

East African Bryophytes, XXIII. Three new species of *Diplasiolejeunea* (Lejeuneaceae, Jungermanniopsida) from Madagascar

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(Received 10 April 2006, accepted 20 May 2006)

Abstract – Three new species of *Diplasiolejeunea* are described from Madagascar, as new to science: *Diplasiolejeunea ornata* Pócs & Schäfer-Verwimp, distributed in north-east Madagascar, is characterised by its first lobule teeth with superposed cells and by its perianth with often umbonate auricles. *Diplasiolejeunea ranomafanae* Pócs occurs exclusively in the Ranomafana National Park, and is characterised by its shaped sigmoid lobule with three teeth. Finally, *Diplasiolejeunea andringitrae* Schäfer-Verwimp is scattered all along the forested eastern escarpment and is characterised also by the lobule having three teeth, of which the first is located near the junction of the lobule with the ventral margin of lobe, and the second appears T-shaped, a combination of characters unique in African species of *Diplasiolejeunea*.

Africa / *Diplasiolejeunea* / Lejeuneaceae / Madagascar

Résumé – Trois espèces nouvelles sont décrites de Madagascar : *Diplasiolejeunea ornata* Pócs & Schäfer-Verwimp, distribuée dans le NE de Madagascar, caractérisée par la première dent du lobule avec des cellules superposées et par un périanthe avec des auricules souvent umbonate ; *Diplasiolejeunea ranomafanae* Pócs est exclusivement présente dans le Parc National de Ranomafana, reconnaissable par son lobule sigmoïde avec trois dents ; *Diplasiolejeunea andringitrae* Schäfer-Verwimp est dispersée au long de l'escarpement boisé oriental, caractérisée aussi par un lobule à trois dents, dont la première est placée près de la jonction lobule-marge ventrale du lobe, tandis que la seconde a une forme de T, une combinaison de caractères unique dans les espèces africaines de *Diplasiolejeunea*.

Afrique / *Diplasiolejeunea* / Lejeuneaceae / Madagascar

INTRODUCTION

The diversity of the Madagascan *Diplasiolejeunea* flora became known by the work of Tixier (1977, 1979, 1980, 1984), who himself described 13 new taxa from the area, and dealt with the speciation and phytogeography of these species,

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that are often endemic in limited areas (Tixier, 1978, 1986, 1987). To the 22 previously known species of *Diplasiolejeunea* from the island, we would like to add a further three from the collections of the senior author, his wife and his colleagues made in Madagascar during 1994, 1998 and 2004.

We are adopting here the terminology according to Mizutani (1961). The first tooth is the outermost one, closest to the junction of free margin with the keel. In most species of *Diplasiolejeunea*, it is the most prominent tooth and has the hyaline papilla at its proximal base. The second tooth is usually smaller and often positioned at the “apex” of the lobule. Rarely – as in two of our three new species – there is an additional tooth between the previously named “first” or distal tooth and the keel; in the species with three (or more) lobular teeth, this must now be called the first tooth.

DESCRIPTIONS OF NEW *DIPLASIOLEJEUNEA* SPECIES

Diplasiolejeunea ornata Pócs & Schäfer-Verwimp

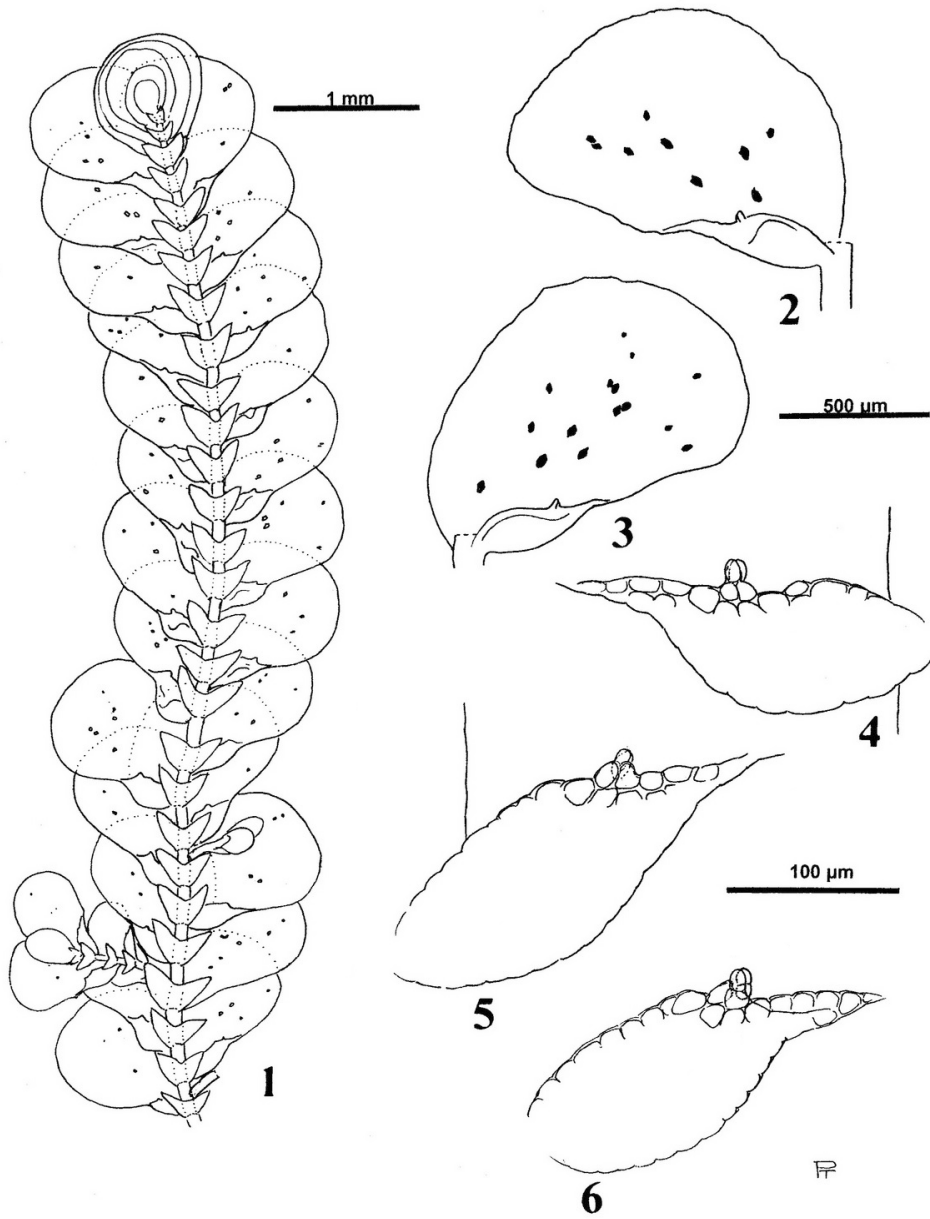
(Figs 1-19)

Planta pallide viridis, epiphylla vel ramicola, coloniae 1-4 cm diametro formans, caulibus 0.5-2 cm longae, cum foliis 1.5-1.8 mm latae, diametro 70-100 µm. Foliae imbricatae lobis obovatis vel cuneatis apicibus rotundatis. Ocelli loborum perianthiorumque numerosi. Lobuli elongato-lanceolatae dentibus primis conduplicatis, secundis obtusis, obsoletis. Amphigastriorum lobuli triangulares, ad basin 4-8 celluli latae. Perianthium clavatum quinquecarinatum auriculis umbonatis.

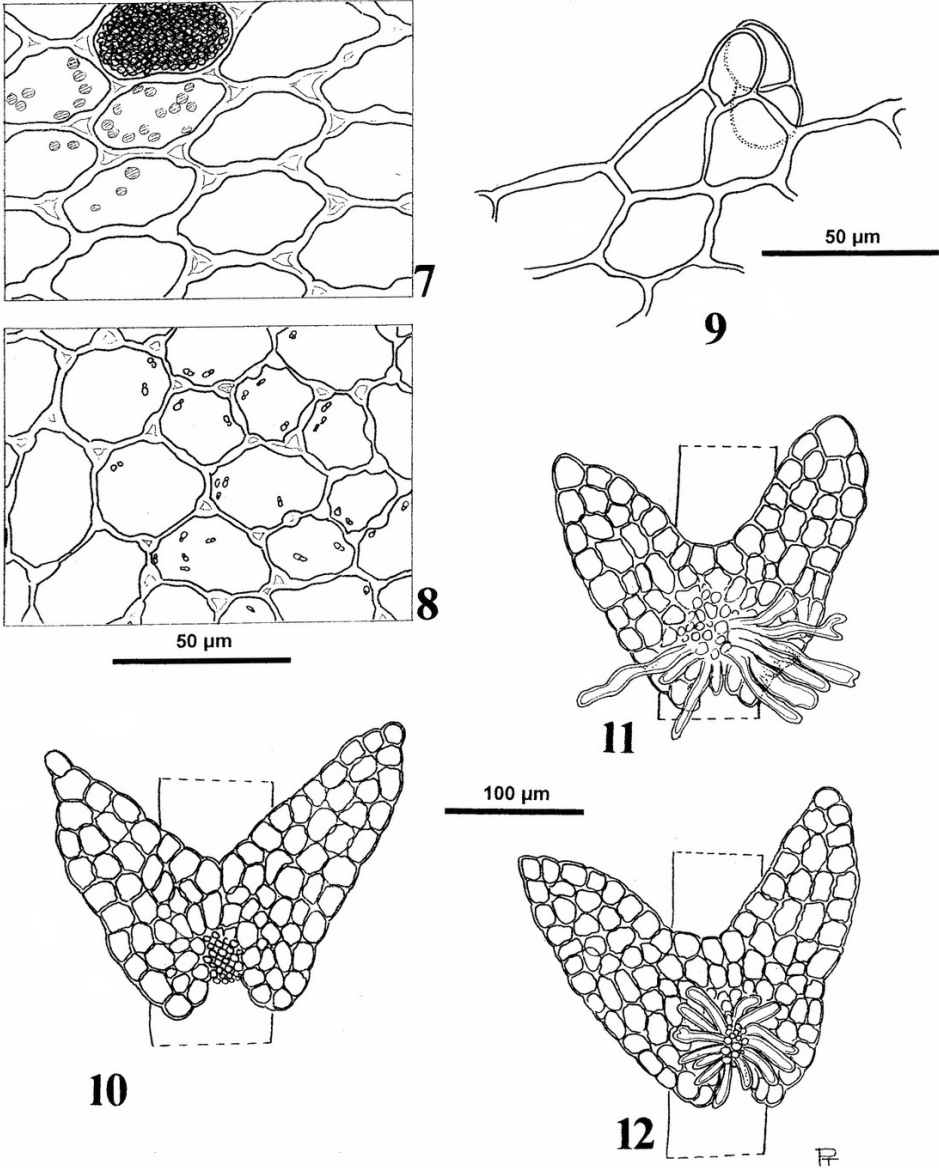
Type: MADAGASCAR, Prov. Toamasina, Mananara Nord Biosphere Reserve. Lowland rain forest on the NW slope of BEHAFOTRA Hill, at 250-300 m alt., with 3500 mm annual rainfall. 16°27.2'S, 49°47.7'E. Coll. T. Pócs & A. Szabó, 9877/CH, 16 August 1998 (Holotype: EGR; Isotypes: G, GOET, MO, PC, TANA, Herb. Schäfer-Verwimp).

Plants pale green, densely and irregularly pinnately-branched, epiphyllous, forming colonies 1-4 cm in diameter, the shoots 1.5-1.8 mm wide and up to 20 mm long. Stems 70-100 µm in diameter. Leaves imbricate, obovate or cuneate with a rounded apex and smooth margins, 800-1200 µm long, 600-750 µm wide, lobe with 5-50 scattered or sometimes paired ocelli of same size and shape as average cells. Ocelli blackish brown, but completely vanishing with time, and unnoticeable in old specimens. Apical and median lobe cells isodiametric to slightly elongate, 18-25 × 18-32 µm, with medium-sized nodulose trigones and many cells with intermediate thickenings, basal cells elongate hexagonal, with more evenly thickened walls, 20-28 × 32-40 µm. Oil bodies small, *Bazzania* type; in ocelli large, brown, of *Diplasiolejeunea* type. Lobule ovate-lanceolate, boat-shaped, inflated, with slightly crenulate keel and with tapering distal apex, which almost straightly continues in the postical margin of the lobe. First lobule tooth 1-3 cells long, doubled, usually with 2 superposed cells in the second layer forming a rodlike structure, not fully overlapping the first layer of the tooth (see Fig. 9). Second lobule tooth obtuse, obsolete. Underleaves distant, 3-5 × as wide as the stem, with acute or blunt segments 4-8 cells wide and 6-14 cells long, ending in one cell. Sinus wide (90-120°), U or V shaped; underleaf base auriculate, with a sinus 2-3 cells deep.

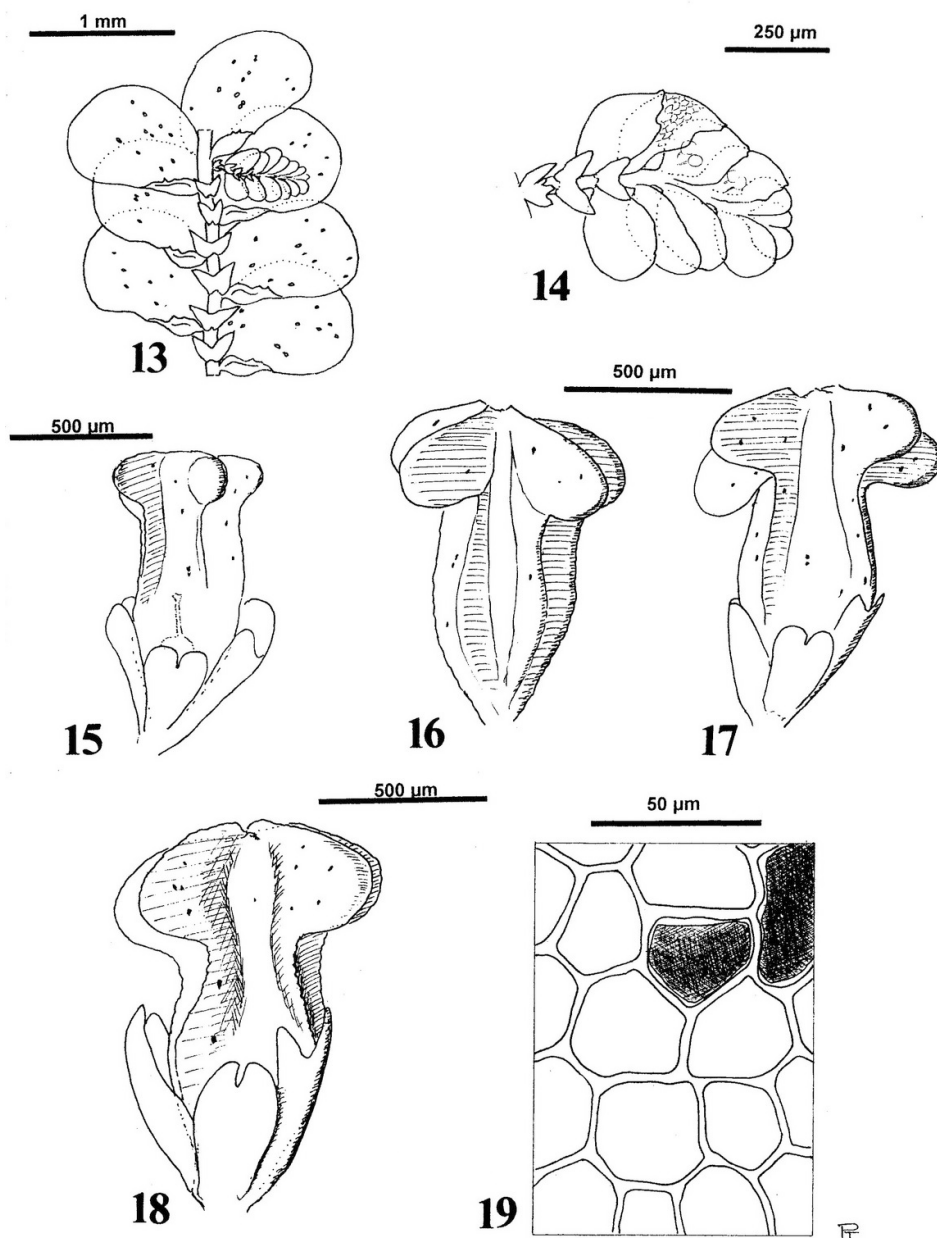
Autoicous, in a few cases even paroicous. Male branches usually on the main stem, with 1-3 bilobed bracteoles at the base; androecia consisting of



Figs 1-6. *Diplasiolejeunea ornata* Pócs & Schäfer-Verwimp. 1. Habit, ventral view. 2-3. Leaves, ventral view. 4-6. Lobules. (All drawn from the type).



Figs 7-12. *Diplasiolejeunea ornata* Pócs & Schäfer-Verwimp. 7. Basal lobe cells with an ocellum and with chloroplasts. 8. Median lobe cells with small, *Bazzania* type oil bodies. 9. Doubled first lobule tooth. 10-12. Underleaves. (All drawn from the type).



Figs 13-19. *Diplasiolejeunea ornata* Pócs & Schäfer-Verwimp. **13.** Male branch on a shoot, ventral view. **14.** Male branch. **15-18.** Perianths. **19.** Perianth wall cells with ocelli. (All drawn from the type).

4-8 pairs of bracts. Gynoecia developing on short lateral branches, with one innovation. Bracts and bracteole bilobate. Perianth clavate, urn-shaped, with 5 flat auriculate or often umbonate carinae, the auriculate part 1/6 to 1/3 the length of the perianth. Instead of a beak, a small incision tips the perianth. Perianth cells isodiametric, polygonal, with evenly thickened walls. Scattered ocelli present and similar to those of the leaves. Gemmae not seen.

Other specimens seen: All from the north-east part of **Madagascar. Prov. Antsiranana. Reserve Integrale Nationale de MAROJEZY.** Lowland rainforest near 1st Campsite in ANDAMPIBE Valley, at 200-500 m alt., with giant trees, epiphyllous, leg. *T. Pócs et al. 90111/BL*, 23-24 March 1990 (EGR, Herb. Schäfer-Verwimp). **Masoala Peninsula:** Montane rainforest on the summit ridge of Mt. AMBOHITSITONDROINA, SE of AMBANIZANA village, 660-720 m alt., 15°37'S, 50°05'E, epiphyllous. Coll. *T. Pócs, 9449/AD, AL and AU*, 11. Sept. 1994 (EGR, Herb. Schäfer-Verwimp). **Prov. Toamasina, Mananara Nord Biosphere Reserve.** Lowland rain forest on the E slopes of MAHAVOHO Hill, at 220-300 m alt., 16°27.0'S, 49°46.9'E, epiphyllous. Coll. *T. Pócs & A. Szabó, 9878/FW*, 17 August 1998 (EGR). **Lohatanjon Peninsula,** opposite of Nosy Boraka = St. Marie Island. Lowland rainforest on coastal dunes SW of FANDRARAZANA village, at 6 m alt. 16°45.6'S, 49°43.2'E, ramicolous. Coll. *S. & T. Pócs & A. Szabó, 9878/FW*, 17 August 1998 (EGR), *9871/CG* (EGR, Herb. Schäfer-Verwimp).

Diplasiolejeunea ranomafanae Pócs

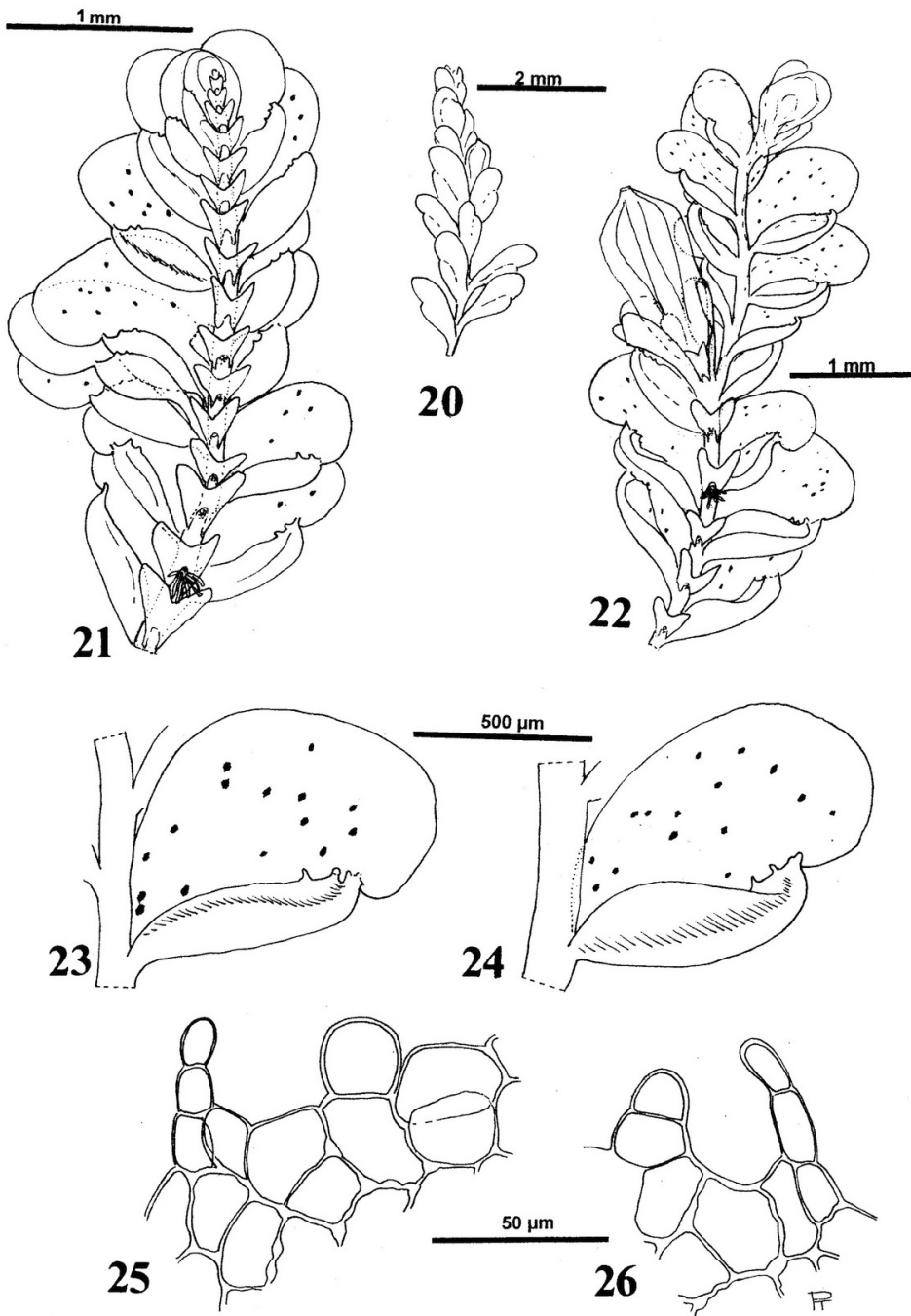
(Figs 20-33)

Planta pallide viridis, ramicola, repens caulibus 0.5 cm longae, cum foliis 1.5-2.1 mm lata, diametro 70-120 µm. Foliae contiguae vel imbricatae lobis falcato-ovatis apicibus rotundatis. Ocelli loborum numerosi. Lobuli sigmoideo-lanceolatae dentibus secundis lanceolatis, primis et tertiis obtusis. Lobuli amphigastriorum obtuso-lanceolati, ad basin 4-7 celluli latae. Perianthium obpyriforme quinquecarinatum aliis decurrentibus.

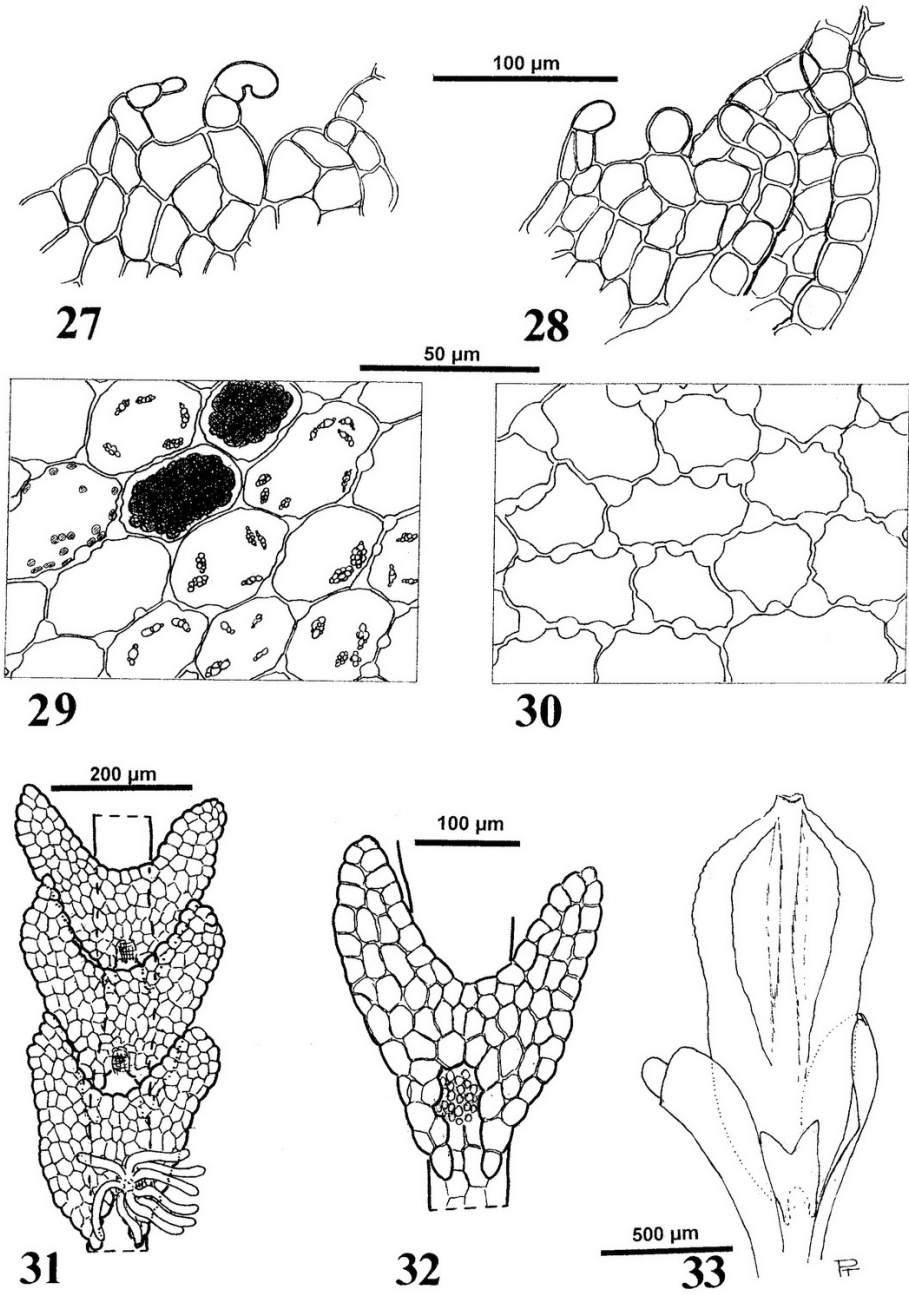
Typus: MADAGASCAR, Ranomafana National Park. On the summit ridge of Mt. VATOLAMPY near the telecom aerial, 2.3 km W of AMBATOLAHY village, at 1200 m alt., 21°15.10'S, 47°24.44'E. Coll. *S. & T. Pócs, 04128/AK*, 30 July 2004 (Holotype: EGR; Isotypes: G, MO, TANA, Herbarium Schäfer-Verwimp).

Plants pale green, sparsely branched, creeping on twigs, the shoots 1.5-2.1 mm wide and up to 5 mm long when moist, shrivelling to 0.5-1 mm wide when dry. Stems 70-120 µm in diameter. Leaves contiguous to imbricate, falcate-ovate with rounded apex and smooth margin, ± 1 mm long and 600-750 (dry only 180-240) µm wide, lobe with 10-30 scattered ocelli the same size and shape as average cells. Ocelli coffee-brown when fresh, but vanishing with time. Marginal lobe cells quadrate, 12 × 16-22 µm, median cells slightly elongated polygonal, 16-20 × 22-32 µm, with small nodulose trigones and on longitudinal walls with intermediate thickenings, basal cells 14-20 × 32-36 µm, with ± sinuose walls with large, nodulose trigones and sometimes with confluent intermediate thickenings. Oil bodies small, *Bazzania* or *Calypogeia* type; in ocelli large, brown, *Diplasiolejeunea* type. Lobule sigmoid-lanceolate, inflated along the smooth keel, with first and third teeth 1-2 celled, obtuse, and second tooth 2-3 celled, more elongate. Sometimes both the second and third teeth are falcately curved (Fig. 27). Cells in the lobule more elongated than in the lobe. Underleaves distant or contiguous, ± 4 × as wide as the stem, with obtusely lanceolate lobes 4-7 cells wide at their base and ending in an acute to rounded, in the latter case 1-3 cells wide apex. Underleaf base decurrent with a narrow sinus 3-4 cells deep.

Most known plants are sterile, and only one gynoecium was observed on a short side branch. Female bracts obtusely bilobate, up to half the length of the



Figs 20-26. *Diplasiolejeunea ranomafanae* Pócs. 20. Habit, dorsal view, in dry state. 21-22. Habit, ventral view. 23-24. Leaves, ventral view. 25-26. Second and third lobule teeth. (All drawn from the type).



Figs 27-33. *Diplasiolejeunea ranomafanae* Pócs. 27-28. Falcate second and third lobule teeth. 29. Median lobe cells with ocelli. 30. Basal lobe cells. 31-32. Underleaves. 33. Perianth. (All drawn from the type).

perianth, bracteole swallow-tail shaped with a V incision, much shorter than the bracts. Perianth 2×1.5 mm, obpyriform, with 5 long decurrent wings and with a short and wide beak. Gemmae not seen.

Other specimens seen: All from **Madagascar, Ranomafana National Park**. Parcel II on the NW side of the Park, 3 km WSW of VOHIPARARA village, on the E ridge of Mt. VOHIPANANI, at 1140-1230 m alt, $21^{\circ}38-46'S$, $47^{\circ}21.46'E$. Elfin forest dominated by *Weinmannia*, *Erica* and *Schefflera*, with many climbing bamboos, on peaty soil. Ramicolous. Coll. T. Pócs & R. Ranaivojaona 04121/BW 27 July 2004 (EGR). On the W slope of Mt. VATOLAMPY, 2 km W of AMBATOLAHY village, at 1100 m alt., $21^{\circ}14.90'S$, $47^{\circ}24.29'E$. Coll. S. & T. Pócs, 04129/Y, 30 July 2004 (EGR).

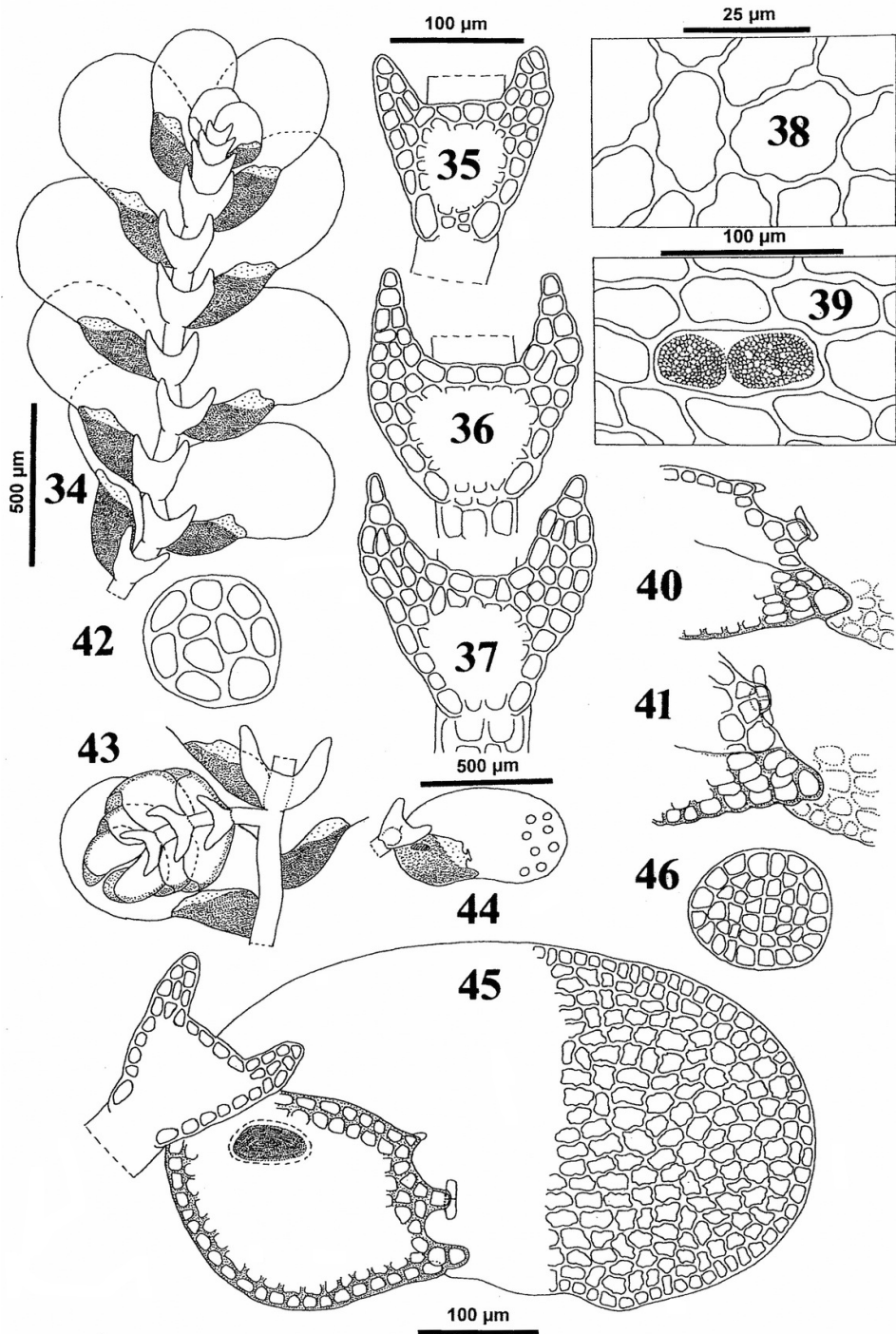
***Diplasiolejeunea andringitrae* Schäfer-Verwimp**

(Figs 34-46)

Planta parva, pallide vel luteo-viridis, caulibus diametro 60-75 μ m, 5-15 mm longis, cum foliis 1-1.2 mm latis. Lobus folii obovatus vel reniformis ocellis basalibus 1-2 et dispersis 5-15. Lobulus curte rectangularis, inflatus, tridentatus dentibus primis obtuse triangularibus, 1-3 cellularis, secundis T-formibus, tertiis parvis, unicellularibus. Amphigastria distantes vel contigui caulis 2.5-3 latioribus. Gemmae circa 40 cellulares diametro 60-70 μ m.

Typus: MADAGASCAR, Andringitra Mts. Nature Reserve, montane rainforests at the W side of Korokoro River, around Camp II, at 750-1000 m alt., $22^{\circ}13'S$, $47^{\circ}1-2'E$. Coll. T. Pócs et al., 9472/AM, 20-23 Sept. 1994 (Holotype: EGR; Isotype: Herbarium Schäfer-Verwimp).

Plants small, 5-15 mm long and 1-1.2 mm wide, pale green to yellowish green, irregularly branched, epiphyllous, rarely ramicolous, the leaves usually ascending from substrate at an angle of 30° - 60° . Stems 60-75 μ m in diameter, in cross section with 3 medullary and 7 cortical cells. Leaves contiguous to slightly imbricate, obliquely spreading, obovate to reniform (best seen when dissected from stem), about as twice as long as wide, up to 600 μ m long and 330 μ m wide, lobe with one large suprabasal ocellus (rarely two), $30-40 \times 80-90$ μ m, about twice as long and wide as surrounding cells, and 5-15 scattered ocelli the same size and shape as average cells, vanishing soon after collection and not recognizable in dead herbarium material. Marginal lobe cells \pm quadrate to short rectangular, 12×14 to 14×16 μ m, median cells elongated polygonal, $16-18(20) \times 25-32$ μ m, with conspicuous knot-like trigones and intermediate thickenings (which are sometimes confluent), basal cells \pm rectangular, $15-20 \times 30-40$ μ m, with sinuose walls and nodulose thickenings. Oil bodies small, 5-12(-16) per cell, of *Calypogeia* or *Bazzania* type; in ocelli large, brown, of *Diplasiolejeunea* type. Lobule shortly oval to shortly rectangular, $1.2-1.6 \times$ as long as wide, ca 250-280 μ m long, 160-180 μ m wide, reaching about 0.4 leaf length, strongly inflated, flat only in upper distal part. The first tooth of 1-3 cells, positioned at the junction of the lobule with the ventral leaf lobe, and forming an incision – the latter feature rarely seen in *Diplasiolejeunea* (see Figs 40-41, 44-45). The second tooth T-like, with one “vertical” cell (sometimes 3 “vertical” cells, two of which are basal side by side) and two (rarely one) very thin walled, elongated-oval cells perpendicular to the “vertical” cell(s), and forming the cross-piece of the “T”. These two thin-walled cells are partly ental behind the “vertical” cell (see Figs 40-41, 45), and seem to be fugacious, sometimes disappearing in older leaves. The third tooth small, one celled, sometimes inconspicuous, often with an attached hyaline cell. Cells in lobule somewhat less elongate than in central leaf lobe, \pm quadrate to short rectangular to irregularly polygonal, 14×14 to 14×25 μ m. Underleaves distant



to contiguous, (2)2.5-3(3.5) × stem width, up to 200 µm long and 160(180) µm wide, the lobes ± triangular, 3-4 cells wide at base (40-60 µm wide), 3-6 cells long, tipped by a single cell or two uniseriate cells, the sinus very broadly rounded and often truncate, rhizoid disc rounded-quadrate, large.

Most plants are sterile. Only a few male plants have been seen in the type specimen. Androecia lateral or terminal on short branches, consisting of 3(-4) pairs of bilobed bracts and 3 bilobed bracteoles. The male branches are 520-530 µm long and do not overtop the surrounding leaves. Asexual reproduction by discoid gemmae which are produced on distal part of ventral surface of lobe, up to 60-70 µm in diameter and consisting of about 40 cells. The leaves that produce gemmae are not differentiated from normal leaves.

Other specimens seen: All from **Madagascar**, – as the type locality. Coll. *T. Pócs et al.*, 9472/AC (EGR, herb. Schäfer-Verwimp), 9472/AV (EGR). **Prov. Toamasina.** Andasibe (Périnet) National Park, montane rainforest E of ANDASIBE village, at 900-970 m alt., 18°54.3' S, 48°28.9' E, on twigs. Coll. *S. & T. Pócs & A. Szabó* 9889/AG, 25-26 Aug. 1998 (EGR, herb. Schäfer-Verwimp). Maromizaha forest. Mossy montane rainforest with bamboo (*Nastus* sp.) undergrowth on the summit ridge of Mt. MAROMIZAHA, south of the Andasibe National Park and the Antananarivo-Toamasina road, 2 km SW of ANEVOKA village, at 1080-1214 m alt., 18°58.8' S, 48°27.5' E, on *Pandanus* leaves. Coll. *S. Pócs* 9890/CT, 26 Aug. 1998 (EGR, herb. Schäfer-Verwimp). **Masoala Peninsula:** Submontane rain forest on the W slopes E of AMBANIZANA village, at 450-600 m alt., 15°37'S, 49°59.5'E, epiphyllous. Coll. *T. Pócs* 9448/M, 9. Sept. 1994 (EGR, herb. Schäfer-Verwimp); –, –, 660-720 m alt., 15°37'S, 50°00'E, epiphyllous. Coll. *T. Pócs* 9449/AJ, 11. Sept. 1994 (EGR, herb. Schäfer-Verwimp); –, –, on *Pandanus* leaf. Coll. *T. Pócs* 9449/AP, 11. Sept. 1994 (EGR, G, herb. Schäfer-Verwimp, TANA).

DISCUSSION

Africa with its now 31 *Diplasiolejeunea* species is the second richest continent after the Americas with their 38 species, but if we examine the species diversity of smaller natural units, Madagascar (including the neighbouring islands), with its now 25 species, becomes the most diverse in *Diplasiolejeunea* among the 21 areas of the humid tropics, exceeding the 22 species of the tropical Andes and the 21 of the Caribbean region (Grolle, 1995; Pócs, 1996; Schäfer-Verwimp, 2001, 2004, 2005; Wigginton *et al.* 1996; Wigginton 2004).

The three new species are endemic to limited areas of Madagascar (Fig. 47), with altitudinal ranges of *Diplasiolejeunea ornata* from sea level to 720 m, *D. ranomafanae* between only 1100 and 1230 m, and *D. andringitrae* from 450-1200 m. *Diplasiolejeunea ornata* and *D. andringitrae* are predominantly epiphyllous, whereas *D. ranomafanae* was found primarily on small branches. The other Madagascarian endemics are *Diplasiolejeunea auriculata* Tixier, *D. cobrensis*

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Figs 34-46. *Diplasiolejeunea andringitrae* Schäfer-Verwimp. **34.** Habit, ventral view. **35-37.** Underleaves. **38.** Median cells of leaf lobe. **39.** Basal lobe cells with one ocellus. **40-41.** Distal part of leaf lobule, scale as in 35-37. **42.** Cross section of stem, 70 µm in diameter. **43.** Androecium, scale as in 34. **44-45.** Two leaf lobes with lobules and underleaves, flattened. **46.** Gemma, 70 µm in diameter. (34, 36-37, 40-43 from the type, 35, 44-45 from 9448/M, 38-39, 46 from 9472/AC).



Fig. 47. The distribution of the three new species from Madagascar. Triangle: *Diplasiolejeunea ornata*. Full circle: *Diplasiolejeunea ranomafanae*. Square: *Diplasiolejeunea andringitrae*. The contours on the map indicate the distribution of the still existing wet forests in Madagascar, according to Adam (1992).

var. *antsirananae* Pócs, *D. ensifera* Tixier, *D. hamata* Tixier, *D. insignis* Tixier, *D. jonesii* Tixier, *D. lemuriana* Tixier, *D. palustrium* Tixier, *D. phyllarthronii* Tixier, *D. ramicola* Tixier, and *D. utriculata* Steph.

The section *Utriculatae* of subgenus *Diplasiolejeunea* as defined by Tixier (1985), to which our three new species belong, has its centre of evolution Madagascar. Many members of this section (*D. andringitrae*, *D. auriculata*, *D. cobrensis* incl. var. *antsirananae*, *D. hamata*, *D. kraussiana*, *D. ornata*, *D. ramicola*, *D. ranomafanae*, *D. symoensii*, *D. utriculata* and *D. zakiae* Tixier from Madagascar, the African *D. deslooveri* Vanden Berghen, *D. onraedtii* Grolle from Sri Lanka as well as *D. buckii* Grolle, the little known *D. guadalupensis* Steph., *D. heimii* Jovet-Ast and *D. replicata* (Spruce) Steph. from the Neotropics belong here) are at least superficially rather similar. Our three new species may be separated from closely related species as follows.

Diplasiolejeunea ornata is well characterized by the obovate or cuneate leaf lobes, the ovate-lanceolate leaf lobule with a doubled first tooth and the clavate perianth with conspicuously auriculate to umbonate carinae. There are only a few species with a doubled lobule tooth, including *Diplasiolejeunea aulae* E.W. Jones, *D. cyanguguensis* Tixier and *D. phyllarthronii* Tixier. However, these

three species belong to section *Villaumeae*, having considerable larger underleaves with lobes at least 8 or more cells wide at base (4-8 cells wide in *D. ornata*), and a different shape of the lobule, never being ovate-lanceolate as in *D. ornata*. *Diplasiolejeunea symoensii* Vanden Berghen, *D. hamata* Tixier (both with an occasionally doubled first tooth) and *D. zakiae* Tixier are readily distinguished by the smaller underleaves with lobes 2-4 cells wide at base and distally truncate leaf lobule. From all these and other superficially similar species, *D. ornata* is separated, too, by the conspicuous auriculate to umbonate carinae of the perianth.

Diplasiolejeunea ranomafanae is unmistakable in its sigmoid-lanceolate inflated lobule with three teeth, the third tooth usually longer than the second. The decurrent underleaf base with a narrow sinus 3-4 cells deep, seems to be another good character distinguishing *D. ranomafanae* from superficially similar species. The falcately curved first tooth which is occasionally present in *D. ranomafanae*, is also a rare feature in the genus; it is otherwise found only in *D. hamata* Tixier in which, however, the first tooth is often doubled, and the second tooth is small, one celled and straight. Furthermore, underleaves in the latter are smaller, the lobes only 3-4 cells wide at base, and the lobule is distally truncate.

Diplasiolejeunea andringitrae seems to be closely related only to *D. auriculata* Tixier, from which it differs 1) in the shape of the leaf lobe being oval in *D. auriculata*, widest near mid-leaf, but obovate to reniform in *D. andringitrae*, 2) by the conspicuous knot-like trigones with abundant intermediate thickenings in *D. andringitrae*; small trigones only at base of leaf lobe in *D. auriculata*, 3) by the flat hammer-shaped second tooth with two rounded-oval "horizontal" cells as thick walled as neighbouring cells in *D. auriculata* (see fig. 1: 5-7 and fig. 2: 5-7 in Tixier 1979), and thin-walled longly oval perpendicular ("horizontal") cells in *D. andringitrae*, and 4) in the shape of the underleaves being usually V-shaped in *D. auriculata* but often with a broad truncate sinus in *D. andringitrae*. *Diplasiolejeunea kraussiana*, which is similar in its leaf cells having conspicuous knot-like trigones and intermediate thickenings, is readily distinguished by its dispersed ocelli that are larger than average cells and conspicuous also in dead herbarium material, by the oval to elongate-oval leaf lobe and by the frequent occurrence of perianths (autoicous). In addition, the incision at the junction of the lobule with the ventral leaf lobe caused by the first tooth in *D. andringitrae* is very characteristic, and this species may be separated from all similar species by this feature alone. We know of only one unrelated African species, *Diplasiolejeunea runssorensis* Steph., which shows a similar incision caused by a first tooth. In *Diplasiolejeunea aulae* E.W. Jones (= *D. tridentata* Tixier), another species with three lobule teeth and a first tooth near the junction of the lobule with the ventral leaf lobe, the lobule is narrowly and shortly decurrent and lacks an incision. Both the latter species are immediately distinguished by their large underleaves typical of sect. *Villaumeae*, the lobes being 10 or more cells wide at base. Another unique feature of *D. andringitrae* in African *Diplasiolejeunea* species is the really T-like second tooth of the lobule (it is "hammer-shaped" in *D. auriculata* and sometimes also in *D. kraussiana* and *D. symoensii* Vanden Berghen), though a T-like second tooth is also found in the Neotropical *D. buckii* Grolle and in the Asian *D. longifolia* Herzog, both species unrelated to *D. andringitrae*.

The little known *Diplasiolejeunea utriculata* Steph. is separated from all other members of sect. *Utriculatae* by the long tubular lobule and dispersed ocelli that are larger than average cells.

Acknowledgements. The authors are grateful to Martin J. Wigginton for his careful revision of their English and for his other useful comments. The senior author expresses his gratitude to Dr. Robert Magill (MO), to Prof. Zoltán Tuba (Gödöllő), to Mr. Rolland Ranaivojaona (TANA), to Mr. András Szabó and to his wife, Mrs. Sarolta Pócs for their logistic help and participation in the collecting work, to the National Geographic Society, USA (Grants No. 5201/94, 6248-98), to the Hungarian Academy of Sciences and to the Hungarian Scientific Research Fund OTKA (Grant No. T 038319) for sponsoring the expeditions.

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