

Zeitschrift: Candollea : journal international de botanique systématique = international journal of systematic botany
Herausgeber: Conservatoire et Jardin botaniques de la Ville de Genève
Band: 36 (1981)
Heft: 1

Artikel: On a small collection of living Lejeuneaceae from Peru
Autor: Geissler, Patricia / Gradstein, Rob
DOI: <https://doi.org/10.5169/seals-880052>

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On a small collection of living Lejeuneaceae from Peru

PATRICIA GEISSLER

&

ROB GRADSTEIN

RÉSUMÉ

GEISSLER, P. & R. GRADSTEIN (1981). Sur une petite collection de Lejeuneacées vivantes du Pérou. *Candollea* 36: 119-130. En anglais, résumé français.

Les oléocorps de *Lopholejeunea subfusca*, *Marchesinia brachiata*, *Archilejeunea parviflora*, *Taxilejeunea asthenica*, *Echinocolea asperrima*, *Mastigolejeunea auriculata*, *Cheilolejeunea clausa* et *Stictolejeunea squamata* sont décrits et photographiés. De la dernière espèce les caractères sporophytiques sont donnés pour la première fois.

ABSTRACT

GEISSLER, P. & R. GRADSTEIN (1981). On a small collection of living Lejeuneaceae from Peru. *Candollea* 36: 119-130. In English, French abstract.

Descriptions and photographs of oil-bodies of *Lopholejeunea subfusca*, *Marchesinia brachiata*, *Archilejeunea parviflora*, *Taxilejeunea asthenica*, *Echinocolea asperrima*, *Mastigolejeunea auriculata*, *Cheilolejeunea clausa* and *Stictolejeunea squamata* are given. From the latter species sporophyte characters are reported for the first time.

Returning from an expedition to the Amazonian lowland forests in Peru, Dr. Spichiger of the Conservatoire botanique in Geneva was so kind as to bring back some living hepatics. The material, collected on decaying log in the Departamento Loreto about 80 km west of Pucallpa in the direction of Lima on 28th of May 1980, was studied within a week of its arrival and will now be kept in G. It is composed mainly of wide-spread tropical lowland

species of *Lejeuneaceae* known throughout the neotropics. Some species, such as *Mastigolejeunea auriculata* and *Lopholejeunea subfusca*, are found also in other continents. *Echinocolea asperrima* is reported from the type locality near Pará in Brasil (SCHUSTER, 1963) and from French Guyana (ONRAEDT & CREMERS, 1980). Special attention was paid to the oil-bodies of the species. Since the classical paper by MÜLLER (1939) the structure of the oil-bodies in hepatics has been recognized as an important taxonomic character. As these have to be studied from living material and not only in their decomposed state, data available on oil-bodies of tropical liverworts are scarce. Previously, oil-bodies in neotropical *Lejeuneaceae* were studied i.a. by SCHUSTER & HATTORI (1954), SCHUSTER (1970), GRADSTEIN (1975), GRADSTEIN & al. (1977) and LORSCHETTER (1977). Data on oil-bodies in *Taxilejeunea asthenica*, *Echinocolea asperrima* and *Stictolejeunea squamata* are reported here for the first time. In *Marchesinia brachiata* and *Archilejeunea parviflora*, oil-bodies were already illustrated by GRADSTEIN (1975) but not yet described.

Four basic oil-body types were recognized by GRADSTEIN & al. (1977). All four are present in the material studied by us:

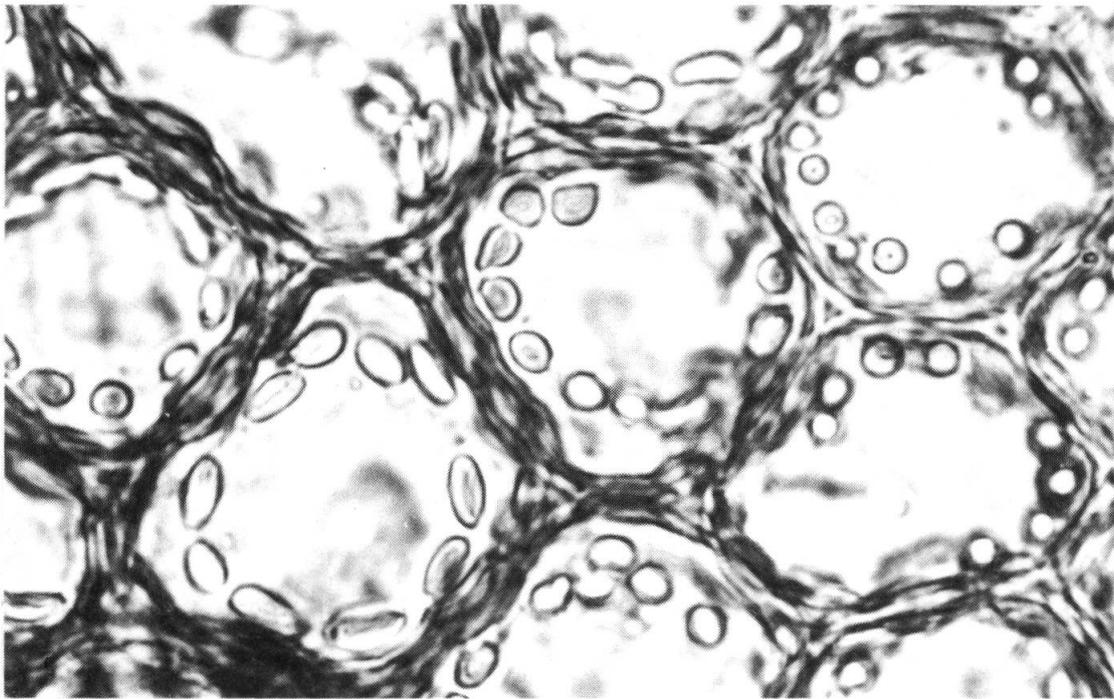
- *Massula* type (e.g. *Lopholejeunea subfusca*);
- *Bazzania* type (e.g. *Marchesinia brachiata*);
- *Jungermannia* type (e.g. *Taxilejeunea asthenica*);
- *Calypogeia* type (e.g. *Mastigolejeunea auriculata*).

In *Stictolejeunea squamata* oil-bodies appear to be lacking in the ordinary green cells; this genus, however, has special non-green cells lacking chlorophyll and containing a large mass of oil instead, so called ocelli. Not necessarily oil-bodies should be lacking in taxa possessing ocelli as e.g. species of *Microlejeunea*, *Leptolejeunea*, *Drepanolejeunea*, *Pycnolejeunea*, etc. In fact *Stictolejeunea squamata* together with the taxa of the genus *Lepidolejeunea* (SCHUSTER, 1980) are the only species of *Lejeuneaceae* reported thus far to possess no oil-bodies in green cells. In addition to oil-body observations, a short description of the hitherto unknown sporophyte of *Stictolejeunea squamata* is also provided.

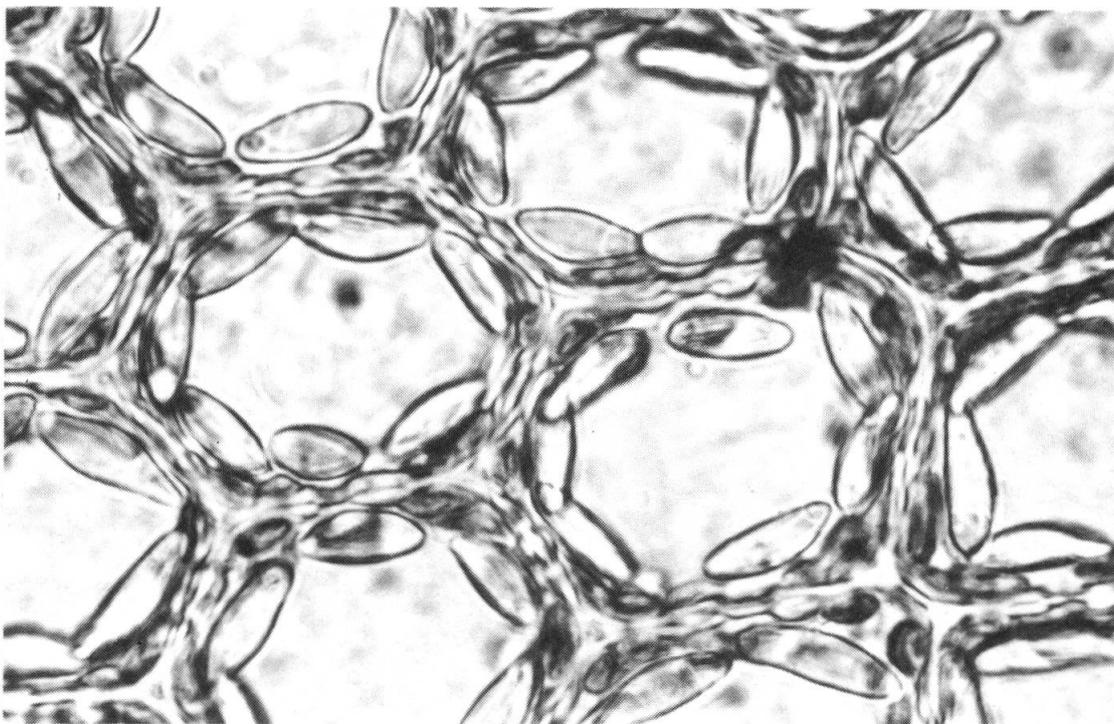
1. *Lopholejeunea subfusca* (Nees) Steph.

Illustrations. — Pl. 1a; SCHUSTER & HATTORI (1954: Pl. IV, 8); GRADSTEIN (1975: Pl. XXIII, 12).

Sterile plants. Oil-bodies *Massula* type, 12-15 per cell, colourless, globose to bluntly ellipsoid, small, homogeneous, 3-6 μm \times 3-4 μm (*G* 172 882).



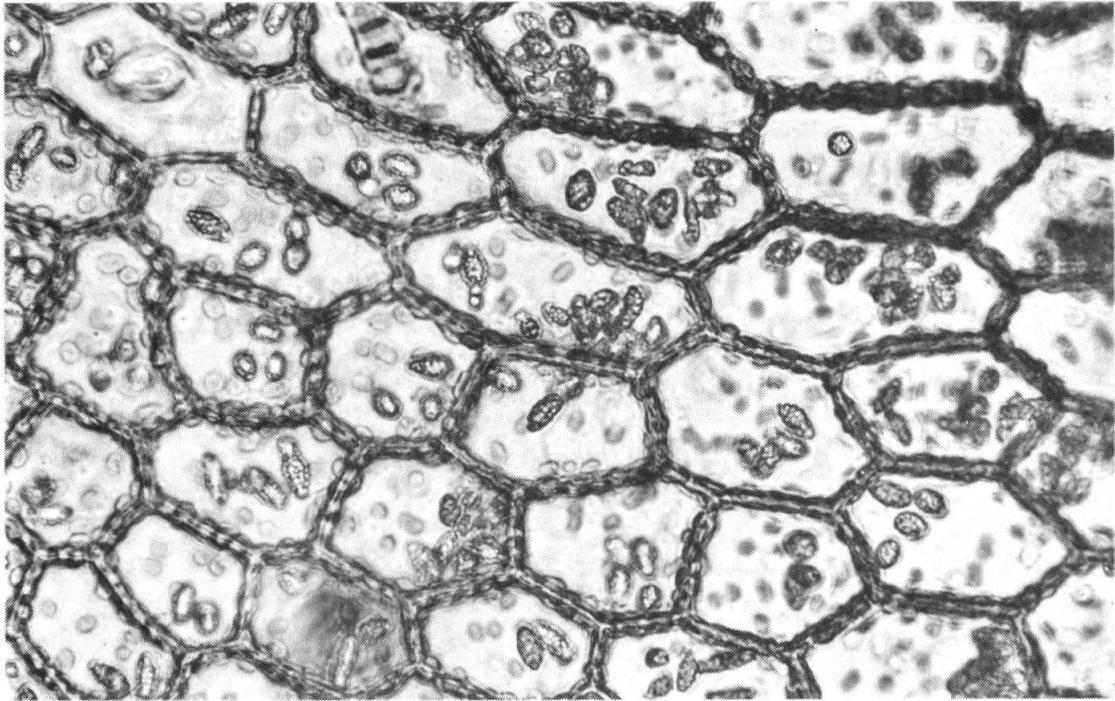
a  10 μ



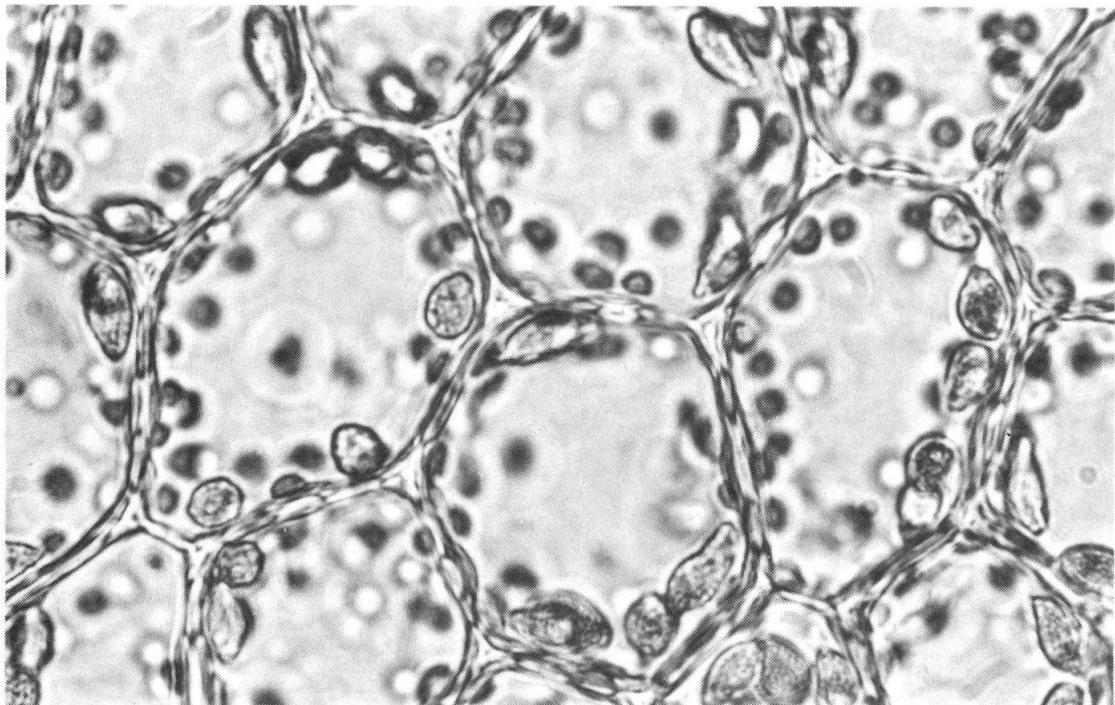
b 

Pl. 1. — Cells with oil-bodies.

a, *Lopholejeunea subfusca* (Nees) Steph.; b, *Marchesinia brachiata* (Sw.) Schiffn.



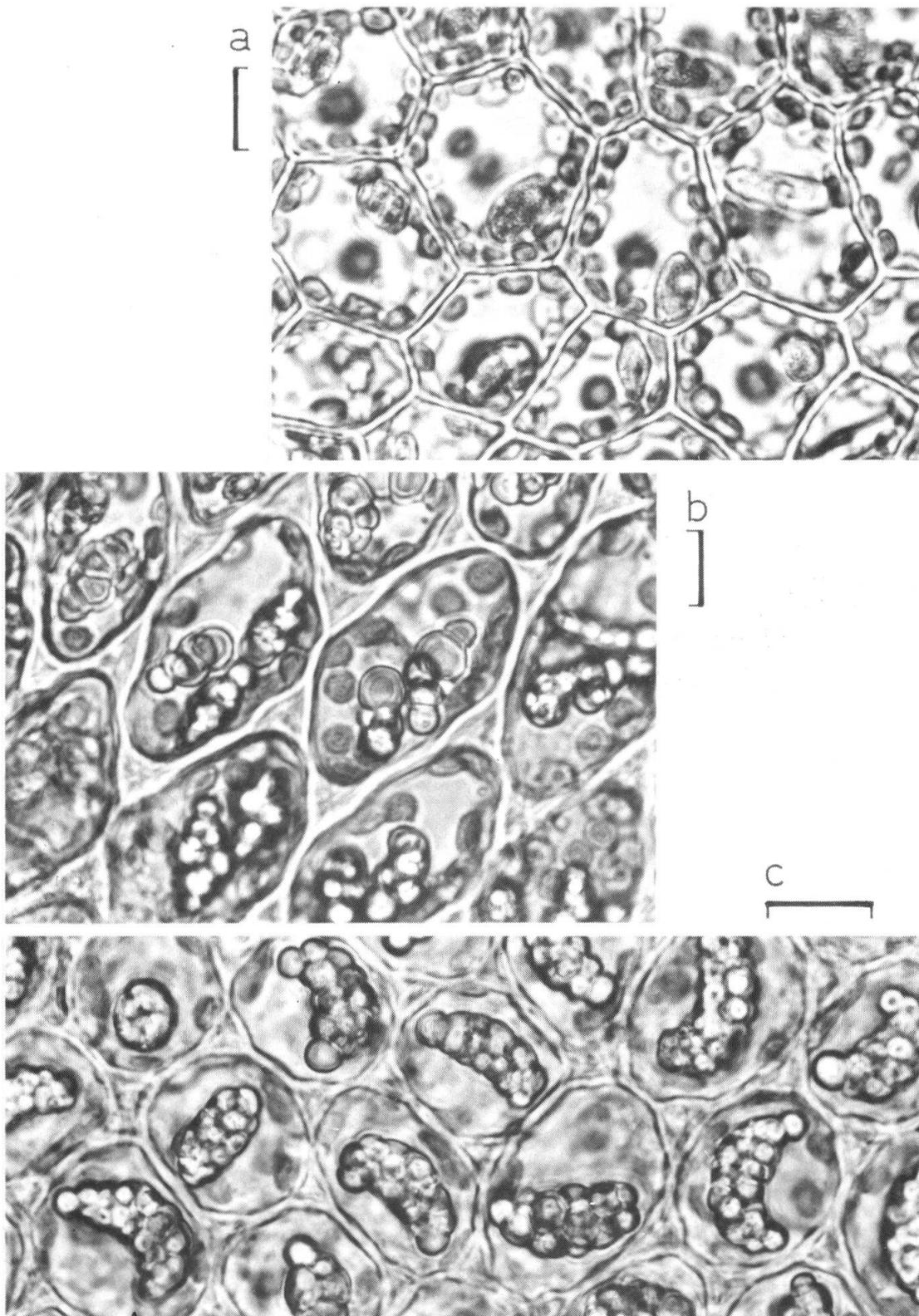
a



b

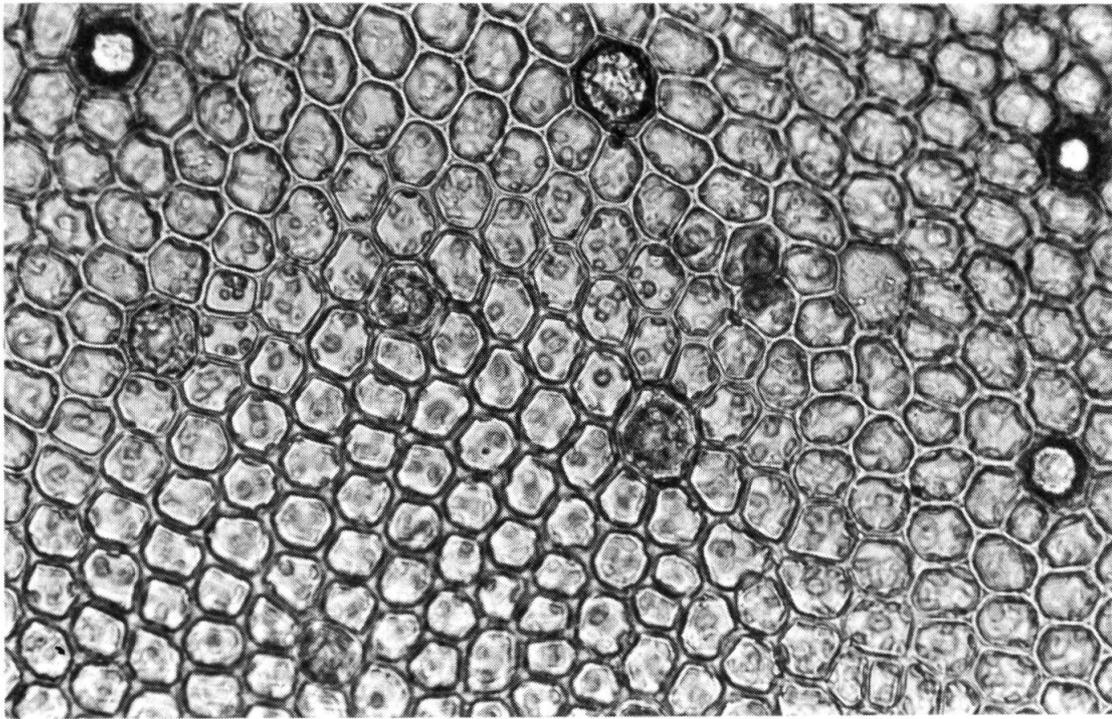
Pl. 2. — Cells with oil-bodies.

a, *Archilejeunea parviflora* (Nees) Steph.; b, *Taxilejeunea asthenica* (Spruce) Steph.

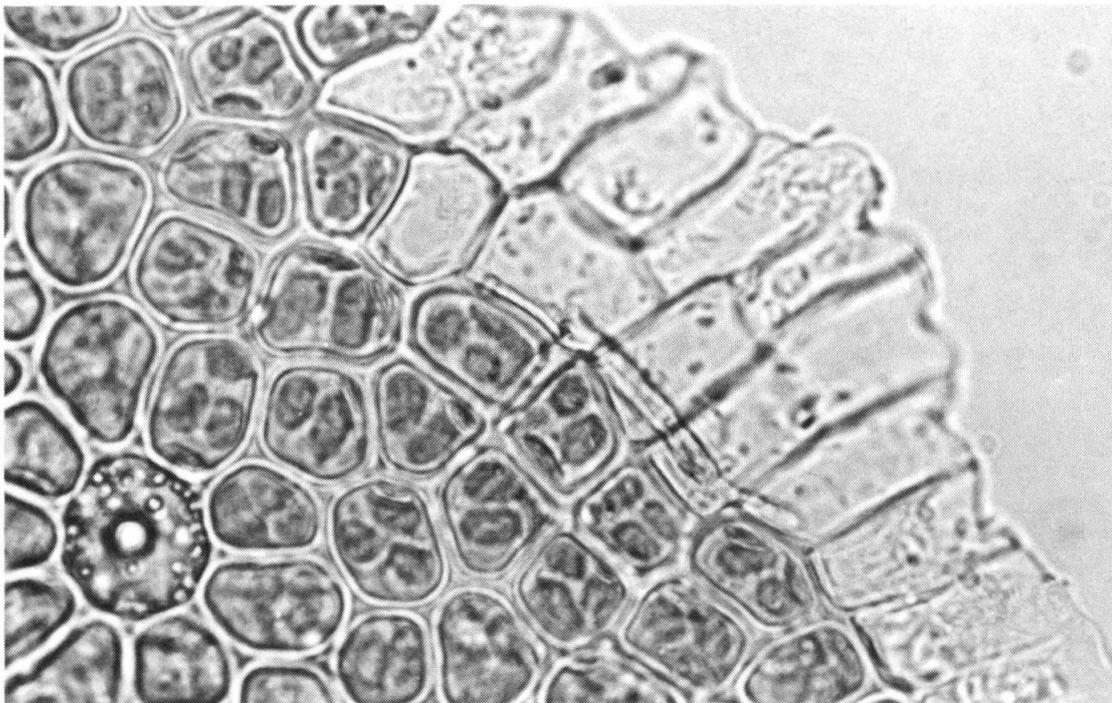


Pl. 3. — Cells with oil-bodies.

a, *Echinocolea asperrima* (Spruce) Schust.; **b**, *Mastigolejeunea auriculata* (Wils.) Schiffn.; **c**, *Cheilolejeunea clausa* (Nees & Mont.) Steph.

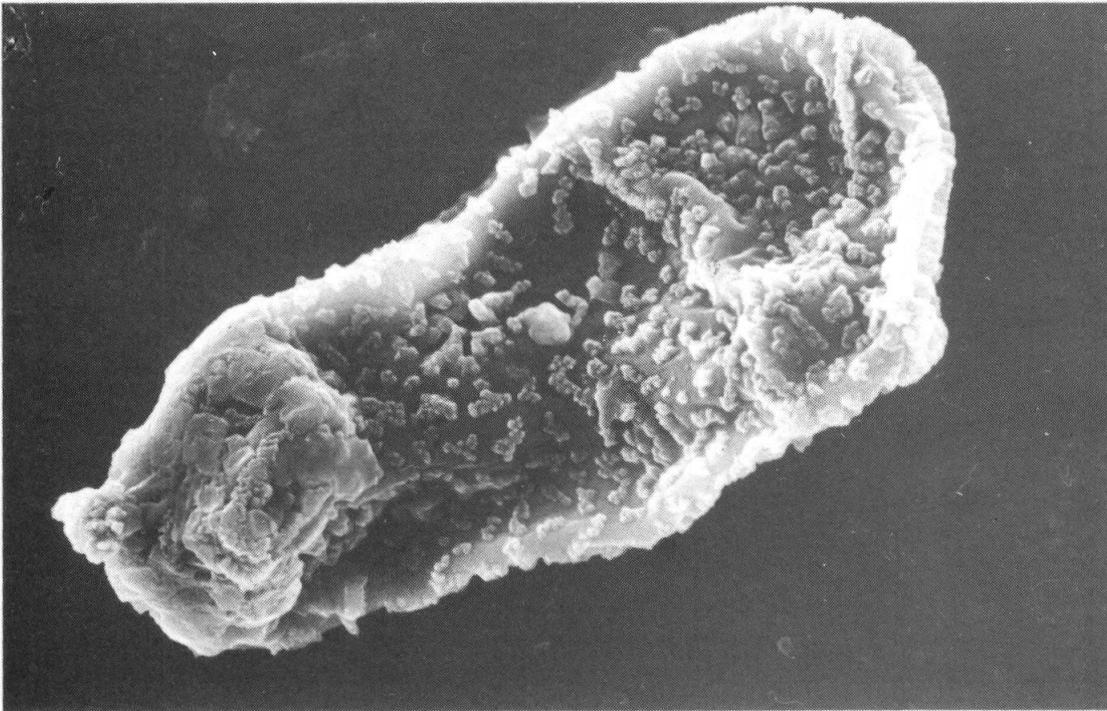


a

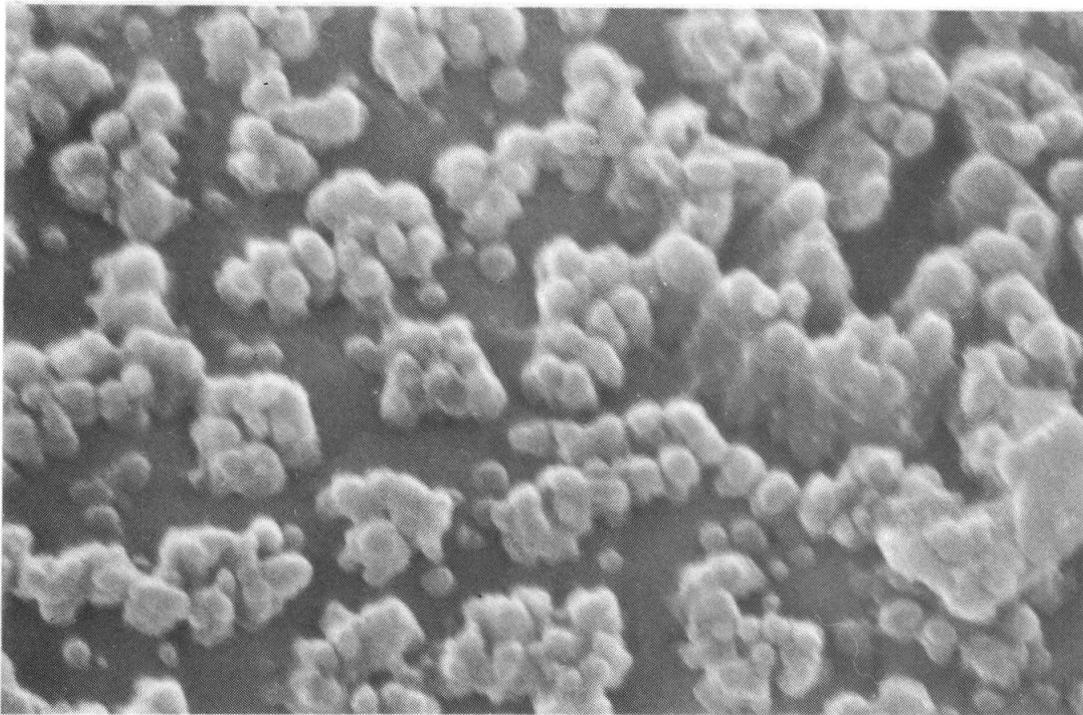


b

Pl. 4. — *Stictolejeunea squamata* (Web.) Schiffn.
a, cells from center of the leaf; b, leaf margin with hyaline border at apex.

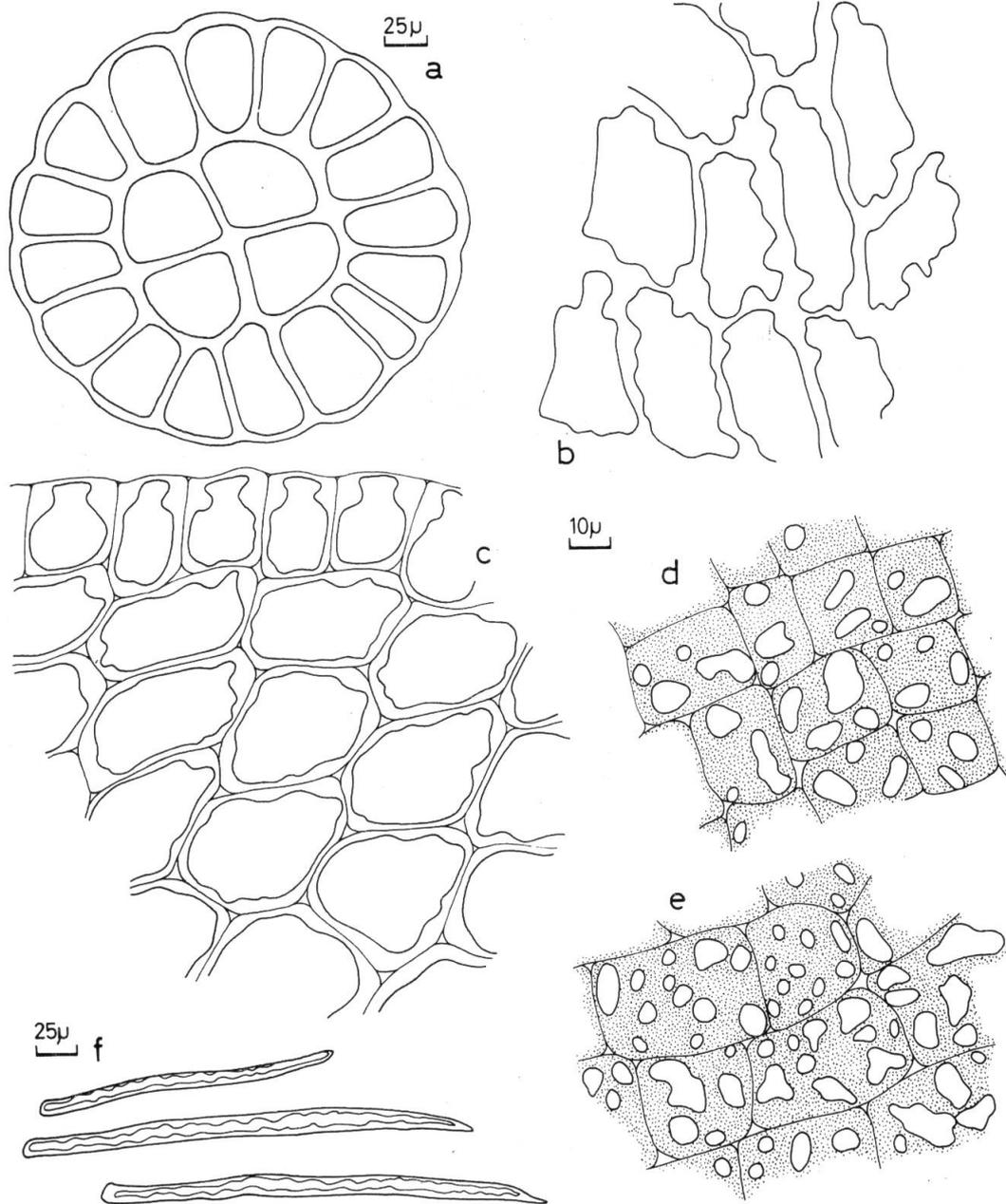


a  10 μ



b  1 μ

Pl. 5. — *Stictolejeunea squamata* (Web.) Schiffn.
a, spore; b, detail from spore surface.



Pl: 6. — *Stictolejeunea squamata* (Web.) Schiffn.
a, seta, cross-section; **b**, **c**, outer layer of capsule wall; **d**, **e**, inner layer of capsule wall; **f**, elaters.

2. *Marchesinia brachiata* (Sw.) Schiffn.

Illustrations. — Pl. 1b; GRADSTEIN (1975: Pl. XXIII, 13).

Sterile plants. Oil-bodies *Bazzania* type, homogeneous, sometimes with one or two faint transverse segments, present in all cells except in some leaf margin cells where they are rudimentary only, 4-8 per cell, colourless, rather large, bluntly ellipsoid, 8-18 μm \times 4-5 μm , more rarely globose, ca. 5 μm in diameter (*G 172 878*).

3. *Archilejeunea parviflora* (Nees) Steph. (det. G. M. C. G. Buskes)

Illustrations. — Pl. 2a; GRADSTEIN (1975: Pl. XXIII, 16).

Sterile plants. Oil-bodies *Jungermannia* type, finely granulose, present throughout the leaf, 3-6 per cell, more numerous in leaf base cells, colourless, globose to bluntly ellipsoid, 4-10 μm \times 4-5 μm , becoming almost homogeneous upon degeneration (*G 172 883*).

4. *Taxilejeunea asthenica* (Spruce) Steph.

Illustration. — Pl. 2b.

♀ plants. Oil-bodies finely granulose-papillose as in *Jungermannia* type but more or less brownish, variable in size and number, along the margins and towards apex 2-5 per cell, globose to subellipsoid, 4-7 μm \times 4-5 μm in diameter, in enlarged, elongated cells of leaf center and central leaf base 5-20 per cell, globose to narrow ellipsoid with tapering, \pm apiculate points, 4-12 μm \times 4-6 μm (*G 172 881*).

5. *Echinocolea asperrima* (Spruce) Schust. (det. R. Grolle)

Illustration. — Pl. 3a.

Sterile plants. Oil-bodies *Jungermannia* type, finely granulose, present in all cells, even in the enlarged basal cells, only one per cell, ellipsoid to subglobose and often sausage shaped, 5-14 μm \times 4-6 μm . Ocelli absent in opposition to SCHUSTER's (1963) suggestion (*G 172 880*).

6. *Mastigolejeunea auriculata* (Wils.) Schiffn.

Illustrations. — Pl. 3b; SCHUSTER & HATTORI (1954: Pl. V, 4); GRADSTEIN (1975: Pl. XXIII, 3).

♀ plants. Oil-bodies *Calypogeia* type, coarsely granulose, 2-3 per cell, 10-15 μm \times 4-6 μm (*G 172 875*).

7. *Cheilolejeunea clausa* (Nees & Mont.) Steph.

Illustrations. — Pl. 3c; SCHUSTER (1966: Fig. 13, 3); BREIL (1970: Fig. 152-153).

Sterile plants. Oil-bodies *Calypogeia* type (SCHUSTER, 1966: *Leucolejeunea* type), coarsely segmented, one per cell, very rarely two, very large, colourless, in leaf-centre sausage shaped, $12-16 \mu\text{m} \times 5-7 \mu\text{m}$, smaller and more globose towards the margins (*G* 172 876).

8. *Stictolejeunea squamata* (Web.) Schiffn.

SPRUCE (1884) already considered *Stictolejeunea* to be a very distinct taxon, very different from other *Lejeuneaceae*. Five species are currently recognized in the genus (MIZUTANI, 1978), two of which occur in tropical America including the generi-type *Stictolejeunea squamata*. EVANS (1908, 1935) gave an excellent description of the gametophyte of the neotropical species but data on the sporophyte and oil-bodies in fresh material have not yet been published and are given here for the first time. The sporeling pattern has been described by FULFORD (1942).

Leaves with 30-35 scattered ocelli, the ocelli colourless, slightly larger than green cells, filled with a globose, coarsely granulose-papillose mass of oil. Green cells totally lacking oil-bodies, chloroplasts rather few and large, 3-6 per cell; ca. $4 \mu\text{m}$ in diameter (Pl. 4a, b).

Stem cortex cells thickened with brownish pigmented walls, lacking oil-bodies as well.

Seta not articulate, *Brachiolejeunea* type, in cross-section made up of 4 inner and 16 outer cells with equally thickened walls (Pl. 6a), before elongation strongly grooved on the outer surface. Foot consisting only of a small clump of cells.

Capsule globose, blackish-green when ripe, splitting by four valves almost to the base. The valves are pale in colour, remaining suberect after opening of the capsule. The upper two thirds of the valves are bistratose, the lower third tristratose with thin-walled cells and two very large cells adjacent to the valve margins in the intermediate layer. Outer layer of cells with irregularly bulging trigones, the cells rhomboid except at margin where they are small and quadrate, facing those of adjacent valve (Pl. 6b, c). Inner layer of cells with irregularly reticulate to plurifenestrate, colourless, coalescent thickenings ($2-4 \mu\text{m}$ thick), presenting an anastomosing pattern (Pl. 6d, e).

Spore green, rectangular with irregularly waving margins, $2-2\frac{1}{2} \times$ longer than wide, $40-50 \mu\text{m} \times 15-25 \mu\text{m}$, the surface densely covered with punctate spines (Pl. 5a, b).

Elaters $200-250 \mu\text{m}$ long, $15 \mu\text{m}$ wide, pale, with rudimentary colourless spirals (wall thickenings) only (Pl. 6f) (*G* 172 879; the same oil-body data have been obtained from living material collected in Surinam, Brownsberg, by P. A. Florschütz 4757, November 1975 [U]).

The presence of a 16: 4 seta shows that the placement of *Stictolejeunea* in the subfamily *Ptychanthoideae* (GRADSTEIN, 1975) is correct. Affinities to other members of this subfamily are however rather obscure. Differences are e.g. the presence of numerous, scattered ocelli in leaves, underleaves and perianth, and the rather complex stem anatomy in the neotropical species.

To these deviating characters can now be added the total absence of oil-bodies in the green cells (a character unreported hitherto in *Lejeuneaceae*), the pale capsule valves which are not spreading widely after capsule dehiscence, and the reduced spiral thickenings of the elaters. The latter two characters are usually found in members of the subfamily *Lejeuneoideae*. Subsequent studies on the structure of sporophytes in *Lejeuneaceae*, now underway, might therefore throw more light on the systematic position of *Stictolejeunea*.

ACKNOWLEDGEMENTS

We wish to thank Dr. Rodolphe Spichiger for the collection of the specimens, Miss G. M. C. G. Buskes (Utrecht) and Dr. R. Grolle (Jena) for identification, in Geneva we are grateful to Dr. M. Dittrich, Miss M. Gavillet and Miss L. Guibentif for their help with SEM, photographs and drawings.

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Addresses of the authors:

P. G.: Conservatoire et Jardin botaniques de la Ville de Genève, Case postale 60, CH-1292 Chambésy/GE.

S. R. G.: Instituut voor Systematische Plantkunde, Heidelberglaan 2, TC-3508 Utrecht.