# ON A NEW SPECIES OF *Wentzelophyllum* HUDSON FROM THE KITAKAMI MOUNTAINS, JAPAN

*by*

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(with 1 plate)

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A thick limestone sequence is widely exposed north of Setamai, Iwate Prefecture, in the southern Kitakami Mountains of northeastern Honshu, Japan. These carbonates are highly recrystallized and until recently no fossils had been recovered from them. In July, 1966, however, the senior author was fortunate enough to find coralline remains in a crystalline limestone within this sequence at a locality near Honoki Pass, NNE of Setamai.

Two species of corals are present; one of these, however, is very poorly preserved and can only be referred to the genus *Yatsengia* HUANG (1932). The second form is described below as a new species of *Wentzelophyllum*.

The geologic horizon of these exposures is not precisely known. The lithic character of immediately subjacent slates, sandstones and conglomerates, although also metamorphosed, is similar to that of the upper part of the Sakamotosawa Series, viz, the *Pseudofusulina* zone. Both *Wentzelophyllum* and *Yetsengia* are common faunal elements in this zone elsewhere in the Kitakami Mountains region and indeed occur at this horizon throughout the Tethys marine province in general.

Notwithstanding the absence of additional age indicators, it thus appears probable that these corals were collected from strata approximately equivalent to the *Pseudofusulina* zone.

## Genus ***Wentzelophyllum*** HUDSON, 1958

1958 *Wentzelophyllum* HUDSON, p. 136
1962 *Wentzellophyllum* (sic) YÜ p. 8–10
1965 *Wentzelophyllum* MINATO and KATO, p. 198–200
Type species: *Lonsdaleia volzi* YABE and HAYASAKA, 1915

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*Remarks:* As was described by M. MINATO in cooperation with Dr. M. KATO (1965), *Wentzelophyllum* HUDSON is easily separable from the genus *Wentzelella* GRABAU (1932) including the subgenus *Szechuanophyllum* WANG, (1957) by differences in the nature of corallite walls, more extensive development of lonsdaleoid dissepiments and less well developed tertiary septa.

From *Polythecalis* YABE and HAYASAKA (1916) *Wentzelophyllum* sometimes is difficult to distinguish, but there actually are numerous differences. For example, corallite walls usually are of the beaded type in *Wentzelophyllum* and even in species in which the walls are atypical of the genus, mural septa are commonly somewhat shorter than those of *Polythecalis*. In addition, the walls of the present genus may be locally surpressed but nevertheless are present throughout most of the corallum, whereas *Polythecalis* is an almost completely aphroid form. A further difference is in the shape of corallites, which tend to be regularly prismatic in *Wentzelophyllum;* in *Polythecalis*, corallite walls, where retained, are irregularly polygonal and are typically more or less curved in transverse sections. Septa in the genus *Wentzelophyllum* grow from the boundary between the tabularium and cystose zone, within the cystose zone, or, less commonly, from the corallite wall (even in the mature stage). In contrast, the septate zone of *Polythecalis* is usually, although not invariably, distinct from the cystose zone.

It should also be noted that in *Polythecalis* lonsdaleoid dissepiments are in general highly convex or subspherical in cross section and rather uniform in size throughout the peripheral area. In *Wentzelophyllum*, lonsdaleoid disepiments are variable in size and distribution: in places, groups of small, densely distributed dissepiments occur, while larger ones also tend to occur in local groups, especially in areas where two or three neighboring corallites join. Smaller disepiments in this genus have rather depressed or flattened outlines in cross section, while the larger vesicles are irregularly curved on their cut edges.

The density of crestal septa in the lonsdaleoid dissepimentarium may provide another criterion useful in distinguishing *Wentzelophyllum* from *Polythecalis*. In most species of the latter described by HUANG (1932), TSENG (1950), ZHAO, and CHEN (1962) from the Chihsia Formation, including *P. chinensis* (GIRTY, 1907) crestal septa are incipient or virtually absent. In the type species of *Polythecalis*, *P. confluens* YABE and HAYASAKA (1916) a few short crestal septa are developed on lonsdaleoid dissepiments, especially near the wall. Thus, while crestal septa undoubtedly must be included in the diagnosis of *Polythecalis*, they are in general far less numerous than in *Wentzelophyllum*.

## ***Wentzelophyllum kitakamiense*** n. sp.

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*Specific diagnosis: Wentzelophyllum* with a distinct inner wall between the tabularium and a cystose zone of lonsdaleoid dissepiments. Septa are uniformly thick throughout their lengths. The axial structure is small and simply constructed.
*Material.*—Holotype (UHR 18472) consists of a limestone slab and three thin sections (UHR 18472a, b, and c).
*Type locality and geological horizon.*—Crystalline limestones exposed about 300 m SW of Honoki Pass, approximately 4 km NNE of Setamai, Kesen-gun, Iwate Prefecture, NE Honshu, Japan. This horizon possibly corresponds to the *Pseudofusulina* zone of the Lower Permian Sakamotosawa Series. *Coll.*, M. MINATO.
*Derivation of specific name.*—From the Kitakami Mountains of northeastern Honshu, Japan.
*Description.*—The limestone in which these corals occur in extensively recrystallized and preservation consequently is poor. The outer form and ornamentation of the corallum is unknown, microstructure is almost obliterated, and many corallites are slightly compressed. The following description is based on the study of cut surfaces and several thin sections.

The corallum is massive, and corallites are irregularly prismatic; comparatively large corallites are irregularly hexagonal or pentagonal in cross section, while smaller corallites, which may be the products of intermural increase, tend to be tetragonal or triangular in outline. Corallite walls, where retained, are generally thin and curved rather than straight as is typical of most cerioid corals. Walls are locally beaded, i.e., consist of a thin, minutely undulating wall with low, rounded mural septa. In places walls are finely sinuous or zig-zag and have short, triangular mural septa that may in part represent tertiary septa.

Major septa are of moderate and uniform thickness throughout their lengths. They are generally straight or only slightly curved near their axial ends. Major septa originate from the inner margin of the cystose zone rather than from the corallite walls; the dissepimentarium thus contains only a few crestal septa. In most corallites, 14 to 15 major septa are present, which is near the maximum number observed.

Minor septa are 1/3 to 1/2 the length of major septa and regularly alternate with them.

The axial structure is very small: for example, in a corallite with a tabularium diameter of 4.5 to 5.5 mm the diameter of the axial structure is 0.8 to 1.2 mm; in an obliquely cut corallite with a tabularium diameter of 4.5 to about 12.0 mm, the axial structure is only 1.5 to 2.0 mm across. The maximum recorded diameter of an axial structure is 2.0×2.0 mm in a corallite in which the tabularium diameter is approximately 5.0 to 6.4 mm. In outline, the axial structure is oval to subelliptical; it is composed of a few irregularly disposed septal lamellae and axial tabellae. A median plate is present but commonly thin and indistinct. The overall dense appearence of the axial structure is primarily due to the rather thick septal lamellae and tabellae; in this respect this coral is similar to some cerioid waagenophyllid corals with tertiary and quaternary septa such as *Wentzelella* (including *Szechuanophyllum*) and *Wentzelloides*.

Dissepiments are concentric or slightly inclined (anguloconcentric) and are arranged in four or five rows. Lonsdaleoid dissepiments occupy the wide peripheral area: most of these are small but locally large dissepiments are developed where two or three adjacent corallites join. Large lonsdaleoid dissepiments are irregularly circular in outline, while smaller ones are typically elongated or flattened in cross section. All dissepimenst have, in transverse sections, a directional " fluid " appearence that may be due in part to deformation of the corallum.

Crestal septa are not uniformly distributed throughout the entire peripheral area but locally are well developed, especially on lonsdaleoid dissepiments near the corallite walls and on the larger lonsdaleoid dissepimetns.

The boundary between the peripheral area and tabularium is marked by an almost circular inner wall formed by the concentrically arranged inner surfaces of lonsdaleoid dissepiments. Non-crestal septa originate from this wall and are only rarely present peripherally.

Longitudinal sections of this specimen were not obtainable and longitudinal characters consequently are not known.

*Remarks*: Because of the lack of longitudinal sections, the presence of clinotabulae and elongate dissepiments is uncertain. However, some interseptal " dissepiments " situated at the outer margin of the tabularium may in fact be elongate dissepiments, judging from the curvature of their cut edges. Similarly, certain strongly concave " tabulae " may actually represent clinotabulae.

This species can be assigned with confidence to the genus *Wentzelophyllum* on the basis of its beaded corallite walls and extensive retention of walls throughout the corallum. The presence of tertiary mural septa, lonsdaleoid dissepiments of variable sizes and with flattened outlines, irregularly polygonal corallites and curved corallite walls precludes assignment to *Polythecalis*, as is discussed above.

This species most nearly resembles the type species of *Wentzelophyllum*, especially the subspecies described by HUANG (1932, p. 69) as " *Stylidophyllum* " *volzi* mut. *gamma* from the Permian of Southern China. Although HUANG's species

is also characterized by a septal zone that is sharply defined from the crystose zone and has moderately thick septa, it can be distinguished from *Wentzelophyllum kitakamiense* n. sp. by its consistently much longer minor septa.

" *Stylidophyllum* " *kueichowense* HUANG (1932, p. 70), and in particular " S." *kueichowense* var. *beta* (DOUGLAS, 1950, p. 16) is also similar to the present species with respect to its irregularly and thinly constructed walls and comparatively few septa. It can be distinguished from *Wentzelophyllum kitakamiense* n. sp. however, by its relatively much narrower tabularium.

In general, all varieties of " *Stylidophyllum* " *kueichowense* are characterized by septa that are quite thick at the boundary between the tabularium and dissepimentarium and thin towards both ends: in addition, the dissepimental zone is septate in the type species of *Wentzelophyllum*. Thus the present form is distinguishable from both the *W. volvi* (*sensu stricto*) form and the *W.* (*Stylidophyllum*) *kueichowense* varieties. *Wentzelophyllum kitakamiense* n. sp. differs from *W. hayasakai* MINATO and KATO (1965, p. 207), from the Lower Permian Sakamoto-sawa Series of the Kitakami Mountains, in which septa are very thick at the boundary between the tabularium and dissepimentarium. The new species also lacks the highly septate dissepimentarium of *W. hayasakai*.

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# PLATE 43 AND EXPLANATION

## Explanation of Plate 43

*Wentzelophyllum kitakamiense* MINATO and ROWETT, n. sp. × 4 Cross section, UHR. 18472c
Loc: About 300 m SW of Honoki Pass, approximately 4 km NNE of Setamai, Kitakami Mountains, NE. Honshu, Japan.
Horizon: Sakamotosawa Series, possibly *Pseudofusulina* zone.

**Plate 43**