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Morphological study of the freshwater red alga, *Caloglossa leprieurii* (MONT.) J. AG. var. *angusta* JAO (Rhodophyta, Ceramiales) from China

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The isotype specimen of *Caloglossa leprieurii* (MONT.) J. AG. var. *angusta* JAO (1941), No. SC1105 (Fig. 1) was examined again and the structures of the vegetative organs are observed in detail. Based on the manner of the secondary branch development, the present variety belongs to *C. leprieurii*.

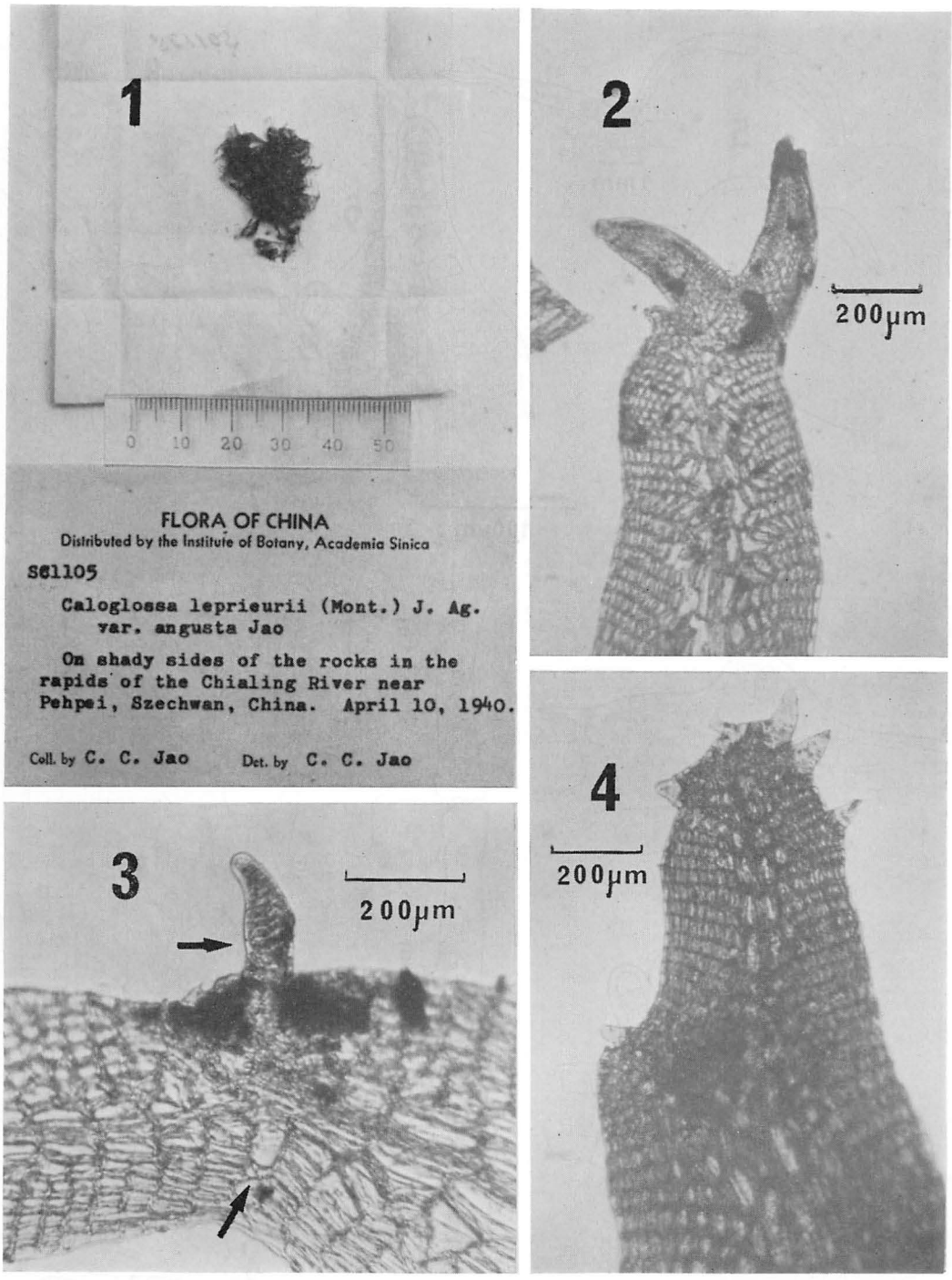
Key Index Words: Caloglossa leprieurii var. angusta; *China*; *freshwater Rhodophyta*; *morphology*.

The morphological studies of the genus *Caloglossa* have been reported by various workers. POST (1936) emphasized that as the characteristic of the species rank, *Caloglossa leprieurii* (MONT.) J. AGARDH had the secondary proliferated leafy branch, which was always formed endogenously from the midrib at the node. While in *Caloglossa ogasawaraensis* OKAMURA, the secondary proliferated leafy branches are exogenously formed at the margin of the leafy branch. OKAMURA (1897, 1951) also mentioned that *C. leprieurii* had the secondary proliferated leafy branches endogenously formed, while *C. ogasawaraensis* had those formed exogenously. In other words, *C. ogasawaraensis* distinguishes from *C. leprieurii* in having the secondary proliferated leafy branches formed endogenously. PAPENFUSS (1961) reported that the secondary proliferated leafy branches of *C. leprieurii* were endogenously formed from central cell of the midrib. KUMANO (1978) described that many secondary proliferated branches were exogenously formed at the margin of the leafy branches of *C. ogasawaraensis* var. *latifolia*. JAO (1941) described that the fronds of *C. leprieurii* var. *angusta* were proliferous from both midribs and margins. He assigned this variety to *C. leprieurii*.

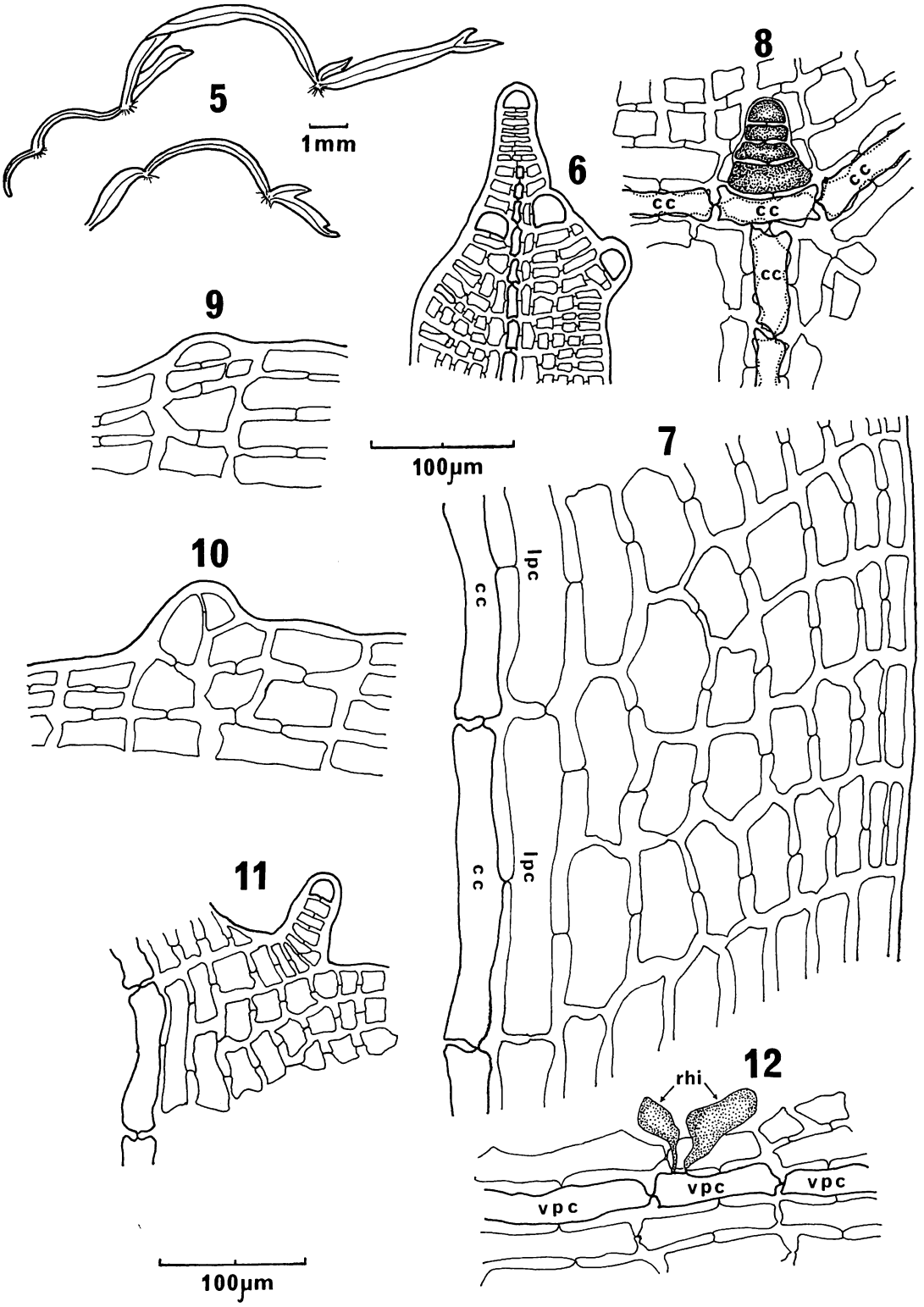
Observations

Caloglossa leprieurii (MONT.) J. AG. var. *angusta* JAO, Figs. 1-12. Examined specimen: specimens of the frond were collected on the shady sides of the rocks in the rapids of the Chialing River near Pehpei, Szechwan, China, on April 10, 1940. The fronds were growing very abundantly. Collector C. C. JAO, specimen No. SC1105 isotype (Fig. 1).

Fronds are ca. 2 cm high, brownish-red tufted and creepingly stolon-shaped. Leafy branches are ca. 3.0-7.3 mm long, ca. 0.5-0.8 mm width, regulary downwards arcuated, linear and slightly or not at all constricted at the node (Figs. 1, 5). A dome-shaped apical cell of primary leafy branches cuts off segments by transverse division. Each segment cell undergoes divisions into a cen-



Figs. 1–4. *Calogloss aleprieurii* (MONT.) J. AG. var. *angusta* JAO. 1. Herbarium specimen of SC1105; 2. Apical portion of fronds, showing dichotomous primary branches; 3. Two secondary proliferated leafy branches arising from the central cell at the node of the primary branch; 4. The uppermost portion of a leafy branch, showing small secondary proliferated leafy branches arising exogenously at the margin.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tral cell, four pericentral cells and lateral cells of the wing (Fig. 6). Thus lateral cells become monostromatically arranged with usually 4 rows per a central cell on each side of the wings. The lowermost row of lateral cells consists of 8 cells (Fig. 7). The ramification is dichotomous, but the two arms of the primary branches are not equal in their size. One arm is often completely suppressed, so that ramification becomes frequently pseudodichotomous (Figs. 2, 5). Secondary proliferated leafy branches are endogenously formed at the node from the dorsal side of the central cell (Figs. 3, 8). Secondary proliferated leafy branches are also exogenously formed at the internode from the lateral cell of the marginal portion. In the case of the latter, many secondary leafy branches are produced from the upper portion of the primary leafy branch (Figs. 4, 9-11). Initial cells of rhizoids are formed as knob-like protuberences from the ventral pericentral cells at the node (Fig. 12). They are divided and result in unbranched filamentous rhizoids. A cluster of rhizoids consists of 4-5 filaments.

Discussions

POST (1936) emphasized that as the characteristic of the species rank, *C. leprieurii* and *C. leprieurii* var. *hookeri* had the secondary proliferated leafy branch, which was always formed endogenously from the midrib at the node. The former species had 2 or 4 such leafy branches and the latter variety had more than 4 whorl-like leafy branches around the short stem. While in *C. ogasawaraensis*, the secondary proliferated leafy branches are exogenously formed at the margin of the primary leafy branch. OKAMURA (1897, 1951) also mentioned that *C. leprieurii* had secondary proliferated leafy branches endogenously, while the *C. ogasawaraensis* had those formed exogenously, and this is a criterion to distinguish from *C. leprieurii* and *C. ogasawaraensis*. PAPENFUSS (1961) reported that the secondary proliferated leafy branches of *C. leprieurii* were endogenously formed from the central cells of the midrib. KUMANO (1978) described that many secondary proliferated branches were exogenously formed at the margin of the leafy branches of *C. ogasawaraensis* var. *latifolia*. JAO (1941) described that the fronds of *C. leprieurii* var. *angusta* were sometimes proliferous from both midribs and margins. He assigned this variety to *C. leprieurii* on the basis of the presence of the secondary leafy branches formed endogenously from the midrib.

In the present study it is observed that the secondary proliferated leafy branches of *C. leprieurii* var. *angusta* are endogenously formed from the midrib, and also exogenously at the margin of the leafy branches. Although the endogenous formation of the secondary proliferated leafy branches are observed less frequently than the exogenous, the endogenous formation is considered more important characteristic to distinguish *C. leprieurii* from *C. ogasawaraensis*, because the endogenous formation is more a fundamental manner of the ramification than the exogenous one. The present authors agree

Figs. 5-12. *Caloglossa leprieurii* (MONT.) J. AG. var. *angusta* JAO. 5. Creeping stolon-shaped primary leafy branches, showing regularly downwards arcuated, linear and pseudodichotomous branches, and clusters of rhizoids at the ventral side of the nodes; 6. Apical portion of the primary leafy branch; 7. Surface-view of the half of the wing of the primary leafy branch, showing glateral cells arranged in 4 rows per one central cell and the lowermost row consisting of cells of lateral cells. Transverse pericentral cells are not illustrated; 8. Early stage in the development of the secondary endogenous leafy branch arising from a central cell at the dorsal side of the node; 9-11. Succession stages in early development of the secondary exogenous leafy branches arising at the margin of the internode; 12. Formation of rhizoids, showing two knob-like cells in early stage from the ventral pericentral cell. (cc: central cell, lpc: lateral pericentral cell, rhi: initial stage of rhizoids, vpc: ventral pericentral cell)

with JAO's opinion (1941) that the present variety belongs to the *C. leprieurii*.

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瀬戸良三*・饒　欽止: 中国産淡水紅藻類アヤギヌ属の1変種 *Caloglossa leprieurii* (MONT.) J. AG. var. *angusta* JAO (紅藻類，イギス目) の形態学的研究**

中国四川省，北ペイ，嘉陵江産のアヤギヌ属の1変種 *Caloglossa leprieurii* (MONT.) J. AG. var. *angusta* の基準標本 No. SC1105 の栄養器官を形態学的に研究した。本属の種段階における分類学上の大きな特徴として，二次的葉状枝の形成に2つの異なる様式があることが知られている。本変種は，その二次的葉状枝の形成において2つの異なる様式を併せ持っている。すなわち，その1つは，一次葉状枝の節部中肋の中心細胞から内生的に二次的葉状枝を発出する様式と，他の1つは，一次葉状枝の節間の周辺から外生的に二次的葉状枝を発出する様式とである。筆者らは，前者の発生様式が，分枝においてより基本的であるとの判断に基いて，本変種が，*Caloglossa leprieurii* に属するものであることを，再確認した。(*662 西宮市岡田山 4-1，神戸女学院大学研究所，**中華人民共和国湖北省武漢，中国科学院水生生物研究所)