

OVERVIEW OF *APHANOLEJEUNEA* (JUNGERMANNIOPSIDA) AFTER 25 YEARS

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Abstract. The last worldwide account of *Aphanolejeunea*, done 25 years ago, recognized 41 valid species. Since then the number of accepted taxa has increased by 10 new species, described mostly by us, and 4 species, as new combinations, were transferred from *Cololejeunea* to *Aphanolejeunea*. It also turned out that some other names, mostly synonyms, have been overlooked in the intervening years. Recent molecular evidence has shown that at the generic level *Aphanolejeunea* cannot be separated from *Cololejeunea*. Here, all valid *Aphanolejeunea* taxa are merged with (or returned to) *Cololejeunea*. Forty-three *Cololejeunea* names are established for the previously known 64 *Aphanolejeunea* binomials, 23 new combinations and 4 new names (these latter to avoid homonymy) are made, and 22 new synonyms are proposed. The continental distributions of all species are given, based on our recent knowledge.

Key words: *Aphanolejeunea*, *Cololejeunea*, new combinations, synonymy

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INTRODUCTION

The genus *Aphanolejeunea* was segregated relatively later than most of the Lejeuneaceae genera, by Evans (1911). He distinguished it from *Cololejeunea* by its small size, dimorphic leaves, thin walls of lobe cells without trigones, and later by its distal hyaline papilla position (Evans 1938). Schuster (1955) supplied a new character, the formation of marginal and perpendicular gemmae in contrast to the intramarginal gemmae of *Cololejeunea* adherent to the lobe surface. Thiers (1982) added to the previous characters another one: the athecal, basispic branching type, which proved to be quite a useful tool in most cases. Meanwhile, 41 valid *Aphanolejeunea* species were listed by Pócs (1984a), who planned to make a worldwide revision of the genus. Other authors (Benedix 1953; Stotler & Crandall-Stotler 1977; Tixier 1979; Asthana & Srivastava 2003) doubted the independence of *Aphanolejeunea*, claiming that the characters distinguishing it from *Cololejeunea* do not occur consistently together in all species. After 1984 a number of species were described from Africa, Central America and Western Melanesia (Bernecker-Lücking 1995, 1998; Morales & Ber-

necker-Lücking 1995; Pócs 1984b, 1994; Pócs *et al.* 1994; Pócs & Piippo 1999; Reiner-Drehwald 1995). New combinations and synonymy were also made by Pócs (in Equihua and Pócs 1999 and in Schumacker and Váña 2005).

We have been working for more than a decade on a revision of the genus for *Flora Neotropica*. We have studied the types and established their synonymy, identified large numbers of specimens collected in Costa Rica, Panama, Mexico, Cuba, Venezuela, Ecuador, Bolivia and Brazil, and revised the species of the Guayanas (Pócs & Bernecker-Lücking 1997). The first author has published the revision of Brazilian species (Pócs, in Gradstein & Da Costa 2003), while the second author has made drawings of all the investigated taxa (Bernecker-Lücking, unpublished).

In the meantime, molecular evidence (Ahonen 2004; Jochen *et al.* 2005; Gradstein *et al.* 2006; Wilson *et al.* 2006) has revealed that *Aphanolejeunea* A. Evans (1911) cannot be separated at the generic level from *Cololejeunea* (Spruce) Schiffner in Engler & Prantl (1893). This finding justified previous doubts about the independence

of the genus *Aphanolejeunea* and mandated that its species should be transferred (or returned) to *Cololejeunea*, requiring new combinations. Some of these combinations have already been published in local floras and checklists (Pócs, in Dauphin *et al.* 2008; Pócs, in Gradstein 2009).

The present work briefly summarizes these results in the form of a list, with the new combinations and recently established new synonyms, and their world distribution at the continental level, including many new records. In addition, a list of synonyms is provided for the 62 previously published *Aphanolejeunea* species names, together with their infraspecific units.

ALPHABETICAL LIST OF FORMER *APHANOLEJEUNEA* TAXA WITH THEIR *COLOLEJEUNEA* EQUIVALENTS

In this list the valid *Cololejeunea* synonyms and new names of all hitherto known *Aphanolejeunea* are given. Their references and validation are in the next part.

- Aphanolejeunea amphibola* (B. M. Thiers) Pócs & Bernecker = *Cololejeunea amphibola* B. M. Thiers
- Aphanolejeunea angustiloba* Horikawa = *Cololejeunea sintenisii* (Steph.) Pócs
- Aphanolejeunea azorica* (V. Allorge & Ast) Pócs & Bernecker = *Cololejeunea azorica* V. Allorge & Ast
- Aphanolejeunea bistyla* (Steph.) Steph. = *Cololejeunea bistyla* Steph.
- Aphanolejeunea camillii* (Lehm.) R. M. Schust. = *Cololejeunea camillii* (Lehm.) A. Evans
- Aphanolejeunea capensis* (S. Arnell) S. Arnell = *Cololejeunea grossepapillosa* (Horik.) Pócs *comb. nov.*
- Aphanolejeunea cingens* Herzog = *Cololejeunea cingens* (Herz.) Bernecker & Pócs
- Aphanolejeunea clavatopapillata* (Steph.) Reiner = *Cololejeunea clavatopapillata* Steph.
- Aphanolejeunea contractiloba* (A. Evans) R. M. Schust. = *Cololejeunea contractiloba* A. Evans
- Aphanolejeunea cornutissima* R. M. Schust. = *Cololejeunea cornutissima* (R. M. Schust.) Pócs
- Aphanolejeunea costaricensis* Bernecker = *Cololejeunea costaricensis* (Bernecker) Bernecker & Pócs
- Aphanolejeunea crenata* A. Evans = *Cololejeunea crenata* (A. Evans) Pócs
- Aphanolejeunea diaphana* (A. Evans) R. M. Schust. incl. var. *crisulata* (R. M. Schust.) R. M. Schust. = *Cololejeunea diaphana* A. Evans
- Aphanolejeunea diaphana* Herzog = *Cololejeunea microscopica* (Taylor) Schiffn.
- Aphanolejeunea ephemeroides* R. M. Schust. = *Cololejeunea sintenisii* (Steph.) Pócs
- Aphanolejeunea evansii* Herzog = *Cololejeunea cubensis* (Herzog) Pócs
- Aphanolejeunea evansii* R. M. Schust. = *Cololejeunea cornutissima* (R. M. Schust.) Pócs
- Aphanolejeunea exigua* A. Evans = *Cololejeunea microscopica* (Taylor) Schiffn. var. *exigua* (A. Evans) Bernecker & Pócs
- Aphanolejeunea exigua* A. Evans var. *africana* Pócs = *Cololejeunea microscopica* (Taylor) Schiffn. var. *africana* (Pócs) Pócs & Bernecker
- Aphanolejeunea fadenii* (Pócs) Pócs = *Cololejeunea clavatopapillata* Steph.
- Aphanolejeunea gracilis* Jovet-Ast incl. var. *linearifolia* R. M. Schust. = *Cololejeunea gracilis* (Ast) Pócs in Dauphin *et al.*
- Aphanolejeunea grossepapillosa* Horik. = *Cololejeunea grossepapillosa* (Horik.) Pócs
- Aphanolejeunea heterophylla* (Goebel) Schuster = *Cololejeunea gracilis* (Ast) Pócs
- Aphanolejeunea iwatsukiana* Pócs = *Cololejeunea iwatsukiana* (Pócs) Pócs
- Aphanolejeunea jamaicensis* R. M. Schust. = *Cololejeunea sicaefolia* (Gottsche) Pócs & Bernecker subsp. *jamaicensis* (R. M. Schust.) Bernecker & Pócs
- Aphanolejeunea jovetastiana* Pócs = *Cololejeunea jovetastiana* (Pócs) Pócs
- Aphanolejeunea kopenonii* Pócs = *Cololejeunea kopenonii* (Pócs) Pócs
- Aphanolejeunea kunertiana* Steph. = *Cololejeunea papilliloba* (Steph.) Steph.
- Aphanolejeunea liliputana* (Spruce) R. M. Schust. = *Cololejeunea camillii* (Lehm.) A. Evans
- Aphanolejeunea lisowskii* Pócs = *Cololejeunea lisowskii* (Pócs) Pócs
- Aphanolejeunea longifolia* Jovet-Ast = *Cololejeunea antillana* Pócs
- Aphanolejeunea madeirensis* (Schiffn.) Grolle = *Cololejeunea madeirensis* Schiffn.
- Aphanolejeunea magnilobula* Horik. = *Cololejeunea macounii* (Spruce) A. Evans
- Aphanolejeunea mamillata* (Ångstr.) Steph. = *Cololejeunea mamillata* (Ångstr.) E. A. Hodgson
- Aphanolejeunea microscopica* (Taylor) A. Evans = *Cololejeunea microscopica* (Taylor) Schiffn.

- Aphanolejeunea microscopica* (Taylor) A. Evans var. *africana* (Pócs) Pócs & Bernecker = ***Cololejeunea microscopica*** (Taylor) Schiffn. var. *africana* (Pócs) Pócs & Bernecker
- Aphanolejeunea microscopica* (Taylor) A. Evans var. *exigua* (A. Evans) Bernecker & Pócs = ***Cololejeunea microscopica*** (Taylor) Schiffn. var. *exigua* (A. Evans) Bernecker & Pócs
- Aphanolejeunea minuta* R. M. Schust. = ***Cololejeunea minuscula*** Pócs
- Aphanolejeunea misionensis* Reiner = ***Cololejeunea camillii*** (Lehm.) A. Evans
- Aphanolejeunea moralesiae* Bernecker = ***Cololejeunea moralesiae*** (Bernecker) Bernecker & Pócs
- Aphanolejeunea moramangae* (Tixier) Tixier in Pócs = ***Cololejeunea moramangae*** Tixier
- Aphanolejeunea morobensis* Pócs = ***Cololejeunea morobensis*** (Pócs) Pócs
- Aphanolejeunea ninhbinhiana* (Tixier) Tixier in Pócs = ***Cololejeunea diaphana*** A. Evans
- Aphanolejeunea norrisii* Pócs = ***Cololejeunea norrisii*** (Pócs) Pócs
- Aphanolejeunea paucifolia* (Spruce) Reiner = ***Cololejeunea paucifolia*** (Spruce) Bernecker & Pócs
- Aphanolejeunea pocsii* Bernecker = ***Cololejeunea berneckerae*** Pócs
- Aphanolejeunea proboscoidea* (Goebel) Tixier = ***Cololejeunea diaphana*** A. Evans
- Aphanolejeunea pterocolea* (Herzog.) R. M. Schust. = ***Cololejeunea pterocolea*** Herzog
- Aphanolejeunea pustulosa* (Ast) Bernecker & Pócs in Equihua & Pócs = ***Cololejeunea papilliloba*** (Steph.) Steph.
- Aphanolejeunea ranongensis* Tixier = ***Cololejeunea grossepapillosa*** (Horik.) Pócs *comb. nov.*
- Aphanolejeunea runssorensis* Steph = ***Cololejeunea runssorensis*** (Steph.) Pócs
- Aphanolejeunea sicaefolia* (Gottsche, in Steph.) A. Evans = ***Cololejeunea sicaefolia*** (Gottsche) Pócs & Bernecker
- Aphanolejeunea sicaefolia* subsp. *roraimensis* Pócs & Bernecker = ***Cololejeunea sicaefolia*** subsp. *jamaicensis* (R. M. Schust.) Bernecker & Pócs
- Aphanolejeunea sintenisii* (Steph.) Steph. = ***Cololejeunea sintenisii*** (Steph.) Pócs
- Aphanolejeunea subdiaphana* (Ast) Pócs incl. var. *cristulata* (R. M. Schust.) Pócs = ***Cololejeunea diaphana*** A. Evans
- Aphanolejeunea subsphaeroidea* R. M. Schust. = ***Cololejeunea subsphaeroidea*** (R. M. Schust.) Pócs
- Aphanolejeunea teotonii* V. Allorge & Ast = ***Cololejeunea sintenisii*** (Steph.) Pócs
- Aphanolejeunea thiersiae* Pócs = ***Cololejeunea thiersiae*** (Pócs) Pócs
- Aphanolejeunea truncatifolia* Horikawa = ***Cololejeunea diaphana*** A. Evans
- Aphanolejeunea tuberculata* (A. Evans) R. M. Schust. = ***Cololejeunea clavatopapillata*** Steph.
- Aphanolejeunea veillonii* (Tixier) Pócs = ***Cololejeunea veillonii*** Tixier
- Aphanolejeunea verrucosa* Ast = ***Cololejeunea microscopica*** (Taylor) Schiffn. var. *africana* (Pócs) Pócs & Bernecker
- Aphanolejeunea winkleri* Morales & Lücking = ***Cololejeunea winkleri*** (Morales & Bernecker) Bernecker & Pócs
- Aphanolejeunea zenkeri* Steph. = ***Cololejeunea zenkeri*** (Steph.) E. W. Jones

LIST OF THE CONCERNED *COLOLEJEUNEA* SPECIES WITH THEIR SYNONYMS

In this list the new/old valid name within the genus ***Cololejeunea*** written in bold italics is given first, followed by the former *Aphanolejeunea* taxon name in italics, and the basionym or other synonyms. For new heterotypic synonyms the type seen by us is also indicated. Finally the world distribution is given briefly.

Cololejeunea amphibola B. M. Thiers

Beih. Nova Hedwigia **90**: 130. 1988.

Aphanolejeunea amphibola (B. M. Thiers) Pócs & Bernecker, in Pócs & Piippo, Acta Bot. Fennica **165**: 87. 1999.

DISTRIBUTION: Australia, New-Guinea.

Cololejeunea antillana Pócs, *nom et comb. nov.*

BASIONYM: *Aphanolejeunea longifolia* Jovet-Ast, Rev. Bryol. Lichén. **16**: 23, Fig. III. 1947, non *Cololejeunea longifolia* Schiffner, Hedwigia **39**: 200. 1900.

NOTE. A new specific epithet was needed.

DISTRIBUTION: America: Antilles.

Cololejeunea azorica V. Allorge & Ast

Mitt. Thür. Bot. Ges. **1**(2–3): 21. 1955.

Aphanolejeunea azorica (V. Allorge & Ast) Pócs & Bernecker, in Schumacker & Váňa, Liverworts and Hornworts of Europe and Macaronesia: 51. 2005.

DISTRIBUTION: Macaronesia; America: Brazil, Venezuela.

Cololejeunea berneckerae Pócs, *nom. et comb. nov.*

BASIONYM: *Aphanolejeunea pocsii* Bernecker, Nova Hedwigia **66**: 168–171. 1998, non *Cololejeunea pocsii* Tixier, Ann. Hist.-Nat. Mus. Nat. Hung. **66**: 95. 1974, hence a new epithet was needed.

DISTRIBUTION: America: Costa Rica.

Cololejeunea bistyla Steph.

Hedwigia **28**: 168. 1889, Icones 7329.

Aphanolejeunea bistyla (Steph.) Steph., Spec. Hep. **5**: 862. 1916.

DISTRIBUTION: Australia: Norfolk Island.

Cololejeunea camillii (Lehm.) A. Evans

Bryologist **15**: 59, pl. II, figs. 6–14. 1912.

BASIONYM: *Lejeunea camillii* Lehm, Pugillus **10**: 15. 1857.

Lejeunea montagnei Steph. Hedwigia **29**: 96 non *L. montagnei* Gottsche, Ann.Sci, Nat. Bot. ser. 2, **19**: 261. 1843.

Aphanolejeunea camillii (Lehm.) R. M. Schust., Hep. North Amer. **4**: 1297. 1980.

Aphanolejeunea misionensis Reiner, Trop. Bryol. **10**: 30, Fig. 1. 1955.

Aphanolejeunea liliputana (Spruce) R. M. Schust. J. Elisha Mitchell Soc. **71**: 140. 1955.

Physocolea liliputana (Spruce) Steph., Sp. Hep. **5**: 878. 1916. [BASIONYM: *Lejeunea (Colo-Lejeunea) liliputana* Spruce, Hep. Amaz. et And.: 297. 1884, see Dauphin *et al.* (2008) based on the type observations of Andrea Bernecker (in lit.)].

DISTRIBUTION: America.

Cololejeunea cingens (Herz.) Bernecker & Pócs, *comb. nov.*

BASIONYM: *Aphanolejeunea cingens* Herzog, Svensk Bot. Tid. **46**: 104, Fig. 13. 1952.

DISTRIBUTION: America: Costa Rica, Dominica, Ecuador.

Cololejeunea clavatopapillata Steph.

Hedwigia **34**: 246. 1895.

Physocolea clavatopapillata (Steph.) Steph., Spec. Hep. **5**: 875. 1916.

Aphanolejeunea clavatopapillata (Steph.) Reiner, Trop. Bryology **10**: 29–30, fig. 3. 1995.

Aphanolejeunea tuberculata (A. Evans) R. M. Schust. Hep. Anthoc. N. Amer. **4**: 1290. 1980. [BASIONYM: *Cololejeunea tuberculata* A. Evans, Bryologist **18**: 84. 1915.]

Cololejeunea crystallina Herzog, Feddes Rep. Spec. Nov. **55**(1): **16**. 1952.

Aphanolejeunea fadenii (Pócs) Pócs, J. Hattori Bot. Lab. **55**: 309. 1984. [BASIONYM: *Cololejeunea fadenii* Pócs, Acta Bot. Acad. Sci. Hung. **21**: 353, Figs. 13–14. 1975. HOLOTYPE: Kenya, Mt. Kenya, Pócs & Faden 6604/A, EGR], *syn. nov.*

DISTRIBUTION: America, Africa.

Cololejeunea contractiloba A. Evans

Amer. J. Bot. **5**: 131, Fig. 1. 1918.

Aphanolejeunea contractiloba (A. Evans) R. M. Schust., Hep. Anthoc. N. Amer. **4**: 1314. 1980.

DISTRIBUTION: America: the Guyanas.

Cololejeunea cornutissima (R. M. Schust.) Pócs, *comb. nov.*

BASIONYM: *Aphanolejeunea cornutissima* R. M. Schust., Bryologist **59**: 217. 1956 as nom. nov., replacing *Aphanolejeunea evansii* R. M. Schust., J. Elisha Mitchell Sci. Soc. **71**: 134. 1955, homon. illeg., non *Aphanolejeunea evansii* Herzog, Beih. Bot. Centralbl. **61**: 583–584, Fig. 15. 1942.

DISTRIBUTION: America: Florida.

Cololejeunea costaricensis* (Bernecker) Bernecker & Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea costaricensis* Bernecker, Nova Hedwigia **66**: 164, Fig. 1. 1995.

DISTRIBUTION: America: Costa Rica.

Cololejeunea crenata* (A. Evans) Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea crenata* A. Evans, Bull. Torrey Bot. Club **38**: 276, Figs. 11–16. 1911.

DISTRIBUTION: America.

Cololejeunea cubensis* (Herzog) Pócs, *nom et comb. nov.

BASIONYM: *Aphanolejeunea evansii* Herzog, Beih. Bot. Centralblatt, Abt. B, **61**: 583, Fig. 15. 1942, non *Cololejeunea evansii* Tixier, Candollea **46**: 271. 1991.

NOTE. A new specific epithet was needed.

DISTRIBUTION: America: Cuba.

***Cololejeunea diaphana* A. Evans**

Bull. Torrey Bot. Club **32**: 184. 1905.

Aphanolejeunea diaphana (A. Evans) R. M. Schust., Hep. North Amer. **4**: 1294. 1980. *homon. illeg.* non *Aphanolejeunea diaphana* Herzog, Nat. Hist. Juan Fernandez **2**: 748. 1943.

Aphanolejeunea diaphana (A. Evans) Schust. R. M. var. *crisulata* (R. M. Schust.) R. M. Schust., Hep. N. Amer. **4**: 1298. 1980.

Cololejeunea subdiaphana Ast, Rev. Bryol. Lichénol. **16**: 28. 1947.

Aphanolejeunea subdiaphana (Ast) Pócs, J. Hattori Bot. Lab. **55**: 311. 1984.

Cololejeunea diaphana A. Evans var. *crisulata* Schust. R. M., J. Elisha Mitchell Sci. Soc. **72**: 112. 1956.

Aphanolejeunea subdiaphana var. *crisulata* (Schuster) Pócs, J. Hattori Bot. Lab. **55**: 311. 1984.

Aphanolejeunea truncatifolia Horikawa, J. Sci. Hiroshima Univ. Ser. 3, Div. 2, **2**: 284. 1934.

Aphanolejeunea ninhbinhiana (Tixier) Tixier in Pócs, J. Hattori Bot. Lab. **55**: 310. 1984. [BASIONYM: *Cololejeunea* (*Aphanolejeunea*) *ninhbinhiana* Tixier, Ann. Hist.-Nat. Mus. Nat. Hung. **66**: 89. 1974, HOLOTYPE: Vietnam,

Cuc Phuong Nat. Park, Pócs, Ninh & Bich & Tran Ninh 3049/5, PC], *syn. nov.*

Aphanolejeunea proboscoidea (Goebel) Tixier, in Pócs, J. Hattori Bot. Lab. **55**: 310. 1984. [BASIONYM: *Physocolea proboscoidea* Goebel, Ann. Jard. Bot. Buitenzorg **39**: 35, Figs 63–67. 1928. TYPE: Goebel, Sumatra, Fort Kock, JE?, *syn. nov.* Although the type was not seen, based on the diagnosis and illustration of Goebel it seems to belong to this species.

Cololejeunea ensifolia Spruce var. *pygmaea* Spruce, Hepat. Amaz. et And.: 298. 1884. [SYNTYPE: Brazil, Manaos, *Spruce 327*, MANCH 18770 and 18772, both from the same locality], *syn. nov.*

DISTRIBUTION: America, Asia

Cololejeunea erostrata* (Herzog) Bernecker & Pócs, *comb. nov.

BASIONYM: *Physocolea erostrata* Herzog, Beih. Bot. Centralblatt, Abt. B, **61**: 582, Fig. 14. 1942.

DISTRIBUTION: America.

***Cololejeunea gracilis* (Ast) Pócs**

in Dauphin *et al.*, Cryptogamie, Bryol. **29**(3): 233. 2008.

BASIONYM: *Aphanolejeunea gracilis* Jovet-Ast, Rev. Bryol. et Lichénol. **16**: 21. 1947.

Aphanolejeunea gracilis Jovet-Ast var. *linearifolia* R. M. Schust., Phytologia **45**: 434. 1980.

Aphanolejeunea heterophylla (Goebel) Schuster, J. Elisha Mitchell Sci. Soc. **71**: 128. 1955, based on the unvalid basionym of *Lejeunea heterophylla* Goebel, Pflanzenbiol. Schild. **1**: 178, figs. A, B. 1889, non *Lejeunea heterophylla* Sande-Lacoste, Syn. Hep. Javan.: 69. 1856.

DISTRIBUTION: America, ?Africa.

Cololejeunea grossepapillosa* (Horik.) Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea grossepapillosa* Horik., J. Sci. Hiroshima Univ. Ser. B, Div. 2, **1**: 92, Fig. 16. 1932.

Aphanolejeunea capensis (S. Arnell) S. Arnell, Hep. S. Afr.: 172. 1963. [BASIONYM: *Cololejeunea capensis* S. Arnell, Bot. Not. Lund **106**: 163. 1953. HOLOTYPE: Cape: Knysna, Deepwall Forest, *Arnell 1790*, BOL], *syn. nov.*

Cololejeunea ranongensis Tixier, Nat. Hist. Bull. Siam Soc. **3**: 4–5: 556, Fig. 6: 1–4. 1970. [TYPE: Thailand, Ranong, Namphu Ron, Tixier 1970, PC], **syn. nov.**

DISTRIBUTION: Africa, Asia, New Guinea.

***Cololejeunea iwatsukiana* (Pócs) Pócs, comb. nov.**

BASIONYM: *Aphanolejeunea iwatsukiana* Pócs, Hikobia 11: 457, fig. 1. 1994.

DISTRIBUTION: Australia.

***Cololejeunea jovetastiana* (Pócs) Pócs, comb. nov.**

Bas.: *Aphanolejeunea jovetastiana* Pócs, Cryptogamie, Bryol. Lichénol. **5**: 251, Figs 39–46. 1984.

DISTRIBUTION: West Africa.

***Cololejeunea koponenii* (Pócs) Pócs, comb. nov.**

BASIONYM: *Aphanolejeunea koponenii* Pócs, Acta Bot. Fennica **165**: 91, Fig. 4. 1999.

DISTRIBUTION: New Guinea, Philippines.

***Cololejeunea lisowskii* (Pócs) Pócs, comb. nov.**

BASIONYM: *Aphanolejeunea lisowskii* Pócs, Cryptogamie, Bryol. Lichénol. **5**: 259, Figs 70–77. 1984.

DISTRIBUTION: Central and West Africa.

***Cololejeunea macounii* (Spruce) A. Evans**

Mem. Torrey Bot. Club **8**: 171. 1902.

BASIONYM: *Lejeunea macounii* Spruce ex Underw., Bull. Torrey Bot. Club **17**: 259. 1890.; see full synonymy in Mizutani (1961).

Aphanolejeunea magnilobula Horik. J. Sci. Hiroshima Univ. Ser. B, Div. 2, **1**: 92, Fig. 17. 1932., **syn. nov.**

NOTES. The holotype of *Aphanolejeunea magnilobula* from HIRO (coll. S. Iwamasa 1931, no. 860 in herb. Horikawa) fully agrees with *C. macounii*. Our examination confirms that of Ando, on his revision label attached to the type, dated Oct. 1974.

DISTRIBUTION: North America, Asia.

***Cololejeunea madeirensis* Schiffn.**

Hedwigia **41**: 279. 1902.

Aphanolejeunea madeirensis (Schiffn.) Grolle, J. Bryol. **12**: 441. 1983.

DISTRIBUTION: Macaronesia

***Cololejeunea mamillata* (Ångstr.) E. A. Hodgson**

Trans. Roy. Soc. New Zealand, Bot. **3**: 184. 1967.

BASIONYM: *Lejeunea mamillata* Ångstr. Öfvers. Förh. Kongl. Svenska Vetensk. Akad. **29**(4): 14. 1872.

Microlejeunea mamillata (Ångstr.) Steph., Spec. Hep. **5**: 837. 1915.

Aphanolejeunea mamillata (Ångstr.) Steph., Spec. Hep. **5**: 862. 1916.

NOTE. The latter name was erroneously used for a Chilean plant by Herzog (1954) and for an African plant by Pócs (1984a, b).

DISTRIBUTION: Australia.

***Cololejeunea microscopica* (Taylor) Schiffn.**

in Engler & Prantl, Nat. Pflanzenfam. **1**: 122. 1893.

BASIONYM: *Jungermannia microscopica* Taylor in Mackay, Fl. Hibern. **2**: 59. 1836.

Aphanolejeunea microscopica (Taylor) A. Evans, Bull. Torrey Bot. Club. **38**: 273. 1911.

Aphanolejeunea diaphana Herz., Nat. Hist. Juan Fernandez and Easter Isles **2**: 748. 1934. *Cololejeunea fernandeziana* Solari, J. Hattori Bot. Lab. **54**: 546. 1983.

DISTRIBUTION: Europe, America, Africa.

***Cololejeunea microscopica* var. *exigua* (A. Evans) Bernecker & Pócs**

Mem. N.Y. Bot. Garden **76**(4): 1–285. 2009.

BASIONYM: *Aphanolejeunea exigua* A. Evans, Bull. Torrey Bot. Club. **38**: 273, pl. 12 p.p. 1911.

DISTRIBUTION: Europe, America, Africa.

***Cololejeunea microscopica* var. *africana* (Pócs) Pócs & Bernecker**

in Dauphin *et al.*, Cryptogamie, Bryologie **29**: 234. 2008.

BASIONYM: *Aphanolejeunea exigua* A. Evans var. *af-ricana* Pócs, Cryptogamie, Bryol. Lichénol. **5**: 247. 1984.

Aphanolejeunea microscopica (Taylor) A. Evans var. *africana* (Pócs) Pócs & Bernecker, Haussknechtia, Beiheft 7: 27. 1997.

Aphanolejeunea asperrima Steph., Spec. Hep. **5**: 859, Icones 747. 1916.

Aphanolejeunea verrucosa Ast, Rev. Bryol. Lichén. **16**: 25. 1947. [HOLOTYPE: Guadeloupe, Ravin Vauchelet, P. & V. Allorge s.n., 1936, PC], **syn. nov.** Very small fragments on a microslide mounted in resin, with many details obliterated and not visible, but the remains and the illustration (Fig. IV) suggest identity with *Aphanolejeunea microscopica* var. *africana*.

DISTRIBUTION: America, Africa.

Cololejeunea minuscula* Pócs, *nom. et comb. nov.

BASIONYM: *Aphanolejeunea minuta* R. M. Schust., Hep. Anthoc. N. Amer. **4**: 1310, Fig. 774. 1980, non *Cololejeunea minuta* (Mitt.) Steph., Bull. Herb. Boissier **5**: 79. 1915, hence a new specific epithet was needed.

DISTRIBUTION: America: Florida, Peru.

***Cololejeunea minutissima* (Smith) Schiffn.**

in Engler & Prantl, Nat. Pflanzenfam. **1**: 122. 1893.

BASIONYM: *Jungermannia minutissima* Smith, in Sowerby, Engl. Bot.: Pl. 1633. 1806.

Aphanolejeunea minutissima Horik., J. Sci. Hiroshima Univ. Ser. B, Div. **2**(2): 283. 1934.

NOTE. See full synonymy in Schuster, Hep. Anthoc. N. Amer. **4**: 1274. 1980.

DISTRIBUTION: Pantropical to warm temperate.

Cololejeunea moralesiae* (Bernecker) Bernecker & Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea moralesiae* Bernecker, Nova Hedwigia **66**: 166–168. 1998.

DISTRIBUTION: America: Costa Rica.

***Cololejeunea moramangae* Tixier**

Bull. Acad. Malg. **55**: 241, Fig. 44. 1979.

Aphanolejeunea moramangae (Tixier) Tixier in Pócs, J. Hattori Bot. Lab. **55**: 310. 1984.

DISTRIBUTION: East Africa, Madagascar.

Cololejeunea morobensis* (Pócs) Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea morobensis* Pócs, Ann. Bot. Fennici **31**: 180, Fig. 1. 1994.

DISTRIBUTION: New Guinea

Cololejeunea norrisii* (Pócs) Pócs, *comb. nov.

BASIONYM: *Aphanolejeunea norrisii* Pócs, Acta Bot. Fennica **165**: 95–96, Fig. 8. 1999.

DISTRIBUTION: New Guinea

***Cololejeunea papilliloba* (Steph.) Steph.**

Hedwigia **29**: 73 & 135. 1890.

BASIONYM: *Lejeunea papilliloba* Steph., Hedwigia **29**: 73. 1890, non Herzog, Feddes Rep. Spec. Nov. **55**(1952): 14. 1953, *nom. illeg.*

Physocolea papilliloba (Steph.) Steph., Spec. Hep. **5**: 881. 1916.

Aphanolejeunea kunertiana Steph., Spec. Hep. **5**: 860. 1916. [HOLOTYPE: Brazil, Rio Grande, Forromecco, in *Plagiochila*, 1888, *Kunert 104* p.p., G], **syn. nov.**

Aphanolejeunea pustulosa (Ast) Bernecker & Pócs in Equihua & Pócs, The Bryologist **102**: 749. 1999. [BASIONYM: *Cololejeunea pustulosa* Ast, Rev. Bryol. Lichenol. **29**: 35, Fig. II. 1960. HOLOTYPE: Mexico, forest Rio Santiago, 1500 m, 11.7.1959, *Heim s.n.*, PC], **syn. nov.**

NOTE. There are two forms of *Aphanolejeunea pustulosa* specimens on the leaves: one has papillae and the other has no papillae; after careful examination we found all transitions between the two forms: from plants with a papilla on each lobe cell to plants which have papillae only at the border or the upper half of the leaves, or totally smooth.

DISTRIBUTION: America.

***Cololejeunea papillosa* (Goebel) Mizut.**

J. Hattori Bot. Lab. **29**: 156. 1966.

BASIONYM: *Physocolea (Aphanolejeunea) papillosa* Goebel, Ann. Jard. Bot. Buitenzorg **39**: 39. 1928.

Aphanolejeunea angustissima Steph., Spec. Hep. **5**: 859. 1916.

Aphanolejeunea papillosa (Goebel) Herzog, Trans. Brit. Bryol. Soc. **1**: 325. 1949.

Aphanolejeunea cyathiphylla Herzog, Svensk Bot. Tid. **46**: 105. 1952.

Aphanolejeunea borneensis (Herzog) Pócs, J. Hattori Bot. Lab. **55**: 310. 1984. [BASIONYM: *Aphanolejeunea microscopica* (Taylor) A. Evans var. *borneensis* Herzog, Trans. Brit. Bryol. Soc. **1**: 324. 1949. HOLOTYPE: Borneo, Sarawak, Dulit ridge, Richards 2513, JE], **syn. nov.**

NOTE. Riclef Grolle (JE) indicated on the type of *Aphanolejeunea microscopica* var. *borneensis* its identity with *Aphanolejeunea papillosa* and we can confirm this.

DISTRIBUTION: America, Asia.

Cololejeunea paucifolia (Spruce) Bernecker & Pócs, **comb. nov.**

BASIONYM: *Lejeunea (Cololejeunea) paucifolia* Spruce, Rev. Bryol. **15**: 35. 1888, *nom. inval.* *Lejeunea (Cololejeunea) paucifolia* Spruce, Bull. Soc. Bot. France **36** (Suppl.: Congrès Bot. 1889): 194. 1890.

Aphanolejeunea paucifolia (Spruce) Reiner, Tropical Bryology **10**: 33–35. 1995.

Physocolea paucifolia (Spruce) Steph., Spec. Hep. **5**: 881. 1916.

Cololejeunea lignicola Tixier, Candollea **46**: 284. 1991, *nom. inval.*

Cololejeunea lignicola Tixier, Cryptogamie, Bryol. Lichénol. **16**: 229. 1996. [HOLOTYPE: Brazil, São Paulo, Serra de Cantaneira, 830 m, on dead wood, Schäfer-Verwimp 7519, PC], **syn. nov.**

DISTRIBUTION: South America.

Cololejeunea pterocolea Herzog

Svensk Bot. Tid. **46**: 103. 1952.

Aphanolejeunea pterocolea (Herzog.) R. M. Schust., Annot. Syn. Lejeuneaceae: 184. 1963.

DISTRIBUTION: America: Ecuador.

Cololejeunea runssorensis (Steph.) Pócs

Acta Bot. Acad. Sci. Hung. **21**: 371. 1975.

BASIONYM: *Aphanolejeunea runssorensis* Steph., Spec. Hep. **5**: 858. 1916.

Cololejeunea leonardii Vanden Berghen, Bull. Jard. Bot. Nat. Belg. **41**: 283. 1971.

DISTRIBUTION: Africa.

Cololejeunea sicaefolia (Gottsche) Pócs & Bernecker, **comb. nov.**

BASIONYM: *Lejeunea sicaefolia* Gottsche in Steph, Hedwigia **27**: 290. Pl. 12, figs 21–24. 1888.

Aphanolejeunea sicaefolia (Gottsche in Steph.) A. Evans, Bull. Torr. Bot. Club **38**: 277. 1911.

NOTE. A new combination is proposed, as *Cololejeunea sicaefolia* Gottsche in Steph., and all *Cololejeunea* combinations of Stephani before 1893 are invalid according to Zijlstra (1982).

DISTRIBUTION: America.

Cololejeunea sicaefolia subsp. ***jamaicensis*** (R. M. Schust.) Bernecker & Pócs, **comb. nov.**

BASIONYM: *Aphanolejeunea jamaicensis* R. M. Schust., Phytologia **45**: 434. 1980. The type was not available, but from the description it is obvious that it is close to *C. sicaefolia* and differs by its spinosely papillose leaves (smooth by subsp. *sicaefolia*). The plant from Guyana seen by us seems to confirm this. It thrives at both known localities at higher altitude than subsp. *sicaefolia*.

Aphanolejeunea sicaefolia subsp. *roraimensis* Pócs & Bernecker, Haussknechtia, Beiheft **7**: 27. 1997. [TYPE: Guyana, Roraima Mts., N-slope of Mount Roraima, upper Mazaruni district, virgin mossy forest, 700 m, Aptroot No. 17084, HOLOTYPE: GOET, ISOTYPE: EGR], **syn. nov.**

DISTRIBUTION: America.

Cololejeunea sintenisii (Steph.) Pócs

Crypt., Bryol. **29**(3): 235. 2008, non *Cololejeunea sintenisii* Steph., Hedwigia **27**: 291. 1888, *nom. inval.*

BASIONYM: *Lejeunea (Cololejeunea) sintenisii* Steph. Hedwigia **27**: 291. 1888.

Aphanolejeunea sintenisii (Steph.) Steph., Sp. Hep. **5**: 861. 1916.

Aphanolejeunea angustiloba Horikawa, J. Sci. Hiroshima Univ. ser. b, div. 2: 91. 1932, **syn. nov.**

Cololejeunea angustiloba (Horik.) Mizut., Proc. Biol. Soc. Japan 6: 246. 1996. [HOLOTYPE: in Hb. Horikawa, Japan. Kyushu, Prov. Ohsumi, Mt. Takakuma, 1931, *T. Saneyoshi No. 137*, HIRO], **syn. nov.**

Aphanolejeunea ephemeroides R. M. Schust., J. Elisha Mitchell Sci. Soc. 71: 130. 1955. HOLOTYPE: USA, Florida, Clay Co., Gold Head Branch State Park, *R. M. & O. M. Schuster 31405*, F], **syn. nov.**

Aphanolejeunea teotonii V. Allorge & Ast, Rev. Bryol. Lichénol. 19: 21, Fig. 1, 2. 1950. [HOLOTYPE: Açores, Parc Jose de Canto, épiphyllie sur Camélia, 4.6.1937, *V. Allorge s.n.*, PC], **syn. nov.**

Cololejeunea teotonii (V. Allorge & Ast) Grolle, Feddes Rep. 87(3–4): 190. 1976, **syn. nov.**

DISTRIBUTION: America, Africa (Macaronesia), Asia, Australia.

Cololejeunea subsphaeroidea (R. M. Schust.) Pócs

Crypt., Bryol. 29(3): 235. 2008.

BASIONYM: *Aphanolejeunea subsphaeroidea* R. M. Schust., Phytologia 39: 431. 1978.

DISTRIBUTION: America: Venezuela, Brazil.

Cololejeunea thiersiae (Pócs) Pócs, **comb. nov.**

BASIONYM: *Aphanolejeunea thiersiae* Pócs, Hikobia 11: 459, Figs 7–12. 1994.

DISTRIBUTION: Australia.

Cololejeunea veillonii Tixier

Nova Hedwigia 31: 757, Fig. 19. 1979.

BASIONYM: *Aphanolejeunea veillonii* (Tixier) Pócs, J. Hattori Bot. Lab. 55: 311. 1984.

DISTRIBUTION: New Caledonia, New Guinea.

Cololejeunea winkleri (Morales & Bernecker) Bernecker & Pócs, **comb. nov.**

BASIONYM: *Aphanolejeunea winkleri* Morales & Lücking, Nova Hedwigia 60: 120, Figs 1–2. 1995.

DISTRIBUTION: America: Costa Rica, the Guianas.

Cololejeunea zenkeri (Steph.) E. W. Jones

Trans. Brit. Bryol. Soc. 2: 240. 1954.

BASIONYM: *Aphanolejeunea zenkeri* Steph., Spec. Hep. 5: 859. 1916.

DISTRIBUTION: Africa.

NEW NAMES AND COMBINATIONS

Cololejeunea antillana Pócs, **nom. et. comb. nov.**

Cololejeunea berneckerae Pócs, **nom. et. comb. nov.**

Cololejeunea cingens (Herzog) Bernecker & Pócs, **comb. nov.**

Cololejeunea cornutissima (R. M. Schust.) Pócs, **comb. nov.**

Cololejeunea costaricensis (Bernecker) Bernecker & Pócs, **comb. nov.**

Cololejeunea crenata (A. Evans) Pócs, **comb. nov.**

Cololejeunea cubensis (Herzog) Pócs, **nom. et. comb. nov.**

Cololejeunea erostrata (Herzog) Bernecker & Pócs, **comb. nov.**

Cololejeunea grossepapillosa (Horik.) Pócs, **comb. nov.**

Cololejeunea iwatsukiana (Pócs) Pócs, **comb. nov.**

Cololejeunea jovetastiana (Pócs) Pócs, **comb. nov.**

Cololejeunea koponenii (Pócs) Pócs, **comb. nov.**

Cololejeunea lisowskii (Pócs) Pócs, **comb. nov.**

Cololejeunea microscopica (Taylor) Schiffn. var. ***exigua*** (A. Evans) Bernecker & Pócs, **comb. nov.**

Cololejeunea moralesiae (Bernecker) Bernecker & Pócs, **comb. nov.**

Cololejeunea morobensis (Pócs) Pócs, **comb. nov.**

Cololejeunea paucifolia (Spruce) Bernecker & Pócs, **comb. nov.**

Cololejeunea minuscula Pócs, **nom. et. comb. nov.**

Cololejeunea sicaefolia (Gottsche) Pócs & Bernecker, **comb. nov.**

Cololejeunea sicaefolia subsp. ***jamaicensis*** (R. M. Schust.) Bernecker & Pócs, **comb. nov.**

Cololejeunea thiersiae (Pócs) Pócs, **comb. nov.**

Cololejeunea winkleri (Morales & Bernecker) Bernecker & Pócs, **comb. nov.**

DOUBTFUL, ILLEGITIMATE OR INVALID *APHANOLEJEUNEA* NAMES

Aphanolejeunea angustissima Steph., Sp. Hep. 5: 859. 1916. **Invalid name, to be rejected.** HOLO-

TYPE: Guatemala, Türckheim *ex* Hb. Levier (G) contains only a few lobulate leaves belonging to two species. Even the diagnosis contains elements of both taxa.

Lejeunea heterophylla Goebel and *Aphanolejeunea heterophylla* (Goebel) R. M. Schuster, J. Elisha Mitchell Sci. Soc. **71**: 128. 1955. **BA**-**SIONYM**: *Lejeunea heterophylla* Goebel, Pflanzenbiol. Schild. **1**: 178. 1889. **Illegitimate names, to be rejected.** *Lejeunea heterophylla* was published earlier (*L. heterophylla* Lacoste in De Vries, Syn Hep. Jav.: 69–185. 1856.

SPECIES NOT SEEN

Aphanolejeunea lancifera R. M. Schust., Phytologia **45**: 434. 1980. TYPE: Jamaica, Blue Mts. Schuster 67–342. The type was not available. From the protologue we could conclude that this taxon might be similar or identical with *Aphanolejeunea sintenisii* (Steph.) Steph.

Aphanolejeunea minima Tixier, Ann. Fac. Sc. Yaoundé **20**: 7. 1975. The type was not accessible. Based on the drawing in the original description, the species seems to be close to *Cololejeunea gracilis* (Ast) Pócs, but being so fragmentary, having only reduced leaves, its identity is still uncertain.

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