

Some New Additions to the Hepatic Flora (Jungermanniophyta) for the State of Bahia, Brazil.

Cid José Passos Bastos & Silvana B. Vilas Bôas-Bastos

Departamento de Botânica, Instituto de Biologia, Universidade Federal da Bahia. Campus de Ondina, 40170-280 Salvador, Bahia, Brasil.

E-mail: cjpbasto@ufba.br

Abstract. In this paper are recorded 18 taxa of hepatics (Jungermanniophyta) for the first time for the state of Bahia, Brazil. Of these, *Harpalejeunea ovata* (Hook.) Schiffn. is new for Brazil. Morphological characters, notes on habitat and substrate are given for each species. Illustrations for *Harpalejeunea ovata*, *Pycnolejeunea callosa* (Lindenb.) Steph., *Pycnolejeunea macroloba* (Nees & Mont.) Schiffn., *Rectolejeunea berteriana* (Gott. ex Steph.) Evans and *Trachylejeunea crenata* (Mont. & Nees) Schust. are given.

The bryophyte flora from state of Bahia have best been known from works of Martins et al. (1990), Bastos & Yano (1993), Yano & Bastos (1994), Harley (1995), Bastos et al. (1998a, 1998b), Bastos & Vilas Bôas-Bastos (1998) and Vilas Bôas-Bastos & Bastos (1998). However, a number of species have been reported by other authors, as compiled by Yano (1981, 1984, 1989, 1995).

The hepatic flora of Bahia is represented by 111 species of which 45 belong to the Lejeuneaceae, the family best represented in Brazil. The first record of hepatics for Bahia were given by Nees (1833) and further records by other authors as compiled by Yano (1984, 1989, 1995). New records are given by Gradstein (1994) for Lejeuneaceae and new species by Jovet-Ast

(1987, 1991) for *Riccia* and Yuzawa & Hattori (1988) for *Frullania*. The most species are represented by Amazonian elements and only four species, *Cololejeunea minutissima* (Smith) Schiffn. subsp. *myriocarpa* (Nees & Mont.) Schust., *Drepanolejeunea mosenii* (Steph.) Bischl., *Lejeunea brittiniae* (Evans) Grolle and *Omphalanthus filiformis* ((Sw.) Nees are not reported for Amazonia regions.

In this present paper are recorded taxa yet not reported for state of Bahia, one being new for Brazil.

All specimens are deposited at Alexandre Leal Costa Herbarium (ALCB) of the Instituto de Biologia of the Universidade Federal da Bahia.

Calypogeiaceae:

Calypogeia amazonica (Spruce) Steph.

Morphological characters: gametophyte medium size, prostrate, in mats. Leaves unlobed, oblong, apex broad, bifid, the tooth mostly 1-celled. Cells oblong, without trigones and intermediate thickenings. Underleaves bisbifid, the sinus broad, the segments short. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Cachoeira, Vale do Iguape, Fazenda Esperança, 29-9-1991, C. Bastos & A. Cerqueira 373 (ALCB 18472). Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas-Bastos 215, 228, 231, 234, 242 (ALCB 38175; ALCB 38188; ALCB 38191; ALCB 38194; ALCB 38205).

Description and illustration: Fulford (1968).

Habitat: ombrophilous forest; gallery forest in cerrado vegetation.

Substrate: soil.

Cephaloziaceae:

Anomoclada portoricensis (Hampe & Gott) Vána

Morphological characters: gametophyte medium size, prostrate in dense mats. Leaves unlobed, spreading, subrectangular, the margin undulate or crisped; median cells with large trigones, the lumen stellate; the marginal cells thick-walled, cuticle verrucose. Underleaves small, ovate, the margin with marginal projections. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Una, Mico-leão Biological Reserve (IBAMA), 15°09'S, 49°05'W, 14-11-1992, S. L. Oliveira 266 (CEPEC 55925).

Description and illustration: Fulford (1968, as *Anomoclada mucosa*).

Habitat: ombrophilous forest.

Substrate: decaying logs.

Frullania nodulosa (Reinw., Blume & Nees) Nees in Gott., Lindenb. & Nees

Morphological characters: gametophyte medium to robust, brownish, irregularly branched, prostrate. Leaves lobed, spreading, imbricate; lobe ovate to orbicular; cells thick-walled, trigones large, intermediate thickening conspicuous; oil-

bodies not seen; ocelli absent; lobule clavate, pendulous; stylus filiform, 2-4 cells long; hyaline papilla not seen. Underleaves large, broader than long, bifid, imbricate, ovate. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Itacaré, "Campo Cheiroso", 14 km at N of Serra Grande, 14°22'S, 39°04'W, S. 15-11-1994, L. Oliveira 281 (CEPEC 55950). Cairu, Tinharé Island, Mata do Sertão, 13°24'38"S, 38°54'54"W, 28-10-1996, M. L. Guedes & M. Accioly s/n (ALBC 28553).

Descriptions and illustrations: Germano & Pôrto (1998a).

Habitat: restinga vegetation.

Substrate: tree trunk.

Lejeuneaceae:

Archilejeunea fuscescens (Hampe ex Lehm.) Fulf.

Morphological characters: gametophyte medium size, prostrate, creeping. Leaves imbricate, incubus, lobed; lobe suborbicular, apex rounded to obtuse, margin plane, entire; cells oblong, thick-walled with distinct trigones; intermediate thickenings 1-3 per cell; oil bodies segmented; lobule subrectangular, apex with pointing tooth. Underleaves imbricate, entire, orbicular, apex rounded, recurved or plane, margin plane or recurved. Ventral merophyte four cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Ilhéus, ca. 7km of the road Olivença to Vila Brasil, 1-5-1992, S. L. Oliveira & A. C. Messias 230 (CEPEC 55957; ALCB).

Description and illustration: Gradstein (1994).

Habitat: restinga vegetation.

Substrate: tree trunk.

Ceratolejeunea cubensis (Mont.) Schiffn.

Morphological characters: gametophyte small, branched, prostrate. Leaves lobed, incubus, contiguous to imbricate, the apices usually deflexed; lobe convex, ovate to falcate, margin of the apical region somewhat serrulate; cells thick-walled; ocelli large in a transverse group separated from the others by a vegetative cell; lobule small, inflated, apical tooth large, often falcate. Underleaves rotund, bifid, small and

distant. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Cachoeira, Vale do Iguape, Fazenda Esperança, 29-9-1991, C. Bastos & A. Cerqueira 378 (ALCB 29555). Lamarão do Passé, 17-11-1995, S. B. Vilas Bôas-Bastos 260 (ALCB 38219).

Descriptions and illustrations: Fulford (1945); Schuster (1980).

Habitat: ombrophilous forest; gallery forest in cerrado vegetation.

Substrate: tree trunk.

Ceratolejeunea laetefusca (Aust.) Schust.

Morphological characters: gametophyte small to medium-size, branched, prostrate. Leaves lobed, contiguous to weakly imbricate, widely spreading; lobes ovate to falcate, the apex usually deflexed, rounded or obtuse, margin entire or sinuate, crenulate with projecting cells; lamina cells thin-walled to weakly thick-walled; trigones and intermediate thickened indistinct; ocelli usually 2-3, side by side, rarely 4-6(7); lobule inflated, ovate, free margin involute, apical tooth short. Underleaves bifid, distant, ovate to orbicular, rounded or cuneate basally, lobes erect, triangular, acute or subobtuse. Ventral merophytes two cells wide. Androecia not seen. Gynoecia on short lateral branch; perianth large, emergent, strongly inflated below, keels development as horns.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 26-10-1998, S.B. Vilas Bôas-Bastos 263, 265 (ALCB 38222; 38224).

Descriptions and illustrations: Schuster (1980).

Habitat: gallery forest in cerrado vegetation.

Substrate: tree trunk.

Cheilolejeunea trifaria (Reinw., Blume & Nees) Mizut.

Morphological characters: gametophyte small, prostrate. Leaves lobed, incubus, contiguous to imbricate; lobe rounded; cells oblong, thick-walled; trigones large, intermediate thickenings inconspicuous; oil bodies large, ellipsoid, segmented; lobule triangular-ovate, inflated, apex with small apical tooth. Underleaves large, bifid, orbicular, imbricate. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 20-1-1983, I. C. Britto s/n (ALCB 18866). Ilhéus, Ponta da Tulha, 7-10-1995, C. Bastos & S. B. Vilas Bôas-Bastos 776 (ALCB 27716).

Description and illustration: Reiner-Drehwald (1998).

Habitat: cerrado vegetation; restinga vegetation.

Substrate: tree trunk.

Cololejeunea minutissima (Smith) Schiffn. subsp. *myriocarpa* (Nees & Mont.) Schust.

Morphological characters: gametophyte small, prostrate. Leaves usually distant, rarely contiguous, lobed, incubus; lobe ovate; cells thin-walled, without trigones and intermediate thickenings; oil bodies large, ellipsoidal or fusiform, segmented; ocelli absent; lobule rarely inflated, ovate, apex with apical tooth 2-celled. Underleaves absent. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: São Sebastião do Passé, road to São Sebastião do Passé, 17-10-1998, S. B. Vilas Bôas-Bastos 155, 161 (ALCB 38115, 38121); Camaçari, Pólo Petroquímico, 20-10-1998, S. B. Vilas Bôas-Bastos 175, 178, 179, 186, 192 (ALCB 38135; 38138; 38134; 38146; 38152).

Descriptions and illustrations: Schuster (1980).

Habitat: cerrado vegetation.

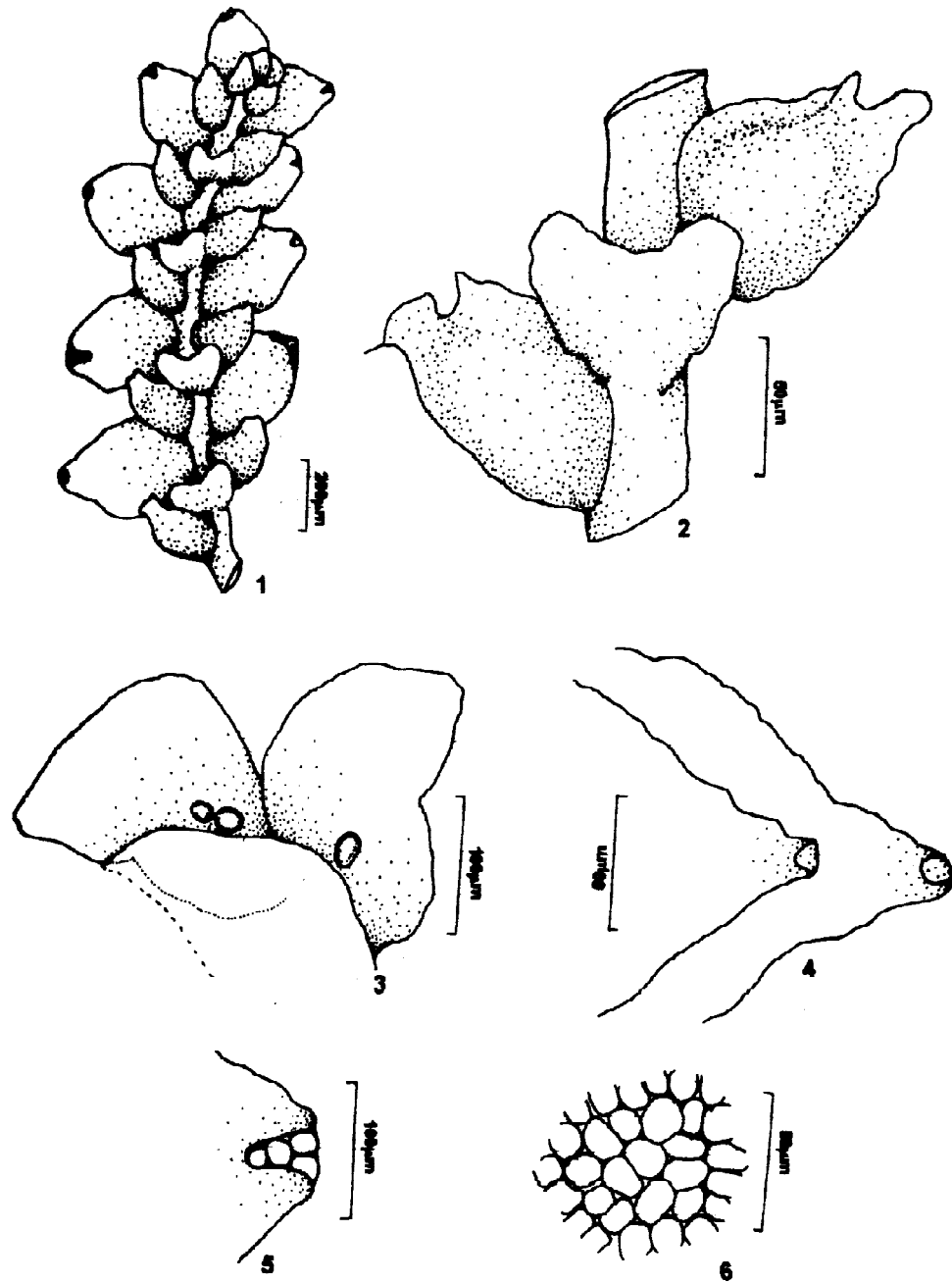
Substrate: tree trunk.

Drepanolejeunea mosenii (Steph.) Bischl.

Morphological characters: gametophyte small, prostrate, usually epiphyllous. Leaves widely spreading, distant, lobed; lobe ovate to lanceolate, widest shortly above base and gradually tapering to the slender apex terminated by 2-3 superposed cells, usually deflexed; margin entire; cells thin-walled with small trigones; ocelli in a broken vitta 3-6 per leaves; lobule subrectangular with apical tooth elongate; free margin involute. Underleaves distant, bifid, lobes filiform formed of a row of 2-3 cells. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas-Bastos 282, 287, 291, 292 (ALCB 38241; 38246; 38250; 38251).

Descriptions and illustrations: Schuster (1980, as *D. sabaliana*); Reiner-Drehwald (1995).



Figures 1-6. *Harpalejeunea ovata* (Hook.) Schiffn.: 1 - gametophyte, ventral view; 2 - lobule and underleaves; 3 - leaves and ocelli, dorsal view; 4 - lobe apex; 5 - lobe apex cells; 6 - laminal cells.

Habitat: cerrado vegetation.

Substrate: tree trunk.

Harpalejeunea ovata (Hook.) Schiffn. in Engler & Prantl

(Figures 1-6)

Morphological characters: gametophyte small, spreading and irregularly branched, prostrate. Leaves contiguous to imbricate, deflexed, lobed; lobe ovate-falcate, asymmetrical, convex with apex decurved formed by a solitary cell or by 2 superposed cells; cells thin-walled, trigones small, occasionally with intermediate thickenings; lobules inflated, ovoid, free margin involute; apical tooth curved; ocelli 1-4, basal. Underleaves small, bifid, deltoid to obcordate, apex truncate, lobes 4-5 cells broad, rounded at apex, divergent. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas-Bastos 290 (ALCB 38249). New record for Brazil.

Description and illustration: Schuster (1980).

Habitat: cerrado vegetation.

Substrate: tree trunk.

Lejeunea brittoniae (Evans) Grolle

Morphological characters: gametophyte small, prostrate. Leaves imbricate, incubus, lobed; lobe ovate to ovate-orbicular; cells thick-walled with small trigones; ocelli absent; lobule on noncaducous leaves inflated, ovate to triangular-ovate; free margin involute, apical tooth small; lobule on caducous leaves reduced. Underleaves bifid, distant, orbicular to ovate. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Cachoeira, Pedra do Cavalo, Fazenda Favela, 20-9-1992, C. Bastos 441 (ALCB 18628).

Descriptions and illustrations: Schuster (1980, as *Rectolejeunea brittoniae* Evans).

Habitat: seasonal forest.

Substrate: tree trunk.

Leptolejeunea elliptica (Lehm. & Lindenb.) Steph.

Morphological characters: gametophyte small,

prostrate. Leaves distant to contiguous, incubus, lobed; lobe oblong-elliptical to oblong-lanceolate; cells thick-walled with trigones and intermediate thickenings; ocelli in a broken line along midline, the basal one large, become progressively smaller; lobule small, ovate, apical tooth 1-celled. Underleaves bifid, distant, transverse, with filiform lobes usually 2-3 celled. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Ilhéus, Campus of the Universidade de Santa Cruz, 16-9-1991, S. L. Oliveira & A. C. Messias 189 (ALCB 18804). Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas Bastos 281 (ALCB 38240).

Descriptions and illustrations: Schuster (1980).

Habitat: ombrophilous forest; cerrado vegetation.

Substrate: leaves; tree trunk.

Omphalanthus filiformis (Sw.) Nees in Gott. Lindenb. & Nees*

Morphological characters: gametophyte to median size, brownish, prostrate. Leaves imbricate, incubus, lobed; lobe orbicular; cells thick-walled, oblong-rectangular; trigones large; lobule small, inflated, triangular. Underleaves large, entire, orbicular. Ventral merophytes 2-3 cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Castro Alves, Serra da Pioneira, 12°51'11"S, 39°28'19"W, 7-5-1993, L. P. de Queiroz et al. 3172 (HUEFS 13416).

Descriptions and illustrations: Costa (1992).

Habitat: seasonal forest.

Substrate: tree trunk.

*This species were reported for Bahia by Stephani (1897, *apud* Yano 1984).

Pycnolejeunea callosa (Lindenb.) Steph.

(Figures 7-10)

Morphological characters: gametophyte medium size, 1 mm wide, prostrate. Leaves lobed, spreading, incubus, slightly imbricate; lobe oblong-orbicular; cells oblong with large trigones; ocelli present, at least twice as long as wide; oil-bodies not seen; lobule large, oblong to oblong-ligulate, inflated, sinus at a 90° angle with the free posterior margin of lobe, with short apical tooth. Underleaves large, imbricate, bifid. Ventral merophyte two cells wide. Androecia and

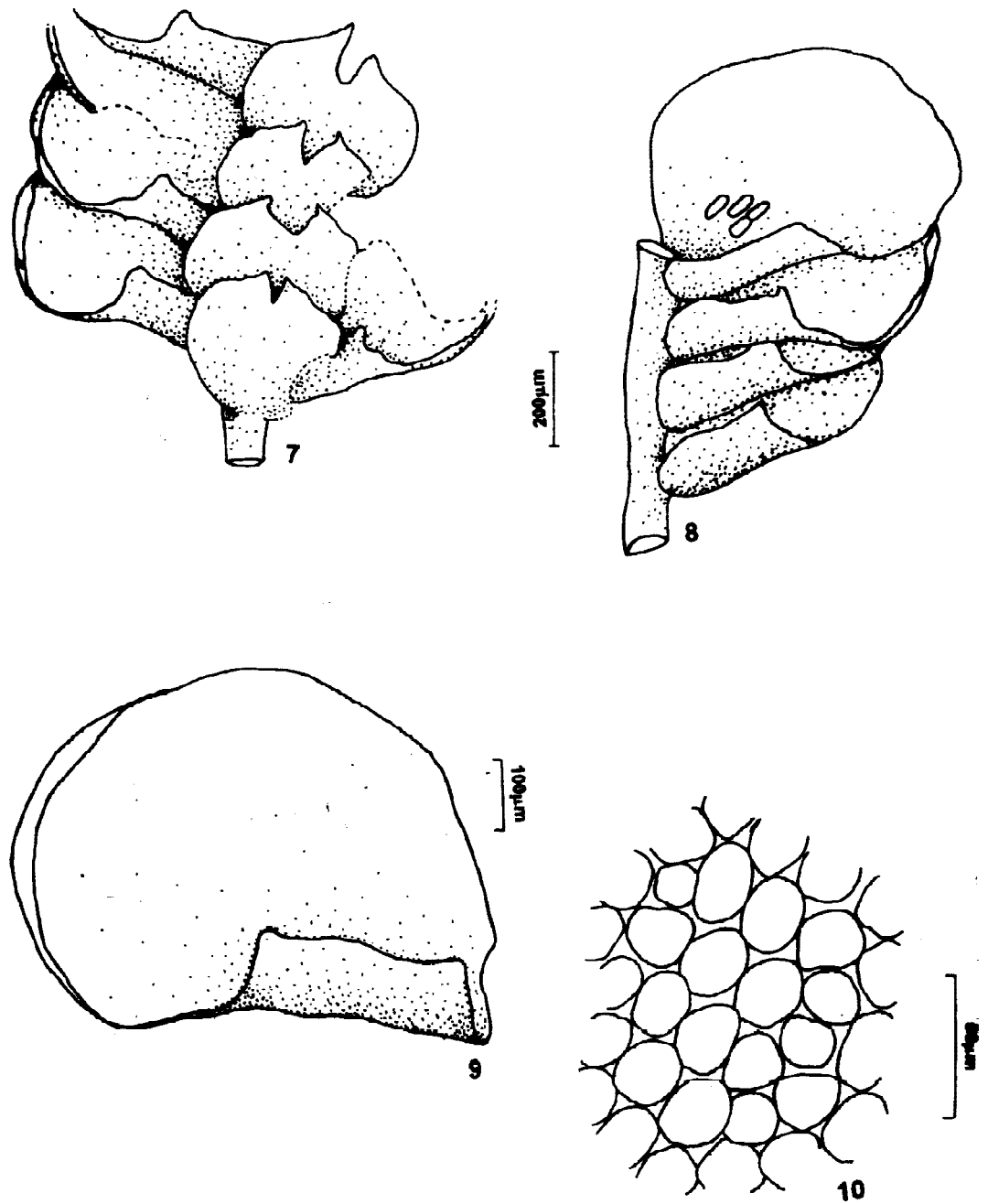


Figure 7-10. *Pycnolejeunea callosa* (Lindenb.) Steph.: 7 - gametophyte, ventral view; 8 - leaves and ocelli; 9 - leafy; 10 - laminal cells.

gynoecia not seen.

Specimens examined: Brazil, Bahia: Ilhéus, Ponta da Tulha, 7-10-1995, C. Bastos & S. B. Vilas Bôas-Bastos 786 (ALCB 27708).

Illustration: Kachroo & Schuster (1961).

Habitat: restinga vegetation.

Substrate: tree trunk.

Pycnolejeunea macroloba (Nees & Mont.) Schifff.

(Figures 11-16)

Morphological characters: gametophyte large, 1-2 mm wide, prostrate. Leaves lobed, spreading, incubus, imbricate; lobe oblong-orbicular, cells oblong with trigones; ocelli present; oil-bodies not seen; lobule large, oblong to oblong-ligulate, inflated, the sinus 90°, oblique with respect to the posterior margin of lobe, apical tooth short. Underleaves large, imbricate, bifid. Ventral merophyte two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas-Bastos 199 (ALCB 38159).

Illustrations: Kachroo & Schuster (1961).

Habitat: gallery forest in cerrado vegetation.

Substrate: tree trunk.

Rectolejeunea berteriana (Gott. ex Steph.) Evans (Figures 17-22)

Morphological characters: gametophyte small, prostrate. Leaves imbricate, incubus, lobed; lobe ovate, rounded at apex; cells thick-walled, devoid of trigones and intermediate thickenings; ocelli scattered, 10-20 per leaves, at base a group of 4-10 larger ocelli arranged in short vitta of 2-4 cells rows; lobule small, inflated, ovoid-cylindrical, free margin involute, apex with 1-celled falcate tooth. Caducous leaves always present, lacking basal ocelli, with lobule reduced to a filiform appendage 1-seriate, tipped by the hyaline papilla. Underleaves distant to contiguous, bifid, obovate. Ventral merophytes two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Lamarão do Passé, 17-11-1998, S. B. Vilas Bôas-Bastos 257 (ALCB 38216); S. B. Vilas Bôas-Bastos 211, 322,

26-10-1998 (ALCB 38171; 40597).

Descriptions and illustrations: Schuster (1980).

Habitat: gallery forest in cerrado vegetation.

Substrate: tree trunk.

Symbiezidium barbiflorum (Lindenb. & Gott.) Evans

Morphological characters: gametophyte small, prostrate. Leaves imbricate, incubus, lobed, in right side smaller; lobe ovate to ovate-oblong, apex rounded or apiculate, margin entire; cells thick-walled with trigones and intermediate thickenings; lobule small, inflated and sac-like, free margin incurved, flattened towards apex; apex with 1-celled tooth. Underleaves imbricate, entire, ovate to reniform. Ventral merophytes two cells wide. Androecia not seen; gynoecia on a very short branch; perianth ventral surface rough due to short spines, cilia or laciniae distributed randomly or in 1-2 rows.

Specimens examined: Brazil, Bahia: Cachoeira, Vale do Iguape, Fazenda Esperança, 29-9-1991, C. Bastos & A. Cerqueira 374 (ALCB 18473). Lamarão do Passé, 26-10-1998, S.B. Vilas Bôas-Bastos 268 (ALCB 38227).

Description and illustration: Gradstein & van Beck (1985).

Habitat: ombrophilous forest; gallery forest in cerrado vegetation.

Substrate: tree trunk.

Trachylejeunea crenata (Mont. & Nees) Schust. (Figures 23-26)

Morphological characters: gametophyte small, prostrate. Leaves lobed, erect-spreading, imbricate; lobe oblong-orbicular, the margin tooth; cells thick-walled, trigones inconspicuous, intermediate thickening absent; oil-bodies not seen; ocelli 2-3, basal; lobule inflated, rectangular-ovate, apical tooth acute; hyaline papilla not seen. Underleaves bifid, distant, triangular-ovate, narrowed at base. Ventral merophyte two cells wide. Androecia and gynoecia not seen.

Specimens examined: Brazil, Bahia: Una, km 10 of road Una to Ilhéus, in restinga vegetation, growing on tree trunk, 28-7-1993, S. L. Oliveira 327 (ALCB 32718); Mico-Leão Biological Reserve (IBAMA), 15°09'S, 39°05'W, 23-8-1994, L.L. Oliveira 09 (CEPEC 62640).

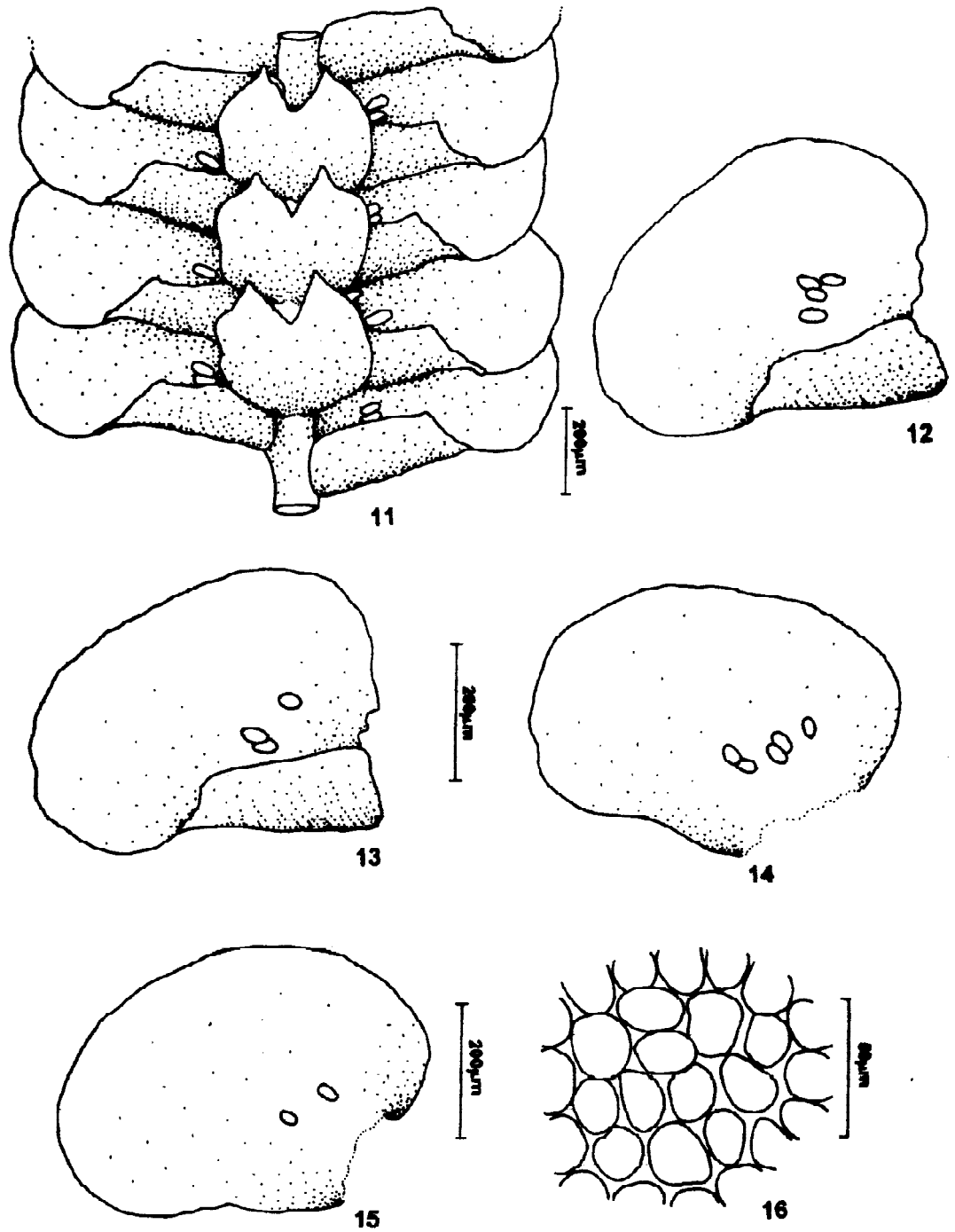
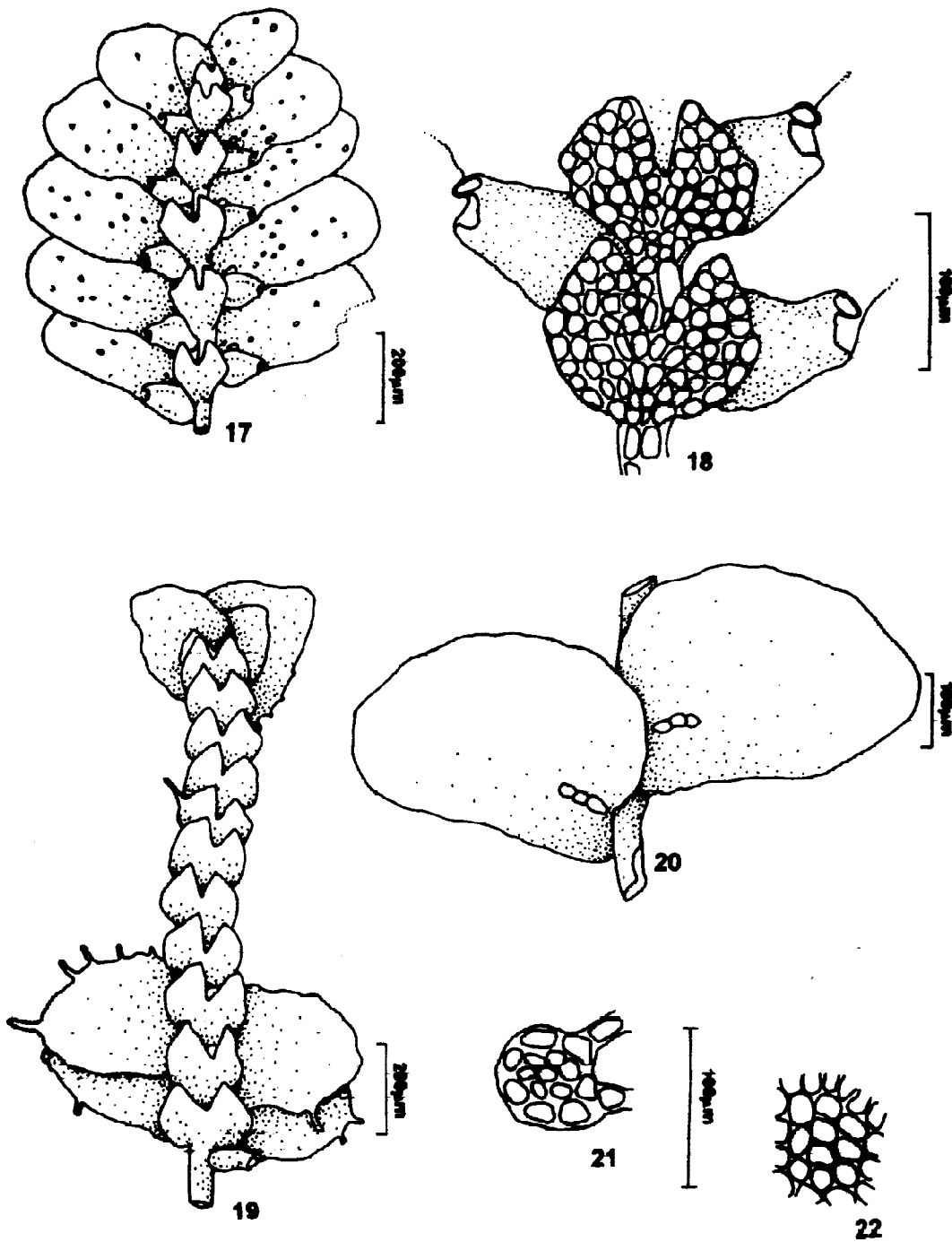


Figure 11-16. *Pycnolejeunea macroloba* (Nees & Mont.) Schiffn.: 11 - gametophyte, ventral view; 12-15 - leaves and ocelli pattern; 16 - laminal cells.



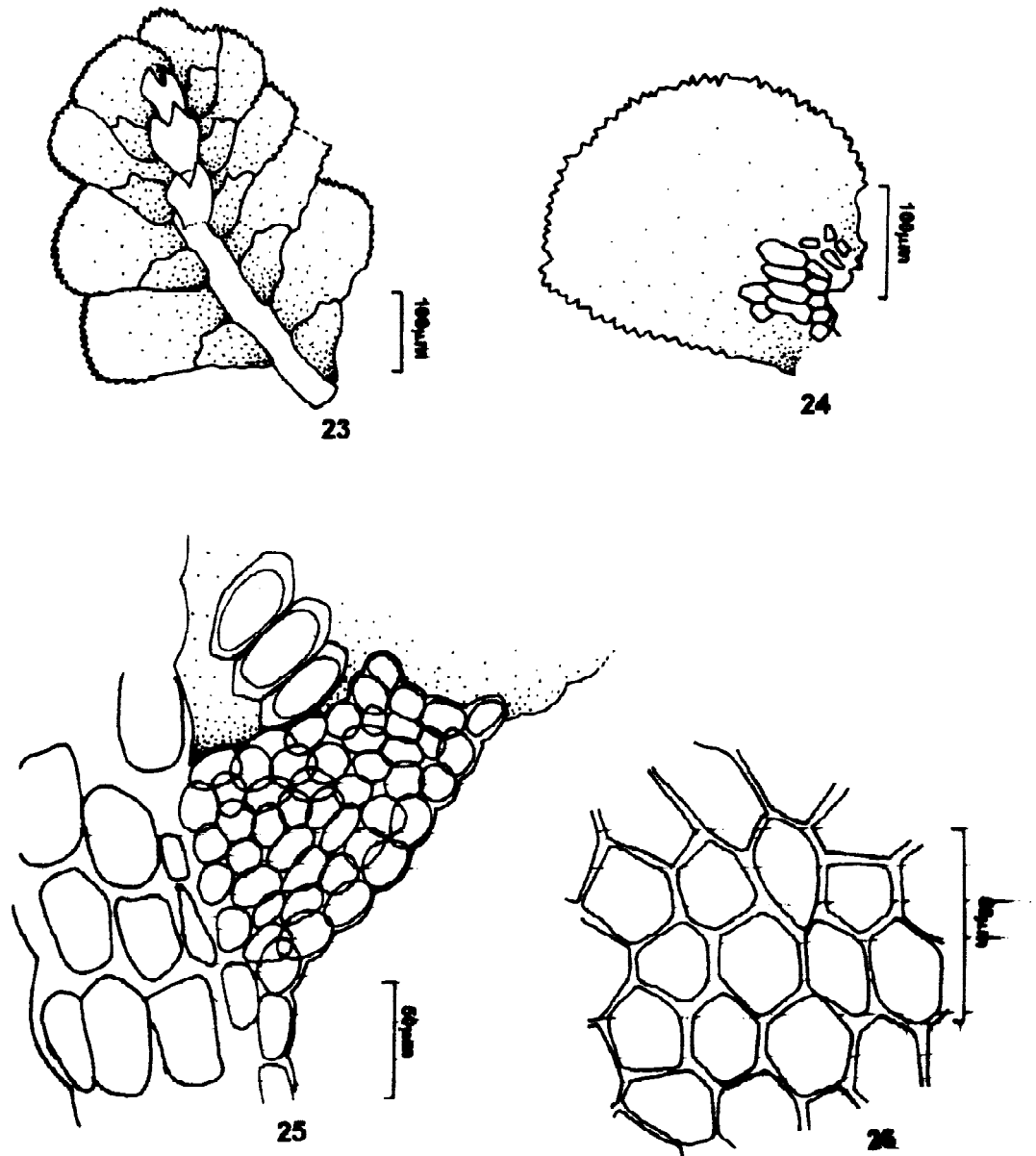


Figure 23-26. *Trachylejeunea creneata* (Mont. & Nees) Schust.: 23 - gametophyte, ventral view; 24 - leaves and ocelli; 25 - lobule and ocelli; 26 - laminal cells.

Illustrations and comments: Germano & Pôrto (1998b).

Habitat: restinga vegetation; ombrophilous forest.

Substrate: tree trunk; decaying logs.

Literature cited

- Bastos, C. J. P., Albertos, B. & Vilas Bôas, S. B. 1998a.** Bryophytes from some Caatinga areas in the state of Bahia (Brazil). *Tropical Bryology* 14: 69-75.
- Bastos, C. J. P., Stradmann, M. T. S. & Vilas Bôas-Bastos, S. B. 1998b.** Additional contributions to the Bryophyte Flora of Chapada Diamantina National Park, State of Bahia, Brazil. *Tropical Bryology* 15: 15-20.
- Bastos, C. J. P. & Vilas Bôas-Bastos, S. B. 1998.** Adições à brioflora (Bryopsida) do Estado da Bahia, Brasil. *Tropical Bryology* 15: 111-116.
- Bastos, C. J. P. & Yano, O. 1993.** Musgos da zona urbana de Salvador, Bahia. *Hoehnea* 20(1/2): 23-33.
- Costa, D. P. 1992.** Hepáticas do Pico da Caledônia, Nova Friburgo, Rio de Janeiro, Brasil. *Acta Botanica Brasilica* 6(1): 3-39.
- Fulford, M. H. 1945.** Studies on American Hepaticae - VI. *Ceratolejeunea*. *Brittonia* 5(4): 368-403.
- Fulford, M. H. 1968.** Manual of the Leafy Hepaticae of Latin America. Part III. *Memoirs of the New York Botanical Garden* 11(3): 277-392.
- Germano, S. R. & Pôrto, K. C. 1998a.** Adições à brioflora do Estado de Pernambuco, Brasil. *Hoehnea* 25(2): 121-131.
- Germano, S. R. & Pôrto, K. C. 1998b.** Briófitas epixílicas de uma área remanescente de floresta atlântica (Timbaúba, PE, Brasil). 2. *Lejeuneaceae*. *Acta Botanica Brasilica* 12(1): 53-66.
- Gradstein, S. R. 1994.** *Lejeuneaceae*. *Ptychantheae, Brachiolejeuneae*. *Flora Neotropica*, Monograph 62: 1-216.
- Gradstein, S. R. & van Beek, J. 1985.** A revision of the genus *Symbiezidium* Trevis. *Beih. Nova Hedwigia* 80: 221-248.
- Harley, R. M. 1995.** Bryophyta. In: Stannard, B. L. (ed.), *Flora of the Pico das Almas, Chapada Diamantina - Bahia, Brazil*. Kew: Royal Botanic Gardens, p. 803-812.
- Jovet-Ast, S. 1987.** Un *Riccia* nouveau du Nord-est du Brésil. *Riccia vitalii* (Ricciaceae, sous-genre *Riccia*). *Memoirs of the New York Botanical Garden* 45: 283-288.
- Jovet-Ast, S. 1991.** *Riccia* (Hépatiques, Marchantiales) d'Amérique Latine. Taxons du sus-genre *Riccia*. *Cryptogamie, Bryologie-Lichénologie* 12(3): 189-170.
- Kachroo, P. & Schuster, R. M. 1961.** The genus *Pycnolejeunea* and its affinities to *Cheilolejeunea*, *Euosmolejeunea*, *Nipponolejeunea*, *Tuyamella*, *Siphonolejeunea* and *Strepsilejeunea*. *Journal of the Linnean Society of Botany* 56: 368-475.
- Martins, D.V., Bastos, C.J.P. & Yano, O. 1990.** Ocorrência de *Notothylas vitalii* e *Phaeoceros laevis* em São Paulo e Bahia, Brasil. *Revista Brasileira de Botânica* 13: 15-18.
- Nees von Esenbeck, C.G. 1833.** Hepaticae. In C.F.P. Martius *Flora Brasiliensis*. Stuttgart et Tübingae. J.G. Gotta ed., vol. 1(2), p. 293-390.
- Reiner-Drehwald, M. E. 1995.** Las Lejeuneaceae (Hepaticae) de Misiones, Argentina III. *Drepanolejeunea y Leptolejeunea*. *Tropical Bryology* 10: 21-17.
- Reiner-Drehwald, M. E. 1998.** Las Lejeuneaceae (Hepaticae) de Misiones, Argentina V. *Cheilolejeunea y Lepidolejeunea*. *Tropical Bryology* 14: 53-68.
- Schuster, R. M. 1980.** The Hepaticae and Anthocerotae of North America east of the Hundredth Meridian. New York: Columbia Univ. Press, vol. 4. 1334p.il.
- Stephani, F. 1897.** Die Lebermoose der Ersten Regnellischen Expedition nach Südamerika vom F. Stephani, mit einer geographischen Einleitung von C.A.M. Lindman. *Bihang till Kgl. Svenska Vetenskapsakademiens Handlingar* 23(2): 1-36.
- Vilas Bôas-Bastos, S. B. & Bastos, C. J. P. 1998.** Briófitas de uma área de Cerrado no município de Alagoinhas, Bahia, Brasil. *Tropical Bryology* 15: 101-110.
- Yano, O. 1981.** A checklist of Brazilian mosses. *The Journal of the Hattori Botanical Laboratory* 50: 279-456.
- Yano, O. 1984.** Checklist of Brazilian liverworts and hornworts. *Journal of the Hattori Botanical Laboratory* 56: 481-584.
- Yano, O. 1989.** An additional checklist of Brazilian bryophytes. *Journal of the Hattori Botanical Laboratory* 66: 371-434.
- Yano, O. 1995.** An New Additional Annotated Checklist of Brazilian Bryophytes. *Journal of the Hattori Botanical Laboratory* 78: 137-182.
- Yano, O. & Bastos, C. J. P. 1984.** Musgos do Estado da Bahia, Brasil. *Biologica Brasilica* 6(1/2): 9-26.
- Yuzawa, Y. & Hattori, S. 1988.** A new *Frullania* species from Brazil. *The Journal of Japanese Botany* 63(1): 30-32.

