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Fistulipora microparallela (Yang and Lu, 1962) from Lower Permian Bryozoans of Lut Block, Central Iran

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Abstract

The *Fistulipora microparallela* (Yang and Lu, 1962) species is described for the first time from the Sakmarian deposits of the Sarab section in Lut Block, Central Iran. This species has been reported only from the Permian (Cisuralian-Guadalupian) of the Qilianshan and Kankerin formations, and the Baliqliq Group (Upper Carboniferous to Lower Permian) of Western Xinjiang, China.

Keywords: *Fistulipora microparallela*, Sakmarian, Sarab section, Central Iran.

1. Introduction

Bryozoans are usually abundant in the Permian sediments of Iran. However, their diversity as well as their stratigraphic and palaeobiogeographic importance has not been thoroughly investigated. Few publications have been made on Iranian Permian bryozoans in the last century. Fantini Sestini [1] described three species from the Permian Ruteh Limestone of the Alborz Mountains (northern Iran). Later, Sakagami [2] described 15 species from the Permian of central Iran (Abadeh region). This fauna displayed a close relation to the Dzhulfan stage, as well as connections to the Permian of Pamir, the Russian platform, Salt Range, Kashmir, South China, and Timor. Four bryozoan faunas from the Permian Jamal Formation of central and northeastern Iran are described in a recent series of publications: (1) Thirty-one bryozoan species were identified from the Permian Jamal Formation exposed in the Lakaftari area of southern Bagher-Abad, northeastern Esfahan and Central Iran [3]. This fauna is regarded as Middle Permian (Murgabian) in age, and shows palaeobiogeographic connections to Australia, Indonesia, Thailand, and Transcaucasia; (2) Six bryozoan species were described from the Permian Jamal Formation in Kuh-e Bagh-e Vang and the Shotori Mountains located in northeastern Iran [4]. This association indicates a Lower Permian age and shows palaeogeographic connections with bryozoan faunas known from Australia and the Urals Mountains; (3) Nine bryozoan species were described from the Permian Jamal Formation outcrop near the village of Chiruk and the Shotori Mountains in northeastern Iran [5].

The bryozoan *Filiramoporina* sp. from the last faunal association shows relations to the Lower Permian of Kansas in North America. Other species are known from the Permian of Afghanistan, Indonesia, the Russian Plate and the Far East; (4) Seven bryozoan species were described from the Jamal Formation exposed near Deh-e Mohammad and the Shotori Mountains (northeastern Iran) displaying palaeobiogeographic connections to the Lower Permian of Pamir (Tajikistan), Indonesia, Thailand, and Kansas in North America [6]. (5) Ten bryozoan species were described from the Surmaq Formation exposed near the Kuh-e Hambast (Hambast Mountains, south of the town of Abadeh, central Iran). The investigated fauna refers to the Middle Permian of Thailand, Pakistan, Indonesia, and Japan [7].

The present paper describes a *Fistulipora microparallela* [8] from the newly studied Sakmarian deposits (chili formation) which is situated in the northeastern portion of the city of Dalgan (27° 42' 15" N, 59° 41' 15" E). Access to the outcrop is via the Iranshahr-Dalgan main road and 30km via the minor road of Jabrabad-Bardok 112 km from Jababad village (Fig. 1).

2. Lithostratigraphy

Permian rocks at this locality nonconformably overlie the Upper Carboniferous of the Absheni formation (Fig. 2). The Absheni formation is composed of sandstones, light-green shales, black limestone, light-brown calcareous dolomite, red shale and green basalt [9]. The Permian at this locality is represented by the Chili formation that contains, at the base, a conglomerate of red shale, quartzarenait, brown dolomite, purple shale,

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sandy limestone and bioclastic limestones, with abundant fusulinids, algae, bryozoans and echinoids. The middle part of the section consists of thin- to medium-bedded grey limestones with intercalated dolomitic limestone with small foraminifers, gastropods and a few bryozoans. The upper part of the section contains light brown dolomites and shale overlying the Middle Permian (Jamal Formation), bauxite and laterite horizon [10].

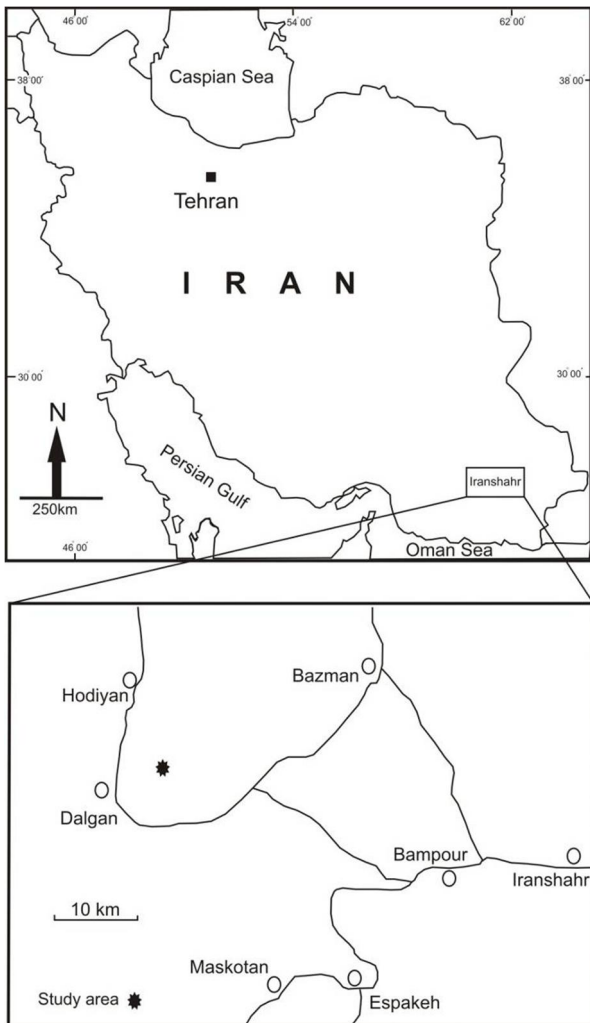


Fig. 1. Geographical position of the Sarab section

3. Material and Methods

The preparatory and analytic techniques employed in our study are standard ones for such investigations [11, 12]. Quantitative aspects, however, require discussion. The measured morphological parameters utilized in the examination of fistuliporacean bryozoans reported here are similar to those of other studies [11-14] (Fig. 3).

Bryozoans were investigated in thin sections using a transmitted light microscope. Statistics were summarized using mathematical mean, sample standard deviation, coefficient of variation, and minimum and maximum value. The studied material includes 12 standard thin sections referring to sample numbers PSH7 and 13-23. The thin sections are housed at the Faculty of Basic Sciences, Islamic Azad University, Zahedan Branch.

4. Systematic palaeontology

Phylum: Bryozoa [16]
 Class: Stenolaemata [17]
 Order: Cystoporata [18]
 Family: Fistuliporidae [19]
 Genus: *Fistulipora* [20]
 Type species: *Fistulipora minor* [20]
Fistulipora microparallela [8]
 Plate 1; Table 1
 Material: PSH.13, 22, 23

Description: Encrusting clony, 0.66-0.78 mm thick. Autozoecia budding from basal lammina at low angles; aperture rounded, having well developed horseshoe-shaped lunaria; diaphragms rare. Vesicles relatively large, polygonal in tangential section, arranged in 1-2 rows between autozoecia, having flat or slightly concave roofs.

Comparison: *Fistulipora microparallela* [8] is similar to *F. timorensis* [15], but differs from it in having smaller apertures (average autozoecia aperture width 0.24 mm vs. 0.30 mm in *F. timorensis*).

Occurrence: Permian (Cisuralian-Guadalupian) of Qilianshan, China. Kankerin Formation and Baliqliq Group (Upper Carboniferous to Lower Permian) of Western Xinjiang, China. Lower Permian (Sakmarian), Dalgan area, southeastern Iran.

Table. 1. Measurements of *Fistulipora microparallela* [8]. Abbreviations: N = number of measurements; X = mean; SD = standard deviation; CV = coefficient variation; MIN = minimal value; MAX = maximal value.

Feature	N	X	SD	CV	MIN	MAX
Aperture Width, mm	15	0.24	0.046	19.27	0.18	0.31
Aperture Spacing, mm	9	0.43	0.041	9.52	0.37	0.48
Lunarium Length, mm	8	0.12	0.012	10.22	0.10	0.13
Lunarium Width, mm	8	0.17	0.014	7.92	0.16	0.19
Vesicle Diameter, mm	10	0.088	0.023	26.70	0.060	0.135
Vesicle Spacing, mm	20	0.077	0.020	26.41	0.045	0.125

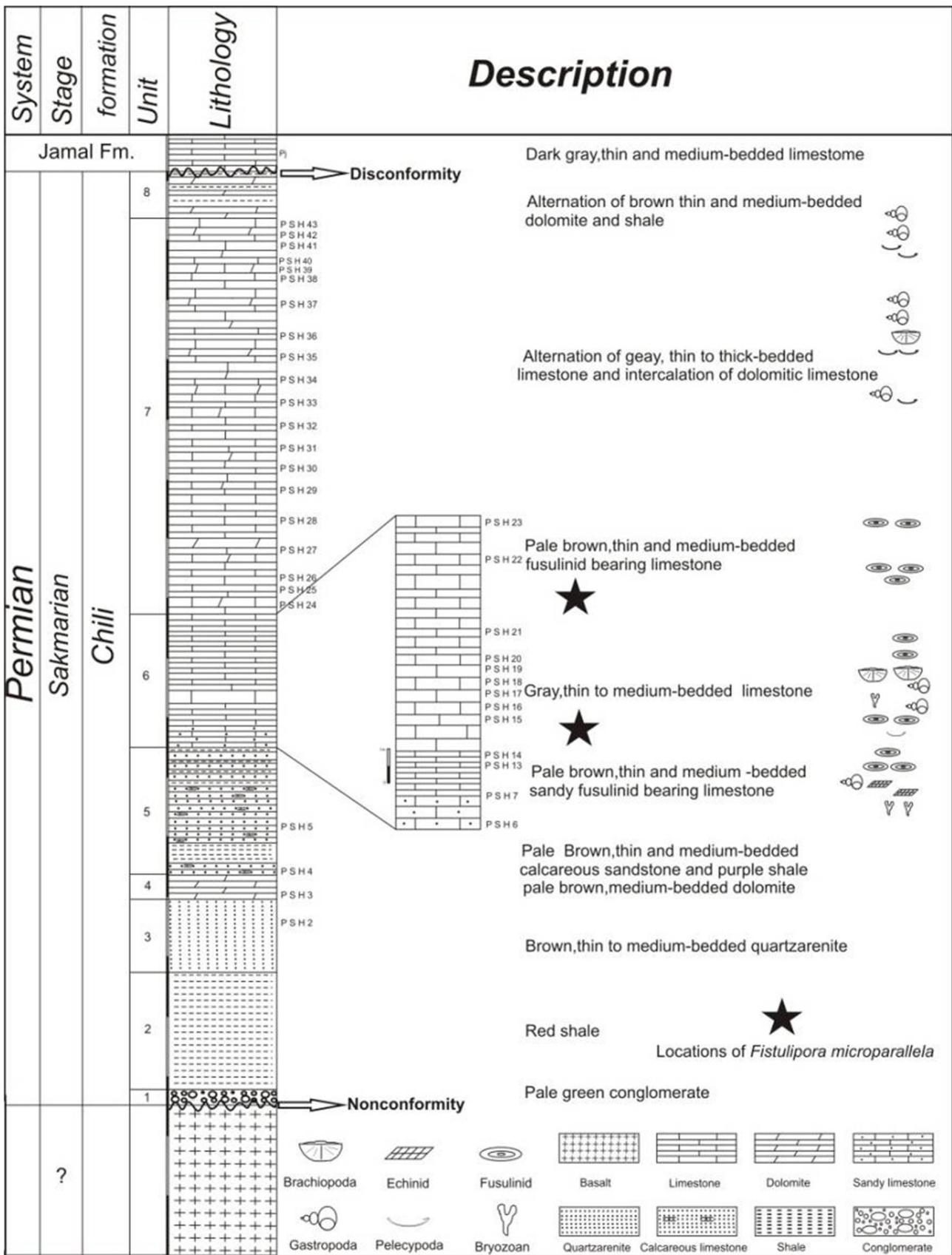


Fig. 2. Stratigraphic column of the Lower Permian (Sakmarian) deposits in Sarab section.

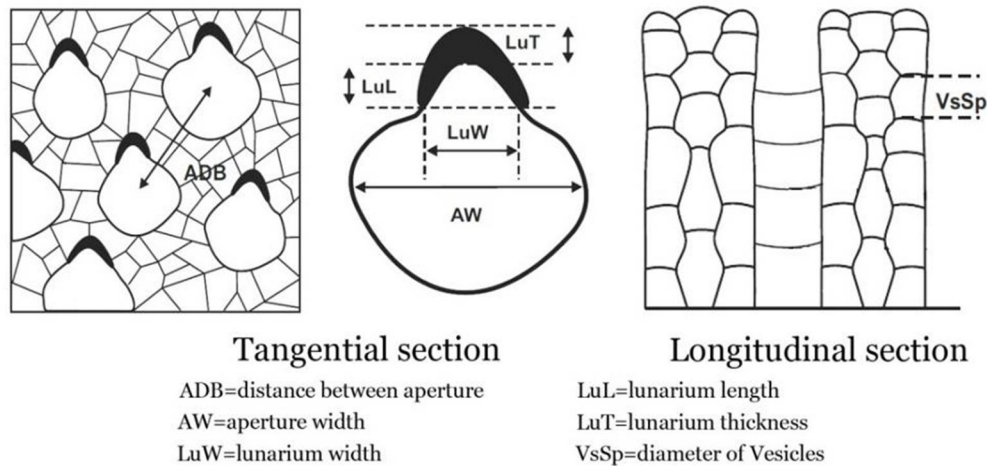


Fig. 3. Sections and external view of a Fisluliporid bryozoan, showing the measured morphological parameters (After [11-14]).

5. Conclusions

In this study, *Fistulipora microparallela* [8] species is described for the first time from the Sakmarian deposits of the Sarab section in Lut Block, Central Iran. This species confirms the age of the sampled part of the section as the Early Permian (Sakmarian) and shows palaeobiogeographic relations to Qilianshan and Western Xinjiang, China.

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References

- [1] Fantini Sestini FN, 1965, The geology of the upper Djadjerud and Lar valleys (north-Iran); II, palaeontology; bryozoans, brachiopods and molluscs from Ruteh limestone (Permian). *Rev Ital paleontologia* 71(1):13-108
- [2] Sakagami, S., 1980, Permian Ectoprocta (Bryozoa) from the Abadeh Region, Central Iran. *Trans Proc Palaeontol Soc Jpn New Ser* 118:269-289
- [3] Ernst, A., Senowbari-Daryan, B. and Hamedani, A., 2006a., Middle Permian Bryozoa from the Lakaftari area, central Iran. *Geodiversitas* 28:543-590
- [4] Ernst, A., Senowbari-Daryan, B. and Rashidi, K., 2006b, Lower Permian Bryozoa of the Jamal Formation from Bagh-e Vang (Shotori Mountains, northeast Iran). *Facies* 52:627-635.
- [5] Ernst, A., Senowbari-Daryan, B., and Rashidi, K., 2008, Permian Bryozoa from the Jamal Formation of Shotori Mountains (northeast Iran). *Rev Paleobiologie* 27(2):395-408
- [6] Ernst, A., Senowbari-Daryan, B. and Rashidi, K., 2009a, Rhabdomesid and cystoporid bryozoans from the Permian of Deh-e Mohammad, Shotori Mountains (north-eastern Iran). *Geobios* 42(2):133-140
- [7] Ernst, A., Senowbari-Daryan, B. and Rashidi, K., 2009b, Bryozoa from the Surmaq Formation (Permian) of the Hambast Mountains, south of Abadeh, central Iran. *Facies* 55:595-608
- [8] Yang, J. and Lu, L., 1962, Paleozoic Bryozoans of Gilianshan- In: *Geology of Gilianshan*, 4: 1-114, Science Press, Beijing. [In Chinese]
- [9] Gorgij, M. N., 2002, Biostratigraphy and sequence stratigraphy of Carboniferous deposits in Central Iran, Ph.D thesis, Isfahan University
- [10] Yarahmadzahi, H., 2011, Fusulinids biostratigraphy and sequence stratigraphy of Lower Permian deposits in Central Iran (Isfahan, Shareza, Abadeh and Yazd areas), PhD thesis, Science and Research Branch, Islamic Azad University, Tehran, Iran.
- [11] Cuffey, R. J., 1967, Bryozoan *Tabulipora carbonaria* in Wreford Megacyclothem (Lower Permian) of Kansas: *Univ. Kansas Paleont. Contrib. Art.* 43 (Bryozoa, art. 1), p. 1-96.
- [12] Newton, G. B., 1971, Rhabdomesid bryozoans of the Wreford Megacyclothem (Wolfcampian, Permian) of Nebraska, Kansas, and Oklahoma: *Univ. Kansas Paleont. Contrib.*, art. 56 (Bryozoa, art. 2), p. 1-71
- [13] Horowitz, A. S., 1968, The ectoproct (bryozoan) genus *Actinotrypa* Ulrich: *Jour. Paleontology*, v. 42, p. 356-373.
- [14] Foerster, B., 1970, Skeletal morphology, variability, and ecology of the bryozoan species *Crisia eburnea* in the modern reefs of Bermuda: Master's Thesis, Pennsylvania State Univ., 212 P.
- [15] Bassler, R.S., 1929, The Permian Bryozoa of Timor. *Palaontologie Timor* 16(28):37-90
- [16] Ehrenberg, C.G., 1831, *Symbolae physicae seu icones et descriptiones corporum Naturalium novorum aut minus cognitorum, quae ex itineribus per libyam, Aegyptum, Nubiam, Dongalaam, Syriam, Arabiam ridiret pars zoologica*, 4, *Animalia Erertebrata exclusis insectis*:1-10 pls-Berolini
- [17] Borg, F., 1926, Studies on recent cyclostomatous Bryozoa *zoologiska Bidlag fran uppsala*, 10:181-507.

- [18] Astrova, G.G., 1964, Bryozoa of the borschov and chortkov horizons of podolia trudy paleontologicheskogo instituta Akademii Nauk SSSR.98:1-52
- [19] Ulrich, E. O., 1882, American Palaeozoic Bryozoa. J. Cincinnati Soc. Nat. Hist., 5:121-175,233-257.

- [20] M'Coy, F., 1849, On some new genera and species of Palaeozoic corals and foraminifera. Ann Mag Nat Hist 3(13):119-136

Plate 1

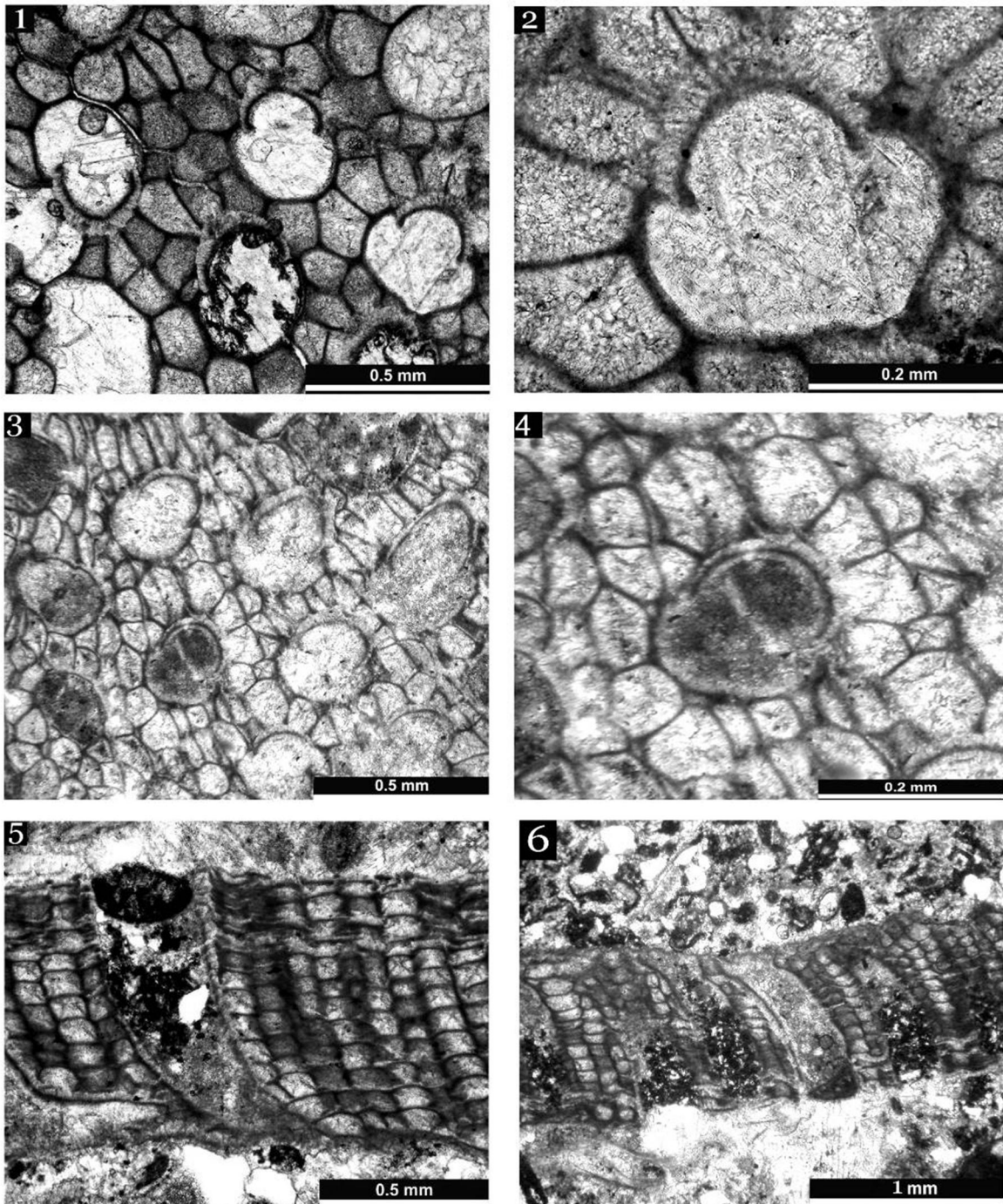


Fig. 1-6. *Fistulipora microparallella* [8]

- 1, 3. Tangential section showing autozooeical apertures
 2, 4. Autozooeical aperture
 5, 6. Longitudinal section showing autozooeical chamber and vesicles