Middle Permian Bryozoa from the Lakaftari area, northeast of Esfahan (central Iran)

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ABSTRACT
A rich bryozoan fauna is described from the Permian of the Jamal Formation, exposed in Lakaftari area, south of the town of Bagher-Abad, northeast of Esfahan (central Iran). The investigated fauna includes 31 bryozoan species: seven are described in open nomenclature, 19 are previously known, and one new genus and new species, *Lakkella jamalica* n. gen., n. sp., as well as four new species, *Dyscritella leptosa* n. sp., *Ascopora gracilis* n. sp., *Rectifenestella crassinodata* n. sp., and *Penniretepora afghanica* n. sp., are described. The fauna is indicative of a middle Permian age and shows extensive palaeobiogeographic relations to the Permian of Transcaucasia, Thailand, China, Russian Platform, Indonesia, Japan and Turkey.

KEY WORDS
Bryozoa,
Middle Permian,
central Iran,
stratigraphy,
paleobiogeography,
new genus,
new species.

RÉSUMÉ
Bryozoaires du Permien moyen de la région de Lakaftari, nord-est d'Ispahan (Iran central).
Une riche faune de bryozoaires est décrite dans le Permien de la Formation Jamal, affleurant dans la région de Lakaftari, au sud de la ville de Bagher-Abad, nord-est d'Ispahan (Iran central). La faune étudiée comprend 31 espèces de bryozoaires :

MOTS CLÉS
Bryozoa,
Permien Moyen,
Iran central,
stratigraphie,
paléobiogéographie,
nouveau genre,
nouvelles espèces.

sept sont décrites en nomenclature ouverte, 19 sont précédemment connues, et un nouveau genre avec une nouvelle espèce, *Lakkella jamalica* n. gen., n. sp., ainsi que quatre espèces nouvelles, *Dyscritella leptosa* n. sp., *Ascopora gracilis* n. sp., *Rectifenestella crassinodata* n. sp. et *Penniretepora afghanica* n. sp., sont décrits. La faune indique un âge Permien moyen. Elle montre des relations paléobiogéographiques étendues avec le Permien moyen de Transcaucasie, de Thaïlande, de la plate-forme russe, de Chine, d'Indonésie, du Japon et de Turquie.

INTRODUCTION

Permian sediments belonging to the Tethyan realm are widely distributed in Asia. They usually contain a rich marine fauna including bryozoans. Permian Bryozoa from southern Asia have been the object of scientific studies beginning with the early works of Waagen & Pichl (1885), Waagen & Wentzel (1886) (Pakistan), and Bassler (1929) (Indonesia). Sakagami contributed greatly to the understanding of bryozoan faunas from Japan (1961, 1964), Iran (1980), Indonesia (2000), and Thailand (1966, 1968a-c, 1970, 1971, 1999).

Permian Bryozoa from Iran are scarcely studied. The earliest publication by Fantini Sestini (1965) includes description of three species from the Ruteh Limestone of Central Elborz (northern Iran), one of which – *Fenestrellina* (syn. *Minilya*) *perelgans* (Meek, 1872) – has also been found in present material. Later, Sakagami (1980) described 15 species from the Permian of central Iran (Abadeh region). This fauna displayed close relation to the Dzhulfian (= Chanhsingian) Stage, as well as connections to the Permian of Pamir, Russian Platform, Salt Range, Kashmir, South China, and Timor.

The present paper is devoted to a description of a bryozoan fauna from a newly discovered locality of the Permian rocks in central Iran (Senowbari-Daryan & Hamedani 2002; Rigby *et al.* 2005). The abundant material was sampled by Baba Senowbari-Daryan and Ali Hamedani during the field work in La Lakaftari area near Kuh-e Kaftar Mountain (32°58'N, 52°05'E), 45 km northeast of Esfahan, central Iran (Fig. 1). Taxonomic questions and paleobiogeographic implications for the described bryozoan fauna are discussed.

LITHOLOGY AND STRATIGRAPHY

The investigated material comes from the Permian Jamal Formation exposed southwest of Kuh-e Lakaftari (32°58'N, 52°05'E) situated in the southern area of the small town Bagher-Abad, approximately 45 km northeast of Esfahan, central Iran. Tectonically, the investigated locality belongs to the Sanandaj-Sirjan tectonic zone (SS-zone). This tectonic zone reaches almost 1500 km extinction, running southwest-southeast, more or less parallel to the Zagros belt in southwest (Stöcklin 1968). The SS-zone belongs to the central Iranian plate at the east, differs from other parts of Iranian plate by its structural geology, corresponding to the Zagros belt. The SS-zone is bounded to the Zagros belt by the "Main Zagros fault", to the central Iranian plate in the northwest by different geological structures. Lithologically, the occurrence of abundant metamorphic rocks in SS-zone differs this from the central Iranian plate and from the Zagros belt.

The thickness of the whole section in Lakaftari is about 400 m (Senowbari-Daryan & Hamedani 2002; Rigby *et al.* 2005). This formation is apparently Middle Permian in age, mostly carbonate, representing deposits of nearshore to open sea environments. Grey massive and richly fossiliferous limestones are intercalated with sandy limestones

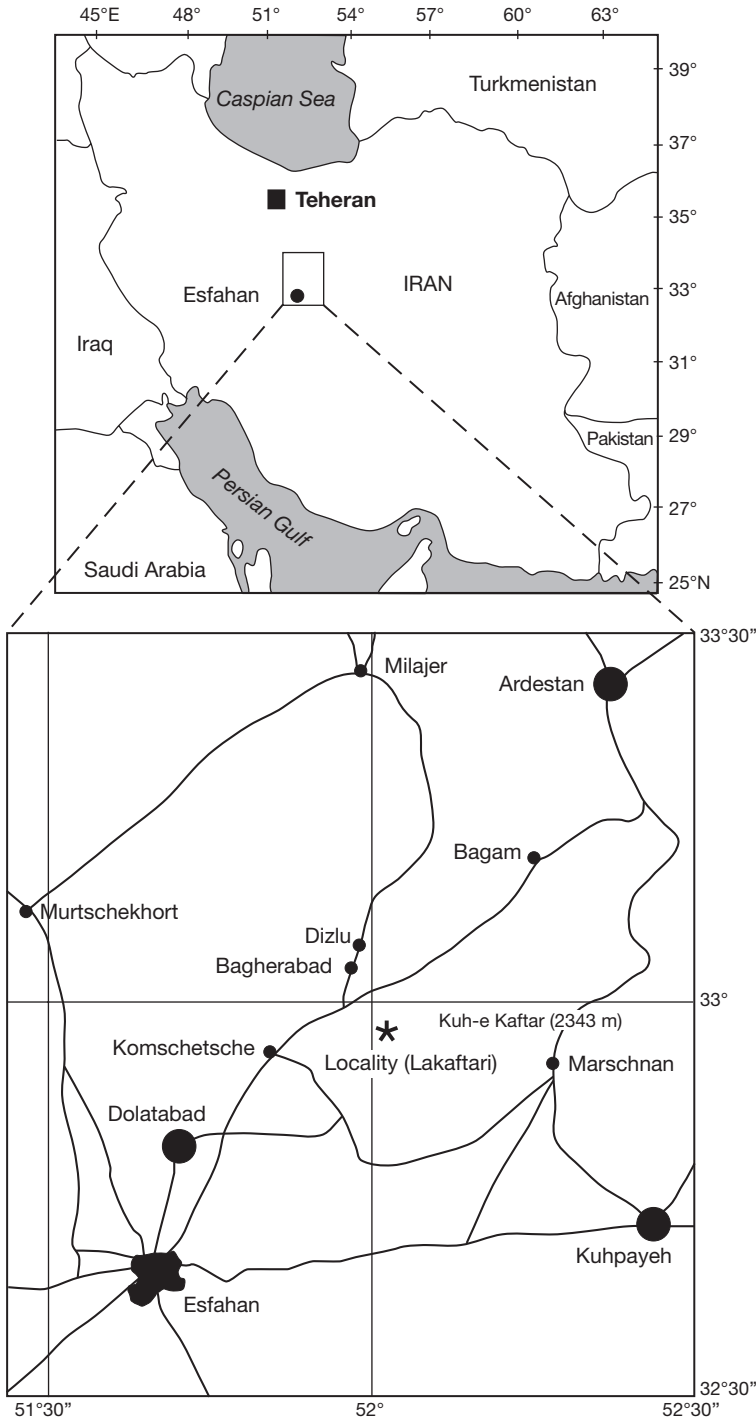

FIG. 1. — Geographic position of the investigated locality (*).

and dolomites, marls as well as rare sandstones and quartzites. The bryozoan material has been sampled from loose blocks which come from the middle part of the section. This unit reaches 53.4 m thick and consists of grey or yellowish-grey massive fossiliferous limestone. In addition to bryozoans the fauna includes brachiopods (*Chonetina* sp., *Orthotina* sp., *Permophricodothyris* sp., *Stegocoelina* sp.), cephalopods (orthocon shells), gastropods (*Bellerophon* sp., *Euomphalus* sp., *Loxonema* sp.), trilobites (*Pseudophillipsia* sp.) and ichnofossils (*Zoophycus* sp.) (identified by M. A. Djafariani, University of Esfahan) and abundant hypercalcified sphinctozoan sponge *Amblysiphonella iranica* (Senowbari-Daryan & Hamedani 2002) and heteractinid sponges *Regispongia fluegeli* and *Iranospongia circulata* described by Rigby *et al.* 2005.

MATERIAL AND METHODS

Twenty-six large rock pieces were available for study; 542 thin sections were prepared for bryozoans from rock samples. Taxonomic descriptions have been undertaken using thin sections and acetate peels. Exterior and interior features were used in systematic descriptions, and supported by following statistics: number of measurements, mean, standard deviation, coefficient of variation, minimal value, and maximal value. Measurements are in mm, except numerical data of objects per distance such as number of apertures per 2 mm at the colony surface, vesicles per 1 mm of autozooecial length, etc.

The description of fenestrate bryozoans followed general recommendations in Snyder (1991a, b), and Hageman (1991a, b). These authors suggested rejecting the so-called micrometric formula, which include different parameters. However, many previous publications contain this formula. We used a simplified variant of the micrometric formula allowing a quick comparison:

Number of branches per 10 mm across the colony/number of fenestrules per 10 mm along the branch//number of apertures per 5 mm along the branch.

The rock material as well as thin sections and paratypes are housed at the Institute of Paleontology, University of Erlangen-Nürnberg, Lakaftari Collection, numbers 1-26, including subnumbers. Holotypes are housed at Senckenberg Forschungsmuseum, Frankfurt am Main, numbers SMF 2111-2115; and in the Paleontological Institute, Moscow (PIN).

Tables 1-31 are grouped in the Appendix at the end of the paper.

SYSTEMATICS

Phylum BRYOZOA Ehrenberg, 1831
Class STENOLAEMATA Borg, 1926
Order CYSTOPORIDA Astrova, 1964
Suborder FISTULIPORINA Astrova, 1964
Family FISTULIPORIDAE Ulrich, 1882

Genus *Fistulipora* M'Coy, 1849

TYPE SPECIES. — *Fistulipora minor* M'Coy, 1849. Lower Carboniferous, Derbshire (England).

Fistulipora monticulosa Nikiforova, 1933
(Fig. 2A, B, D, E, G; Table 1)

Fistulipora monticulosa Nikiforova, 1933: 10, pl. 1, figs 9-15, text-figs 3, 4. — Morozova 1970a: 61, 62, pl. 1, fig. 2.

Fistulipora pseudomonticulosa Sakagami, 1980: 272, pl. 31, figs 4-6.

Fistulipora sp. cf. *F. monticulosa* – Sakagami 1976: 400, pl. 42, figs 3, 4.

LECTOTYPE (designated by Morozova 1970a). — Central Museum of Geological Prospecting, Saint Petersburg, Russia. Thin section No. 13 (Nikiforova 1933: pl. 1, fig. 13). Transcaucasia (Nakhichevan), River Arax; Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

MATERIAL EXAMINED. — 4-3, 4-7-1, 4-12, 5-9, 5-11, 5-12, 9-5, 12x, 21-3, 23-8, 25-3.

OCCURRENCE. — Transcaucasia (Nakhichevan), Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Sainbeyli: Central Turkey, Middle Permian. Abadeh: central Iran; Upper Permian (*Araxopora araxensis*-Horizon). Lakaftari: central Iran, Jamal Formation, Middle Permian.

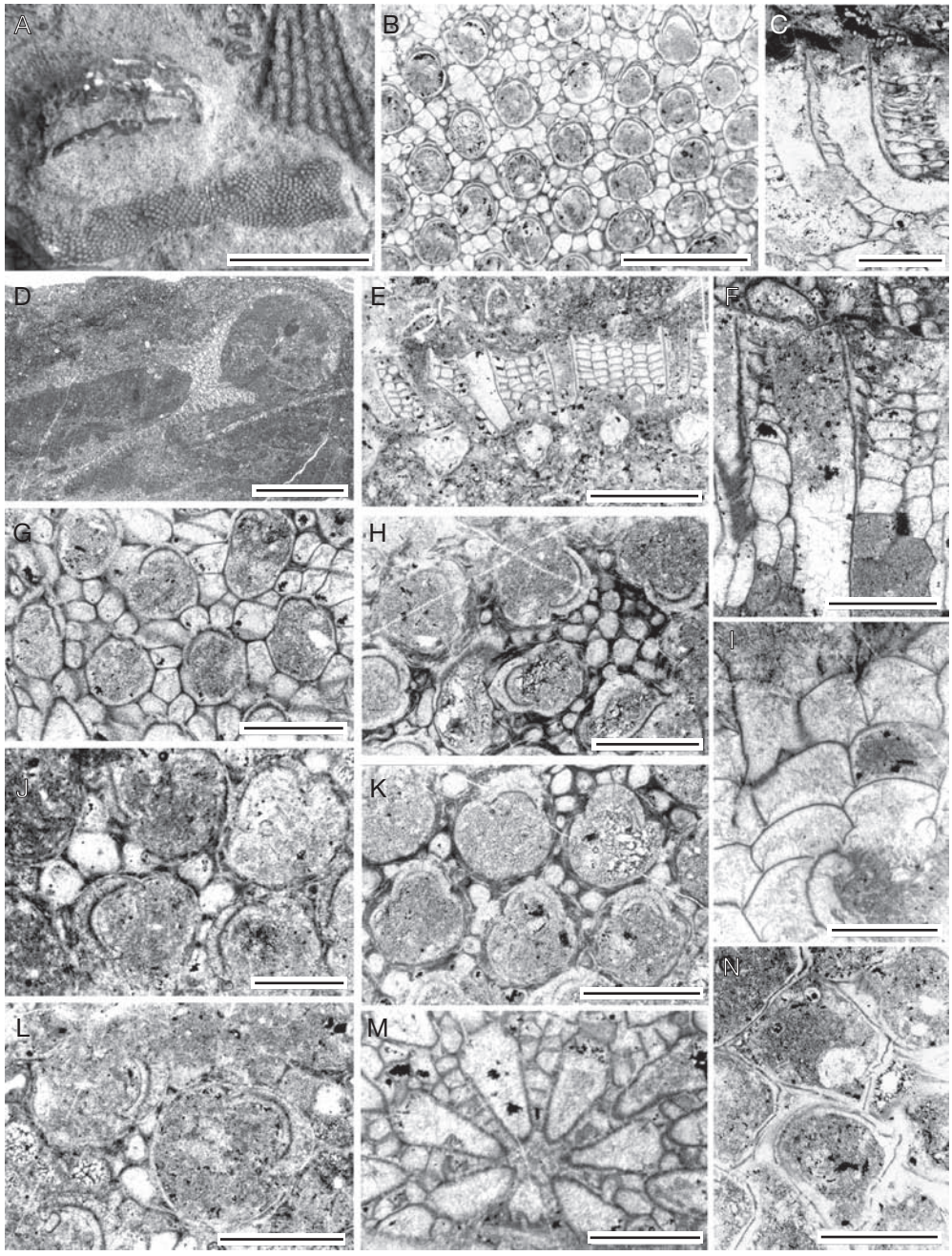

FIG. 2. — **A**, **B**, **D**, **E**, **G**, *Fistulipora monticulosa* Nikiforova, 1933; **A**, 5, cylindrical colony; **B**, 5-9-3, tangential section; **D**, 5-11-1, thin section through cylindrical colony; **E**, 5-9-3, longitudinal section of encrusting colony; **G**, 5-11-1, tangential section; **C**, **J**, **L**, *Fistulipora* sp.; **C**, 4-16-5, longitudinal section of encrusting colony; **J**, 4-16-3, tangential section; **L**, 4-16-3, tangential section; **F**, **H**, **K**, **M**, *Fistulipora timorensis* Bassler, 1929; **F**, 10-2-2, longitudinal section; **H**, **K**, 25-10-3, tangential section; **M**, 7-3-2, deep tangential section of macula center; **I**, **N**, Fistuliporidae indet. (?*Eridopora*); **I**, 4-8-11, longitudinal section; **N**, 19-4-2, tangential section. Scale bars: A, 10 mm; B, E, 1 mm; C, G-I, K-N, 0.5 mm; D, 3 mm; F, 0.05 mm; J, 0.2 mm.

DESCRIPTION
Encrusting colonies, often hollow, tubular (encrusting ephemeral cylindrical substrates). Encrusting sheets 0.6-2.2 mm thick, tubular colonies having rounded lumen 3-6 mm in diameter. Autozooecia budding from substrate at low angles. Autozooecial apertures rounded, having well developed, horseshoe-shaped lunaria, spaced 3.5-4.5 in 2 mm. Autozooecial diaphragms rare to absent in short autozooecia (often developed at their bases), abundant in longer autozooecia, complete, thin, deflected orally. Vesicles polygonal in tangential section, arranged in 1-3 rows between autozooecia, having flat or slightly concave roofs, spaced 8-15 per 1 mm of the colony thickness. Maculae consisting of vesicular skeleton, rounded, 0.66-1.20 mm in diameter, spaced regularly on the colony surface.

COMPARISON
Sakagami (1980) described a new species *Fistulipora pseudomonticulosa* because of rare diaphragms in autozooecia. However, an investigation of a large amount of thin sections of the present material revealed a variation in the number of autozooecial diaphragms. *Fistulipora monticulosa* is similar to *F. timorensis*, which is widely distributed in Permian rocks of Asia (Indonesia, Thailand, Primorye, Iran). The most striking difference is the growth form: unilaminar encrusting, commonly tubular in *F. monticulosa*, multilamellar encrustings rare; usually uni- and multilamellar encrusting colonies in *F. timorensis*, tubular colonies unknown. Furthermore, apertures in *F. timorensis* are larger (0.35 vs. 0.29 mm in *F. monticulosa*).

Fistulipora timorensis Bassler, 1929
(Fig. 2F, H, K, M; Table 2)

Fistulipora timorensis Bassler, 1929: 44, pl. 3, figs 4-9. — Sakagami 1968b: 50, 51, pl. 6, figs 1-3; 1999: 81, 82, pl. 18, figs 1-3. — Morozova 1970a: 63, 64, pl. 2, fig. 1. — Kiseleva 1982: 53, 54, pl. 1, fig. 1. — Xia 1991: 188, 189, pl. 7, figs 6, 7.

Fistulipora cf. *timorensis* – Sakagami 1961: 16, pl. 1, figs 1-8; 1995: 242, fig. 9-3, 4. — Sakagami *in* Yanagida 1988: pl. 12, figs 1-3.

MATERIAL EXAMINED. — 4-8-1, 4-8-5, 4-8-6, 5-2, 10-2-1, 10-2-2, 10-2-3, 10-2-4, 10-2-6, 10-2-7, 23-4, 25-10-3.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian. *Fistulipora timorensis* is apparently widely distributed in Lower to Upper Permian rocks of the Tethys region. It was reported from Timor (Bassler 1929), Thailand (Sakagami 1968b; Sakagami *in* Yanagida 1988), Khabarovsk region (Morozova 1970a), Primorye (Kiseleva 1982), Xizang, China (Xia 1991), and Bolivia (Sakagami 1995).

DESCRIPTION
Encrusting colonies, 0.9-1.5 mm thick. Autozooecia bud from a substrate at low angles. Autozooecial apertures rounded, having well developed, horseshoe-shaped lunaria, spaced 3.5-4.5 in 2 mm. Autozooecial diaphragms rare to absent in short autozooecia (usually developed at their bases), abundant in longer autozooecia, complete, thin, deflected orally. Vesicles polygonal in tangential section, arranged in 1-3 rows between autozooecia (commonly two rows), having flat or slightly concave roofs, spaced 8-9 per 1 mm of the colony thickness. Maculae consisting of vesicular skeleton, rounded, 0.96-1.50 mm in diameter, spaced regularly on the colony surface. Lunaria of adjacent apertures directed towards maculae centre; autozooecia arranged radially around central point of a macula (Fig. 2M).

COMPARISON
Fistulipora timorensis differs from *F. monticulosa* in having larger apertures (0.35 vs. 0.29 mm in *F. monticulosa* averagely), as well as in the absence of tubular colonies. *Fistulipora* sp. described below has larger apertures (0.46 vs. 0.35 mm in *F. timorensis* averagely). *F. timorensis* is also similar to *F. siamensis* Sakagami, 1999, from the Middle Permian of Thailand. The two species may be conspecific, because the only difference with *F. siamensis* mentioned by Sakagami (1999) is the abundant basal diaphragms. The number of basal diaphragms can vary greatly in Palaeozoic stenolaemate bryozoans.

Fistulipora sp.
(Fig. 2C, J, L; Table 3)

MATERIAL EXAMINED. — Three thin sections of a single colony 4-16.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Encrusting colonies, 1.20-1.76 mm thick. Secondary overgrowths common. Encrusting layers 0.75-0.90 mm thick. Autozooecia bud from substrate at low angles. Autozooecial apertures rounded, having well developed, horseshoe-shaped lunaria, spaced 3.5-4.0 in 2 mm. Autozooecial apertures commonly 0.38-0.49 mm in diameter; few apertures extremely larger than others, having diameters of 0.52-0.58 mm. Autozooecial diaphragms rare to absent, complete, thin, deflected orally. Vesicles polygonal in tangential section, arranged in 1-2 rows between autozooecia, usually having slightly concave roofs at the base and more flat roofs near the colony surface, spaced 14-17 per 1 mm of the colony thickness. Distinct maculae not observed, small spaces, consisting of vesicular skeleton between apertures occurring.

COMPARISON

The present specimen is similar to *Fistulipora zhejiangensis* Lu, 1986 (upper part of the Lower Permian [Tongling, Maokou Formation, Hunan, western Zhejiang, China]), especially in the characteristic occurrence of larger and smaller apertures. The latter species has smaller autozooecial apertures and thicker colonies, as well as abundant diaphragms. *Fistulipora vacuolata* Crockford, 1944 from the Lower Permian of Western Australia (upper part of Noonkanbah Series; Late Artinskian to Lower Kungurian) is also similar to the described material, differing in having thicker colonies (4 vs. 1.20-1.76 mm in present material), as well as abundant diaphragms.

Genus *Eridopora* Ulrich, 1882

TYPE SPECIES. — *Eridopora macrostoma* Ulrich, 1882. Mississippian (Carboniferous); Kentucky (USA).

Eridopora oculata Bassler, 1929
(Fig. 3N-P; Table 4)

Eridopora oculata Bassler, 1929: 53, 54, pl. 1, figs 5-11. — Kiseleva 1982: 59, pl. 3, fig. 2.

Eridopora sp. cf. *oculata* – Sakagami 2000: 147, fig. 4-3.

MATERIAL EXAMINED. — 1-2-3, 1-2-4, 1-2-5, 5-11, 11-1-1, 16-1-6, 16-1-7, 19-4-11, 23-2-1, 23-4-1, 23-7, 23-8-2, 24-3-5.

OCCURRENCE. — Timor: Indonesia, Permian (Bassler 1929; Sakagami 2000). Lakaftari: central Iran, Jamal Formation, Middle Permian. Khabarovsk region: Russia; Middle Permian, Kazanian (Kiseleva 1982).

DESCRIPTION

Small encrusting colonies, 0.66-1.35 mm thick. Autozooecial apertures rounded to oval, with well developed triangular lunaria, spaced 4-5 in 2 mm at colony surface. Lunaria large, prominent, 0.06-0.07 mm thick in their middle part, sometimes containing 1-4 nodes. Autozooecial diaphragms rare to abundant, planar, thin. Vesicles angular, separating autozooecia in 1-2 rows, spaced 10-15 in 1 mm of longitudinal section. Distinct polygons developed by keels on the colony surface, enclosing apertures.

COMPARISON

Eridopora oculata differs from the most similar species *E. parasitica* (Waagen & Wentzel, 1886) [syn. *E. major* Bassler, 1929] from Salt Range (Pakistan) by smaller apertures and thinner colony.

Fistuliporidae (?*Eridopora*) indet.
(Figs 2I, N; 3J-M; Table 5)

MATERIAL EXAMINED. — 4-8-11, 10-1-3, 19-4-2, 19-4-10.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Small encrusting colonies, up to 1.26 mm thick. Autozooecial cross section rounded on the colony surface, becoming irregularly polygonal in deeper tangential section. Apertures spaced 3-5 in 2 mm of the colony surface. Lunaria well developed, triangular, prominent, often overlapping neighbouring autozooecium, sharply terminating with single node. Autozooecial diaphragms absent. Hemiphragms

rare to abundant, apparently spine-like, thick, occupying up to 1/3 of autozooecial chamber. Vesicles angular, large, having vaulted roofs, rare to abundant, sometimes separating autozooecia in two rows, spaced averagely 4 in 1 mm of autozooecial length. Walls apparently aragonitic initially; extant walls consisting of thick layers of needle-like crystals oriented perpendicularly to a dark medial line. Small nodes sporadically distributed on the colony surface; consisting of medial dark core and light crystals arranged radially.

COMPARISON

This bryozoan reveals only superficial resemblance to *Eridopora*, because of well developed triangular lunaria and vesicular skeleton (see the above described *E. oculata*). The polygonal shape of the autozooecial cross section is very unusual, as well as wall structure, and especially the presence of hemiphragms. It is likely that this bryozoan belongs in a separate genus. However, the available material is not sufficient for a description of a new genus.

Order TREPOSTOMIDA Ulrich, 1882
Suborder AMPLEXOPORINA Astrova, 1965
Family DYSCRITELLIDAE Dunaeva & Morozova, 1967

Genus *Dyscritella* Girty, 1911

TYPE SPECIES. — *Dyscritella robusta* Girty, 1911. Lower Carboniferous, Arkansas (USA).

Dyscritella leptosa n. sp.
(Fig. 4A-E; Table 6)

HOLOTYPE. — SMF 2111.

ETYMOLOGY. — The species name derives from Greek "λεπτος": thin, and refers to the small thickness of encrusting colony.

PARATYPE. — 23-6-10.

TYPE LOCALITY. — Lakaftari, central Iran.

TYPE LEVEL. — Jamal Formation, Middle Permian.

ADDITIONAL MATERIAL EXAMINED. — 1-2-1, 1-2-2, 23-1-4.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DIAGNOSIS. — Thin encrusting colony with abundant exilazooecia, acanthostyles, and moderately thickened walls.

DESCRIPTION

Encrusting colonies, 0.16-0.24 mm thick (0.20 mm averagely). Autozooecia budding from a thin epitheca, on a short distance parallel to the substrate, then bending to the colony surface sharply. Autozooecial apertures polygonal, spaced 7-11 per 2 mm. Autozooecial diaphragms exceptionally rare (only one was observed), thin. Exilazooecia abundant, polygonal in cross section, often separating autozooecia. Acanthostyles abundant, 3-4 surrounding each aperture, having distinct calcite cores and dark, laminated sheaths. Walls granular, 5-10 µm thick in the endozone; distinctly laminated, 20-40 µm thick in the exozone. Maculae indistinct, consisting of larger autozooecia.

COMPARISON

Dyscritella leptosa n. sp. shows distinct characters of the genus *Dyscritella*: thickened walls, abundant exilazooecia and acanthostyles, as well as rare diaphragms. It differs from other species of the genus *Dyscritella* in having thin encrusting colony and closely spaced apertures.

Order RHABDOMESIDA Astrova & Morozova, 1956
Suborder HYPHASMOPORIDINA Vine, 1886
Family HYPHASMOPORIDAE Vine, 1886

Genus *Ogbinopora* Shishova, 1965

TYPE SPECIES. — *Ogbinopora armeniensis* Shishova, 1965. Middle Permian (Guadalupian), Transcaucasia.

Ogbinopora orientalis Gorjunova, 1975
(Fig. 3A-D; Table 7)

Ogbinopora orientalis Gorjunova, 1975: 67, pl. 11, fig. 2a, b.

HOLOTYPE. — No. 2351/478, PIN; Central Pamir; Upper Permian.

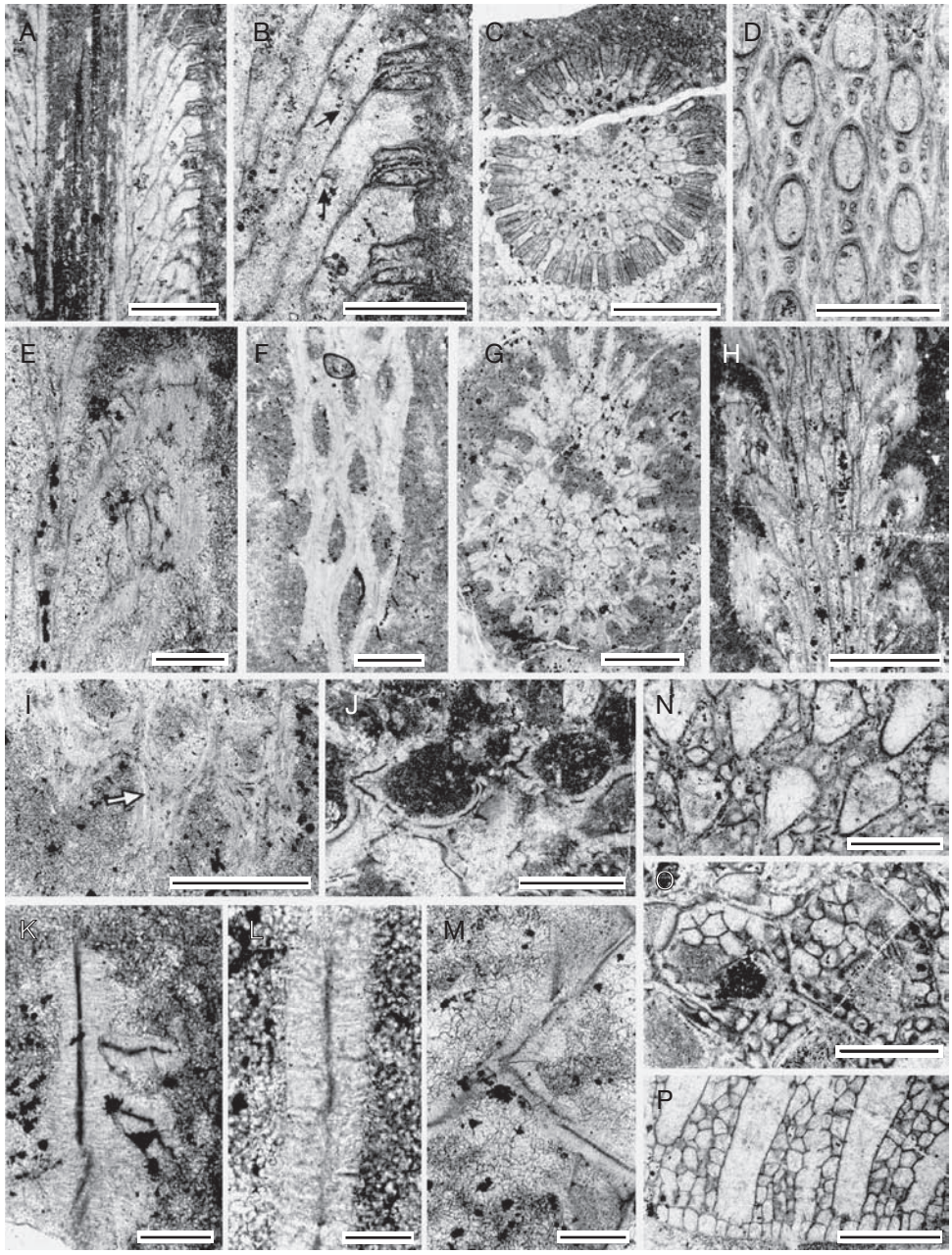

FIG. 3. — **A-D**, *Ogbinopora orientalis* Gorjunova, 1975; **A**, **B**, 5-6-3, longitudinal section (arrow in B: hemisepta); **C**, 5-9-3, cross section; **D**, 5-6, tangential section; **E-I**, *Ascopora gracilis* n. sp.; **E**, paratype 23-6-7, longitudinal section; **F**, 23-6-5, tangential section; **G**, 23-6-8, cross section; **H**, 23-6-7, longitudinal section; **I**, holotype SMF 2112, oblique tangential section (arrow: acanthostyle); **J-M**, Fistuliporidae indet. (?*Eridopora*); **J**, 4-8-11, tangential section; **K**, 19-4-10, longitudinal section showing hemisepta; **L**, 19-4-10, longitudinal section showing wall structure; **M**, 19-4-10, tangential section showing lunarium; **N-P**, *Eridopora oculata* Bassler, 1929; **N**, 11-1, tangential section; **O**, 16-1-7, tangential section showing hexagons around apertures; **P**, 16-1-7, longitudinal section. Scale bars: A, 1 mm; B, D, G, H, J, N-P, 0.5 mm; C, 2 mm; E, K, M, 0.1 mm; F, I, 0.25 mm; L, 0.05 mm.

MATERIAL EXAMINED. — 2-1, 4-4, 4-12, 5-5, 5-6-(1-3), 5-7, 5-9, 5-10, 19-4, 21-2, 23-8, 24-1, 24-2, 24-5, 25-6.

OCCURRENCE. — Central Pamir, Upper Permian. Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Ramose colonies with a bundle of axial zooecia in the endozone. Branches 2.20-3.67 mm in diameter, with well defined 0.55-1.11 mm wide exozones. Axial bundle in the endozone consisting of 11 to 14 rows of zooecia, having diameters of 0.78-1.56 mm. Axial zooecia polygonal in cross section. Autozooecia long, budding along to the axial bundle, in the exozone bending outwards and intersecting the surface at angles of 90°. The angle between the back wall of the autozooecia and the axial bundle reaches 24-28° (25.67° averagely). Autozooecial apertures oval, arranged in regular rows, spaced 4-5 in 2 mm along branches, and 6.0-7.5 in 2 mm diagonally. Metazooecia circular and oval, 5-8 arranged between the apertures. Basal diaphragms rarely occur. Both superior and inferior hemisepta present, well developed, positioned in the distal part of autozooecia. Extensive secondary overgrowth occurring.

COMPARISON

This bryozoan is common in the Jamal Formation. It is similar to *Ogbinopora orientalis* described on three specimens from the Upper Permian of Central Pamir. Gorjunova (1975) mentioned that neither diaphragms nor hemisepta in this species occur. However, she pictured two oblique sections, in which some short inferior hemisepta can be observed (Gorjunova 1975: pl. 11, fig. 2a, b). *Ogbinopora orientalis* differs from *O. armeniensis* Shishova, 1965 by thinner colonies (2.00-3.67 vs. 3.50-5.50 mm in *O. armeniensis*), smaller apertures (0.07-0.13 vs. 0.10-0.15 mm in *O. armeniensis*), and in character of hemisepta. *O. armeniensis* possesses only a single superior hemisepta positioned in the part of the autozooecium transitional between endozone and exozone.

Genus *Ascopora* Trautschold, 1874

TYPE SPECIES. — *Millepora rhombifera* Phillips, 1836. Lower Carboniferous, Yorkshire (England). Alternative type species has been proposed by Wyse Jackson (1993): *Ceriopora nodosa* Fischer von Waldheim, 1837, Carboniferous, Russia.

Ascopora gracilis n. sp.
(Fig. 3E-I; Table 8)

HOLOTYPE. — SMF 2112.

ETYMOLOGY. — The species name derives from Latin "*gracilis*": slender, and refers to the small diameter of the colony.

PARATYPE. — 23-6-7.

TYPE LOCALITY. — Lakaftari, central Iran.

TYPE LEVEL. — Jamal Formation, Middle Permian.

MATERIAL EXAMINED. — 23-3-2, 23-6, 23-6-5, 23-6-8.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DIAGNOSIS. — Delicate ramose colony with a wide axial bundle, abundant hemiphragms, and small acanthostyles.

DESCRIPTION

Ramose branching colonies, 1.08-1.35 mm in diameter. Exozone 0.18-0.25 mm wide. Autozooecia with long proximal parts, building distinct axial bundle in the endozone, arranged there in 8 to 11 rows, having polygonal shape in cross section, bending abruptly outwards in the exozone. Axial bundle 0.45-0.84 mm in diameter. Autozooecial apertures lens-shaped, arranged in regular rows, spaced 5 per 2 mm of the colony length. Hemiphragms (?multiple hemisepta) common, long, occurring 3-5 in each aperture, positioned on the proximal wall of the autozooecia, slightly curved proximally. Single acanthostyle positioned between apertures, 0.02-0.03 mm in diameter, restricted to the laminated wall in the exozone. Rare metazooecia rounded in their cross section, 0.02-0.08 mm in diameter. Zooecial walls thin in the endozone; laminated, regularly thickened in the exozone.

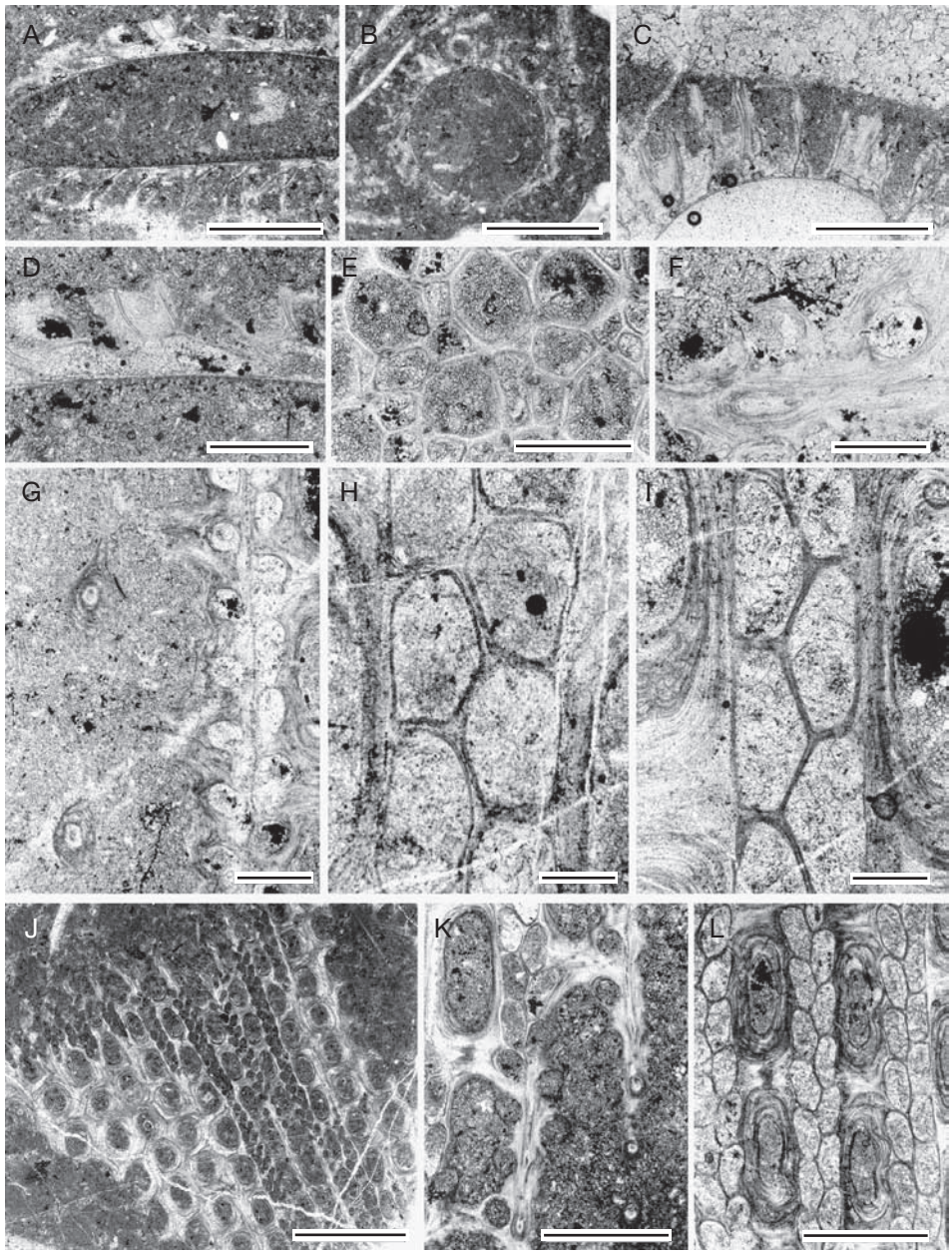

FIG. 4. — **A**-**E**, *Dyscritella leptosa* n. sp.; **A**, SMF 2111, holotype, longitudinal section through the cylindrical colony; **B**, paratype 23-6-10, cross section through the cylindrical colony; **C**, paratype 23-6-10, cross section through the encrusting colony; **D**, holotype 17-1-4, longitudinal section through the cylindrical colony; **E**, holotype 17-1-4, tangential section; **F**-**H**, **J**, *Rectifenestella crassinodata* n. sp.; **F**, SMF 2113, holotype, tangential section displaying apertures with apertural nodes; **G**, SMF 2113, holotype, tangential section displaying apertures and carinal nodes; **H**, 1-5-2, deep tangential section displaying autozooecia; **J**, 23-1-1, tangential section; **I**, **K**, **L**, *Rectifenestella araxensis* (Nikiforova, 1933) n. comb.; **I**, 1-4-3, deep tangential section displaying autozooecia; **K**, 17-1-6, tangential section displaying apertures and carinal nodes; **L**, 1-4-1, deep tangential section. Scale bars: A, C, K, L, 0.5 mm; B, 1 mm; D, F, 0.2 mm; E, H, I, 0.1 mm; G, 0.25 mm; J, 2 mm

COMPARISON

Ascopora gracilis n. sp. is similar to *A. attenuata* Trizna, 1950 from the Lower Permian (Artinskian) of Bashkiria (Russia). The new species has thinner branches (1.08-1.35 vs. 1.37-1.65 mm in *A. attenuata*), as well as smaller acanthostyles (0.02-0.03 vs. 0.08-0.1 mm in *A. attenuata*). The new species is also similar to *Ascopora asiatica* Sakagami, 1968 from the Lower Permian (Artinskian?) of Peninsular Thailand. The latter one has thicker branches (2.2-3.0 vs. 1.08-1.35 mm in the new species), larger apertures and single superior hemiseptum instead of hemiphragms.

Order FENESTRIDA Astrova & Morozova, 1956
Suborder FENESTELLINA Astrova & Morozova, 1956
Family FENESTELLIDAE King, 1849
Subfamily FENESTELLINAE King, 1849

Genus *Rectifenestella* Morozova, 1974

TYPE SPECIES. — *Fenestella medvedkensis* Shulga-Nesterenko, 1951. Upper Carboniferous, Russian Platform (Russia).

Rectifenestella crassinodata n. sp.
(Fig. 4F-H, J; Table 9)

HOLOTYPE. — SMF 2113.

ETYMOLOGY. — The species name is a combination of Latin words "*crassus*" (thick) and "*nodus*" (node), referring to its prominent nodes.

PARATYPES. — 1-5-2, 23-1-1.

TYPE LOCALITY. — Lakaftari, central Iran.

TYPE LEVEL. — Jamal Formation, Middle Permian.

ADDITIONAL MATERIAL EXAMINED. — 1-8, 2-2, 4-15, 7-9, 9-4-4, 23-8.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DIAGNOSIS. — Moderately robust reticulated colony with large and widely spaced keel nodes.

DESCRIPTION

Micrometric formula: 13-22/10-16//16-27. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in two alternating rows on branches, becoming three in the place of bifurcation. Apertures circular, usually spaced 2 per length of a fenestrule, containing eight small nodes in peristome shaping it as regular octagons. Shape of fenestrules varying from oval to slightly rectangular. Keel high, carrying single row of large and widely spaced nodes. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton thick; no microacanthostyles or striations observed; concave part of the reverse surface forming regular hexagons.

INTERIOR DESCRIPTION

Autozooecia pentagonal in the middle tangential section, 0.09-0.13 mm deep (0.11 mm averagely), and 0.19-0.21 mm long (0.20 mm averagely), with well developed, 0.08-0.10 mm long vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON

Rectifenestella crassinodata n. sp. is similar to *R. totshanensis* (Morozova, 1970) from the Middle Permian (Guadalupian) of SE Mongolia and China, differing in larger and more widely spaced nodes on keel. *R. zavodovskyi* (Nekhoroshev, 1959) from the Upper Permian of the Northern Ural is also similar, having large nodes, but it has thicker branches – 0.45-0.55 vs. 0.28-0.44 mm in present material. *R. pentagonalis* (Shulga-Nesterenko, 1936) from the Lower Permian of the Northern Urals is similar but differs in having smaller and more closely spaced nodes on keel.

Rectifenestella araxensis
(Nikiforova, 1933) n. comb.
(Figs 4I, K, L; 5A-E; Table 10)

Fenestella araxensis Nikiforova, 1933: 15, pl. 6, fig. 6. — Morozova 1970a: 172, 173, pl. 35, fig. 1.

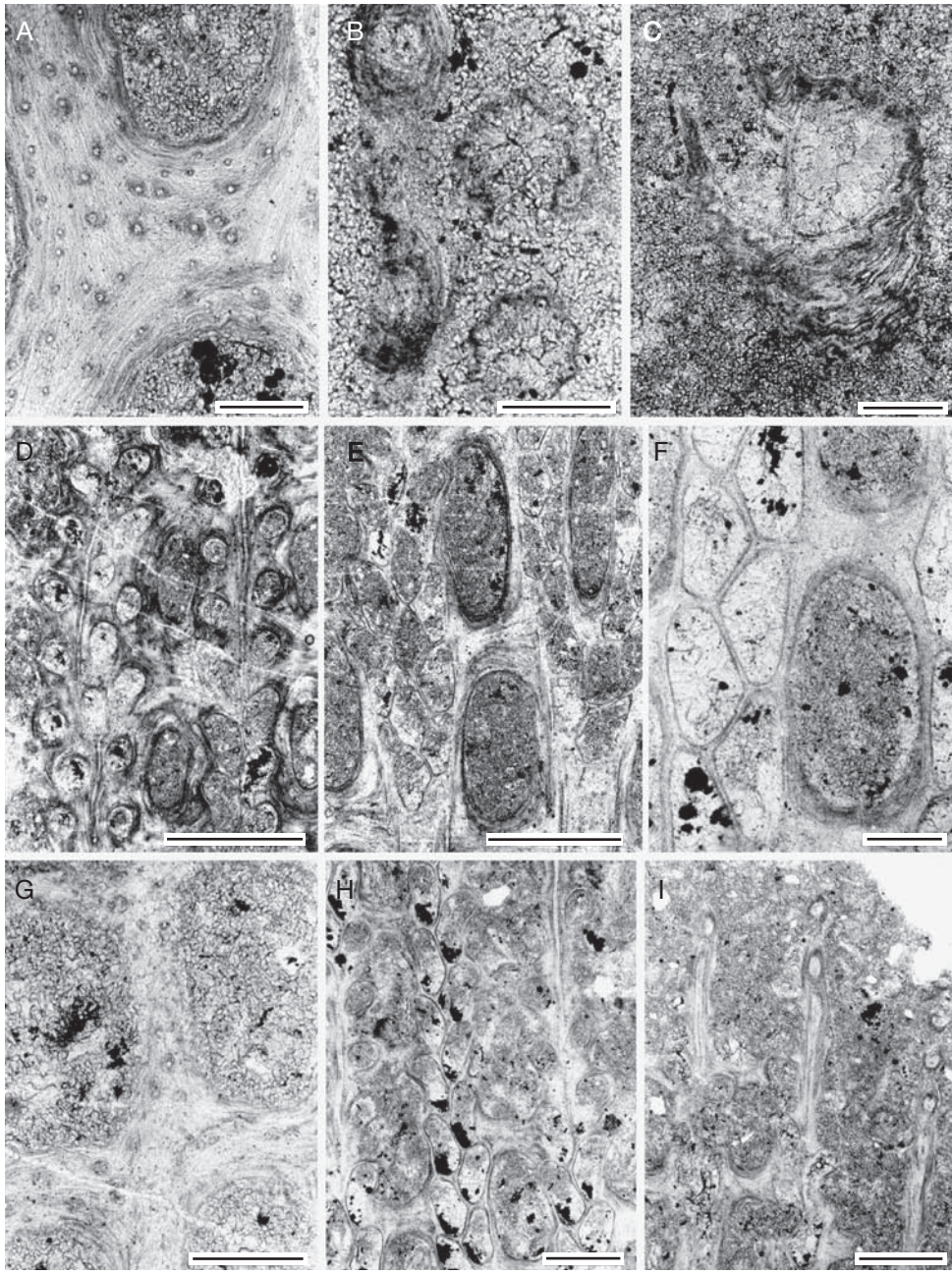

FIG. 5. — **A**-**E**, *Rectifenestella araxensis* (Nikiforova, 1933) n. comb.; **A**, 7-1-1, thin section of reverse surface showing abundant microacanthostyles; **B**, 17-1-6, tangential section showing apertures with apertural nodes and carinal nodes; **C**, 9-5-7, cross section of the branch showing autozooecial chambers; **D**, 1-4-3, tangential section of the branch with three rows of autozooecia; **E**, 1-4-1, deep tangential section of the branch with three rows of autozooecia and dichotoming branch; **F**-**I**, *Rectifenestella microretiformis* (Morozova, 1970) n. comb.; **F**, 23-1-2, deep tangential section; **G**, 7-2, thin section of the reverse surface showing abundant microacanthostyles; **H**, 10-1-6, tangential section; **I**, 7-2-3, tangential section. Scale bars: A-C, F, 0.1 mm; D, E, 0.5 mm; G, 0.2 mm; H, I, 0.25 mm.

LECTOTYPE. — Central Museum of Geological Prospecting, Saint Petersburg, Russia. Thin section No. 31, pictured in Nikiforova 1933: pl. 6, fig. 6 (designated by Morozova 1970a: 172). River Arax, Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

MATERIAL EXAMINED. — 1-5-3, 2-3-4, 4-1, 4-14, 7-1-1, 7-2, 9-3, 9-5, 9-6-3, 11-2, 17-1, 20-1-1, 20-1-3, 23-1-3, 23-3-3, 23-8-4, 24-1-1, 24-3-2, 25-10, 26-2.

OCCURRENCE. — Transcaucasia (Nakhichevan), Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 20-28/13-19//20.5-26.5. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches, becoming 3 in places of bifurcation and occasionally between bifurcation areas at short distances. Apertures circular, spaced 2 per length of a fenestrule, containing 8 small nodes in the peristome shaping it as a regular octagon. Shape of fenestrules varying from oval to slightly rectangular. Keel low, carrying single row of moderately large and closely spaced nodes. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant and closely spaced microacanthostyles 015-20 µm in diameter. Microacanthostyles having distinct hyaline cores and dark sheaths.

INTERIOR DESCRIPTION

Autozooecia pentagonal in the middle tangential section, rhombic in the middle row, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON

Rectifenestella araxensis n. comb. differs from *R. crassinodata* n. sp. in having smaller and more closely spaced nodes of the keel, presence of microacanthostyles on the reverse colony surface, and smaller autozooecial apertures. *R. microretiformis* n. comb. has thinner and more closely spaced branches. *R. araxensis* n. comb. is similar to *R. accurata* (Trizna, 1950) differing from it in having thicker branches (0.26-0.34 vs. 0.20-0.25 mm in *R. accurata*).

REMARK

Fenestella araxensis is placed in the genus *Rectifenestella* because of its pentagonally shaped autozooecial chambers in the middle tangential section and presence of singular row of nodes on the keel (Morozova 1974: 61).

Rectifenestella microretiformis (Morozova, 1970) n. comb.
(Fig. 5F-I; Table 11)

Fenestella microretiformis Morozova, 1970a: 166-168, pl. 32, fig. 5a, b, text-figs 35, 36. — Xia 1986: 220, 221, pl. 7, fig. 6; 1991: 175, pl. 1, fig. 7.

HOLOTYPE. — No. 1692/182, PIN; Arkhangelsk region (Russia); Middle Permian (lower Kazanian).

MATERIAL EXAMINED. — 1-6-1, 4-5-5, 5-9, 7-2, 10-1, 10-2, 22-1-3, 23-1-2, 25-5-1, 25-8.

OCCURRENCE. — Xizang, Southern China; Upper Xarla Formation, Lower Permian and Chanaha Formation (Chihsan-Maokauan Stages), Middle Permian (Xia 1986, 1991). Russian Platform; lower Kazanian, Middle Permian. Khabarovsk region; Chandalazki Horizon (= *Metadoliolina* zone), ?Murgabian-Midian, Middle Permian. Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 22.5-31.5/18-25//22-26.5. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches, becoming 3 in the place of bifurcation. Apertures circular, spaced 2-2.5 per length of a fenestrule, containing 8 small nodes in the peristome shaping it as regular octagons. Shape of fenestrules varying from oval to slightly rectangular. Keel low, carrying single row of moderately large and closely spaced nodes. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, microacanthostyles, peristome and across dissepiments. Outer lamellar skeleton moderately thick. Abundant microacanthostyles on the reverse surface, having distinct cores and wide laminated sheaths, 15-25 µm in diameter.

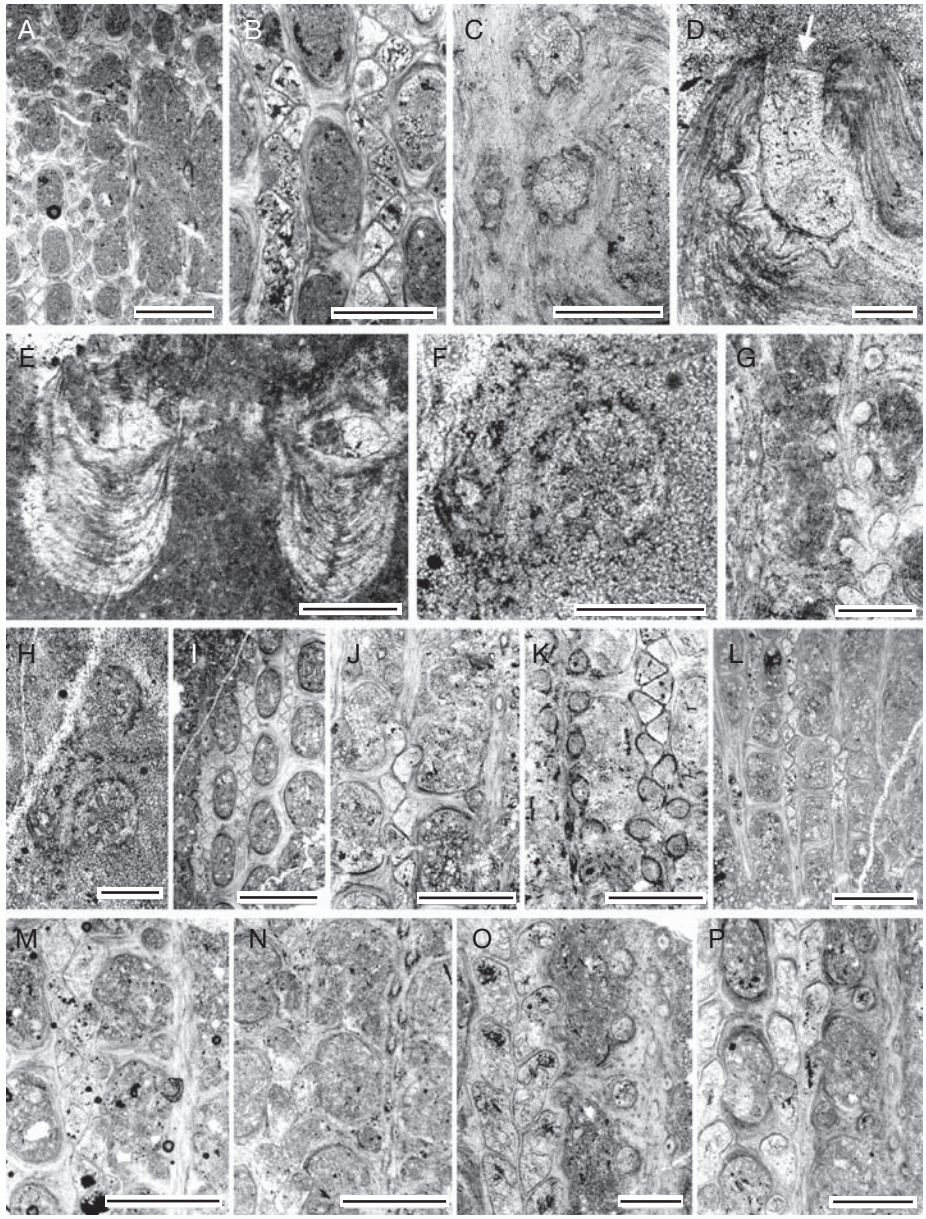

FIG. 6. — **A**-**E**, *Spinofenestella* sp. 1; **A**, **B**, 17-1-1, tangential section; **C**, 23-3-1, tangential section showing apertures with apertural nodes; **D**, 9-5-7, cross section showing the autozooecial chamber with terminal diaphragm (arrow: terminal diaphragm); **E**, 9-5-10, cross section showing the autozooecial chamber and extensive depositions of outer laminated skeleton; **F**-**I**, *Spinofenestella* sp. 2; **F**, 9-7, tangential section showing the autozooecial apertures with septa and nodes; **G**, 9-5-8, tangential section showing the autozooecial apertures and carinal nodes; **H**, 9-7, tangential section showing the autozooecial apertures with septa and nodes; **I**, 7-3-5, tangential section; **J**-**L**, *Alternifenestella sayensis* Termier & Termier, 1971; **J**, 13-4-1, tangential section showing the autozooecial apertures and carinal nodes; **K**, 5-8-1, tangential section showing the autozooecial apertures and autozooecial chambers; **L**, 13-4-1, tangential section; **M**, **N**, *Minilya perelegans* (Waagen & Pichl, 1885); **M**, 25-3-5, tangential section; **N**, 4-7-3, tangential section; **O**, **P**, *Fabifenestella jabiensis* (Waagen & Pichl, 1885), 25-10-5, tangential section. Scale bars: A, 1 mm; B, I-N, P, 0.5 mm; C, 0.2 mm; D, F, H, 0.1 mm; E, G, O, 0.25 mm.

INTERIOR DESCRIPTION
Autozooecia pentagonal in the middle tangential section; low and elongated, with well developed vestibule in longitudinal section; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON
Rectifenestella microretiformis n. comb. differs from *R. permulta* (Morozova, 1970) (Morozova 1970a) in having thinner branches and smaller fenestrules. This species differs also from *R. araxensis* n. comb. in having thinner branches (0.25 vs. 0.30 mm averagely in *R. araxensis* n. comb.) and smaller fenestrules (fenestrule length 0.36 vs. 0.45 mm; fenestrule width 0.18 vs. 0.21 mm in *R. araxensis* n. comb.).

REMARK
Fenestella microretiformis is placed in the genus *Rectifenestella* because of its pentagonally shaped autozooecial chambers in the middle tangential section and presence of singular row of nodes on the keel (Morozova 1974: 61).

Genus *Spinofenestella* Termier & Termier, 1971

TYPE SPECIES. — *Fenestella spinulosa* Condra, 1902. Lower Permian, Nebraska (USA).

Spinofenestella sp. 1
(Fig. 6A-E; Table 12)

MATERIAL EXAMINED. — 4-15, 5-12-1, 7-4, 9-1-2, 9-4, 9-5-8, 9-5-10, 17-1, 23-3-1.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 15-20/13-16//19-26. Reticulated colonies with straight or slightly undulating branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches. Apertures circular, containing 12-13 small nodes and 8 septa in the peristome, spaced 2 per length of a fenestrule. Shape of fenestrules varying from oval to slightly rectangular. Keel low, carrying single row of large and widely spaced nodes. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton sometimes extremely thick. Microacanthostyles abundant on the obverse surface; usually absent on reverse side, having distinct narrow hyaline cores and wide laminated sheaths, 10-30 µm in diameter.

INTERIOR DESCRIPTION
Autozooecia triangular in a middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent. Apertures often closed by terminal diaphragms.

COMPARISON
The present material is similar to *Fenestella otae* Sakagami, 1964 from the Lower Permian of Japan (*Parafusulina kaerimizensis*-zone). *Spinofenestella* sp. 1 differs in having thicker branches (0.31-0.47 vs. 0.23-0.32 mm in *F. otae*), and thinner dissepiments (0.20-0.30 vs. 0.228-0.368 mm in *F. otae*). It is also similar to *Spinofenestella popovi* (Nekhoroshev, 1959) from the Upper Permian of the Northern Urals (Morozova 1981). The two species differ in fenestrule length (0.80-0.90 mm in *S. popovi* vs. 0.42-0.58 mm in *Spinofenestella* sp. 1).

REMARK
Both species of *Spinofenestella* described here contain eight regular septa in their apertures. These septa are similar to those described by Engel (1975) for his new family Septatoporidae including the single genus *Septatopora*. However, similar structures occur in many fenestrate bryozoans, but are often destroyed by weathering. Furthermore, species placed by Engel (1975) in his family reveal different internal morphologies.

Spinofenestella sp. 2
(Fig. 6F-I; Table 13)

MATERIAL EXAMINED. — 7-3-5, 7-3-6, 9-5-1, 9-7, 12-1, 12-2-3, 19-2-1, 23-8, 25-7-1.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 18-21/11-14//22-25. Reticulated colonies with straight or slightly undulating branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches. Apertures circular, spaced 2-3 per length of a fenestrule, containing 12-13 small nodes and 8 septa in the peristome. Keel low, carrying single row of moderately large and closely spaced nodes. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton moderately thick. Microacanthostyles abundant on the obverse surface; scarcely to abundant on reverse side, 10-25 µm in diameter, having distinct hyaline cores and thin laminated sheaths.

INTERIOR DESCRIPTION
Autozooecia triangular in the middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON
The present material is similar to *Spinofenestella subspecifica* (Shulga-Nesterenko, 1952) from the Lower Permian of the Russian Platform. The latter species has longer fenestrules (0.80-0.90 vs. 0.46-0.69 mm in *Spinofenestella* sp. 2).

Genus *Alternifenestella* Termier & Termier, 1971

TYPE SPECIES. — *Fenestella minor* Nikiforova, 1933. Middle Carboniferous, Donetz Basin (Ukraine).

Alternifenestella sayensis Termier & Termier, 1971 (Fig. 6J-L; Table 14)

Alternifenestella sayensis Termier & Termier, 1971: 42, pl. 29, fig. 7.

MATERIAL EXAMINED. — 4-2, 4-15-9, 5-8-1, 13-4-1.

OCCURRENCE. — Afghanistan, Middle Permian (Murgabian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 20-25/13-18//22-23. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches, having circular apertures with smooth peristomes, spaced 2-3 per length of a fenestrule. Shape of fenestrules varying from oval to rectangular with rounded corners. Keel low, carrying singular row of small nodes. Internal granular skeleton thin, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton thin. Abundant microacanthostyles occurring on the reverse colony surface, 10-15 µm in diameter.

INTERIOR DESCRIPTION
Autozooecia triangular in the middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON
Alternifenestella sayensis is similar to *A. subconstans* (Yang & Lu, 1962) from the Upper Permian of China and Guadalupian Gnishik Horizon of Transcaucasia (Morozova 1970a), but differs from the latter in having thicker branches (0.26-0.35 vs. 0.20-0.22 mm in *A. subconstans*), as well as smaller fenestrules.

Genus *Minilya* Crockford, 1944

TYPE SPECIES. — *Minilya dupliaris* Crokford, 1944. Lower Permian, Western Australia.

Minilya perelegans (Waagen & Pichl, 1885) (Fig. 6M, N; Table 15)

Fenestella perelegans Waagen & Pichl, 1885: 777, 778, pl. 87, figs 1-3. — Fantini Sestini 1965: 28, 29, pl. 2, fig. 1. — Yang *et al.* 1981: 89, pl. 2, fig. 7.

Non Meek, 1872: 153, pl. 7, fig. 3-3d.

Minilya perelegans – Crockford 1944a: 173.

MATERIAL EXAMINED. — 4-1, 4-5-2, 4-6-3, 4-8, 5-1-1, 5-6-3, 5-8-5, 12-1, 16-1, 19-4, 24-1-2, 25-3-5, 25-7.

OCCURRENCE. — Salt Range: Pakistan, Middle Permian (Guadalupian) (Waagen & Pichl 1885). Xizang: Tibet, China, Lower Permian. Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 21-26/17-21//17-21. Reticulated colonies with straight branches, joined by thin dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches. Apertures circular having high peristomes with small nodes, spaced 1-2 per length of a fenestrule. Shape of fenestrules varying from oval to rectangular with rounded corners. Keel low, carrying two alternating rows of small closely spaced nodes. Internal granular skeleton thin, continuous with obverse keel, nodes, peristome and across dissepiments. Outer lamellar skeleton thin. Abundant microacanthostyles on the reverse surface, having distinct hyaline cores and dark laminated sheaths, 10-25 µm in diameter.

INTERIOR DESCRIPTION

Autozooecia triangular in the middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta short; inferior hemisepta absent.

COMPARISON

Minilya perelegans is similar to *M. paratuberculifera* (Yang & Lu, 1962) from the Upper Permian of China and Khabarovsk region (Russia) (Morozova 1970a), differing from it in having thicker branches (0.24-0.35 vs. 0.22-0.24 mm in *M. paratuberculifera*). Another similar species is *M. shurae* (Morozova, 1970) from the Middle Permian (Kazanian) of the Russian Platform, which differs from *M. perelegans* in having smaller fenestrules.

REMARK

Waagen & Pichl (1885) referred this bryozoan to the species *Fenestella perelegans* Meek, 1872 (Meek 1872: 153, pl. 7, fig. 3-3d) from the Upper Carboniferous of Nebraska (see also Fantini Sestini 1965: 28, 29, who placed it into *Fenestrellina*). Crockford (1944a: 173) included the species *Fenestella perelegans* Waagen & Pichl, 1885 (not Meek, 1872) in her new genus *Minilya*. She recognized that these are different species (and genera), with the occurrence in the Upper Carboniferous of Nebraska (Meek 1872) and in the Middle Permian of Salt Range (Waagen & Pichl 1885). We support this conclusion and use the name "*Minilya perelegans*" for the species established by Waagen & Pichl (1885). The species of Meek (1872) should keep its specific name but change the generic assignment.

Genus *Fabifenestella* Morozova, 1974

TYPE SPECIES. — *Fenestella praevirgosa* Shulga-Nesterenko, 1951. Upper Carboniferous, Russian Platform.

Fabifenestella jabiensis (Waagen & Pichl, 1885) (Figs 6O, P; 7A-C; Table 16)

Fenestella jabiensis Waagen & Pichl, 1885: 778-780, pl. 87, fig. 4, pl. 88, figs 1, 2. — Sakagami 1970?: 54, 55, pl. 9, figs 4, 5.

Fabifenestella jabiensis – Morozova 2001: 53.

MATERIAL EXAMINED. — 4-4-1, 4-15, 4-16, 4-18, 5-2, 5-8-4, 7-3-1, 7-6, 10-1, 10-2(a), 25-5, 25-8, 25-10, 25-11, 25-12.

OCCURRENCE. — Salt Range: Pakistan, Middle Permian (Guadalupian) (Waagen & Pichl 1885). Lakaftari: central Iran, Jamal Formation, Middle Permian. Peninsular Thailand, Lower Permian (Artinskian) (Sakagami 1970).

DESCRIPTION

Micrometric formula: 13-19/7-12//17-21. Reticulated colonies with straight branches, joined by relatively thick dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches. Apertures circular, with 8 peristomal nodes, spaced 3-4 per length of a fenestrule. Shape of fenestrules varying from oval to slightly rectangular. Keel low, carrying two alternating rows of small nodes. Some colonies containing larger nodes

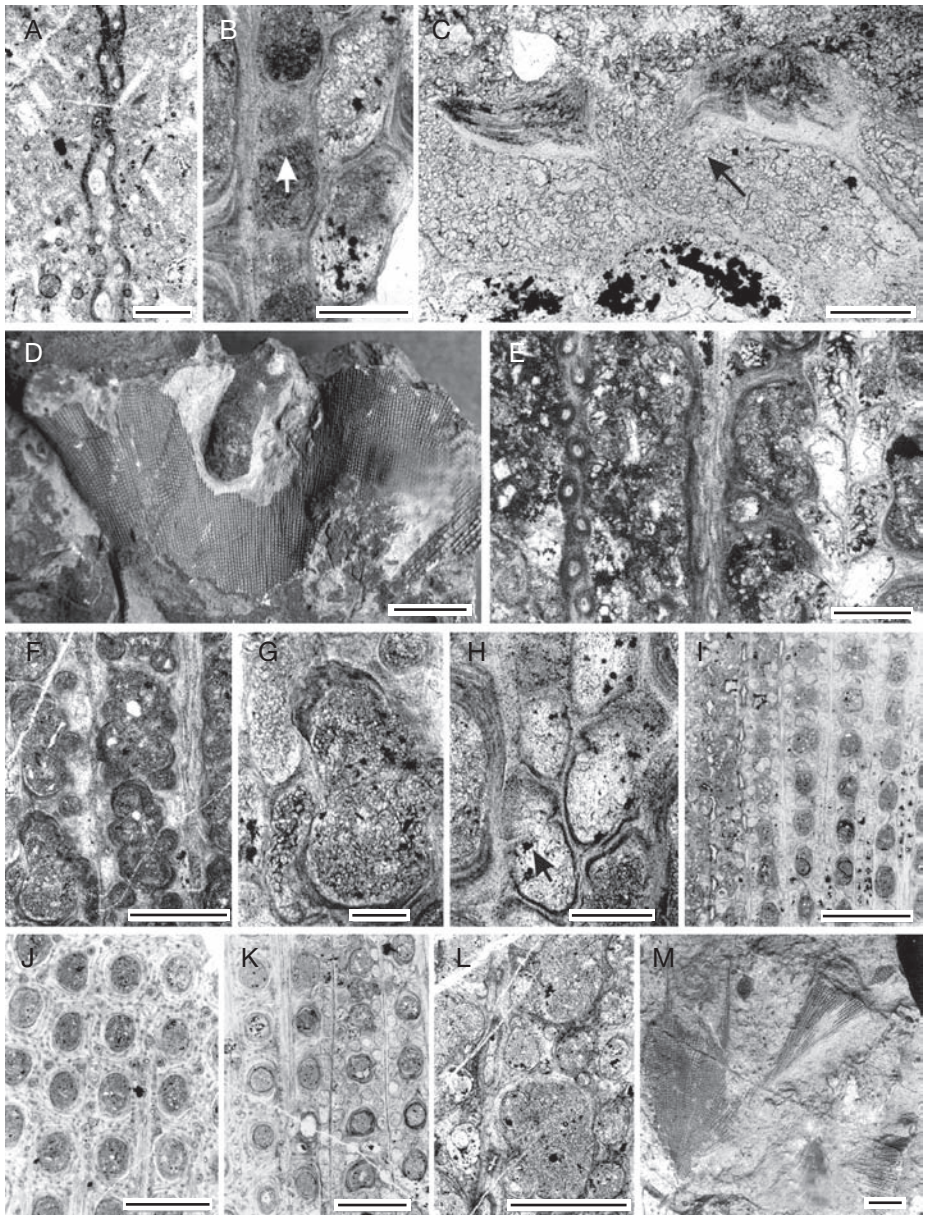

FIG. 7. — **A**-**C**, *Fabifenestella jabiensis* (Waagen & Pichl, 1885); **A**, 10-1-2, tangential section of the keel showing nodes of different sizes; **B**, 4-15-3, deep tangential section showing bases of autozooecial chambers with inferior hemisepta (arrow: hemisepta); **C**, 4-15-2, deep oblique tangential section showing autozooecial chambers with long superior hemisepta; **D**-**H**, *Fabifenestella vediensis* (Morozova, 1965) n. comb.; **D**, 6-1, fragment of the funnel-shaped colony; **E**, 12-2-2, tangential section; **F**, 7-3-7, tangential section showing ovicells; **G**, 7-3-7, tangential section of the fenestrule with ovicell; **H**, 4-5-6, deep tangential section showing inferior hemisepta; **I**-**M**, *Septopora flabellata* Nikiforova, 1933; **I**, 20-2-5, tangential section showing carinal nods; **J**, 20-2-5, thin section of the reverse surface showing nods, microacanthostyles and cyclozooecia; **K**, 1-7-3, deep tangential section; **L**, 1-7-2, tangential section showing apertures, carinal nods and cyclozooecia; **M**, 4-12, fragment of the funnel-shaped colony. Scale bars: A, B, E, 0.25 mm; C, G, H, 0.1 mm; D, M, 10 mm; F, L, 0.5 mm, I-K, 1 mm.

between smaller ones. Internal granular skeleton thin, continuous with obverse keel, nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant microacanthostyles 5-15 µm in diameter, with distinct hyaline cores and very thin dark laminated cores. No heterozooecia observed.

INTERIOR DESCRIPTION

Autozooecia rectangular to bean-shaped in the middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta long; inferior hemisepta long, low, separating the proximal third of the chamber.

COMPARISON

Fabifenestella jabiensis differs from *F. vediensis* n. comb. in having thicker branches, and larger fenestrules. Sakagami (1970) described a specimen from Artinskian of Peninsular Thailand, which he placed in *Fabifenestella jabiensis*. However, it has much thicker branches (0.52-0.60 vs. 0.30-0.48 mm in present material), although revealing close morphological similarity to the material described in present paper. Waagen & Pichl (1885) did not give any detailed measurements for *F. jabiensis* as well as no scale for the plates. Unfortunately, the deposition of the type material for this species is also unknown.

REMARK

Morozova (2001) mentioned two species under different generic names: *Minilya jabiensis* and *Fabifenestella jabiensis*. They correspond to the same species, *Fabifenestella jabiensis*.

Fabifenestella vediensis
(Morozova, 1965) n. comb.
(Fig. 7D-H; Table 17)

Fenestella vediensis Morozova, 1965: 190, pl. 27, fig. 2; 1970a: 174, 175, pl. 25, fig. 4.

HOLOTYPE. — No. 1613/155, PIN; River Vedi, Armenia, Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

MATERIAL EXAMINED. — 4-5-5, 4-5-6, 4-11, 4-12, 4-15, 6-1, 7-2, 7-3-7, 7-3-8, 7-5, 7-9, 10-2(b), 12-2-2, 21-1-1, 23-2, 24-1, 24-4, 25-2, 25-12.

OCCURRENCE. — Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 19.5-25/17.5-20//17.5-20.5. Reticulated funnel-shaped colonies up to 20 cm high, consisting of straight branches, joined by thin dissepiments. Bifurcation common. Autozooecia arranged in 2 alternating rows on branches. Apertures circular, spaced 2 per length of a fenestrule. Shape of fenestrules varying from oval to slightly rectangular, becoming irregular in places of projection of ovicells. Keel low, carrying two alternating rows of small regularly spaced nodes. Internal granular skeleton thin, continuous with obverse keel, nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter. Abundant microacanthostyles on the reverse surface, irregularly spaced, having distinct hyaline cores and dark laminated sheaths, 10-25 µm in diameter. Ovicells spherical chambers, attached at apertures and projecting in neighbouring fenestrules, 0.18 mm in diameter.

INTERIOR DESCRIPTION

Autozooecia rectangular to bean-shaped in the middle tangential section, low and elongated, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Superior hemisepta long; inferior hemisepta long, low, separating the proximal third of the chamber.

COMPARISON

Fabifenestella vediensis n. comb. is similar to *F. thaiensis* (Sakagami, 1966) from the Lower Permian of Peninsular Thailand. The latter one has thinner branches (0.29-0.32 vs. 0.24-0.41 mm in *F. vediensis* n. comb.), and longer fenestrules (0.56-0.72 vs. 0.34-0.48 in *F. vediensis* n. comb.).

REMARK
Fenestella vediensis is placed in the genus *Fabifenestella* because of its bean-shaped autozooecial chambers in the middle tangential section with both superior and inferior hemisepta, and presence of two rows of alternating nodes on the keel (Morozova 1974: 60).

Family SEPTOPORIDAE Morozova, 1962

Genus *Septopora* Prout, 1859

TYPE SPECIES. — *Septopora cestriensis* Prout, 1859. Lower Carboniferous, Illinois (USA).

Septopora flabellata Nikiforova, 1933
(Figs 7I-M; 8A-C; Table 18)

Septopora flabellata Nikiforova, 1933: 27, text-fig. 8. — Morozova 1970a: 197, 198, pl. 43, figs 3, 4, text-figs 10, 11. — Gorjunova 1975: 90, 91, pl. 22, fig. 2.

LECTOTYPE (designated by Morozova 1970a). — Central Museum of Geological Prospecting, Saint Petersburg, Russia. Thin section No. 62. Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

MATERIAL EXAMINED. — 1-1-(1-3), 1-3-(1-3), 1-7-(1-4), 2-(1-3), 3-1, 4-5-4, 4-5-7, 4-6-2, 4-6-4, 4-12-4, 4-15-(6-7), 5-3-1, 5-8-3, 7-1-2, 7-3-(3-4), 7-5-(5-6), 8-1-(1-3), 9-4-2, 9-4-3, 9-4-7, 9-5-2, 9-6-2, 9-6-4, 9-7-1, 10-2-8, 11-2-2, 12-1-(7-8), 13-4-4, 19-4-4, 19-4-7, 20-1-4, 20-2-(1-6), 22-1-1, 23-6-2, 23-6-3, 23-6-9, 24-5-8, 25-1-1, 25-4-2, 25-9-2, 25-9-3, 25-13, 26-1-2.

OCCURRENCE. — Transcaucasia (Nakhichevan), Gnishik Horizon, Middle Permian, Murgabian (= Wordian) (Morozova 1970a). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 11-16/11-14//16-20. Slender funnel-shaped, reticulated colonies with straight branches, joined by dissepiments; up to 30 cm high. New branches appearing by development of dissepiments to new branches or by bifurcation of branches. Autozooecia arranged in two alternating rows on branches and dissepiments, open on inside of the colony. Apertures circular to slightly oval, with low and thin peristomes bearing few small nodes, usually spaced 2 per length of a fenestrule. Shape of fenestrules varying from oval, narrow oval to rectangular and V-shaped. Obverse keel high with irregularly shaped elongated and prominent nodes. Nodes long, irregularly shaped, often having stellate shape, widening in the upper part. Smaller nodes of similar shape distributed on the reverse side, often arranged in 2-3 rows. Abundant microacanthostyles on the reverse surface of the colony arranged in regular rows. Internal granular skeleton thick, well developed, continuous with obverse keel, nodes, microacanthostyles, rods, peristome and across dissepiments. Outer lamellar skeleton sometimes extremely thick, containing small hyaline rods. Cyclozooecia abundant, spaced throughout the colony, often embedded by the outer lamellar skeleton.

INTERIOR DESCRIPTION
Autozooecia rectangular in the middle tangential section, relatively high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON
Septopora flabellata is similar to *S. flabellatiformis* Romantchuk *in* Morozova, 1970 (Morozova 1970a) from the Upper Permian (Osachtin Series) of the Khabarovsk region (Russian Far East). The latter species has considerably thicker branches (0.54-0.65 vs. 0.30-0.45 mm in *S. flabellata*).

Family ACANTHOCLADIIDAE Zittel, 1880
Subfamily DIPLOPORARIINAE Vine, 1883

Genus *Penniretepora* d'Orbigny, 1849

Acanthopora Young & Young, 1875: 327.

Pinnatopora Vine, 1883: 191.

TYPE SPECIES. — *Retepora pluma* Phillips, 1836. Lower Carboniferous, Yorkshire (England).

Penniretepora afghanica n. sp.
(Fig. 8D-F; Table 19)

Penniretepora sp. – Termier & Termier 1971: 47, pl. 32, figs 4, 5.

HOLOTYPE. — SMF 2114.

ETYMOLOGY. — The species name refers to its first description from the Upper Permian of Afghanistan (Termier & Termier 1971).

PARATYPE. — 4-15-11.

TYPE LOCALITY. — Lakaftari, central Iran.

TYPE LEVEL. — Jamal Formation, Middle Permian.

MATERIAL EXAMINED. — 4-8, 4-11-1, 10-2-11, 14-1.

OCCURRENCE. — Afghanistan; Middle Permian (Murgabian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Straight main branch with frequently diverging secondary branches. Main branches 0.3-0.42 mm wide, secondary branches 0.21-0.32 mm wide, spaced 4-5 on 5 mm distance. Apertures circular, arranged in two rows both on the main and secondary branches; 2-3 apertures on the space between the two neighboring secondary branches, spaced 14-16 on 5 mm distance along the branches. Keel low, undulating, developed both on the main branch and secondary branches. Low oval nodes on the keel, 0.05-0.07 mm wide, spaced 0.33-0.47 mm from each other. Reverse side of the colony ribbed. Small microstylets in the outer laminated skeleton.

INTERIOR DESCRIPTION
Autozooecia rectangular in the middle tangential section. Short superior hemiseptum present; inferior hemiseptum absent.

COMPARISON
The new species is morphologically similar to *Penniretepora waltheri* Korn, 1930 from Zechstein of Europe. The two species have similar autozooecial shape, differing in main branch thickness (0.30-0.56 vs. 0.30-0.42 mm in *P. afghanica* n. sp.), and the spacing of autozooecial apertures. *P. triporosa* Crockford, 1944 from the Lower Permian of Western Australia has similar colony dimensions (Crockford 1944b). However, the inner structure of this species is unknown, and it possesses widely spaced nodes on the main branches (nodes spacing is 0.80-1.60 vs. 0.33-0.47 mm in *P. afghanica* n. sp.).

Subfamily POLYPORINAE Vine, 1884

Genus *Mackinneyella* Morozova & Lisitsyn, 1996

TYPE SPECIES. — *Polypora ornamentata* Shulga-Nesterenko, 1941. Lower Permian, Southern Urals (Russia).

Mackinneyella praepluriformis
(Morozova, 1965)
(Fig. 8G-K; Table 20)

Polypora consanguinea Bassler, 1929: 79, 80, pl. 19, figs 5-10.

Polypora sp. ex. gr. *consanguinea* – Nikiforova 1933: 25, pl. 6, fig. 5.

Polypora praepluriformis Morozova, 1965: 194, pl. 28, fig. 2; 1970a: 218, pl. 50, figs 2, 3.

Mackinneyella praepluriformis – Morozova & Lisitsyn 1996: 45.

HOLOTYPE. — No. 1613/106, PIN; Transcaucasia; Gnishik Horizon, Middle Permian (Murgabian).

MATERIAL EXAMINED. — 4-5-3, 5-7, 7-2-1, 7-5, 23-2-2, 23-8, 24-5, 25-4-1, 25-10, 25-12-1.

OCCURRENCE. — Xainza, Northern Xizang, Southern China; Upper Xarla Formation, Lower Permian. Transcaucasia (Nakhichevan), Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 4.5-6.5/3-4//12-15. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 4-6 alternating rows on branches, becoming 7-9 in the place of bifurcation. Apertures

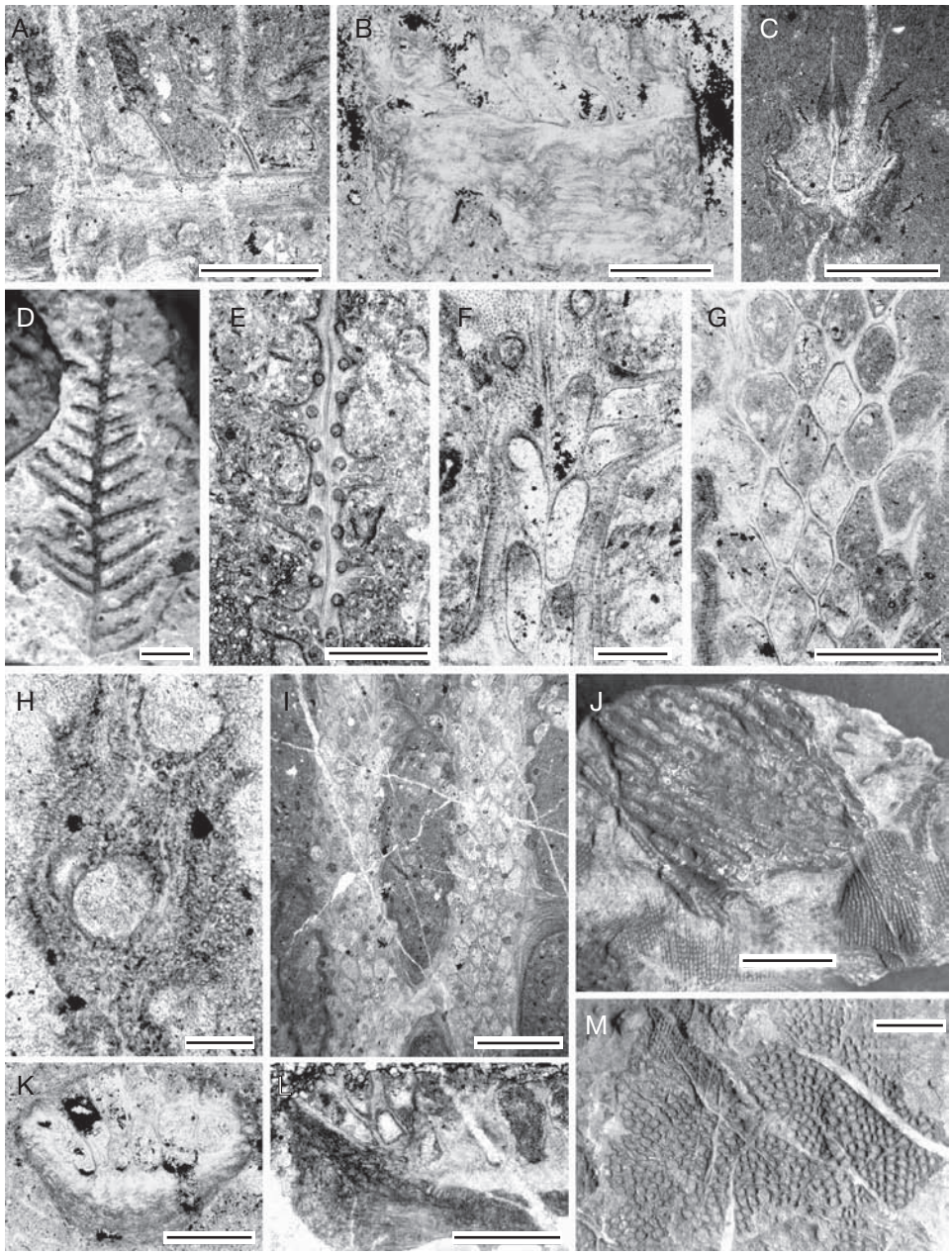

FIG. 8. — **A**-**C**, *Septopora flabellata* Nikiforova, 1933; **A**, 1-7-4, longitudinal section showing autozooecial chambers and cyclozooecia; **B**, 20-5-4, longitudinal section showing autozooecial chambers, cyclozooecia and the outer laminated skeleton with microacanthostyles; **C**, 1-3-1, cross section showing autozooecial chambers and cyclozooecia; **D**-**F**, *Penniretepora afghanica* n. sp.; **D**, paratype 14, free colony; **E**, 10-2-11, tangential section; **F**, holotype SMF 2114, tangential section; **G**-**K**, *Mackinneyella praepluriformis* (Morozova, 1965); **G**, 24-5-2, deep tangential section showing autozooecial chambers; **H**, 24-5-2, tangential section showing autozooecial apertures, nodes and hyaline rods; **I**, 25-12-1, tangential section; **J**, 16-1, fragment of the colony; **K**, 16-1-4, cross section of the branch; **L**, **M**, *Mackinneyella dzhulfensis* (Morozova, 1965); **L**, 13b, cross section of the branch; **M**, 13, fragment of the colony. Scale bas: A-C, G, K, L, 0.5 mm; D, 2 mm; E, 1 mm; F, 0.25 mm; H, 0.1 mm; I, J, M, 10 mm.

circular, spaced 5-8 per length of a fenestrule, surrounded by thin peristomes; usually 1-2 small nodes near the aperture. Shape of fenestrules varying from oval to slightly rectangular. Keels absent. Nodes small, regularly spaced on the obverse colony surface. Internal granular skeleton thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-10 µm in diameter.

INTERIOR DESCRIPTION

Autozooecia rhombic in the middle tangential section, high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON

Mackinneyella praepluriformis is similar to *M. robustiformis* from the Middle Permian (Gnishik Horizon, Guadalupian) of Transcaucasia. The two species differ in branch thickness (1.04 mm in *M. praepluriformis* vs. 0.75 mm in *M. robustiformis*), as well as in fenestrule dimensions which are larger in *M. praepluriformis*. Furthermore, *M. robustiformis* has abundant microacanthostyles on the reverse side and abundant nodes on the obverse side.

Mackinneyella dzhulfensis (Morozova, 1965)
(Figs 8L, M; 9A-C, E; Table 21)

Polypora dzhulfensis Morozova, 1965: 193, pl. 28, fig. 1; 1970a: 216, pl. 50, fig. 1, pl. 53, fig. 3.

Mackinneyella dzhulfensis – Morozova & Lisitsyn 1996: 45.

HOLOTYPE. — No. 1613/31, PIN; Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

MATERIAL EXAMINED. — 5-7-5, 12-2-3, 13a-b.

OCCURRENCE. — Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 7-8.5/5-7//13-16. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 5-6 alternating rows on branches, becoming 7-8 in the place of bifurcation. Apertures circular, arranged in regular alternating rows, spaced 4-5 per length of a fenestrule. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes small, regularly spaced on the obverse colony surface; usually 3-4 surrounding each aperture. Internal granular skeleton thick, well developed, continuous with rods, nodes, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-10 µm in diameter. Rods arranged in distinct longitudinal rows on the reverse side.

INTERIOR DESCRIPTION

Autozooecia rhombic to irregular hexagonal in the middle tangential section, irregularly shaped in the place of bifurcation; high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON

Mackinneyella dzhulfensis differs from *M. robustiformis* from the Middle Permian (Gnishik Horizon, Guadalupian) of Transcaucasia, in having smaller fenestrules, and different microstructure of the reverse side (regular rows of rods instead of microacanthostyles).

Mackinneyella robustiformis (Morozova, 1965)
(Fig. 9D, F-K; Table 22)

Polypora robustiformis Morozova, 1965: 195, pl. 28, fig. 4; 1970a: 220, 221, pl. 5, fig. 2, text-fig. 40. — Xia 1986: 228, pl. 10, fig. 1.

Mackinneyella robustiformis – Morozova & Lisitsyn 1996: 45.

HOLOTYPE. — No. 1613/199, PIN; Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian).

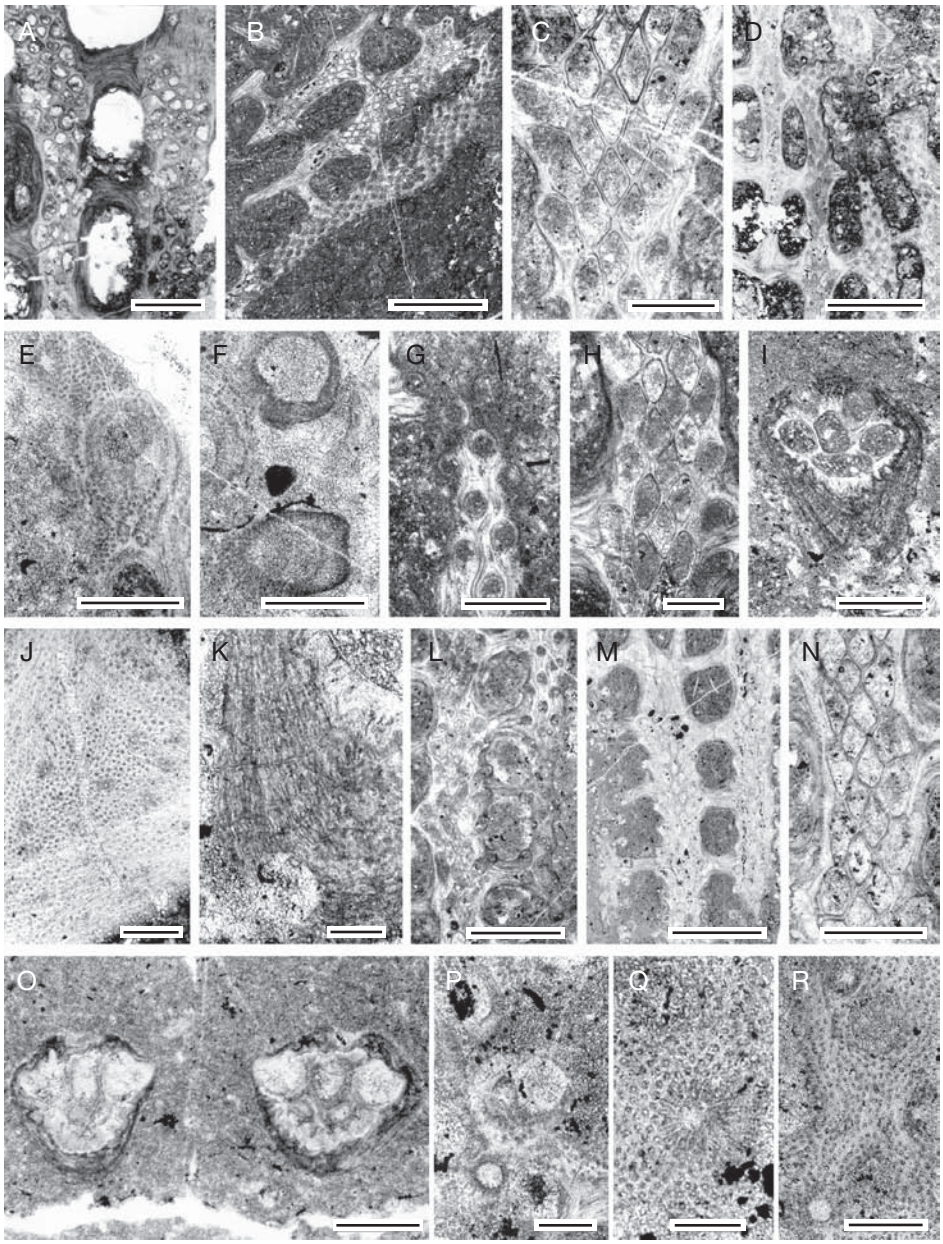

FIG. 9. — **A**-**C**, **E**, *Mackinneyella dzhulfensis* (Morozova, 1965); **A**, 13a, deep tangential section; **B**, 12-2-3, tangential section; **C**, 12-2-3, deep tangential section; **E**, 12-2-3, tangential section showing apertures and nodes; **D**, **F**-**K**, *Mackinneyella robustiformis* (Morozova, 1965); **D**, 4-18-2, deep tangential section; **F**, 4-18-2, tangential section showing apertures with apertural nodes; **G**, 4-18-2, tangential section of the branch; **H**, 4-18-2, deep tangential section showing autozooecial chambers; **I**, 19-4-10, cross section of the branch; **J**, 4-18-2, thin section showing reverse surface with microacanthostyles and hyaline rods; **K**, 19-4-10, cross section of the branch showing outer laminated skeleton with microacanthostyles; **L**-**R**, *Polypora soyanensis* Morozova, 1970; **L**, 23-6-3, tangential section; **M**, 18-1-6, tangential section; **N**, 1-8-2, tangential section; **O**, 18-1-6, cross section; **P**, 18-1-6, tangential section showing ovicell; **Q**, 23-6-3, tangential section showing radial structure of a node; **R**, 23-6-3, tangential section showing apertures and nodes. Scale bars: A, L, M, 1 mm; B, D, 2 mm; C, E, G-I, O, 0.25 mm; F, 0.2 mm; J, K, P-R, 0.1 mm; N, 0.5 mm.

MATERIAL EXAMINED. — 4-18-2, 20-1, 24-5.

OCCURRENCE. — Transcaucasia (Nakhichevan); Gnishik Horizon, Middle Permian, Murgabian (= Wordian). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 6-10/4-6.5//16-18.5. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 4-5 alternating rows on branches, becoming 7-8 in the place of bifurcation. Apertures circular, arranged in regular alternating rows, spaced 4-5 per length of a fenestrule. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes small, regularly spaced on the obverse colony surface. Internal granular skeleton thick, well developed, continuous with nodes, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant hyaline rods 5-10 µm in diameter. Microacanthostyles moderately abundant, having distinct hyaline cores and dark laminated sheaths, 10-15 µm in diameter.

INTERIOR DESCRIPTION

Autozooecia rhombic in the middle tangential section, irregularly shaped in the place of bifurcation; high and short in longitudinal section, with well developed vestibule protruding highly above the colony surface; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON

Mackinneyella robustiformis differs from *M. praepluriformis* in having smaller fenestrules and thinner branches, as well as in arrangement of microacanthostyles on the reverse surface.

Genus *Polypora* M'Coy, 1844

TYPE SPECIES. — *Polypora dendroides* M'Coy, 1844. Lower Carboniferous, Ireland.

Polypora soyanensis Morozova, 1970
(Fig. 9L-R; Table 23)

Polypora soyanensis Morozova, 1970a: 211, 212, pl. 48, fig. 3, pl. 49, fig. 2. — Sakagami 1980: 278, 279, pl. 32, fig. 6; 1999: 97, 98, pl. 24, fig. 3.

Polypora sp. cf. *P. orientalis* – Sakagami *in* Yanagida 1988: pl. 21, figs 2, 3.

HOLOTYPE. — No. 1692/168, PIN; River Soyana, Arkhangelsk region, Russian Platform. Middle Permian, Lower Kazanian Substage.

MATERIAL EXAMINED. — 1-8, 4-5, 4-6-1, 4-7-2, 4-8-4, 4-18, 5-4-1, 5-8-2, 7-3-1, 7-3-2, 7-5-3, 7-7-1, 7-9-1, 23-6-1, 23-6(3-4), 23-7, 23-8, 24-1, 24-5, 25-1-2.

OCCURRENCE. — Russian Platform, Middle Permian, Lower Kazanian Substage. Thailand, Permian. Abadeh region: central Iran, Upper Permian. Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 11-14/10-15//17-20.5. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 3-4 alternating rows on branches, becoming 5 in the place of bifurcation, and 2-3 after the bifurcation. Apertures circular, spaced 2-3 per fenestrule length; 2-4 small nodes developed in peristome. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes small to moderately large, arranged in regular rows between apertures on the obverse colony surface, displaying radial arrangement of rods. Internal granular skeleton thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter. Ovicells occurring occasionally, shaped as spherical chambers attached at distal part of apertures, reaching 0.14 mm in diameter.

INTERIOR DESCRIPTION

Autozooecia rhombic in the middle tangential section, irregularly shaped in the place of bifurcation; high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON

Polypora soyanensis is similar to *P. magnicava* from the Middle Permian (Lower Kazanian) of the Archangelsk

region (Russian plate) (Morozova 1970a), differing from the latter in smaller fenestrules and wider dissepiments. *Polypora tubulosa* Nikiforova, 1933 from the Middle Permian (Gnishik Horizon, Guadalupian) of Transcaucasia, is also similar to *P. soyanensis*, differing in thicker branches and larger fenestrules.

Polypora darashamensis Nikiforova, 1933
(Fig. 10A-F; Table 24)

Polypora timorensis var. *darashamensis* Nikiforova, 1933: 22, pl. 4, figs 4-9.

Polypora darashamensis – Morozova 1970a: 219, 220, pl. 51, fig. 1.

Polypora aff. *darashamensis* – Sakagami 1980: 282, 283, pl. 32, fig. 9.

LECTOTYPE. — Central Museum of Geological Prospecting, Saint Petersburg, Russia. Pictured in Nikiforova 1933: pl. 4, fig. 8 (designated by Morozova 1970a: 219).

MATERIAL EXAMINED. — Single colony 21-2 (two thin sections).

OCCURRENCE. — Transcaucasia, Upper Permian, Dzhulfian (Morozova 1970a). Abadeh region: central Iran, Middle Permian (Sakagami 1980). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 7-8.5/6//16-17. Reticulated colonies with straight branches, joined by dissepiments. Bifurcation common. Autozooecia arranged in 3-4 alternating rows on branches, becoming 5 at the site of bifurcation. Apertures circular, spaced 2-3 per length of a fenestrule; 1-4 small nodes developed in peristome. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes small to moderately large, irregularly spaced on the obverse colony surface between apertures, displaying radial arrangement of rods. Internal granular skeleton thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter.

INTERIOR DESCRIPTION

Autozooecia rhombic to hexagonal in the middle tangential section, irregularly shaped in the place of bifurcation; high and short in longitudinal section, with well developed vestibule protruding highly above the colony surface; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON

Polypora darashamensis differs from *P. soyanensis* in having thicker branches and larger fenestrules.

REMARK

Morozova (1970a: 220) mentioned the finding of three colonies of *Polypora darashamensis* in the Lower Triassic (Indian) of Transcaucasia. However, it seems very likely that this material was re-deposited from the Upper Permian rocks, and is not autochthonous to the Triassic rocks.

Polypora magnicava Morozova, 1970
(Fig. 10G-J; Table 25)

Polypora magnicava Morozova, 1970a: 210, pl. 49, fig. 1. — Sakagami 1980: 279, 280, pl. 32, fig. 8.

MATERIAL EXAMINED. — Single colony 19-1.

OCCURRENCE. — Russian Platform, Middle Permian, Lower Kazanian Substage (Morozova 1970a). Abadeh region: central Iran; Upper Permian (Sakagami 1980). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Micrometric formula: 7-12/9-10//15-17. Reticulated colonies with straight branches, joined by relatively thin dissepiments. Bifurcation common. Autozooecia arranged in 3-4 alternating rows on branches, becoming 5 in the place of bifurcation. Apertures circular, spaced 3-4 per length of a fenestrule; 2-3 small nodes developed in peristome. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes moderately large, arranged in regular rows between apertures on the obverse colony surface, displaying radial arrangement of rods. Internal granular skeleton moderately thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter.

INTERIOR DESCRIPTION
Autozooecia rhombic to hexagonal in the middle tangential section; high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent

COMPARISON
Polypora magnicava reveals some similarities to *P. tubulosa* from the Middle Permian (Gnishik Horizon, Guadalupian) of Transcaucasia (Morozova 1970a). The present material has thicker branches (0.43-0.90 vs. 0.50-0.60 mm in *P. tubulosa*).

Polypora aff. ***anshunensis*** Yang & Lu, 1980
(Fig. 10K-O; Table 26)

Polypora tuberculifera anshunensis Yang & Lu, 1980: 469, pl. 1, fig. 4.

MATERIAL EXAMINED. — 25-3-1.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian. China, Upper Permian (Yang & Lu 1980).

DESCRIPTION
Micrometric formula: 10-13/10-11//17. Reticulated colonies with straight branches, joined by relatively thin dissepiments. Bifurcation common. Autozooecia arranged in 3-4 alternating rows on branches, becoming 5 at the site of bifurcation. Apertures circular, spaced 3-4 per length of a fenestrule; 2-4 small nodes developed in peristome. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes moderately large, arranged in regular rows between apertures on the obverse colony surface, displaying radial arrangement of rods. Internal granular skeleton moderately thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter.

INTERIOR DESCRIPTION
Autozooecia rhombic to hexagonal in the middle tangential section; high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON
The investigated material is similar to the subspecies *Polypora tuberculifera anshunensis* from the Upper Permian of China, regarded here as a separate species. The present material differs only in minor details – slightly thinner branches, wider fenestrules. *Polypora magnicava* from the Middle Permian of the Russian Platform (Morozova 1970a) is also similar to the present material differing in having thicker branches (0.64 vs. 0.50 mm averagely in present specimen).

Polypora sinokoninckiana Yang & Lu, 1962
(Figs 10P; 11A-D; Table 27)

Polypora sinokoninckiana Yang & Lu, 1962: 93, pl. 17, figs 10-12.

MATERIAL EXAMINED. — 1-3-4, 9-5-4, 9-5-8, 9-7.

OCCURRENCE. — Southern China; Maokao Formation, Permian (?Murgabian) (Yang & Lu 1980). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 8-11.5/5-7//16-22. Reticulated colonies with straight branches, joined by relatively thin dissepiments. Autozooecia arranged in 3-4 alternating rows on branches. Apertures circular, spaced 5-6 per length of a fenestrule; 1-2 small nodes developed in peristome. Shape of fenestrules varying from narrow oval to rectangular and triangular. Keels absent. Nodes small, rounded, hyaline, arranged in regular rows between apertures on the obverse colony surface, widely spaced. Internal granular skeleton moderately thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter. Ovicells occurring occasionally, shaped as spherical chambers attached at distal part of apertures, reaching 0.14 mm in diameter.

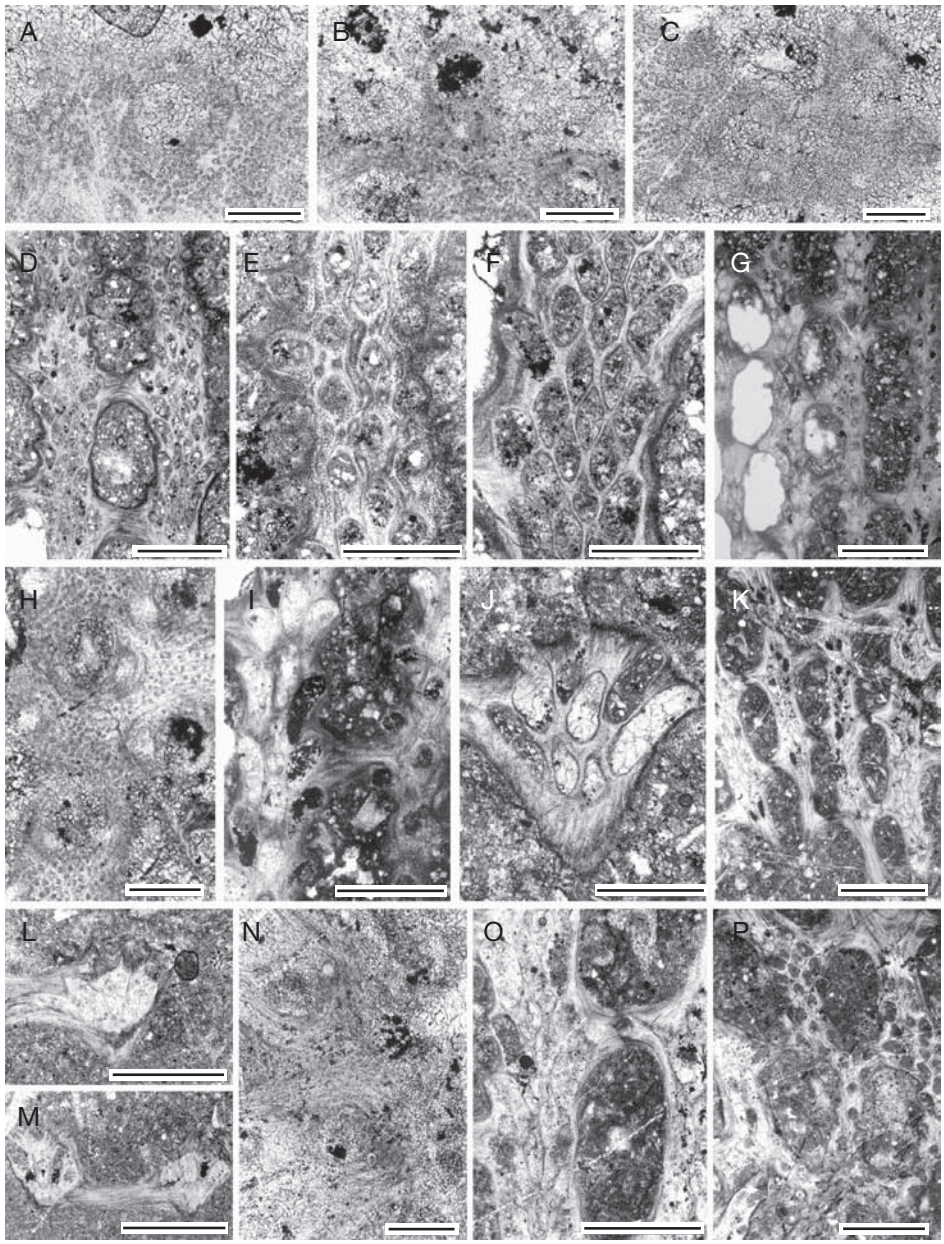

FIG. 10. — **A**-**F**, *Polypora darashamensis* Nikiforova, 1933; **A**, 21-2, tangential section showing aperture with apertural nodes; **B**, 21-2, tangential section showing aperture with apertural nodes and high peristome; **C**, 21-2, tangential section showing aperture with apertural nodes and nodes on the colony surface; **D**, 21-2, deep tangential section; **E**, 21-2, tangential section showing apertures and nodes on the colony surface; **F**, 21-2, deep tangential section showing autozooecial chambers; **G**-**J**, *Polypora magnicava* Morozova, 1970; **G**, **I**, 19-1, tangential section; **H**, 19-1, tangential section showing aperture with apertural nodes and nodes on the colony surface; **J**, 19-1, cross section of the branch; **K**-**O**, *Polypora* aff. *anshunensis* Yang & Lu, 1980; **K**, 25-3-1, tangential section; **L**, **M**, 25-3-1, cross section; **N**, 25-3-1, tangential section showing apertures with apertural nodes; **O**, 25-3-1, deep tangential section; **P**, *Polypora sinokoninckiana* Yang & Lu, 1962, 1-3-4, tangential section. Scale bars: A-C, H, N, 0.1 mm; D, G, K, M, P, 1 mm; E, F, I, J, L, O, 0.5 mm.

INTERIOR DESCRIPTION
Autozooecia rhombic to hexagonal in the middle tangential section; relatively short in longitudinal section, with well developed vestibule; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent. Terminal diaphragms occurring.

COMPARISON
Polypora sinokoninckiana is similar to *P. timorensis* Bassler, 1929 from the Permian of Indonesia. The latter species differs in having longer fenestrules (*c.* 2 vs. 0.99-1.47 mm in present material), and thinner branches (*c.* 0.45 vs. 0.60 mm in present material).

Polypora principalis Gorjunova, 1975
(Fig. 11E-G; Table 28)

Polypora principalis Gorjunova, 1975: 97, pl. 26, fig. 3. — Gorjunova & Morozova 1979: 87, pl. 26, fig. 2.

HOLOTYPE. — No. 2351/392, PIN; Central Pamir (Tajikistan); Lower Permian.

MATERIAL EXAMINED. — 4-3.

OCCURRENCE. — Central Pamir (Tajikistan), Lower Permian (Gorjunova 1975). Central Mongolia, Permian (Gorjunova & Morozova 1979). Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 6/4-5//15. Single fragment of reticulated colony with straight branches, joined by relatively thin dissepiments. Bifurcation common. Autozooecia arranged in 3-5 alternating rows on branches, becoming 7 at the site of bifurcation and 3 after the bifurcation. Apertures circular, spaced 6-7 per length of a fenestrule; rarely 1-2 small nodes developed in peristome. Shape of fenestrules varying from oval to rectangular. Keels absent. Nodes small, arranged in regular rows between apertures on the obverse colony surface, widely spaced, hyaline. Internal granular skeleton moderately thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-6 µm in diameter.

INTERIOR DESCRIPTION
Autozooecia rhombic to hexagonal in the middle tangential section, irregularly shaped in place of bifurcation; high and short in longitudinal section, with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON
The investigated material shows close similarity to *Polypora principalis* from the Lower Permian of Central Pamir. *Polypora nianekensis* Morozova, 1981 from the Upper Permian of the Northeast of Russia is also similar. The latter species has thicker branches (1.00-1.20 vs. 0.75-0.90 mm in *P. principalis*).

Genus *Polyporella* Simpson, 1895

TYPE SPECIES. — *Fenestella fistulata* Hall, 1884. Hamilton Group, Middle Devonian, New York (USA).

Polyporella sp.
(Fig. 11H, I; Table 29)

MATERIAL EXAMINED. — 4-12-2.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION
Micrometric formula: 13-14/13//17. Single fragment of reticulated colony with straight branches, joined by thick dissepiments. Bifurcation common. Autozooecia arranged in 3 alternating rows on branches, becoming 4 in the place of bifurcation, and 2-3 after the bifurcation. Apertures circular, spaced 2-3 per length of a fenestrule; few small nodes developed in peristome. Fenestrules small, ovally shaped. Keels absent. Nodes small, rounded, irregularly spaced on the obverse colony surface. Internal granular skeleton thick, well developed, continuous with nodes, rods, peristome and across dissepiments. Outer lamellar skeleton moderately thick, containing abundant rods 5-10 µm in diameter.

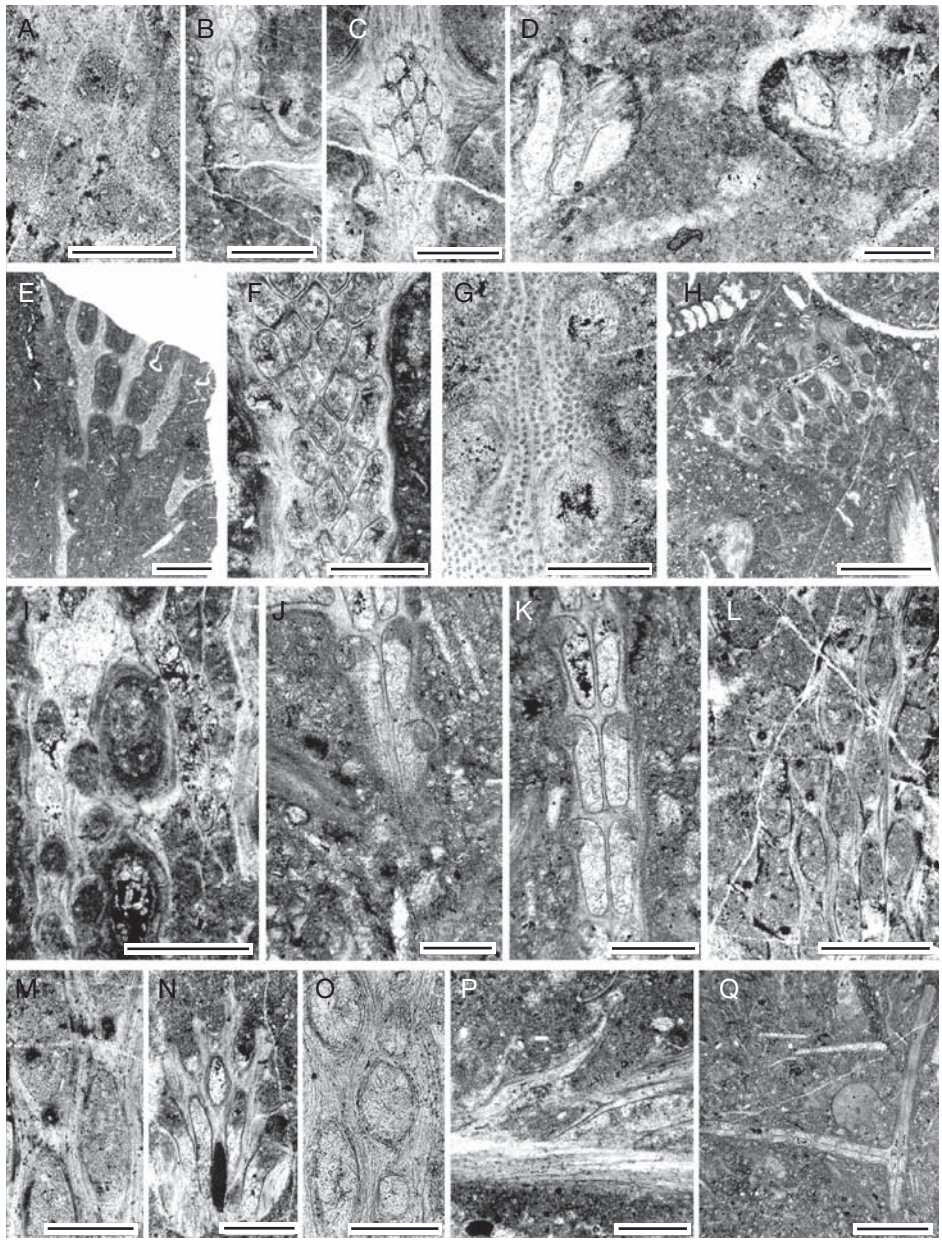

FIG. 11. — **A**-**D**, *Polypora sinokoninckiana* Yang & Lu, 1962; **A**, 1-3-4, tangential section, showing apertures with nodes and nodes on colony surface; **B**, 9-5-4, tangential section of the branch; **C**, 9-5-4, deep tangential section of the branch; **D**, 9-5-4, cross section of the branch; **E**-**G**, *Polypora principalis* Gorjunova, 1975; **E**, 4-3, tangential section; **F**, 4-3, deep tangential section of the branch; **G**, 4-3, tangential section showing autozooecial apertures; **H**, **I**, *Polyporella* sp., 4-12, tangential section; **J**, **K**, **Q**, Fenestrida indet.; **J**, **Q**, 10-1-2, tangential section; **K**, 10-1-2, deep tangential section; **L**-**P**, *Lakkela jamalica* n. gen., n. sp.; **L**, SMF 2115, holotype, tangential section; **M**, SMF 2115, holotype, tangential section showing apertures and acanthostyles; **N**, 1-8-2, paratype, deep tangential section; **O**, 9-5-9, tangential section showing apertures and heterozooecia; **P**, SMF 2115, holotype, longitudinal section. Scale bars: A, G, M, O, 0.2 mm; B, C, F, I, L, 0.5 mm; D, J, K, N, P, 0.25 mm; E, H, 2 mm; Q, 1 mm.

INTERIOR DESCRIPTION
Autozooecia rhombic to hexagonal and pentagonal (half-hexagonal) in the middle tangential section; with well developed vestibule; elongate to branch length; aperture positioned at distal to distal-abaxial end of chamber. Hemisepta absent.

COMPARISON
This bryozoan shows some similarities to *Polyporella visenda* Gorjunova, 1975 from the Lower Permian of Central Pamir (Tajikistan). However, the latter species possesses prominent keels with large nodes.

Suborder PHYLLOPORININA
Lavrentjeva, 1979
Family CHAINODICTYONIDAE
Shulga-Nesterenko, 1955

Lakkella n. gen.

TYPE SPECIES. — *Lakkella jamalica* n. sp.

ETYMOLOGY. — The genus name derives from Greek "λακκος", pit, hole, and suffix "*-ella*". The name refers to the presence of pit-like heterozooecia ("leptozooecia").

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DIAGNOSIS. — Branched colony with 4-6 rows of short tubular autozooecia opening on the one side. Autozooecia elongated oval to slightly rectangular in deep tangential section with well developed vestibule. Autozooecial apertures oval to lens-shaped. Thin ridges between apertures. Single leptozooecium and small acanthostyle in the wall between apertures longitudinally; rare smaller styles between apertures. Inner granular skeleton hyaline, well developed; outer lamellar skeleton relatively thick.

COMPARISON
The new genus is superficially similar to *Strebloclada* Crockford, 1944. However, it differs in having acanthostyles and only one heterozooecium between apertures. *Strebloclada* is known from Upper Carboniferous to Lower Permian (Sakmarian) of Western Australia. Crockford (1944b) did not illustrate the interior morphology, so that a closer comparison is impossible. *Lakkella* n. gen. is also similar to *Rhombocladia* Rogers, 1900, *Chainodictyon* Foerste, 1887 and *Kallodictyon* Morozova, 1981, especially in apertural shape, arrangement of autozooecia, and presence of acanthostyles. However, it differs in colony form and autozooecial shape.

Lakkella jamalica n. sp.
(Figs 11L-P; 12; Table 30)

HOLOTYPE. — SMF 2115 (1-2-1).

ETYMOLOGY. — The species name refers to the Jamal Formation in which it was found.

PARATYPES. — 1-8-2, PL 5.

TYPE LOCALITY. — Lakaftari, central Iran.

TYPE LEVEL. — Jamal Formation, Middle Permian.

ADDITIONAL MATERIAL EXAMINED. — 9-5-9.

DIAGNOSIS. — As for genus.

DESCRIPTION
Branched colony with 4-6 rows of short tubular autozooecia opening on the one side, 0.66-0.75 mm wide. Autozooecia elongated oval to slightly rectangular in deep tangential section having well developed vestibule. Autozooecial apertures oval to lens-shaped, spaced 5 at distance of 2 mm. Thin ridges between apertures separating drop-shaped areas around apertures. Small pit-like heterozooecium (leptozooecium) positioned at distal part of such an area, triangular to rounded in cross section, 0.06-0.075 mm in diameter. Single small acanthostyle in the wall between the heterozooecium and the adjacent aperture; rare smaller styles irregularly spaced between apertures. Inner granular skeleton hyaline, well developed; outer lamellar skeleton relatively thick.

COMPARISON
As for genus.

Incertae sedis

Fenestrida indet.
(Fig. 11J, K, Q)

MATERIAL EXAMINED. — Single fragment 10-1-2.

OCCURRENCE. — Lakaftari: central Iran, Jamal Formation, Middle Permian.

DESCRIPTION

Straight main branch with a single secondary branch diverging at angle of about 90°. Branches 0.28-0.30 mm wide. Apertures circular, arranged in two rows on branches, non-alternating, 0.084 mm in diameter; spaced 15-16 on 5 mm distance along the branches. Keel low, straight. Nodes not observed. Reverse side of the colony smooth. Small microstylets in the outer laminated skeleton.

INTERIOR DESCRIPTION

Autozooecia elongated rectangular to oval in the middle tangential section. Long superior hemiseptum projecting deeply into the zooecial chamber, separating the distal third of it; inferior hemiseptum absent.

COMPARISON

In the colony shape this bryozoan resembles the genus *Diploporaria* Nickles & Bassler, 1900. This genus includes about a dozen of species reported from Lower Carboniferous to Lower Permian. They reveal different internal morphology displaying the same colony shape, and may belong to different genera. An arrangement of apertures in non-alternating rows observable in present specimen is very unusual for fenestrate bryozoans at all.

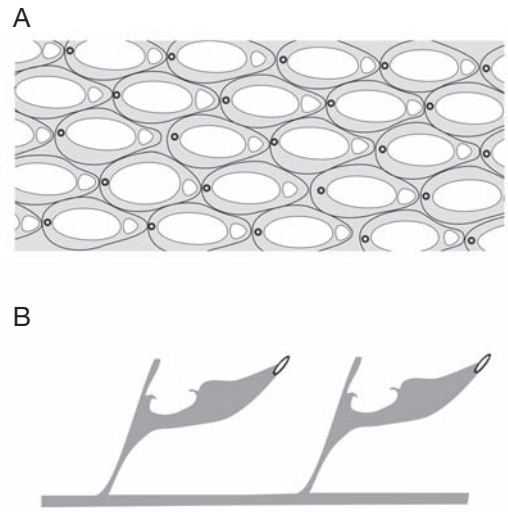

FIG. 12. — *Lakkela jamalica* n. gen., n. sp., tangential (**A**) and longitudinal (**B**) views (without scale).

DISCUSSION

The majority of bryozoans from the Jamal Formation are fenestellids, 23 species have been identified. They are also the largest and most abundant bryozoans. Some of funnel-shaped colonies exceed 20 cm in height (*Septopora flabellata*, *Fabifenestella vediensis* n. comb., *Polypora soyanensis*). Fistuliporid bryozoans are quite common, although only *Fistulipora monticulosa* and *F. timorensis* occur relatively often and reach considerable dimensions. Rhabdomesid bryozoans are represented by the abundant species *Ogbinopora orientalis*, and rare *Ascopora gracilis* n. sp. A single trepostome species, *Dyscritella leptosa* n. sp., was identified in the Jamal Formation.

This bryozoan developed thin encrustations on hard and ephemeral substrates. The new species *Lakkella jamalica* n. gen., n. sp. belongs to the family Chainodictyonidae, and differs from other genera of the family in having regular arrangement of heterozooecia between apertures and in presence of acanthostyles.

The taxonomic position of two problematic bryozoans, one fistuliporid and one fenestellid species is unclear. Fistuliporidae indet. displays a very strange combination of morphologic features such as hemiphragms, deep lunaria, polygonal shape of autozooecial cross section, and indistinct wall structure. Fenestrida indet., unfortunately represented by a single fragment, is similar to the genus *Diploporaria* in colony shape. However, it differs from known fenestellids in having non-alternating arrangement of autozooecia.

The abundant and quite diverse bryozoan fauna from the Jamal Formation of Lakaftari allows stratigraphical and biogeographical deductions. Most of previously known taxa indicate the Middle Permian age of the Jamal Formation (Table 31). The majority of species has been reported from the Gnishik Horizon of Transcaucasia, which is regarded as Murgabian in age (Leven 1998;

Zakharov *et al.* 2001). In earlier papers this horizon has been usually assigned to the lower part of Guadalupian, Wordian Substage (e.g., Morozova 1970a).

The territory of the central Iran was occupied in Middle to Upper Permian by tropical carbonate platforms (Ross & Ross 1987; Kiessling *et al.* 2003). The Lakaftari area was apparently situated at the connection between southern Tethyan Sea, including central-eastern Afghanistan, parts of northern Pakistan, Thailand, Malaysia, and central Tethyan Sea, including Transcaucasia, Darvaz, Pamir, Tibet, and Mongolia (Ross 1978; Sakagami 1985). Otherwise, connections with the Uralian Sea and Russian Platform are also obvious.

The present investigation contributes to our understanding the bryozoan diversity dynamics in the Late Permian. Bryozoan generic diversity increased slightly from the Lower to Upper Permian; faunas showed also quite high provincialism (Ross 1978). The bryozoan fauna of Guadalupian (or Murgabian) age was the most diverse in the whole Middle to Upper Permian interval. The bryozoan diversity was apparently controlled by sea-level fluctuations (Ross & Ross 1987, 1996). The diversity peak is distinct in the Tethyan realm, whereas North American faunas are less diverse.

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APPENDIX

TABLES 1-30. — Abbreviations: **N**, number of measurements; **X**, mean; **SD**, standard deviation; **CV**, coefficient of variation; **MIN**, minimal value; **MAX**, maximal value. All measurements in mm.

TABLE 1. — Measurements of *Fistulipora monticulosa* Nikiforova, 1933.

	N	X	SD	CV	MIN	MAX
Aperture width	70	0.29	0.038	13.321	0.22	0.37
Lunarium width	70	0.25	0.031	12.306	0.19	0.38
Lunarium length	70	0.17	0.037	20.956	0.10	0.25
Vesicles / 1 mm	33	12.00	2.190	18.563	8.00	15.00
Vesicle diameter	55	0.11	0.029	26.540	0.05	0.18
Apertures / 2 mm	16	4.00	0.287	6.902	3.50	4.50
Colony thickness	14	1.10	0.475	43.360	0.60	2.20

TABLE 2. — Measurements of *Fistulipora timorensis* Bassler, 1929.

	N	X	SD	CV	MIN	MAX
Aperture width	70	0.35	0.050	14.584	0.22	0.480
Lunarium width	70	0.27	0.038	14.047	0.18	0.410
Lunarium length	70	0.22	0.038	17.158	0.16	0.336
Vesicle diameter	70	0.10	0.027	27.812	0.05	0.160
Apertures / 2 mm	14	4.00	0.369	9.200	3.50	4.500

TABLE 3. — Measurements of *Fistulipora* sp.

	N	X	SD	CV	MIN	MAX
Aperture width	15	0.46	0.057	12.158	0.38	0.58
Lunarium width	15	0.34	0.024	7.184	0.29	0.38
Lunarium length	15	0.24	0.049	20.239	0.18	0.34
Vesicles / 1 mm	5	16.00	1.167	7.331	14.00	17.00
Vesicle diameter	15	0.14	0.019	14.242	0.11	0.18
Lunarium thickness	15	0.10	0.027	26.534	0.07	0.16

TABLE 4. — Measurements of *Eridopora oculata* Bassler, 1929.

	N	X	SD	CV	MIN	MAX
Aperture width	20	0.28	0.041	14.298	0.21	0.35
Lunarium length	20	0.13	0.039	29.191	0.07	0.21
Lunarium width	20	0.21	0.042	19.986	0.15	0.32

TABLE 5. — Measurements of Fistuliporidae indet. (?*Eridopora*).

	N	X	SD	CV	MIN	MAX
Aperture width	25	0.42	0.073	17.369	0.26	0.57
Lunarium length	15	0.22	0.036	16.294	0.18	0.28
Lunarium width	15	0.25	0.025	9.951	0.20	0.30
Lunarium thickness	15	0.09	0.020	23.333	0.05	0.12
Vesicle diameter	15	0.16	0.052	32.882	0.10	0.24

TABLE 6. — Measurements of *Dyscritella leptosa* n. sp.

	N	X	SD	CV	MIN	MAX
Aperture width	30	0.12	0.023	18.778	0.08	0.16
Exilazooecia width	30	0.05	0.012	26.216	0.02	0.08
Acanthostyle diameter	30	0.04	0.007	18.382	0.03	0.06
Apertures / 2 mm	10	9.70	1.667	17.243	7.00	11.00

TABLE 7. — Measurements of *Ogbinopora orientalis* Gorjunova, 1975.

	N	X	SD	CV	MIN	MAX
Branch width	20	2.61	0.362	13.857	2.20	3.67
Diameter of axial bundle	20	1.10	0.206	18.790	0.78	1.56
Exilazooecia width	20	0.71	0.139	19.639	0.55	1.11
Aperture width	80	0.10	0.012	12.379	0.07	0.13
Aperture spacing along branch	60	0.37	0.044	11.674	0.30	0.48
Aperture spacing across branch	60	0.27	0.031	11.515	0.22	0.36
Metazooecia diameter	30	0.03	0.006	21.430	0.02	0.04
Metazooecia / aperture	30	5.87	0.900	15.333	5.00	8.00
Apertures / 2 mm	20	4.35	0.324	7.448	4.00	5.00
Apertures / 2 mm diagonal	10	6.47	0.585	9.043	6.00	7.50

TABLE 8. — Measurements of *Ascopora gracilis* n. sp.

	N	X	SD	CV	MIN	MAX
Aperture width	15	0.08	0.013	16.544	0.06	0.11
Exilazooecia width	3	0.04	0.035	86.603	0.02	0.08
Acanthostyle diameter	4	0.03	0.006	23.094	0.02	0.03
Width of branch	3	1.20	0.159	13.229	1.08	1.38
Axial bundle diameter	3	0.59	0.217	36.784	0.45	0.84

TABLE 9. — Measurements of *Rectifenestella crassinodata* n. sp.

	N	X	SD	CV	MIN	MAX
Branch width	40	0.35	0.039	10.898	0.28	0.44
Dissepiment width	40	0.27	0.038	14.201	0.18	0.37
Fenestrule length	40	0.57	0.095	16.715	0.40	0.78
Fenestrule width	40	0.30	0.053	17.540	0.19	0.42
Distance between dissepiment centers	40	0.80	0.114	14.179	0.57	1.02
Distance between branch centers	40	0.57	0.082	14.290	0.42	0.81
Aperture width	40	0.09	0.012	12.640	0.08	0.12
Aperture spacing along branch	40	0.24	0.030	12.247	0.19	0.30
Aperture spacing across branch	40	0.26	0.031	12.051	0.18	0.34
Distance between aperture centers across fenestrule	40	0.37	0.052	14.194	0.25	0.47
Maximal chamber width	50	0.14	0.022	15.050	0.11	0.19
Minimal chamber width	50	0.08	0.011	13.095	0.06	0.11
Node diameter	40	0.11	0.027	25.158	0.06	0.18
Node spacing	40	0.69	0.173	25.283	0.30	1.05
Branches / 10 mm	10	18.00	2.614	14.754	13.00	22.00
Fenestrules / 10 mm	19	13.00	1.771	13.844	10.00	16.00
Apertures / 10 mm	18	21.00	2.846	13.324	16.00	27.00

TABLE 10. — Measurements of *Rectifenestella araxensis* (Nikiforova, 1933) n. comb.

	N	X	SD	CV	MIN	MAX
Branch width	30	0.30	0.019	6.310	0.26	0.34
Dissepiment width	30	0.24	0.056	23.346	0.13	0.37
Fenestrule length	30	0.45	0.066	14.716	0.31	0.55
Fenestrule width	30	0.21	0.024	11.512	0.16	0.26
Distance between dissepiment centers	30	0.68	0.081	11.924	0.53	0.84
Distance between branch centers	30	0.43	0.043	9.905	0.34	0.504
Aperture width	30	0.08	0.006	7.331	0.07	0.09
Aperture spacing along branch	30	0.23	0.017	7.313	0.19	0.25
Aperture spacing across branch	30	0.21	0.017	7.895	0.18	0.25
Distance between aperture centers across fenestrule	30	0.27	0.020	7.472	0.23	0.30
Maximal chamber width	30	0.11	0.007	5.962	0.10	0.13
Minimal chamber width	30	0.06	0.008	12.938	0.05	0.08
Node diameter	30	0.07	0.010	15.488	0.04	0.08
Node spacing	30	0.27	0.042	15.348	0.18	0.35
Branches / 10 mm	15	24.00	2.041	8.680	20.00	28.00
Fenestrules / 10 mm	15	15.00	2.302	15.123	13.00	19.00
Apertures / 10 mm	15	24.00	2.056	8.743	20.50	26.50

TABLE 11. — Measurements of *Rectifenestella microretiformis* (Morozova, 1970) n. comb.

	N	X	SD	CV	MIN	MAX
Branch width	30	0.25	0.032	12.5420	0.18	0.34
Dissepiment width	30	0.11	0.017	15.9850	0.06	0.14
Fenestrule length	30	0.36	0.048	13.2970	0.30	0.47
Fenestrule width	30	0.18	0.028	15.4488	0.13	0.24
Distance between dissepiment centers	30	0.49	0.065	13.3860	0.38	0.65
Distance between branch centers	30	0.36	0.034	9.549	0.280	0.41
Aperture width	30	0.08	0.008	10.574	0.060	0.09
Aperture spacing along branch	30	0.21	0.018	8.354	0.180	0.25
Aperture spacing across branch	30	0.19	0.025	13.180	0.156	0.25
Distance between aperture centers across fenestrule	30	0.22	0.031	14.420	0.160	0.28
Maximal chamber width	10	0.10	0.008	8.178	0.09	0.110
Minimal chamber width	10	0.05	0.008	14.374	0.04	0.065
Node diameter	30	0.06	0.008	14.765	0.04	0.070
Node spacing	30	0.20	0.023	11.256	0.16	0.250
Branches / 10 mm	10	27.00	3.071	11.335	22.50	31.500
Fenestrules / 10 mm	10	21.00	2.886	13.765	18.00	25.000
Apertures / 10 mm	10	24.00	1.718	7.159	22.00	26.500

TABLE 12. — Measurements of *Spinofenestella* sp. 1.

	N	X	SD	CV	MIN	MAX
Branch width	20	0.38	0.046	12.038	0.31	0.470
Dissepiment width	20	0.25	0.026	10.562	0.20	0.300
Fenestrule length	20	0.50	0.046	9.226	0.42	0.580
Fenestrule width	20	0.28	0.023	8.245	0.25	0.324
Distance between dissepiment centers	20	0.73	0.031	4.243	0.66	0.810
Distance between branch centers	20	0.54	0.051	9.341	0.47	0.66
Aperture width	25	0.09	0.007	8.130	0.07	0.10
Aperture spacing along branch	25	0.24	0.036	15.052	0.18	0.31
Aperture spacing across branch	15	0.25	0.022	8.876	0.20	0.28
Distance between aperture centers across fenestrule	10	0.32	0.029	8.906	0.29	0.37
Maximal chamber width	10	0.14	0.013	9.230	0.11	0.16
Node diameter	20	0.09	0.013	15.746	0.06	0.10
Node spacing	15	0.61	0.112	18.210	0.42	0.75
Zooecial chamber depth	7	0.16	0.014	8.333	0.15	0.19
Branches / 10 mm	10	17.00	1.891	10.834	15.00	20.00
Fenestrules / 10 mm	15	14.00	1.007	7.131	13.00	16.00
Apertures / 10 mm	10	22.00	1.975	8.789	19.00	26.00

TABLE 13. — Measurements of *Spinofenestella* sp. 2.

	N	X	SD	CV	MIN	MAX
Branch width	20	0.30	0.021	6.926	0.26	0.35
Dissepiment width	20	0.23	0.022	9.416	0.20	0.28
Fenestrule length	20	0.60	0.076	12.722	0.46	0.69
Fenestrule width	20	0.28	0.035	12.727	0.23	0.38
Distance between dissepiment centers	20	0.82	0.101	12.328	0.66	0.96
Distance between branch centers	20	0.51	0.047	9.257	0.42	0.62
Aperture width	30	0.09	0.006	6.143	0.08	0.10
Aperture spacing along branch	30	0.22	0.018	8.367	0.18	0.25
Aperture spacing across branch	30	0.22	0.020	9.165	0.18	0.26
Distance between aperture centers across fenestrule	20	0.31	0.032	10.308	0.24	0.37
Maximal chamber width	30	0.14	0.013	9.319	0.12	0.17
Node diameter	20	0.08	0.012	15.041	0.06	0.10
Node spacing	18	0.62	0.138	22.371	0.40	0.93
Branches / 10 mm	9	20.00	0.914	4.575	18.00	21.00
Fenestrules / 10 mm	10	12.00	1.006	8.315	11.00	14.00
Apertures / 10 mm	10	24.00	0.932	3.928	22.00	25.00

TABLE 14. — Measurements of *Alternifenestella sayensis* Termier & Termier, 1971.

	N	X	SD	CV	MIN	MAX
Branch width	15	0.30	0.026	8.722	0.26	0.35
Dissepiment width	15	0.11	0.021	19.623	0.07	0.14
Fenestrule length	15	0.50	0.084	16.602	0.42	0.63
Fenestrule width	15	0.30	0.031	10.578	0.23	0.35
Distance between dissepiment centers	15	0.62	0.090	14.566	0.54	0.78
Distance between branch centers	15	0.490	0.055	11.404	0.40	0.60
Aperture width	20	0.090	0.009	9.985	0.07	0.10
Aperture spacing along branch	17	0.230	0.020	8.679	0.22	0.28
Aperture spacing across branch	15	0.200	0.019	9.193	0.18	0.23
Distance between aperture centers across fenestrule	11	0.278	0.025	9.023	0.24	0.31
Maximal chamber width	15	0.14	0.013	9.085	0.12	0.16
Node diameter	15	0.06	0.008	13.459	0.04	0.08
Node spacing	8	0.27	0.036	13.035	0.22	0.34
Branches / 10 mm	7	22.00	1.943	8.754	20.00	25.00
Fenestrules / 10 mm	6	16.00	2.262	14.023	13.00	18.00

TABLE 15. — Measurements of *Minilya perelegans* (Waagen & Pichl, 1885).

	N	X	SD	CV	MIN	MAX
Branch width	30	0.28	0.026	9.283	0.24	0.35
Dissepiment width	30	0.15	0.028	18.357	0.11	0.22
Fenestrule length	30	0.41	0.039	9.556	0.35	0.49
Fenestrule width	30	0.21	0.032	15.022	0.12	0.28
Distance between dissepiment centers	30	0.54	0.035	6.478	0.48	0.62
Distance between branch centers	30	0.41	0.051	12.425	0.32	0.55
Aperture width	30	0.07	0.009	11.919	0.06	0.08
Aperture spacing along branch	30	0.27	0.022	7.992	0.24	0.32
Aperture spacing across branch	30	0.24	0.019	8.143	0.20	0.28
Distance between aperture centers across fenestrule	30	0.24	0.053	22.139	0.16	0.40
Maximal chamber width	30	0.12	0.011	8.818	0.09	0.14
Node diameter	30	0.05	0.008	17.690	0.04	0.06
Node spacing	30	0.14	0.015	10.245	0.11	0.18
Branches / 10 mm	10	24.00	1.506	6.298	21.00	26.00
Fenestrules / 10 mm	15	18.00	1.027	5.573	17.00	21.00
Apertures / 10 mm	10	19.00	1.351	7.103	17.00	21.00

TABLE 16. — Measurements of *Fabifenestella jabiensis* (Waagen & Pichl, 1885).

	N	X	SD	CV	MIN	MAX
Branch width	40	0.40	0.045	11.275	0.30	0.48
Dissepiment width	40	0.27	0.051	19.179	0.20	0.40
Fenestrule length	40	0.70	0.113	16.261	0.45	0.96
Fenestrule width	40	0.30	0.067	22.344	0.18	0.54
Distance between dissepiment centers	40	0.94	0.118	12.464	0.75	1.17
Distance between branch centers	40	0.60	0.064	10.6350	0.46	0.75
Aperture width	50	0.09	0.007	7.8240	0.08	0.11
Aperture spacing along branch	50	0.29	0.026	8.7510	0.23	0.36
Aperture spacing across branch	50	0.32	0.021	6.5056	0.29	0.37
Distance between aperture centers across fenestrule	40	0.31	0.068	21.929	0.22	0.64
Maximal chamber width	40	0.12	0.011	8.928	0.10	0.15
Node diameter	40	0.07	0.018	26.629	0.04	0.13
Node spacing	40	0.16	0.024	15.209	0.11	0.20
Branches / 10 mm	15	16.00	1.928	11.778	13.00	19.00
Fenestrules / 10 mm	20	10.00	1.382	13.270	7.00	12.00
Apertures / 10 mm	10	18.00	1.100	5.996	17.00	21.00

TABLE 17. — Measurements of *Fabifenestella vediensis* (Morozova, 1965) n. comb.

	N	X	SD	CV	MIN	MAX
Branch width	40	0.33	0.0370	11.051	0.24	0.41
Dissepiment width	40	0.14	0.0140	10.598	0.11	0.17
Fenestrule length	40	0.41	0.0310	7.499	0.34	0.48
Fenestrule width	40	0.24	0.0307	12.703	0.18	0.30
Distance between dissepiment centers	40	0.54	0.0320	5.964	0.47	0.60
Distance between branch centers	40	0.49	0.040	8.194	0.42	0.60
Aperture width	40	0.09	0.007	8.431	0.07	0.10
Aperture spacing along branch	40	0.28	0.018	6.617	0.24	0.31
Aperture spacing across branch	40	0.27	0.024	8.916	0.23	0.31
Distance between aperture centers across fenestrule	40	0.24	0.033	13.642	0.18	0.31
Maximal chamber width	40	0.11	0.011	9.477	0.09	0.15
Node diameter	40	0.06	0.007	12.424	0.05	0.08
Node spacing	40	0.14	0.015	11.136	0.11	0.17
Branches / 10 mm	15	21.00	1.517	7.200	19.50	25.00
Fenestrules / 10 mm	15	19.00	0.826	4.440	17.50	20.00
Apertures / 10 mm	15	19.00	1.052	5.551	17.50	20.50

TABLE 18. — Measurements of *Septopora flabellata* Nikiforova, 1933.

	N	X	SD	CV	MIN	MAX
Branch width	30	0.36	0.040	11.089	0.30	0.45
Dissepiment width	30	0.29	0.032	11.247	0.22	0.37
Fenestrule length	30	0.42	0.069	16.240	0.31	0.66
Fenestrule width	30	0.30	0.060	20.076	0.19	0.41
Distance between dissepiment centers	30	0.81	0.065	8.104	0.69	1.02
Distance between branch centers	30	0.72	0.168	23.334	0.09	1.02
Aperture width	30	0.11	0.009	7.974	0.09	0.13
Aperture spacing along branch	30	0.23	0.025	11.219	0.18	0.29
Aperture spacing across branch	30	0.23	0.020	8.741	0.18	0.27
Distance between aperture centers across fenestrule	20	0.36	0.102	28.523	0.27	0.69
Maximal chamber width	30	0.15	0.014	9.697	0.11	0.17
Node spacing	30	0.67	0.136	20.437	0.30	0.87
Zooecial chamber length	10	0.21	0.023	10.766	0.18	0.26
Zooecial chamber depth	10	0.19	0.026	13.466	0.16	0.23
Vestibule depth	11	0.21	0.033	15.462	0.15	0.26
Cyclozooecia diameter	30	0.06	0.012	20.268	0.04	0.09
Branches / 10 mm	15	13.00	1.583	12.449	11.00	16.00
Fenestrules / 10 mm	15	13.00	0.985	7.684	11.00	14.00
Apertures / 10 mm	15	18.00	0.980	5.311	16.00	20.00

TABLE 19. — Measurements of *Penniretepora afghanica* n.sp.

	N	X	SD	CV	MIN	MAX
Aperture width	25	0.08	0.008	9.893	0.06	0.09
Aperture spacing along branch	21	0.29	0.026	8.984	0.25	0.36
Aperture spacing across branch	10	0.25	0.021	8.546	0.20	0.26
Main branch width	8	0.36	0.037	10.082	0.30	0.42
Lateral branch width	13	0.27	0.028	10.417	0.21	0.32
Lateral branching angle	15	63.47	4.373	6.890	58.00	74.00
Lateral branch spacing	18	0.97	0.163	16.712	0.38	1.10
Maximal chamber width	6	0.12	0.011	8.843	0.10	0.13

TABLE 20. — Measurements of *Mackinneyella praepluriformis* (Morozova, 1965).

	N	X	SD	CV	MIN	MAX
Branch width	34	1.04	0.144	13.921	0.72	1.26
Dissepiment width	27	0.57	0.173	30.546	0.32	0.90
Fenestrule length	27	2.13	0.400	18.736	1.56	3.12
Fenestrule width	27	0.84	0.215	25.656	0.47	1.29
Aperture width	47	0.10	0.016	14.926	0.08	0.14
Aperture spacing along branch	46	0.33	0.048	14.348	0.22	0.44
Aperture spacing across branch	25	0.22	0.022	10.238	0.18	0.27
Maximal chamber width	27	0.15	0.017	11.178	0.12	0.20
Node diameter	14	0.05	0.012	24.785	0.03	0.08
Branches / 10 mm	9	5.00	0.623	11.782	4.50	6.50
Fenestrules / 10 mm	11	3.50	0.378	10.810	3.00	4.00
Apertures / 10 mm	14	13.00	0.888	6.714	12.00	15.00

TABLE 21. — Measurements of *Mackinneyella dzhulfensis* (Morozova, 1965).

	N	X	SD	CV	MIN	MAX
Branch width	9	0.860	0.149	17.267	0.72	1.11
Dissepiment width	11	0.470	0.113	24.165	0.27	0.60
Fenestrule length	14	1.180	0.181	15.362	0.84	1.59
Fenestrule width	16	0.694	0.120	17.360	0.48	0.93
Distance between dissepiment centers	13	1.610	0.181	11.251	1.44	1.95
Distance between branch centers	10	1.44	0.145	10.053	1.26	1.64
Aperture width	20	0.09	0.011	12.346	0.07	0.10
Aperture spacing along branch	13	0.28	0.035	12.314	0.23	0.34
Aperture spacing across branch	3	0.20	0.018	9.079	0.18	0.22
Branches / 10 mm	5	8.00	0.587	7.628	7.00	8.50
Fenestrules / 10 mm	7	6.00	0.667	10.864	5.00	7.00
Apertures / 10 mm	3	14.00	1.528	10.657	13.00	16.00

TABLE 22. — Measurements of *Mackinneyella robustiformis* (Morozova, 1965).

	N	X	SD	CV	MIN	MAX
Branch width	15	0.75	0.116	15.491	0.57	0.93
Dissepiment width	9	0.39	0.074	19.074	0.24	0.48
Fenestrule length	16	1.31	0.204	15.620	0.99	1.70
Fenestrule width	16	0.70	0.143	20.295	0.49	1.05
Distance between dissepiment centers	16	1.74	0.173	9.922	1.50	2.00
Distance between branch centers	15	1.18	0.266	22.615	0.90	1.70
Aperture width	29	0.10	0.010	9.922	0.08	0.12
Aperture spacing along branch	13	0.31	0.032	10.365	0.26	0.40
Aperture spacing across branch	10	0.23	0.027	11.839	0.20	0.28
Maximal chamber width	12	0.13	0.016	12.081	0.11	0.16
Branches / 10 mm	9	8.08	1.766	21.865	6.00	10.00
Fenestrules / 10 mm	4	5.50	1.2247	22.268	4.00	6.50
Apertures / 10 mm	3	17.50	1.323	7.559	16.00	18.50

TABLE 23. — Measurements of *Polypora soyanensis* Morozova, 1970.

	N	X	SD	CV	MIN	MAX
Branch width	25	0.57	0.071	12.414	0.43	0.72
Dissepiment width	30	0.25	0.029	11.496	0.19	0.30
Fenestrule length	30	0.51	0.111	21.901	0.31	0.69
Fenestrule width	30	0.44	0.087	19.785	0.23	0.63
Distance between dissepiment centers	30	0.80	0.129	16.136	0.60	1.14
Distance between branch centers	30	0.79	0.127	15.930	0.60	1.05
Aperture width	35	0.09	0.007	8.151	0.08	0.11
Aperture spacing along branch	35	0.29	0.030	10.390	0.23	0.37
Aperture spacing across branch	35	0.22	0.023	10.434	0.18	0.30
Distance between aperture centers across fenestrule	20	0.33	0.042	12.745	0.24	0.43
Maximal chamber width	30	0.11	0.010	8.797	0.09	0.13
Node diameter	30	0.09	0.016	19.069	0.06	0.12
Node spacing	30	0.27	0.046	17.222	0.18	0.36
Branch thickness	10	0.43	0.077	17.838	0.32	0.53
Branches / 10 mm	24	13.00	1.002	7.937	11.00	14.00
Fenestrules / 10 mm	32	13.00	1.341	10.247	10.00	15.00
Apertures / 10 mm	15	18.00	1.174	6.491	17.00	20.50

TABLE 24. — Measurements of *Polypora darashamensis* Nikiforova, 1933.

	N	X	SD	CV	MIN	MAX
Branch width	10	0.77	0.06	7.709	0.69	0.90
Dissepiment width	10	0.37	0.052	14.083	0.26	0.44
Fenestrule length	10	1.26	0.070	5.610	1.14	1.35
Fenestrule width	10	0.65	0.088	13.600	0.54	0.84
Distance between dissepiment centers	10	1.62	0.083	5.107	1.48	1.76
Distance between branch centers	10	1.19	0.114	9.535	1.05	1.38
Aperture width	20	0.09	0.011	11.731	0.07	0.10
Aperture spacing along branch	20	0.33	0.030	8.951	0.26	0.36
Aperture spacing across branch	20	0.24	0.021	8.815	0.20	0.29
Maximal chamber width	10	0.14	0.012	8.355	0.13	0.17
Node diameter	15	0.07	0.011	16.188	0.05	0.08
Node spacing	5	0.17	0.036	18.956	0.13	0.22
Branches / 10 mm	5	8.00	0.565	7.237	7.00	8.50
Fenestrules / 10 mm	4	6.00	0.408	6.804	5.50	6.50
Apertures / 10 mm	3	16.00	0.577	3.535	16.00	17.00
Apertural nodes diameter	10	0.032	0.0063	19.762	0.02	0.04

TABLE 25. — Measurements of *Polypora magnicava* Morozova, 1970.

	N	X	SD	CV	MIN	MAX
Branch width	10	0.64	0.157	24.518	0.43	0.90
Dissepiment width	10	0.21	0.017	8.037	0.19	0.24
Fenestrule length	10	0.86	0.047	5.380	0.81	0.93
Fenestrule width	10	0.52	0.061	11.825	0.41	0.60
Distance between dissepiment centers	10	1.10	0.047	4.332	1.05	1.20
Distance between branch centers	10	0.86	0.142	16.561	0.66	1.17
Aperture width	10	0.09	0.006	6.454	0.08	0.10
Aperture spacing along branch	10	0.29	0.020	7.102	0.25	0.30
Aperture spacing across branch	10	0.21	0.011	5.360	0.20	0.24
Distance between aperture centers across fenestrule	4	0.35	0.028	8.219	0.32	0.38
Maximal chamber width	10	0.12	0.010	8.354	0.11	0.14
Node diameter	10	0.05	0.006	12.405	0.04	0.06
Node spacing	10	0.32	0.052	15.961	0.23	0.38
Branches / 10 mm	4	10.00	2.858	30.007	7.00	12.00
Fenestrules / 10 mm	3	9.00	0.577	6.186	9.00	10.00
Apertures / 10 mm	3	16.00	1.155	7.070	15.00	17.00
Apertural nodes diameter	10	0.024	0.006	24.670	0.015	0.035

TABLE 26. — Measurements of *Polypora* aff. *anshunensis* Yang & Lu, 1980.

	N	X	SD	CV	MIN	MAX
Branch width	8	0.50	0.048	9.7620	0.42	0.58
Dissepiment width	7	0.21	0.020	9.7650	0.18	0.23
Fenestrule length	8	0.80	0.062	7.8121	0.72	0.90
Fenestrule width	8	0.44	0.106	24.2030	0.30	0.60
Distance between dissepiment centers	8	1.00	0.060	6.1170	0.90	1.11
Distance between branch centers	8	0.84	0.120	14.151	0.66	0.99
Aperture width	7	0.09	0.006	7.196	0.08	0.10
Aperture spacing along branch	3	0.27	0.038	13.851	0.23	0.30

TABLE 27. — Measurements of *Polypora sinokoninckiana* Yang & Lu, 1962.

	N	X	SD	CV	MIN	MAX
Branch width	10	0.60	0.062	10.245	0.50	0.69
Dissepiment width	14	0.34	0.065	19.150	0.23	0.43
Fenestrule length	11	1.24	0.149	12.004	0.99	1.47
Fenestrule width	13	0.60	0.100	16.209	0.47	0.84
Distance between dissepiment centers	7	1.50	0.144	9.576	1.35	1.76
Distance between branch centers	9	1.02	0.083	8.088	0.90	1.14
Aperture width	26	0.09	0.007	8.102	0.07	0.10
Aperture spacing along branch	31	0.30	0.040	13.300	0.23	0.37
Aperture spacing across branch	27	0.21	0.018	8.685	0.18	0.24
Maximal chamber width	13	0.12	0.016	13.611	0.105	0.17
Node diameter	21	0.04	0.008	19.778	0.025	0.06
Node spacing	17	0.29	0.040	14.118	0.20	0.35
Branches / 10 mm	5	10.00	1.285	13.703	8.00	11.50
Fenestrules / 10 mm	5	6.00	0.899	14.833	5.00	7.00
Apertures / 10 mm	5	18.00	2.537	13.938	16.00	22.00
Apertural nodes diameter	10	0.02	0.006	26.189	0.01	0.03

TABLE 28. — Measurements of *Polypora principalis* Gorjunova, 1975.

	N	X	SD	CV	MIN	MAX
Branch width	2	0.83	0.106	12.857	0.75	0.90
Dissepiment width	4	0.30	0.028	9.547	0.28	0.34
Fenestrule length	3	1.98	0.254	12.862	1.70	2.20
Fenestrule width	3	0.89	0.076	8.483	0.81	0.96
Distance between dissepiment centers	3	2.31	0.351	15.163	1.95	2.65
Aperture width	11	0.08	0.009	11.343	0.06	0.09
Aperture spacing along branch	10	0.35	0.027	7.920	0.29	0.38
Aperture spacing across branch	5	0.25	0.024	9.886	0.22	0.28
Maximal chamber width	6	0.15	0.004	2.743	0.15	0.16

TABLE 29. — Measurements of *Polyporella* sp.

	N	X	SD	CV	MIN	MAX
Branch width	4	0.51	0.032	6.247	0.48	0.54
Dissepiment width	10	0.36	0.035	9.949	0.31	0.42
Fenestrule length	10	0.43	0.030	7.058	0.37	0.48
Fenestrule width	7	0.29	0.061	21.337	0.22	0.40
Distance between dissepiment centers	6	0.74	0.053	7.099	0.69	0.84
Distance between branch centers	5	0.69	0.1034	15.100	0.55	0.84
Aperture width	6	0.08	0.009	11.016	0.07	0.10
Aperture spacing along branch	5	0.34	0.035	10.334	0.30	0.37
Aperture spacing across branch	5	0.27	0.024	8.8102	0.24	0.30
Maximal chamber width	5	0.15	0.006	3.8520	0.14	0.16
Node diameter	5	0.05	0.006	11.877	0.04	0.06

TABLE 30. — Measurements of *Lakkella jamalica* n. gen., n. sp.

	N	X	SD	CV	MIN	MAX
Aperture width	9	0.10	0.012	11.595	0.08	0.12
Acanthostyle diameter	8	0.04	0.011	31.471	0.02	0.05

TABLE 31. — Paleobiogeographical relations of the bryozoan fauna from the Jamal Formation of Lakaftari, central Iran.

Species	Distribution	Age
Fistulipora monticulosa	Transcaucasia, Thailand, Turkey	Middle Permian
F. timorensis	Indonesia, Thailand, Russia, Bolivia, China	Lower to Upper Permian
Eridopora oculata	Timor (Indonesia), Russia	Middle Permian
Ogbinopora orientalis	Tajikistan	Upper Permian
Rectifenestella araxensis n. comb.	Transcaucasia	Middle Permian
R. microretiformis n. comb.	Russia, China	Lower to Middle Permian
Alternifenestella sayensis	Afghanistan	Middle Permian
Minilya perelegans	Pakistan, China	Lower to Middle Permian
Fabifenestella jabiensis	Pakistan, Thailand	?Lower to Upper Permian
F. vediensis n. comb.	Transcaucasia	Middle Permian
Septopora flabellata	Transcaucasia	Middle Permian
Penniretepora afghanica n. sp.	Afghanistan	Middle Permian
Mackinneyella praepluriformis	Transcaucasia, China	Lower to Middle Permian
M. dzhulfensis	Transcaucasia	Middle Permian
M. robustiformis	Transcaucasia	Middle Permian
Polypora soyanensis	Russia, Thailand	Middle Permian
P. darashamensis	Transcaucasia, Thailand	Middle to Upper Permian
P. magnicava	Russia, Thailand	Middle to Upper Permian
P. aff. *anshunensis*	China	Upper Permian
P. sinokoninckiana	China	Middle Permian
P. principalis	Tajikistan, Mongolia	Lower to Middle Permian