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# Drepanolejeunea grollei (Lejeuneaceae, Hepaticae) a new species from south-eastern Brazil

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&  
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## ABSTRACT

REINER-DREHWALD, M. E. & A. SCHÄFER-VERWIMP (1996). *Drepanolejeunea grollei* (Lejeuneaceae, Hepaticae), a new species from south-eastern Brazil. *Candollea* 51: 475-482. In English, English and German abstracts.

*Drepanolejeunea grollei* Reiner & Schäfer-Verwimp, a new species from S.E. Brazil, is described and illustrated. It is characterized by a 2-celled tooth at the lobule apex and a small notch at its proximal base, occupied by the hyaline papilla.

## ZUSAMMENFASSUNG

REINER-DREHWALD, M. E. & A. SCHÄFER-VERWIMP (1996). *Drepanolejeunea grollei* (Lejeuneaceae, Hepaticae), eine neue Art aus SO-Brasilien. *Candollea* 51: 475-482. Auf Englisch, englische und deutsche Zusammenfassung.

*Drepanolejeunea grollei* Reiner & Schäfer-Verwimp spec. nova., aus SO-Brasilien, wird beschrieben und abgebildet. Die Art wird durch einen 2-zelligen Eckzahn des Lobulus charakterisiert, an dessen proximaler Basis die Hyalinpapillen-Zelle eine kleine Nische ausfüllt.

**KEY-WORDS:** *Drepanolejeunea* – *Drepanolejeunea grollei* – LEJEUNEACEAE – HEPATICAE – Brazil.

## Introduction

The bryophyte flora of Brazil, principally of the south-eastern portion of the country, has become better known in recent years thanks to the collections made by the junior author together with his wife during 1986 to 1991. Several papers dealing with these gatherings have already been published (SCHÄFER-VERWIMP, 1989, 1991, 1992, 1996; SCHÄFER-VERWIMP & GIANCOTTI, 1993; SCHÄFER-VERWIMP & VITAL, 1989; BUCK & SCHÄFER-VERWIMP, 1992, 1993; GRADSTEIN, GROLLE & SCHÄFER-VERWIMP, 1993; SCHUSTER & SCHÄFER-VERWIMP, 1995). Specimens of these Brazilian collections were also cited in ca. 30 papers by different authors.

Among the epiphyllous liverworts collected, a small species of *Drepanolejeunea* was found, which was recognized by Dr. R. Grolle, Jena, as a new taxon. *Drepanolejeunea* (Spruce) Schiffn. (Lejeuneaceae, tribe Lejeuneae) is a large genus with ca. 150 described species, represented principally in the tropical and subtropical regions of the world (GROLLE, 1976). In a

revision of the American taxa, BISCHLER (1964, 1968a, 1968b) recognized 36 species for this region. A few neotropical species were added by SCHUSTER (1978, 1996) and GROLLE (1991). Also, a fossil species of *Drepanolejeunea* from Dominican amber was recently described by GROLLE (1993).

In the present paper, the new species *Drepanolejeunea grollei* is described, illustrated and its affinities are discussed.

### Description

***Drepanolejeunea grollei* Reiner & Schäfer-Verwimp, spec. nova** (Figs. 1-3).

*Dente angulari lobuli bicellulari inter Drepanolejeuneis solum nonnullis speciebus subgeneris Kolpolejeuneae comparandum, sed differt ab eis sinu brevissimo proximali denti angulari adjacenti.*

**Type:** Brazil. São Paulo. Serra da Mantiqueira, Campos do Jordão, Horto Florestal, "epiphyll in feuchtem Podocarpus-Araukarien-Wald an der Trilha do Sapucaí", 1550 m, *Schäfer-Verwimp & Verwimp 14463*, 11.V.1991 (Holotype herb. Schäfer-Verwimp, c. per.; isotypes G, JE, herb. Drehwald, all c. per.).

*Plants* very small and delicate, yellowish to pale green when dry, creeping on leaves and forming loose mats; shoots 300-440  $\mu\text{m}$  wide  $\times$  4-6 mm long; irregularly branched, branches of the *Lejeunea*-type, widely spreading, similar or slightly smaller than the main shoots. *Stem* often geniculate, slender, 30-40  $\mu\text{m}$  in diam.; in cross section formed of 7 cortical cells surrounding 3 smaller medullary cells, thin walled. *Leaves* distant to subcontiguous, widely spreading (45-60° with stem); when moist flat or the antical margin  $\pm$  convex; when dry slightly standing away from substrate. *Lobes* asymmetrically ovate pointed, with reduced or well developed lobules; lobes with developed lobules 220-280  $\mu\text{m}$  long  $\times$  120-145  $\mu\text{m}$  wide, the distal 1/3 of the leaf very slightly falcate; lobes with reduced lobules somewhat smaller and more symmetrical, 190-250  $\mu\text{m}$  long  $\times$  100-115  $\mu\text{m}$  wide; margins entire, the proximal 1/2 of the dorsal margin  $\pm$  straight, the rest of the free lobe margin very slightly crenulate; apex of the leaf apiculate to short acuminate, terminated by (1-)2 cells in a row, plane or recurved. *Leaf cells* with  $\pm$  thin and colorless walls, occasionally with small trigones and intermediate thickenings, cuticle smooth; median and apical cells subquadrate, 14-16  $\times$  16-18  $\mu\text{m}$ , to the base of the leaf the cells are more elongated, 14-18  $\times$  22-28  $\mu\text{m}$ ; oil bodies mostly 2-5(-6) per median leaf cell (2-4 in lobule cells, 1-5 in cortical stem cells), spheroidal to ellipsoidal, small: 2,5-4  $\times$  2,5-4,5  $\mu\text{m}$ , formed of minute spherules, appearing finely granular; chloroplasts ca. 3  $\times$  4,5  $\mu\text{m}$ . *Ocelli* usually 5-10 per leaf, 2-5 of them in a broken longitudinal median line, the first 2(-4) ocelli in a continuous basal longitudinal row, the ocelli not forming part of this line are scattered in the lamina and are usually not larger than surrounding cells; ocelli in the basal part of the leaf 20-22(-30)  $\times$  26-32(-50)  $\mu\text{m}$ ; each ocellus containing a single large granular-botryoidal oil body and no chloroplasts, the oil body ellipsoidal, 20-25  $\times$  30-35  $\mu\text{m}$  (in ocelli in proximal half of leaf), formed of numerous coarse spherules, almost filling the lumen. Ocelli are also present in perichaetial bracts and perianths. *Lobules* when reduced ovate-rectangular, 1/4 - 1/3 of the lobe surface, slightly inflated, free margin not involute, apical tooth formed by an undifferentiated cell, hyaline papilla on the inner side of this cell, the keel straight. About 1/3 of the lobules of a plant are well developed, oval, 1/3 of the lobe surface, strongly inflated; keel moderately arched, the distal half of the keel and the adjacent cells of the ventral margin of the lobe  $\pm$  strongly crenulate due to projecting cells; free margin of the lobule involute; apical 2-celled tooth is seen in situ, long and falcate, directed towards apex of keel, thus forming a  $\pm$  circular opening to the interior of the lobule; hyaline papilla positioned in a slight indentation, or  $\pm$  entally, at the proximal base of the tooth. *Underleaves* small, remote, transverse insertion on 2 rows of cortical cells, obtuse, bilobed, the lobes strongly divergent, the sinus shallow and broad; the lobes filiform, 3-4 cells in a row, 1 (rarely 2) cells wide at

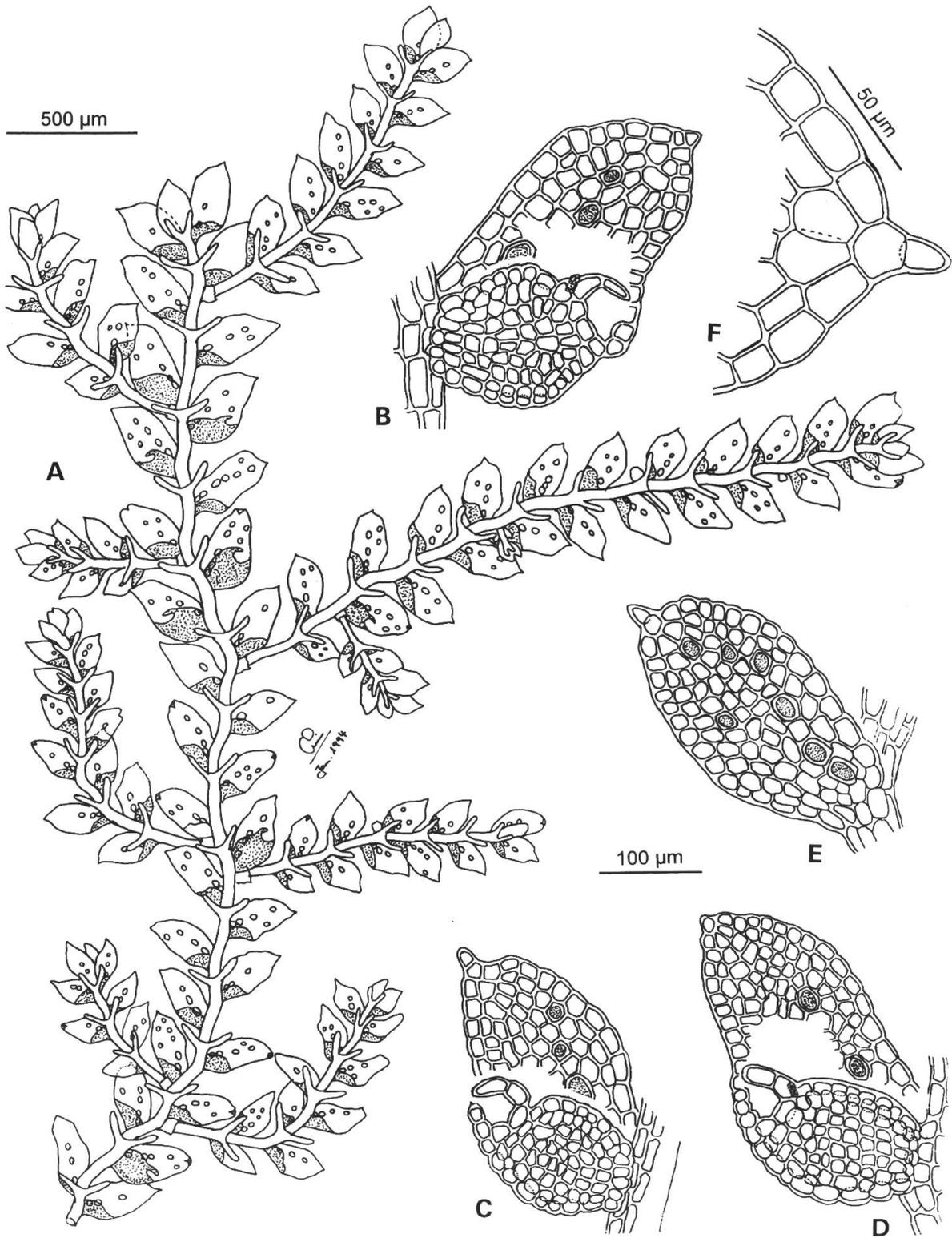


Fig. 1. – *Drepanotejeunea grollei*. **A**, habit of plant, ventral view; **B-D**, leaves, ventral view; **E**, leaf, dorsal view; **F**, typical apex of leaf lobe.

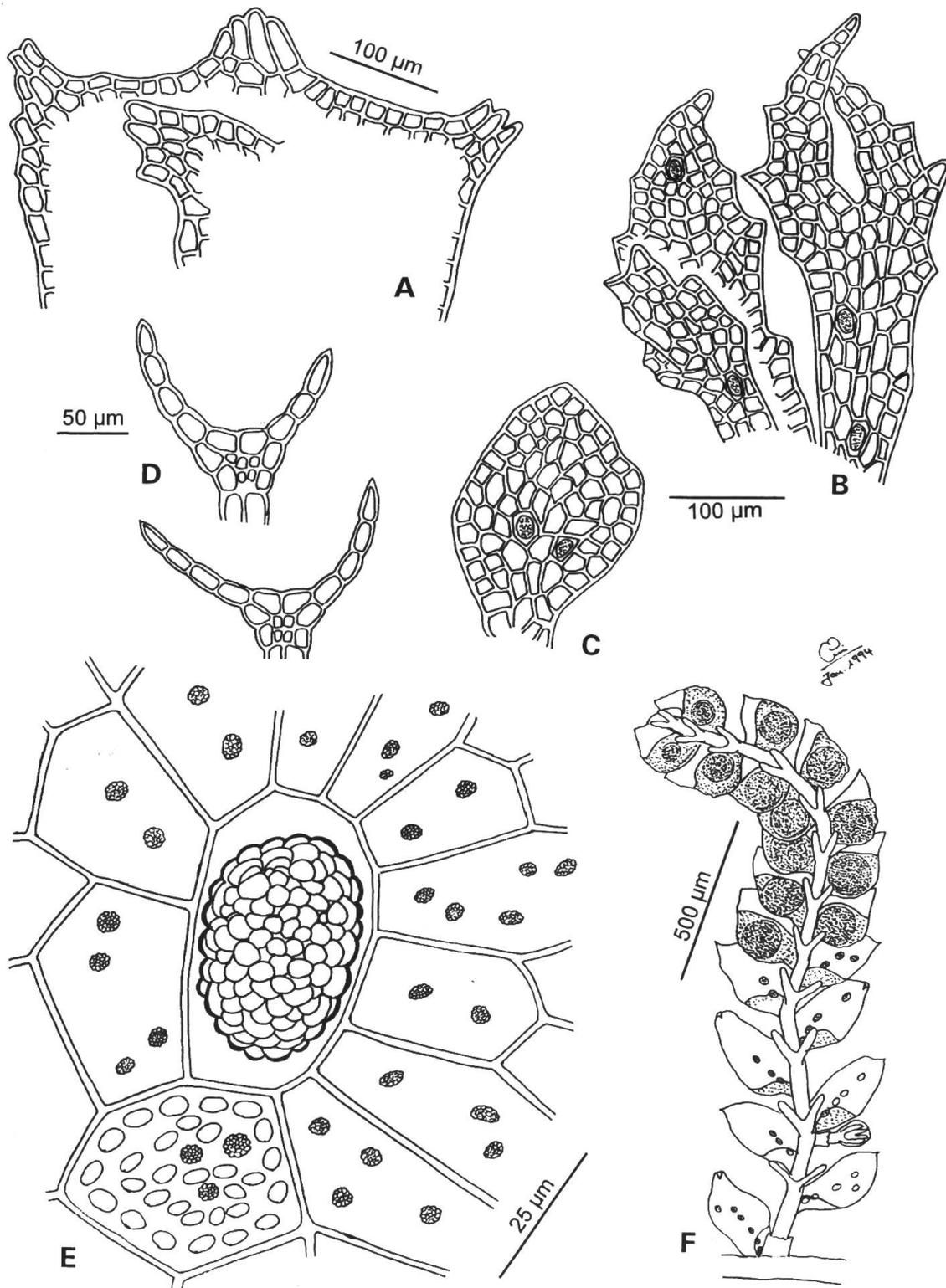


Fig. 2. – *Drepanolejeunea grollei*. **A**, cells of perianth mouth and keels; **B**, female bract and bracteole; **C**, subinvolutural leaf; **D**, underleaves; **E**, basal leaf cells with oil bodies, one ocellus and, down left, with chloroplasts; **F**, male branch, ventral view.

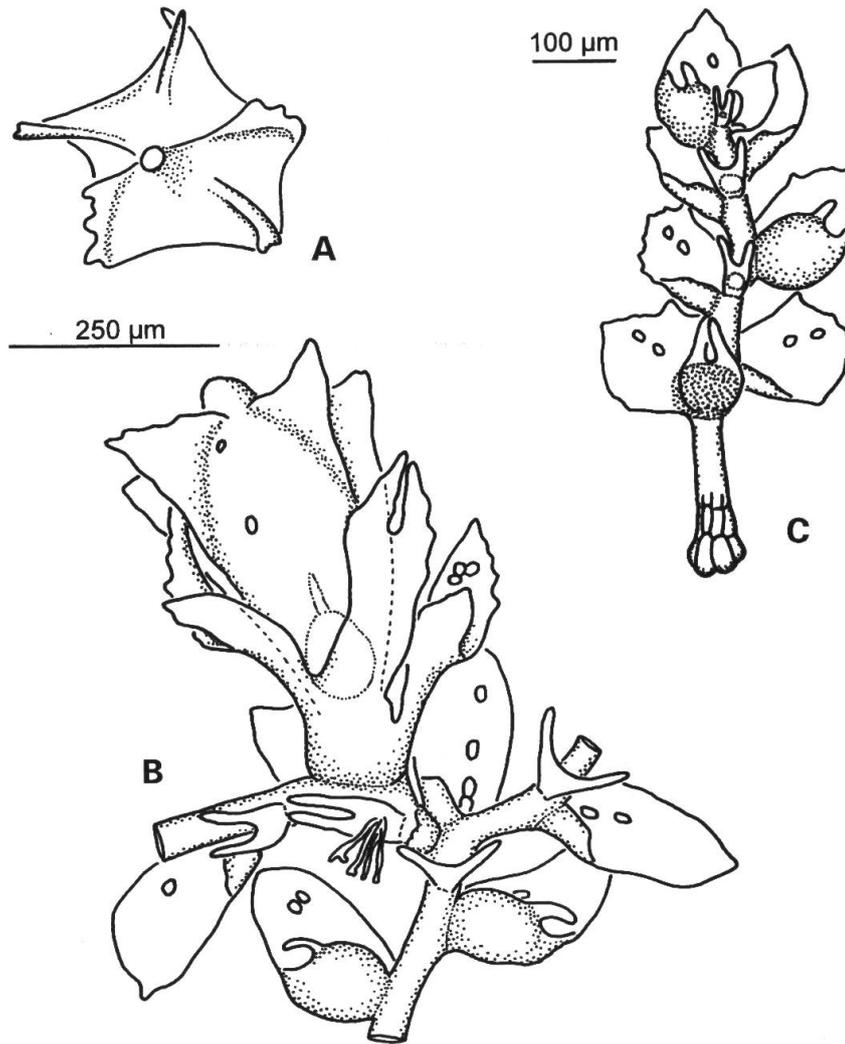


Fig. 3. – *Drepanolejeunea grollei*. **A**, perianth, apical view; **B**, portion of stem with female branch, ventral view; **C**, cladia, ventral view.

base, separated by 2 cells; rhizoid-initial cells slightly smaller than the 6 surrounding cells, the coalesced rhizoids frequently forming an adhesive rhizoid disc.

*Dioicous.* *Androecia* terminal on short or long branches, made up of 4-8 pairs of strongly inflated, subimbricate, bilobed bracts; lobes  $\pm$  triangular, apex acute, ending in 2 superimposed cells, margin entire; lobule hypostatic (lobule imbrication visible only in young androecia), 1/2-2/3 lobe surface, free margin straight or slightly involute, apex formed by an undifferentiated cell, keel arched with  $\pm$  conical cells; male bracteoles present throughout the androecium, similar to the underleaves but lobes less divergent; antheridium 1 per bract, hidden or emergent from the lobule. *Gynoecia* terminal on lateral branches, with one pycnolejeuneoid innovation (the first leafy appendage of the innovation is an underleaf), the innovation sterile, short or  $\pm$  long. At the base of this fertile branch only an underleaf and a lateral leaf; the subinvolucral underleaf bifid for 2/3-3/4 its length, the lobes straight to slightly convergent, 5 cells long, the upper 3 in a row and 2-celled wide at the base, with an adhesive rhizoid disk or numerous rhizoids; the subinvolucral leaf without lobule, oval, flat, apex acute, with 1-5 scattered ocelli. Female bracts in one pair, slightly larger than vegetative leaves; bract lobes ovate-lanceolate, 280-340  $\mu\text{m}$  long  $\times$  70-100  $\mu\text{m}$  wide, united for 1/2-2/3 of its length to the lobule, apex acute, ending in 1-2 cells in a row, margin  $\pm$  dentate due to conical to mammilose marginal cells, dorsal margin of the lobe convex; bract lobule  $\pm$  rectangular, 200-240  $\mu\text{m}$  long  $\times$  40-60  $\mu\text{m}$  wide, with an acute to obtuse apex, free margin  $\pm$  dentate due to conical cells; female bracteole connate with both bracts at the base, 300-360  $\mu\text{m}$  long  $\times$  70-100  $\mu\text{m}$  wide, bilobed for 30 % of its length, lobes triangular to lanceolate, erect to convergent, margins dentate. Perianth terete below and 5-keeled above, 360-440  $\mu\text{m}$  long  $\times$  200-270 wide (widest in the upper 1/3), keels produced as small dentate or armed crests, beak distinct, of 1-2 superimposed cells, 40-50  $\mu\text{m}$  long.

*Vegetative reproduction* by cladia: small, leafy and deciduous propagula; with median cells of first underleaf produced to form a large, orbicular mucilaginous disk; first leaves with vestigial lobules and margin with 2-3 teeth.

### Distribution and ecology

*Drepanolejeunea grollei* is known from only two close localities in the Serra da Mantiqueira, State of São Paulo, south-eastern Brazil, at altitudes of 1450-1550 m. The specimen selected as the holotype was found in a *Podocarpus-Araucaria* forest on the slope of a rivulet gorge. It was growing as an epiphyll on bushes along a jungle path, in a rather exposed but very humid habitat. Associated to *D. grollei* a few other Lejeuneaceae (*Colura tenuicornis* (Evans) Steph., *Cololejeunea cardiocarpa* (Mont.) Evans, *Drepanolejeunea mosenii* (Steph.) Bischl. and *Drepanolejeunea campanulata* (Spruce) Steph.), some epiphyllous lichens and a green alga were found. However, these associated taxa were always very scanty. A second specimen of *D. grollei* was collected a few km away from the type locality, in a secondary forest.

*Additional specimen examined.* – BRAZIL. São Paulo. Serra da Mantiqueira, Campos do Jordão, “epiphyll in feuchtem Sekundärwald zwischen Minalba und Agua Santa”, 1450 m, Schäfer-Verwimp & Verwimp 6905/A, 19.IV.1986 (herb. Schäfer-Verwimp).

### Discussion

The species of *Drepanolejeunea* are very small plants, and are found creeping as epiphylls on leaving leaves, as epiphytes on fine twigs or bark, sometimes also on rocks, rarely on rotting wood and even on soil.

By its small size and  $\pm$  remote leaves, the diverging underleaf lobes, the proximal hyaline papilla, the vegetative reproduction by cladia, the 5-keeled perianths with keels  $\pm$  armed and leaves with ocelli, *Drepanolejeunea* is closely related to *Leptolejeunea* (Spruce) Schiffn.

(Schuster 1967). The latter genus, however, has a primary rhizoid disk at the underleaf base formed by cells conspicuously smaller than the surrounding ones and lacks innovations, whereas in *Drepanolejeunea* the cells of the primary rhizoid disc are similar to the surrounding cells and the innovation, when present, is of the pycnolejeuneoid type (SCHUSTER, loc. cit.; GROLLE, 1980). *Drepanolejeunea grollei* belongs to the “Groupe I” as defined by BISCHLER (1964: 28), but it is readily separated from all other American species of the genus by the 2-celled apical tooth of the lobule<sup>1</sup>. GROLLE (1976) has divided *Drepanolejeunea* into three subgenera, but *D. grollei* cannot be assigned to any of these groups. The new taxon is most closely related to subgen. *Kolpolejeunea* Grolle, because of the apical tooth which can be 2-celled in this group. In the latter subgenus, however, proximal of the apical tooth there is a wide and shallow notch, the proximal end of this notch being separated by 2-3 marginal cells from the apical tooth and formed by a distinct preapical tooth, which is widely separated from the hyaline papilla. In *D. grollei*, however, there is only one distinct tooth at the lobule apex, and at its proximal base there is a small notch largely occupied by the hyaline papilla. In subgen. *Drepanolejeunea* and *Pristolejeunea* Grolle the apical tooth is always 1-celled.

<sup>1</sup>*Drepanolejeunea trematodes* (Nees) Bischl. from Madagascar, Comores, Mascarenes, Tanzania and Kenya, has a 2-celled apical tooth and was reported for Mexico, but this report has not been confirmed (see GROLLE, 1976: 207 and BISCHLER, 1968a: 130). The species is very distinct from *D. grollei*, by the leaves with toothed margins and leaf cells with distinct trigones and intermediate thickenings, and belongs to subgen. *Kolpolejeunea* (GROLLE, 1976: 203).

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