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# On Two Species Of *Cololejeunea (Pedinolejeunea)* New To India

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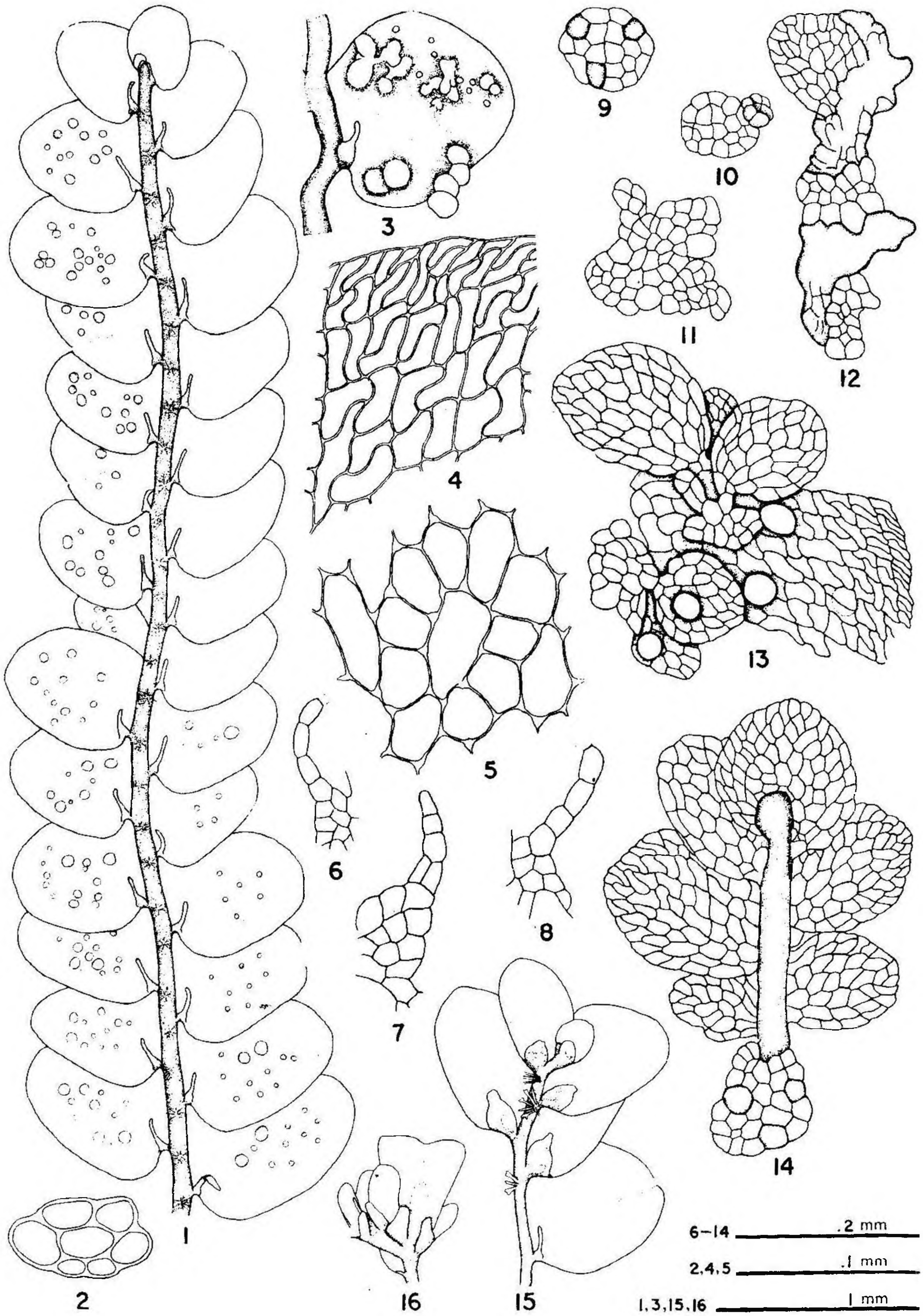
*Cololejeunea formosana* Mizutani and *C.sigmoidea* Jovet-Ast *et* Tixier belonging to the subgenus *Pedinolejeunea*, growing epiphyllously are recorded for the first time from India, the former in dense forests of Periakulam at Kodaikanal (Tamil Nadu) and Arunachal Pradesh and latter from Jog Falls (Karnataka). The species are characterised by linear-flexuose marginal cells - characteristic of the subgenus *Pedinolejeunea*.*C.formosana* is monoecious and has ciliate lobule with inflated base whereas *C.sigmoidea* has highly reduced one-celled lobule which is often absent. The Indian population, however, contain few leaves with well developed inflated lobule which may represent antheridial bracts.

During the study of collections from eastern Himalayas and south India, two epiphyllous taxa, belonging to the subgenus *Pedinolejeunea* were noted. These are, *C.formosana* Mizutani previously known from Formosa, Japan, Ryukyu Archipelago (Mizutani, 1961) and *C.sigmoidea* Jovet-Ast *et* Tixier from Vietnam, Borneo, Indo-China and Ryukyu Archipelago (Jovet-Ast & Tixier, 1962 and Mizutani, 1978). We have collected the taxa from Arunachal Pradesh, Tamil Nadu (Periakulam) and Karnataka (Jog Falls). With this addition, we have recorded a total of 7 taxa of the subgenus *Pedinolejeunea* in this country (Udar *et al.*, 1985).

**TAXONOMIC DESCRIPTION** 1. *Cololejeunea (Pedinolejeunea) formosana* Mitzutani, J.Hatt. Bot. Lab.24:250, 1961.

*Leptocolea ciliatilobula* Horik. J. Sci. Hiroshima Univ. ser. b.div.2.1:90, 1932; non *Cololejeunea ciliatilobula* Schiffn. 1893. (Figs.1-16)

Plants yellowish-green, appressed to the substratum. Stem 8 mm long, 1.2 - 1.5 mm wide with leaves, less branched, 0.08 mm across diameter, with 6 cortical cells, 13x10-30x24 µm and one medullary cell, 27x17 µm, ventral cells of the cortex smaller than other cortical and medullary cells. Rhizoids grouped, hyaline. Leaves imbricate, widely-obliquely spreading, leaf-lobe orbicular, margin entire, 0.5 - 0.8 mm long, 0.3 - 0.5 mm wide, both dorsal and ventral margins arched, marginal cells small, hyaline, linear-flexuose, 12-29x8-25 µm; median cells rectangular-polygonal, 20-33x12- 21 µm, trigones present, intermediate nodular thickenings absent, basal cells elongated, hexagonal 32-62x20-33 µm, cuticle smooth, leaf-lobule small, 8-15 celled, first tooth ciliate, composed of 4-6 cells in a single row, hyaline papilla at the tip of the tooth, second tooth absent, stylus absent. Gemmae numerous, discoid, 73-82 µm in diameter, about 14-21 celled, with three mamillose cells; germinated gemmae with young plant-lets also present. MONOECIOUS. Male inflorescence terminal, bracts in 2-3 pairs, similar to the vegetative leaves, lobule not ciliate but large and saccate, 1-3 antheridia per bract. Female inflorescence terminal with one subfloral innovation which is again floriferous, female bracts in one pair, the lobe of female bract smaller than the leaf-lobe, margin entire, lobule of female bract ligulate. Perianth obcordate,




Figs. 1-16. *Cololejeunea formosana* Mizutani. 1. A vegetative axis. 2. Cross-section of the stem. 3. A leaf with gemmae. 4. Marginal leaf-cells (linear-flexuose). 5. Basal leaf-cells. 6-8. Leaf loubles. 9. A gemma with three mamillose cells. 10-13. Germinated gemmae at different stages. 14. A young plant axis arising from gemma. 15. A plant portion showing male bracts. 16. Perianth.

compressed, 0.54x0.40 mm, apex truncate, dorsal and ventral plicae absent, two lateral plicae sharp, mature sporophyte not seen.

**Type Locality**: Formosa; **Habitat**: Foliicolous;

**Range**: Formosa, Japan, Ryukyu Archipelago, India (Arunachal Pradesh and Tamil Nadu).

**Specimens examined**: LWU 6811/81; **Locality**: Tirap (Arunachal Pradesh), **Habitat**: Foliicolous, Leg.: D.K. Singh, January-February, 1981; LWU 7255/83, LWU 7256/83, LWU 7257/83, LWU 7262/83, LWU 7267/83, **Locality**: Periakulam (Kodaikanal), **Habitat**: Foliicolous, Leg.: R.Udar & Party, October 1, 1983.

2. - ***Cololejeunea (Pedinolejeunea) sigmoidea***, Jovet-Ast *et* Tixier, Revue Bryol.Lichenol 31:27, 1962. (Figs.17-26)

Plants hyaline, strongly appressed to the substratum . Stem 2-3 mm long, 0.06-0.08 mm wide with leaves, less branched, 0.06 mm across diameter. Rhizoids grouped, hyaline. Leaves imbricate, widely-obliquely spreading, leaf-lobe orbicular, margin entire, 0.36-0.43 mm long, 0.25-0.36 mm wide, both dorsal and ventral margins arched, marginal cells small, hyaline, linear-flexuose, 12-29x8-12 µm, median cells rectangular-polygonal, 20-29x12-21 µm, trigones small, intermediate nodular thickenings absent, basal cells elongated, hexagonal, 24-40x16-25 µm, cuticle smooth, leaf-lobule very small, unicellular, occasionally 2-few celled, rarely absent, stylus unicellular, hyaline. Gemmae not seen. DIOECIOUS ? Male inflorescence intercalary in position on main axis, bracts in 2-3 pairs, similar to vegetative leaves but with large and inflated lobule. Female inflorescence not known.

**Type Locality**: Benom (Viet-Nam); **Habitat**; Foliicolous

**Range**: Viet-Nam, Borneo, Indo-China, Ryukyu Archipelago, India (Karnataka)

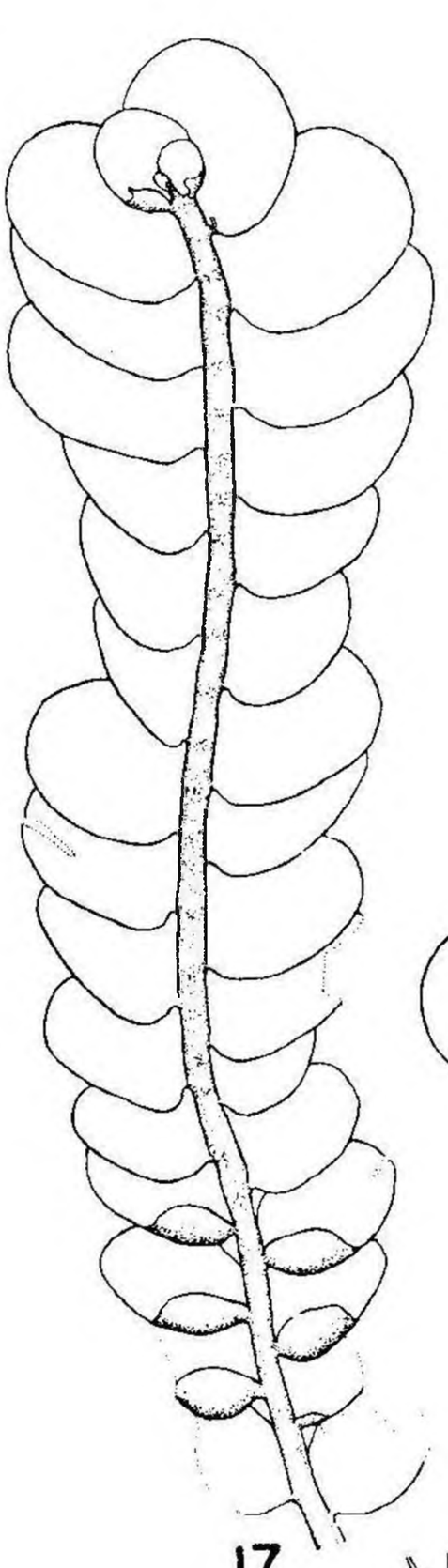
**Specimens examined**: LWU 3761/40, LWU 3763/40, LWU 3776/40.

**Locality**: Jog Falls (Karnataka), **Habitat**: Foliicolous, Leg.: S.K.Pande, January 5, 1940.

**DISCUSSION** *Cololejeunea formosana* Mizutani, *C.sigmoidea* Jovet-Ast *et* Tixier and *C. desciscens* Steph. are three closely related Asiatic species which share a common characteristic of marginal linear-flexuose cells in the leaf but differ in their lobule and stylus morphology. *C.formosana* has ciliate lobule and no stylus; *C.sigmoidea* has unicellular lobule (often absent) and unicellular stylus whereas *C.desciscens* has 3-4 cells long setose stylus and the lobule is entirely absent (Mizutani, 1965). Of these, the former two taxa have been reported from India for the first time.

The plants of *C.formosana* (Figs.1-16) have characteristic flexuose cells (Fig.4) and ciliate lobule which is broader at base and uniseriate at apex (Fig.6-8). There is copious formation of gemmae (Figs.1,3), which develop into a young plant-let through different stages of their germination (Figs.9-14). Monoecious sexuality has been reported for this taxon but in Indian populations, the male and female inflorescences were not seen on the same plant but on isolated pieces (Fig.15,16). The population from Arunachal Pradesh was in a poor state. Only a portion of the axis, along with one leaf attached was seen while the rest of the plant was decaying (Fig.3). The south Indian population contained, healthy plants (Fig.1). The characteristic linear-flexuose cells along with the ciliate lobule helped in the identification of this taxon.

*C. sigmoidea* (Figs.17-26) collected from Jog Falls, was studied. The plants were collected by the late Professor S.K.Pande some four decades ago and as they were delicate, it was not possible to obtain a satisfactory section of the axis. However, the axis had a generalised anatomy of five cortical and one medullary cells (see Jovet-Ast & Tixier, 1962). Only sterile plants of this taxon are known so far; as a con-



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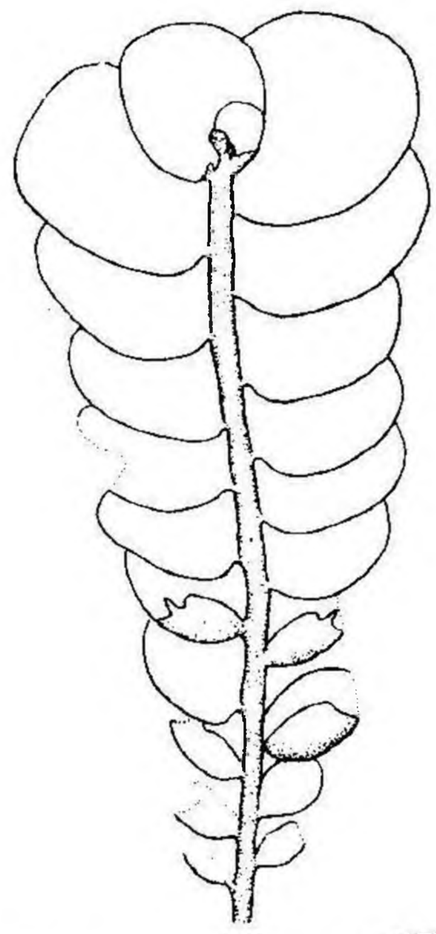

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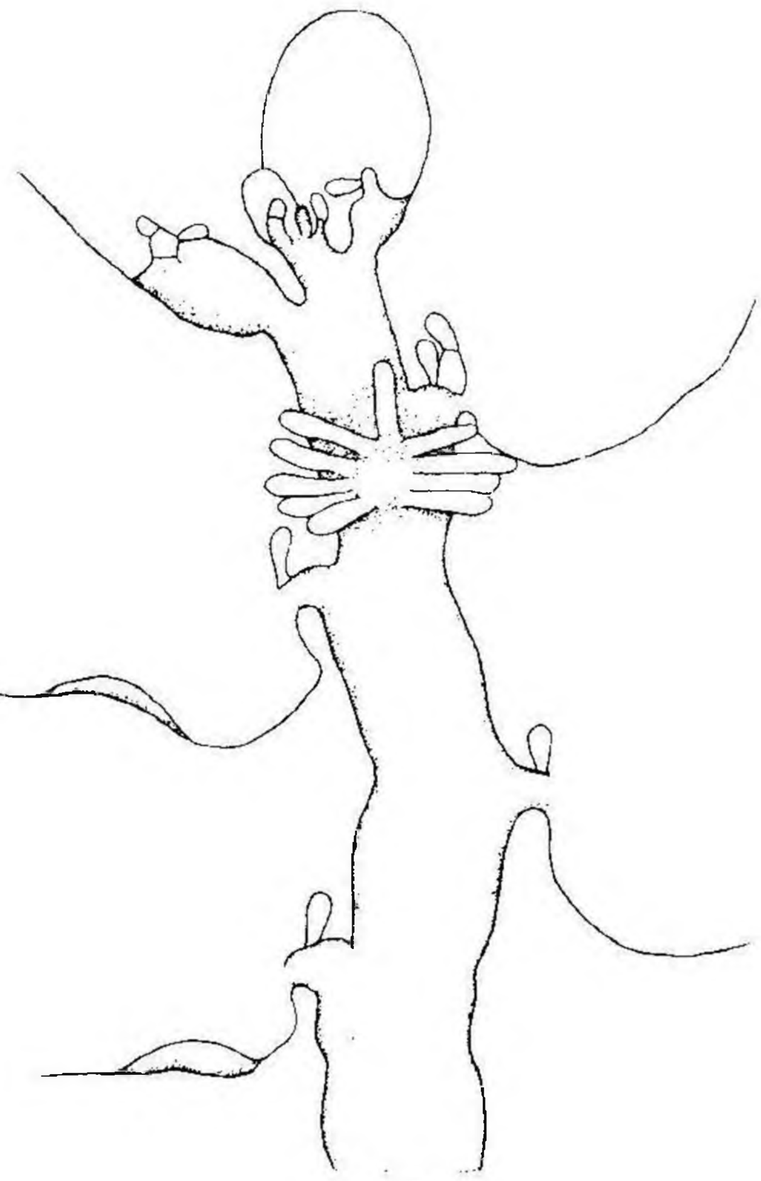

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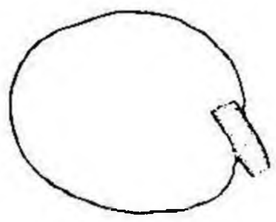

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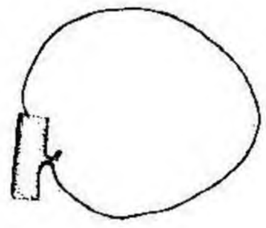

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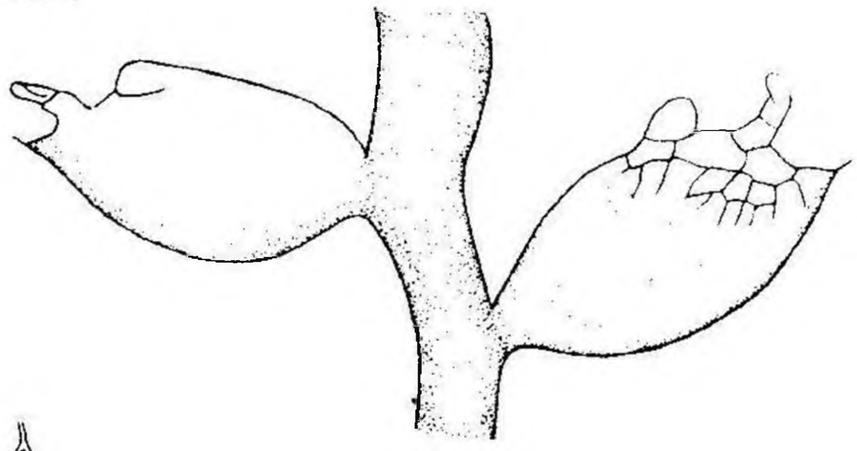

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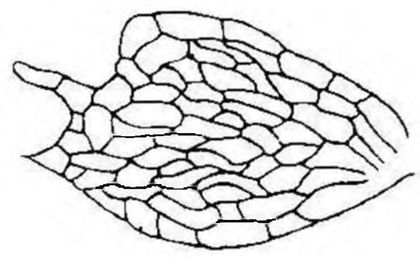

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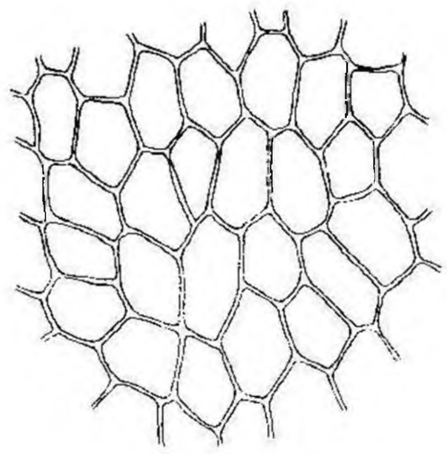

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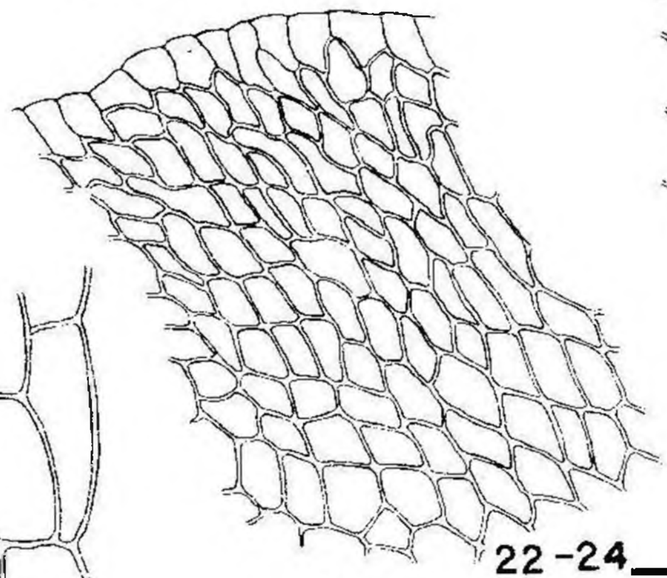

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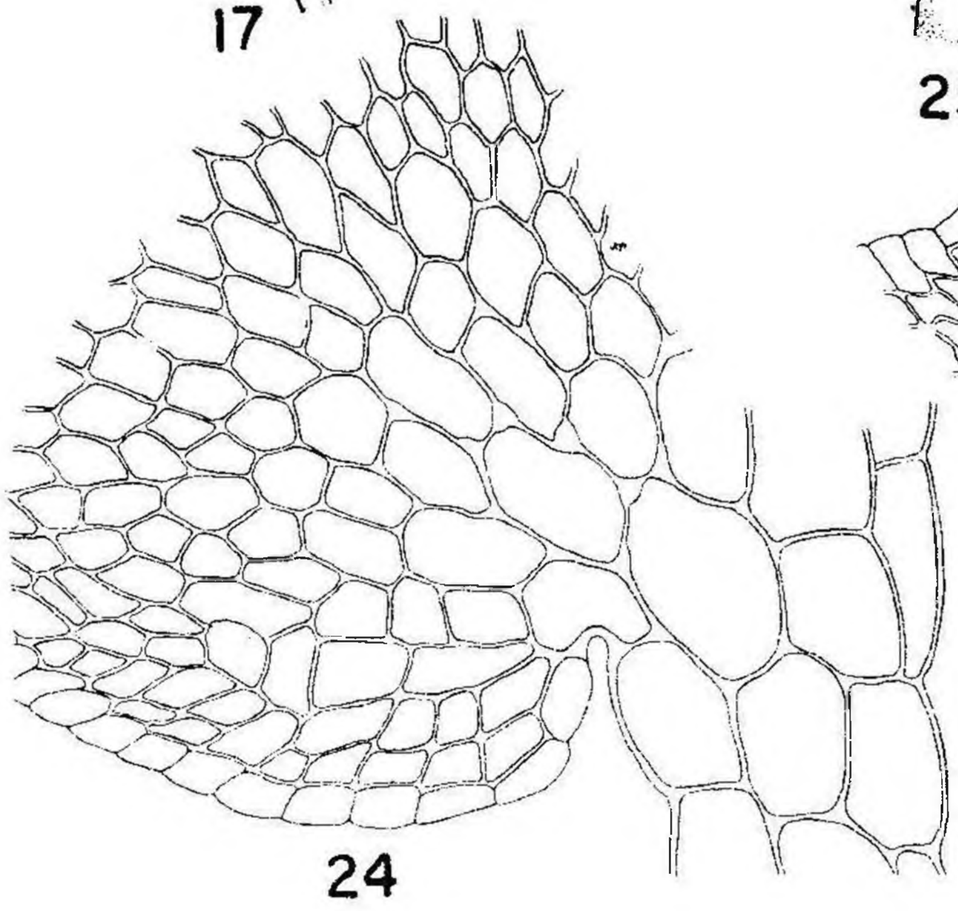

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.1 mm

22 19, 25, 26 .2 mm

17, 18, 20, 21 1 mm

Figs. 17-26. *Cololejeunea sigmoidea* Jovet-Ast *et* Tixier. 17, 18. Plants with intercalary male bracts. 19. A portion of axis showing 1-2 – (few) celled lobule and stylus. 20, 21. Leaves. 22. Marginal leaf-cells (linear-flexuose). 23. Median leaf-cells. 24. Basal leaf-cells. 25, 26. Male bractloubles.

sequence its sexuality is unknown. However, in Indian plants, some leaves show well developed inflated lobule which possibly represent the male bracts (Figs. 17, 18, 25 & 26). The female inflorescence of this taxon is yet to be discovered.

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