

## ***Sutherlandia hasegawai*, a new species of Late Carboniferous tabulate coral from the Omi Limestone, Niigata Prefecture, central Japan**

Shuji NIKO\*, Yousuke IBARAKI\*\* and Jun-ichi TAZAWA\*\*\*

### **Abstract**

A Moscovian (Late Carboniferous) favositid tabulate coral, *Sutherlandia* was discovered from the Omi Limestone at Fukugakuchi in the Omi area, Niigata Prefecture, central Japan. Morphologic combination of the characteristic proximal squamulae and dimensions of the corallum diameter and the intercorallite wall thickness in the material is identified as *Sutherlandia hasegawai* sp. nov. Comparable taxa with the new species are *Sutherlandia* sp. indet. (Senzai and Niko, 2005) from the allochthonous limestone block in the Tamba Terrane of Kyoto Prefecture and *Sutherlandia alani* Cocke and Bowsher, 1968 from Oklahoma, Midcontinent North America.

*Key words:* Favositidae, Moscovian, Omi Limestone, *Sutherlandia hasegawai*, tabulate coral.

### **Introduction**

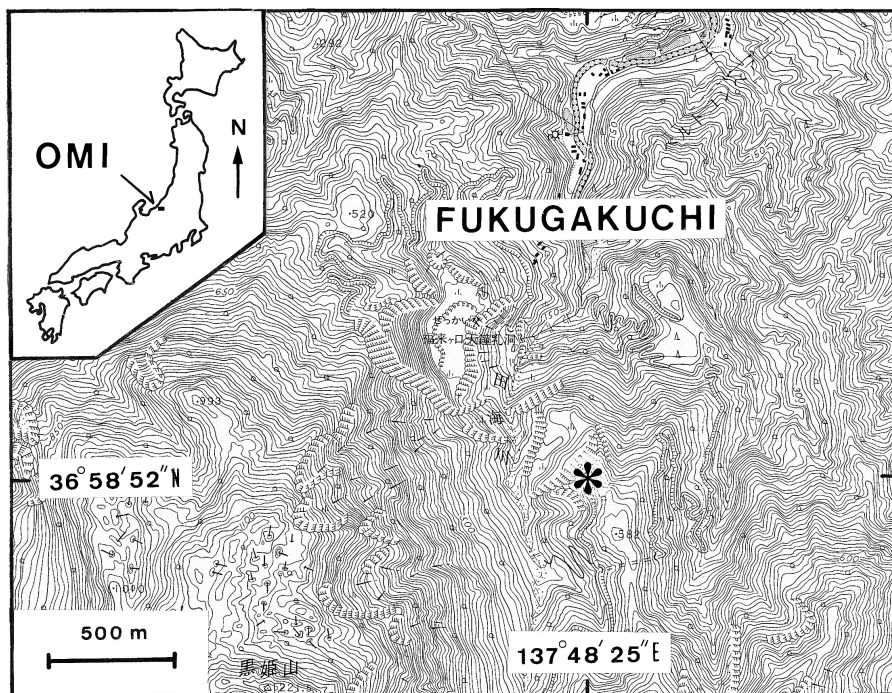
*Sutherlandia* Cocke and Bowsher, 1968 is a relatively rare genus of favositid tabulate corals. Previously known occurrences of *Sutherlandia* in Japan have been represented by only two species, namely *Sutherlandia minatoi* Niko, 2000 from the Fukuji area, Gifu Prefecture and *Sutherlandia* sp. indet. (Senzai and Niko, 2005) from the Oji area, Kyoto Prefecture. Hence the present discovery of a well-preserved specimen referable to the genus in the Omi Limestone deserves mention. The material on which the authors describe here a new species *Sutherlandia*

---

\* Department of Environmental Studies, Faculty of Integrated Arts and Sciences, Hiroshima University, Hiroshima 739-8521, Japan

\*\* Fossa Magna Museum, Ichinomiya 1313, Itoigawa 941-0056, Japan

\*\*\* Department of Geology, Faculty of Science, Niigata University, Niigata 950-2181, Japan  
(Manuscript received 26 December, 2008; accepted 9 February, 2009)



**Fig. 1.** Index map showing the fossil locality of Fukugakuchi in the Omi area, on the topographical map of “Kotaki” scale 1:25,000 published by the Geographical Survey Institution of Japan.

*hasegawai* was collected from grayish-white massive limestone (bioclastic wackestone to grainstone) belonging to the *Fusulina-Fusulinella* Zone (Moscovian, Late Carboniferous) at Fukugakuchi in the Omi area, Niigata Prefecture, central Japan (Fig. 1). Latitude and longitude coordinates (TD) of the fossil locality are 36°58'52" N and 137°48'25" E. The geologic background of the area is given by Hasegawa et al. (1982) and Tazawa et al. (2002).

### Systematic Paleontology

Order Favositida Wedekind, 1937

Suborder Favositina Wedekind, 1937

Superfamily Favositoidea Dana, 1846

Family Favositidae Dana, 1846

Subfamily Emmonsinae Lecompte, 1952

Genus *Sutherlandia* Cocke and Bowsher, 1968

*Type species.*—*Sutherlandia irregularis* Cocke and Bowsher, 1968.

*Sutherlandia hasegawai* sp. nov.

Fig. 2

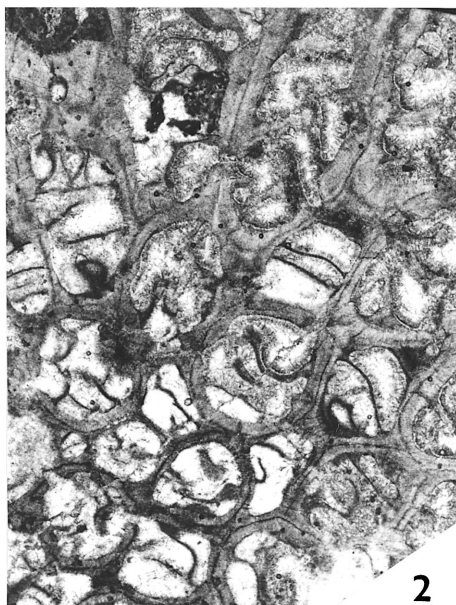
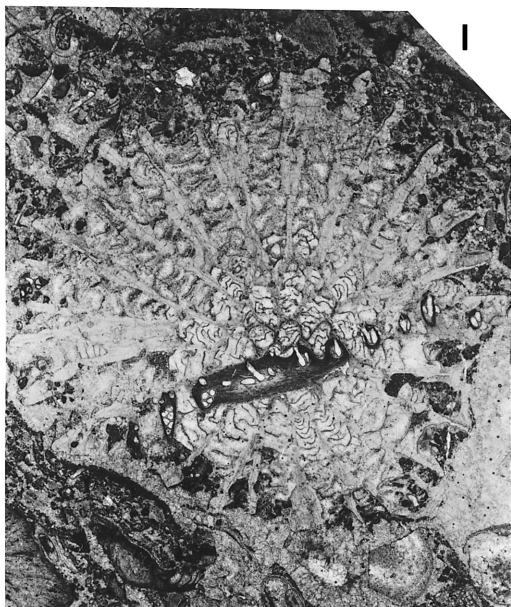
*Etymology.*—The specific name honors Dr. Y. Hasegawa, in recognition of his contributions to geology and fusulinacean biostratigraphy of the Omi Limestone.

*Material.*—Holotype, FMM1755, from which three thin and a single polished sections were prepared. Repository of the specimen is in Fossa Magna Museum, Itoigawa.

*Diagnosis.*—Relatively large species of *Sutherlandia* with 13.2 mm in corallum diameter and approximately 1.5 mm in diameter of adult corallites; intercorallite walls 0.10-0.23 mm in thickness; mural pores abundant, large with  $0.19 \times 0.25$  mm in typical pore; squamulae very long, attaining 0.76 mm in usual length; proximal squamulae up-arched in profile, close, regularly arranged in alternate manner.

*Description.*—Corallum small for subfamily, but relatively large for genus, subspherical, 13.2 mm in diameter, encircling bryozoan branch, cerioid. Except for the most proximal portion of corallum, where corallites adhere to substratum and alveolitoid-like, corallites prismatic with 4-8 sides in transverse section and radial in arrangement; diameters of corallites range from 0.33 to 1.53 mm, with approximately 1.5 mm mean in adult ones; lumina subcircular to subpolygonal in transverse section; calices perpendicularly oriented to corallum surface, moderately deep; increase of new corallites lateral, probably common. Intercorallite walls moderately thickened with 0.10 to 0.23 mm, differentiated into median dark line and stereoplasm; microstructure of stereoplasm is rect-radiate fibers; mural pores abundant, occur at near corallite corners and on corallite faces, large, laterally compressed in profile; typical mural pore has  $0.19 \times 0.25$  mm in diameter; squamulae very long and wide, usually 0.48-0.76 mm in length; in proximal portion of corallite, squamulae composed of thin dark lamella indicating up-arched profiles, then shift to shallowly concave to nearly flat forms, that have stereoplasmic layers on their lower and upper surface, in distal portion of corallite; thus distal squamulae attain 0.19 mm in thickness, whose internal structure consists of three layers; tips of some proximal squamulae are recurved and rarely anastomosed with adjoining one; proximal squamulae close in spacing with a regularity of arrangement in an alternate manner, there are 3-8 squamulae in 1 mm of corallite length at longitudinal section, then this ratio decreases 2-4 in distal portion; septal elements including ridges and spines are replaced by squamulae; apparent tabulae are not detected, but short diaphragms occur between adjoining two squamulae.

*Discussion.*—Among Japanese taxa of *Sutherlandia*, an Early Permian species *Sutherlandia* sp. indet. (Senzai and Niko, 2005, p. 4, 6, figs. 2.1-2.4) from the allochthonous limestone block in the Tamba Terrane appears most similar to the new species in having the up-arched and alternately arranged proximal squamulae. The Permian species is distinguished from *Sutherlandia hasegawai* sp. nov. by its thicker intercorallite walls reaching 0.48 mm, that



form an indistinct peripheral stereozone, whereas those of *S. hasegawai* are 0.10-0.23 mm. *Sutherlandia alani* Cocke and Bowsher (1968, p. 7, figs. 2.5-2.9) from the Upper Carboniferous in Oklahoma, Midcontinent North America is also comparable with *S. hasegawai*, but the former differs by having the smaller coralla (approximately 7-9 mm) and nearly flat profiles in the proximal squamulae.

### Acknowledgments

We are grateful with Mr. Y. Furumi, who provided guidance in the field to collect the material. Dr. I. Niikawa kindly reviewed an earlier draft of this study.

### References

- Cocke, J. M. and Bowsher, A. L., 1968, New tabulate genus *Sutherlandia* (Coelenterata, Anthozoa) from Pennsylvanian of Oklahoma and Kansas. *Univ. Kansas Paleont. Contrib., Pap.*, **33**, 1-8.
- Dana, J.D., 1846, *Structure and classification of zoophytes: U. S. Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842 under the command of Charles Wilkes, U. S. N.*, vol. 7, Lea and Blanchard, Philadelphia, 740 p.
- Hasegawa, Y., Tazawa, J. and Niikawa, I., 1982, The Omi Limestone and adjoining older rocks. In *Guidebook of field excursion at 89th Meeting of the Geological Society of Japan*, 1-23, Geol. Soc. Japan. (in Japanese)
- Lecompte, M., 1952, Madreporaires paléozoïques. In Piveteau, J., ed., *Traité de Paléontologie*, vol. 1, Masson et Cie, Paris, 419-538.
- Niko, S., 2000, Carboniferous tabulate corals from the Fukuji area, Gifu prefecture. *Bull. Natn. Sci. Mus., Tokyo, Ser. C*, **26**, 121-128.
- Senzai, Y. and Niko, S., 2005, An Early Permian tabulate coral *Sutherlandia* from the Tamba Belt in the Oji area, Kameoka City, Kyoto Prefecture, Central Japan. *Chigakukenkkyu*, **54**, 3-7. (in Japanese)
- Tazawa, J., Niikawa, I., Ibaraki, Y. and Hasegawa, Y., 2002, The Omi Limestone and some Paleozoic-Mesozoic formations in the Omi area, central Japan. In *Guidebook of field excursion at 109th Meeting of the Geological Society of Japan*, 27-39, Geol. Soc. Japan. (in Japanese)
- Wedekind, R., 1937, *Einführung in die Grundlagen der historischen Geologie, II. Band. Mikrobiostratigraphie, Die Korallen- und Foraminiferenzeit*, Ferdinand Enke, Stuttgart, 136 p.

---

← **Fig. 2.** *Sutherlandia hasegawai* sp. nov., holotype, FMM1755, thin sections. **1:** longitudinal section of corallum, × 5, **2:** transverse to oblique sections of corallites, × 14, **3:** longitudinal to transverse sections of corallites, note thickened squamulae in distal corallites, × 14, **4:** longitudinal to oblique sections of corallites, note up-arched and alternately arranged squamulae in proximal corallites, × 14, **5:** partial enlargement to show structure of intercorallite wall and squamulae, longitudinal section, × 50.