specimens: Fifty-five thin sections were studied from the 10 paratypes, NSM PA14983, 14984, 14987, 14989, 14990, 14992, 14995, 14997, 14999–145000. In addition, the 11 specimens, NSM PA14985, 14986, 14988, 14991, 14993, 14994, 14996, 14998, 15002, 15003, were also examined.

Diagnosis: As for the genus.

Description: Coralla thick tabular in growth form, large for family having more than approximately 200 mm in diameter and 120 mm in height in maximum observed size of largest corallum (paratype, NSM PA14993), alveolitoid to cerioid-like in rare cases. Corallites slender, usually reclined; most proximal corallites prostrate with horizontal growth direction and partly form intracolonial columns, then corallites abruptly upward with 50° to nearly perpendicular growth orientation to substrate, where corallites indicate apparent wavy arrangement; transverse sections of corallites semielliptical, crescent to fan-shaped or subquadrate in rare cases; diameters of corallites are small for family, 0.4–0.7 mm in width and 0.2–0.4 mm in height; form ratios (width/height) of typical corallites range from 1.5 to 2.0; calice not preserved; increase of new corallite is lateral (and intracalicular?), very frequent. Intercorallite walls thin for family; most proximal intercorallite walls of prostrate corallites are 0.02–0.04 mm in thickness, then weakly and uniformly thickened, but wall thickness no more than 0.08–0.11 mm; structure of intercorallite walls is undifferentiated and microgranular; peripheral stereozone not recognized; mural pores numerous on corallite edges with circular profiles, forming single low; their diameters large in comparing corallite size, range from 0.10 to 0.17 mm; septal spine may be absent; squamulae numerous, form both upper (anterior) and lower (posterior) rims of each mural pore, rectangular to intercorallite wall; proximal portion of each squamula is thickened and conical but attenuating and tongue-like distally; length of squamulae usually 0.13–0.17 mm; tabulae somewhat irregular in shape, complete or incomplete, rectangular to strongly oblique to corallite, well-developed; there are 4–10 tabulae in 2.5 mm of corallite length.

Discussion: In Adachi and Niko (1999), the type species of this new genus *Gionyamapora* was provisionally assigned to a species of *Kitakamiia* as *K.* cf. *mirabilis*. The both genera seem to have some affinities in corallite arrangement to form the intracolonial columns and the intercorallite wall structure; however, an additional well-preserved specimen (holotype) reveals that the corallites grow upward except for the most proximal ones whereas they have horizontal direction throughout all growth stages in *Kitakamiia*, and the numerous squamulae are recognized whereas in *Kitakamiia* the squamula is not developed. These differences are enough to separate in a generic level to say the least.

Among the previously known genera of the subfamily Caliaporinae, *Gionyamapora* is closest morphologically to the Ludlow genus *Subcaliapora* (Chekhovich, 1971; type species *S. magnifica* Chekhovich, 1971, pl. 35, figs. 1a, b, v, g, 2a, b, 3, 4) from Tuva in the Siberian Platform. The main differences between two genera are in the corallum shape (thick tabular in *Gionyamapora* versus spherical or hemispherical in *Subcaliapora*) and growth orientation of corallites (prostrate corallite probably lacks in *Subcaliapora*). In addition, *Subcaliapora* has well-developed cerioid-like portions with the rounded-polygonal corallites, and the distinct septal spines.

Etymology: The specific name honors Dr. Nobukazu Kambe, who was a colleague of Dr. Masatsugu Saito in early geologic investigations of the Gionyama Formation.

Occurrence: Abundant in limestone pebbles to

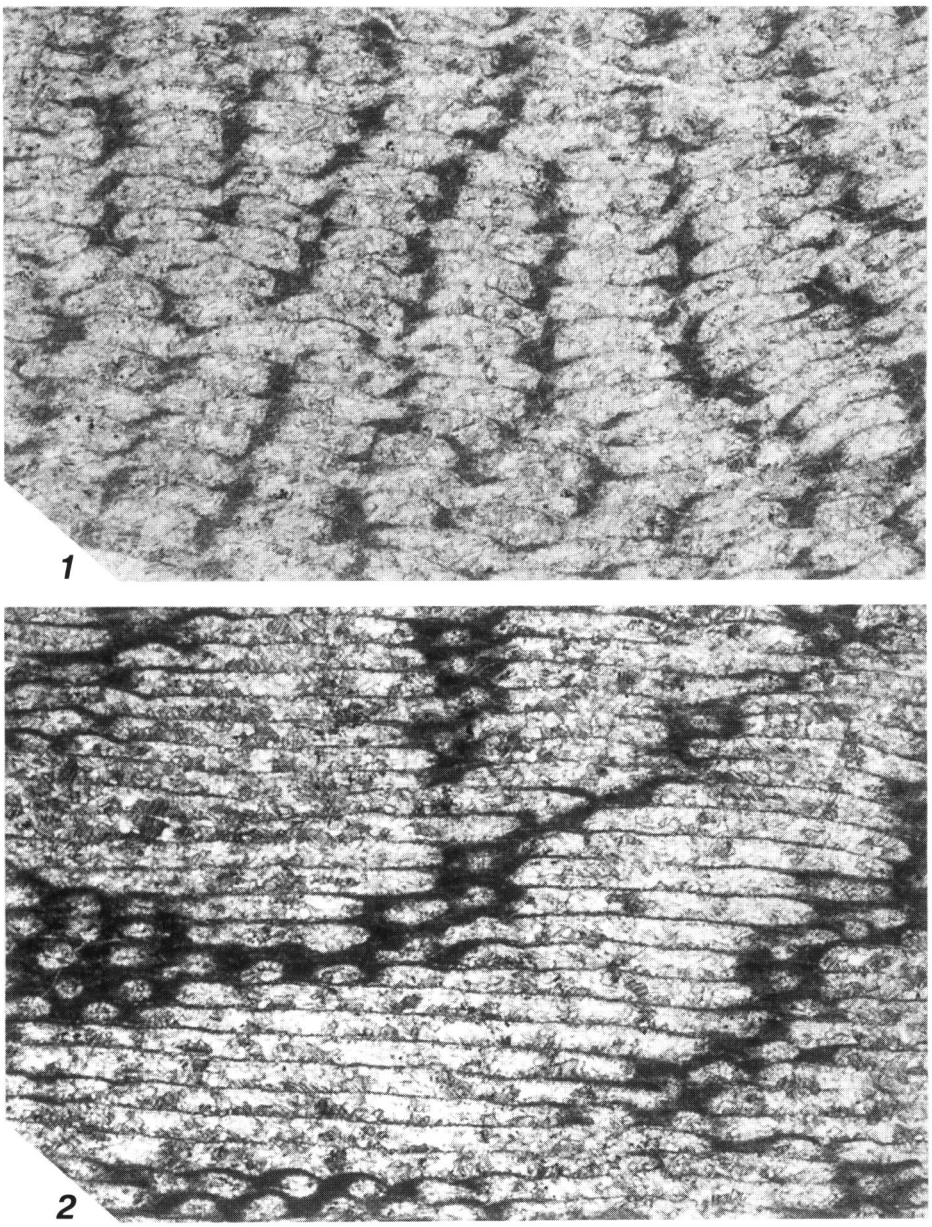

Fig. 5. *Kitakamiia hamadai* sp. nov., holotype, NSM PA14972, thin sections. **1**, transverse sections of corallites, note intracolonial columns, ×14. **2**, longitudinal sections of corallites, ×14.

boulders of the G2 Member at locality 1.

Family Coenitidae Sardeson, 1896

Genus ***Coenites*** Eichwald, 1829

Type species: *Coenites juniperinus* Eichwald, 1829.

Coenites sp. indet.

Figs. 8-1–3

Material examined: Two coralla, NSM PA14658, 14659.

Description: Coralla may be ramose with cylindrical and slender branches of usually 4.8–

5.1 mm in diameter; mode of corallite assemblage in branch shifts from cerioid with polygonal to fan-shaped transverse sections of corallites in axial zone to alveolitoid in peripheral zone. Corallites exceptionally slender for order; each corallite consists of longitudinally directed proximal portion and outwardly curved distal portion; proximal and distal corallites respectively form axial and peripheral zones of branch; peripheral corallites indicate crescent to elliptical transverse sections with approximately 0.9×0.3 mm in diameter. Calices slit-like with slightly waved outline caused by stereoplasmic intercorallite wall thickening of peripheral stereozone. Intercorallite walls attain 0.15 mm in thickness, composed of median dark line and stereoplasm (microlamellae?), but this structural differentiation becomes indistinct in peripheral stereozone by lacking median dark line; mural pores common at corallite edges; tabula and septal element not detected.

Discussion: The type species *Coenites juniperinus* Eichwald (1829, p. 179; Klaamann, 1964, text-figs. 15a, b, pl. 26, figs. 3–5) is diagnosed by its slender branches for Alveolitina, exceptionally slender corallites for Favositida, differentiated branches into axial cerioid and peripheral alveolitoid zones, and slit-like calices. Although unsuccessful attempts to make a well-oriented longitudinal section preclude a specific determination, the present specimens shear the diagnostic characters with the type species and their generic assignment is indicated without question.

Since Sugiyama's precursory works in the first half of the last century, some confusions between *Coenites* and ramose pachyporids have been maintained in Japan. Previously described and/or illustrated all species as *Coenites* are misidentified; i.e., (1) "*Coenites*" *triangularis* Sugiyama (1940, pl. 21, figs. 3–5) and "*Coenites*" sp. (Sugiyama, 1940, pl. 22, fig. 16; ?=*Coenites*? *sakariensis* Sugiyama, 1937, nomen nudum) from the Silurian Kawauchi Formation, Iwate Prefecture are respectively *Cladopora* and *Striatopora*(?), (2) "*Coenites*" sp. from the middle Silurian Imose Limestone, Kochi Prefecture (Sugiyama, 1944, pl. 3, figs. 2a, b; (?) conspecific with "*Coenites*" sp., from the Suberidani Group, Tokushima Prefecture in Yamashita, 1949) is assignable to *Striatopora*, and (3) "*Coenites*" sp. from the Devonian Fukuji Formation, Gifu Prefecture (Hamada and Itoigawa, 1983, p. 11, fig. 3) probably belongs to *Thamnopora*. Therefore, the Gionyama species probably represents the first record of the genus *Coenites* in Japan.

Occurrence: Scarce in massive gray limestone (bioclastic wackestone) of the lower Ludlow G3 Member at locality 3.

Genus ***Planocoenites*** Sokolov, 1952

Type species: *Coenites orientalis* Eichwald, 1861.

Planocoenites oishinouchiensis sp. nov.

Figs. 8-4, 5; 9-1–5

Holotype: NSM PA14662, from which 15 thin sections were made.

Other specimens: Seventeen thin sections were studied from the three paratypes, NSM PA14660, 14661, 14663.

Diagnosis: Species of *Planocoenites* with relatively thick (1.7–2.8 mm) coralla, fan-shaped in transverse section in distal corallite, and well-developed mural pores; calice to open usually 62°–73° in angle; tabulae common.

Description: Coralla encrusting, very thin laminar for family but relatively thick for genus in growth form, consisting of less than five layers of corallites with 1.7–2.8 mm in thickness, alveolitoid; maximum observed size of largest corallum (paratype, NSM PA14663) attains approximately 33 mm in diameter. Corallites mostly reclined; each corallite composed of prostrate in proximal portion with subtrapezoid, fan-shaped, or semicircular in transverse section, and upwardly curved and relatively short (approximately 1.6 mm) distal portion with fan-shaped in transverse section; corallites large for family, 0.5–1.1 mm in width and 0.3–1.0 mm in height in proximal corallite, and 1.1–1.3 mm in width and 0.7–0.8

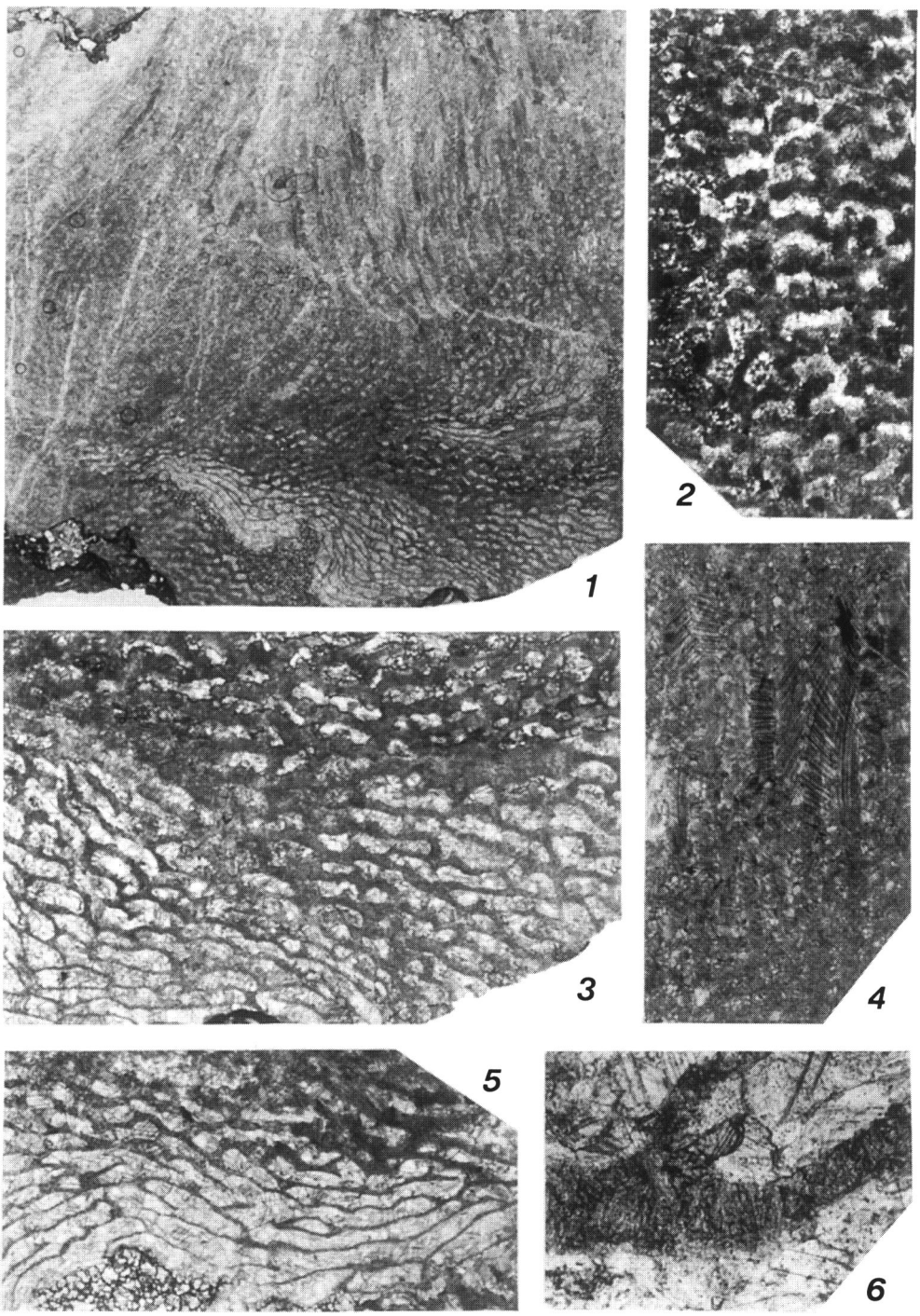

Fig. 6. *Gionyamapora kambei* gen. et sp. nov., holotype, NSM PA15001, thin sections. **1**, longitudinal section of corallum, ×5. **2**, transverse sections of proximal corallites, note intracolonial columns, ×14. **3**, oblique to transverse sections of proximal corallites, ×14. **4**, longitudinal sections of distal corallites, ×14. **5**, longitudinal sections of most proximal corallites, ×14. **6**, partial enlargement to show intercorallite wall structure, ×100.

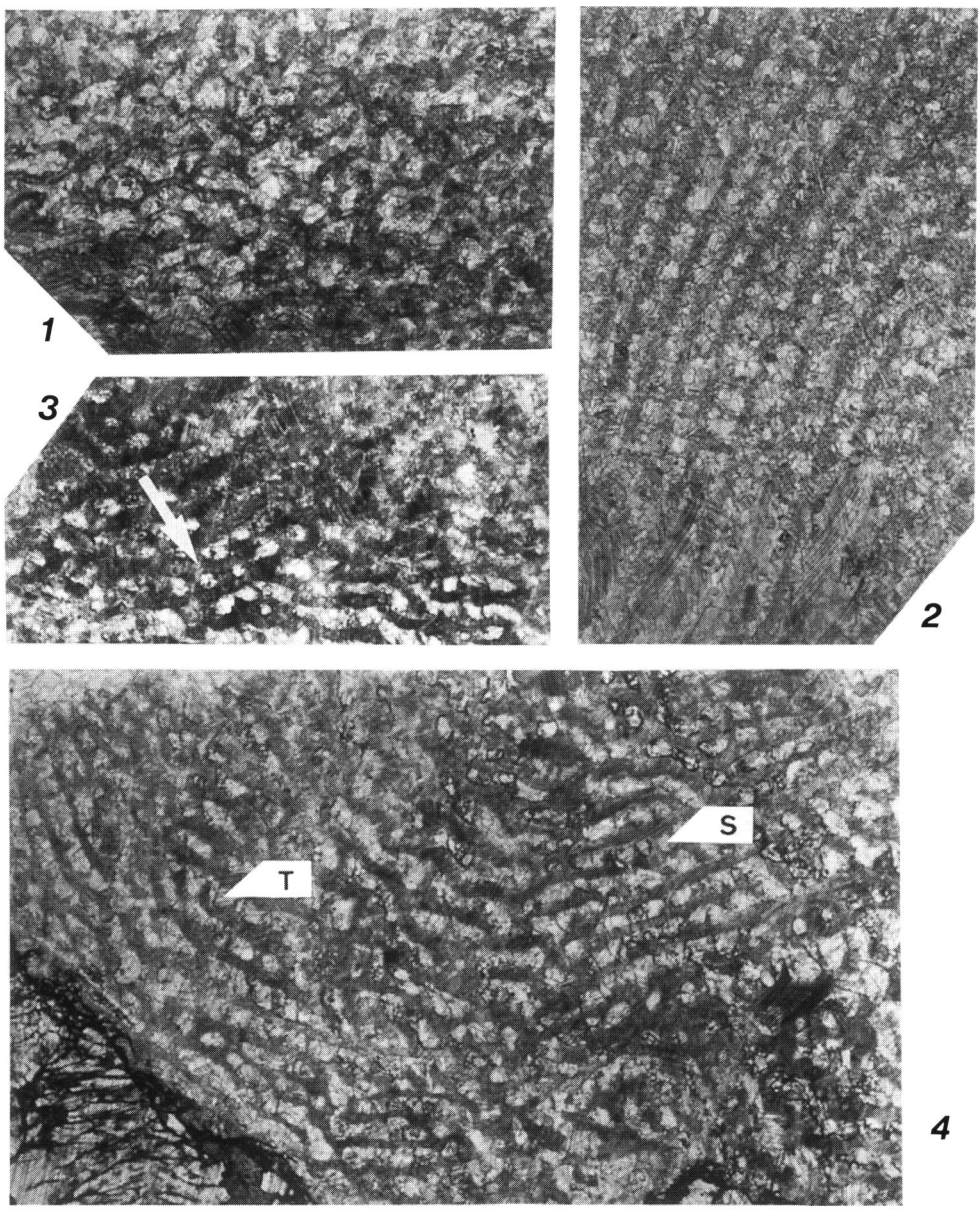

Fig. 7. *Gionyamapora kambei* gen. et sp. nov., thin sections. **1**, paratype, NSM PA14984, transverse sections of distal corallites, ×14. **2**, paratype, NSM PA14990, longitudinal sections of distal corallites, ×14. **3**, **4**, holotype, NSM PA15001, longitudinal thin sections of proximal corallites. **3**, arrow indicates mural pore, ×14. **4**, arrows indicate squamulae (abbreviation=S) and tabula (ditto=T), ×14.

mm in height at calical pit; form ratios (width/height) of corallites usually 1.3–1.5; distal corallite forms deep calice, whose opining 49°–95°, usually 62°–73°, in angle to corallum surface; increase of new corallite not observable in sectioned coralla. Intercorallite walls differentiated into median dark line and stereoplasm; thickness of intercorallite walls is mostly thin for genus, 0.04–0.27 mm in proximal corallite, but abruptly thickened at calice as peripheral stereozone with clavated profile in longitudinal section, attaining 0.52 mm and may form visor-like struc-

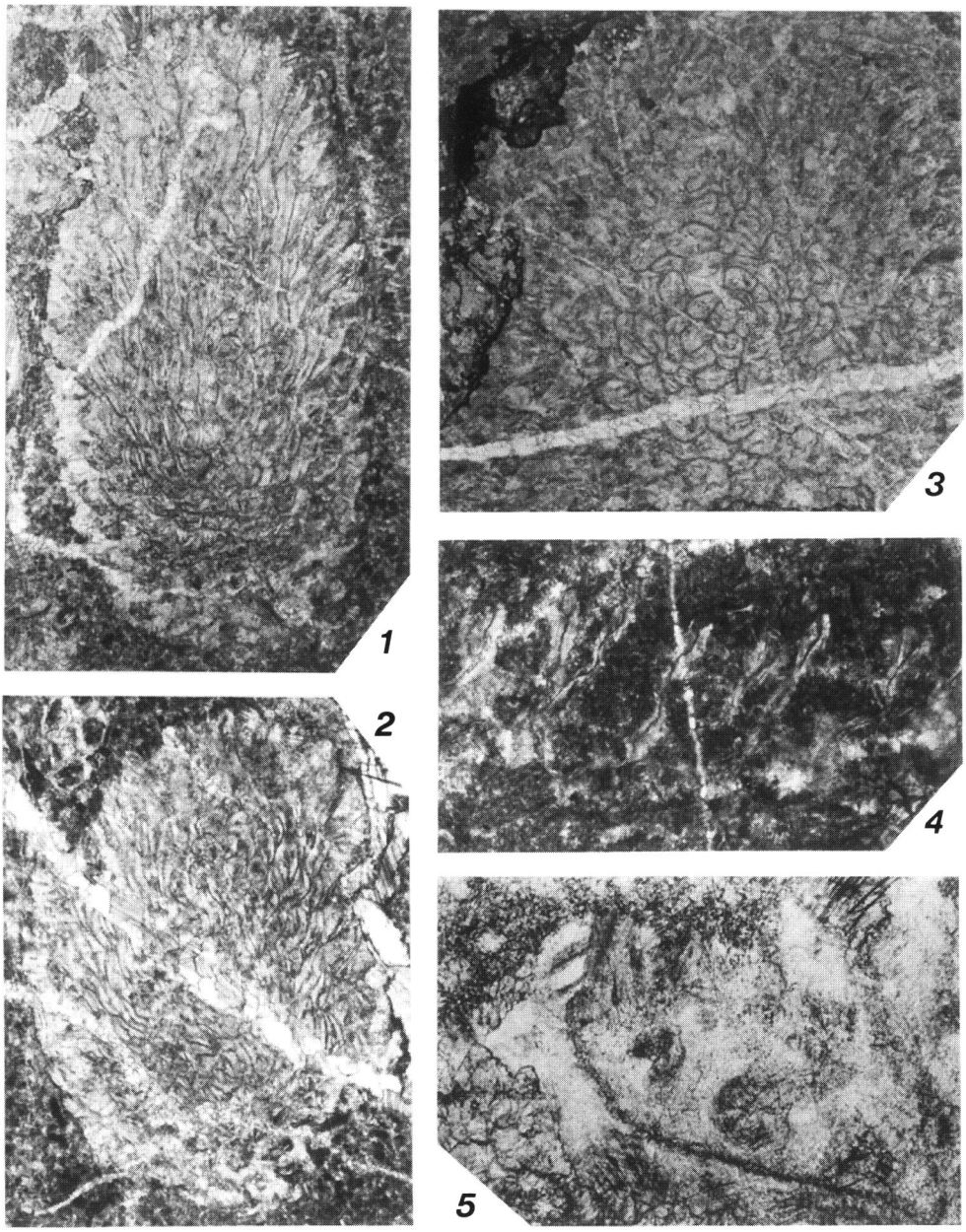

Fig. 8. **1–3**, *Coenites* sp. indet., thin sections of branches. **1**, **2**, NSM PA14659. **1**, oblique section, ×10. **2**, near transverse section, ×10. **3**, NSM PA14658, transverse section, ×10. **4**, **5**, *Planocoenites oishinouchiensis* sp. nov., thin sections. **4**, holotype, NSM PA14662, longitudinal sections of corallites, ×14. **5**, paratype, NSM PA14663, longitudinal sections of distal corallites, showing mural pores and intercorallite wall structure, ×50.

ture; microstructure of stereoplasm not preserved; mural pores well-developed at near corallite edges with circular profiles, 0.13–0.21 mm in diameter; tabulae common, complete, rectangular to corallite; numerous, but very short (approximately 0.03 mm), spine-like projections recog-

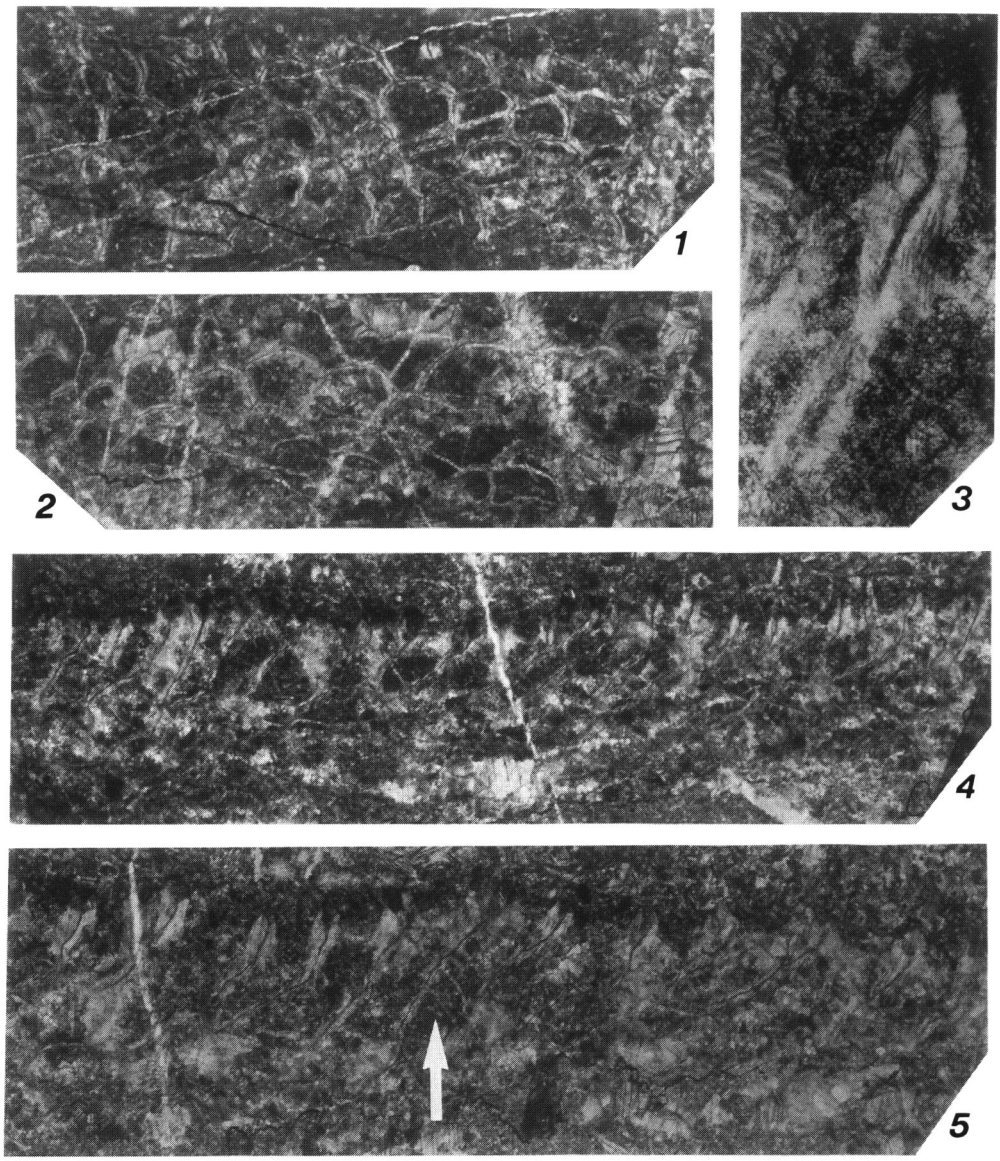

Fig. 9. *Planocoenites oishinouchiensis* sp. nov., thin sections. **1**, paratype, NSM PA14660, transverse sections of corallites, ×10. **2**–**5**, holotype, NSM PA14662. **2**, transverse sections of corallites, ×10. **3**, partial enlargement to show intercorallite wall structure, ×50. **4**, longitudinal sections of corallites, ×10. **5**, longitudinal sections of corallites, arrow indicates tabula, ×14.

nized on intercorallite walls.

Discussion: *Planocoenites oishinouchiensis* sp. nov. closely resembles both *Planocoenites* sp. (Kamiya and Niko, 1998, figs. 1a–c, 2) from the Upper Silurian of the Hitoegane Formation, Gifu Prefecture, Central Japan and *Placocoenites* [sic] *rotundus* Sokolov and Tesakov (1963, pl. 11, figs. 6, 7) from the Wenlock of the Siberian Platform. The most similar Hitoegane species can be distinguished from this new species by differences in opening angle of the calices (40°–60° versus usually 62°–73° in *Planocoenites oishinouchiensis*) and number of the tabulae (very rare versus common in *P. oishinouchiensis*). Compared with

this new species, the Russian species differs in its subcircular profiles of the partial corallites and very rare occurrence of the mural pores. In addition, Sokolov and Tesakov (1963) stated that no tabula is observed in *Placocoenites* [sic] *rotundus*.

Etymology: The specific name is derived from the type locality named Oishinouchi.

Occurrence: Identical with *Coenites* sp. indet. (this report).

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