

MAGYAR AFRIKA TÁRSASÁG
AFRICAN–HUNGARIAN UNION



AHU MAGYAR AFRIKA–TUDÁS TÁR
AHU HUNGARIAN AFRICA–KNOWLEDGE DATABASE

PÓCS, Tamás

New or Little Known Epiphyllous Liverworts, IV. – Two New
Cololejeuneoideae from the Comoro Archipelago

Eredeti közlés /Original publication:

The Journal of the Hattori Botanical Laboratory, 1993, No. 74, 45–57. pp.

Elektronikus újraközlés/Electronic republication:

AHU MAGYAR AFRIKA–TUDÁS TÁR – 000.003.236

Dátum/Date: 2018. november / November.

filename: pocs_1993_EpiphyllousComoro

Ezt az információt közlésre előkészítette

/This information prepared for publication by:

B. WALLNER, Erika és/and BIERNACZKY, Szilárd

Hivatkozás erre a dokumentumra/Cite this document:

PÓCS, Tamás: New or Little Known Epiphyllous Liverworts, IV. – Two
New Cololejeuneoideae from the Comoro Archipelago, *AHU MATT*, 2018,
pp. 1–15. old., No. 000.003.236, <http://afrikatudastar.hu>

Eredeti forrás megtalálható/The original source is available:

Közkönyvtárakban / In public libraries

Kulcsszavak/Key words

African studies in Hungary,

ABSTRACT. *Colura hattoriana* spec. nov. and *Cololejeunea magillii* spec. nov. are described from the Comoro Archipelago. A brief analysis on the epiphyllous bryoflora of the islands is given.

AZ ELSŐ MAGYAR, SZABAD FELHASZNÁLÁSÚ, ELEKTRONIKUS,
ÁGAZATI SZAKMAI KÖNYV-, TANULMÁNY-, CIKK-
DOKUMENTUM- és ADAT-TÁR/THE FIRST HUNGARIAN FREE

ELECTRONIC SECTORAL PROFESSIONAL DATABASE FOR BOOKS,
STUDIES, COMMUNICATIONS, DOCUMENTS AND INFORMATIONS

* magyar és idegen – angol, francia, német, orosz, spanyol, olasz és szükség szerint más – nyelveken készült publikációk elektronikus könyvtára/
writings in Hungarian and foreign – English, French, German, Russian, Spanish, Italian and other – languages

* az adattárban elhelyezett tartalmak szabad megközelítésűek, de olvasásuk vagy letöltésük regisztrációhoz kötött/the materials in the database are free but access or downloading are subject to registration

* Az Afrikai Magyar Egyesület non-profit civil szervezet, amely az oktatók, kutatók, diákok és érdeklődők számára hozta létre ezt az elektronikus adattári szolgáltatását, amelynek célja kettős, mindenekelőtt sokoldalú és gazdag anyagú ismeretekkel elősegíteni a magyar afrikánisztikai kutatásokat, illetve ismeret-igényt, másrészt feltárni az afrikai témájú hazai publikációs tevékenységet teljes dimenziójában a kezdetektől máig./The African-Hungarian Union is a non-profit organisation that has created this electronic database for lecturers, researchers, students and for those interested. The purpose of this database is twofold; on the one hand, we want to enrich the research of Hungarian Africa studies with versatile and plentiful information, on the other hand, we are planning to discover Hungarian publications with African themes in its entirety from the beginning until the present day.

NEW OR LITTLE KNOWN EPIPHYLLOUS LIVERWORTS, IV. TWO NEW COLOLEJEUNEOIDEAE FROM THE COMORO ARCHIPELAGO

TAMÁS PÓCS¹

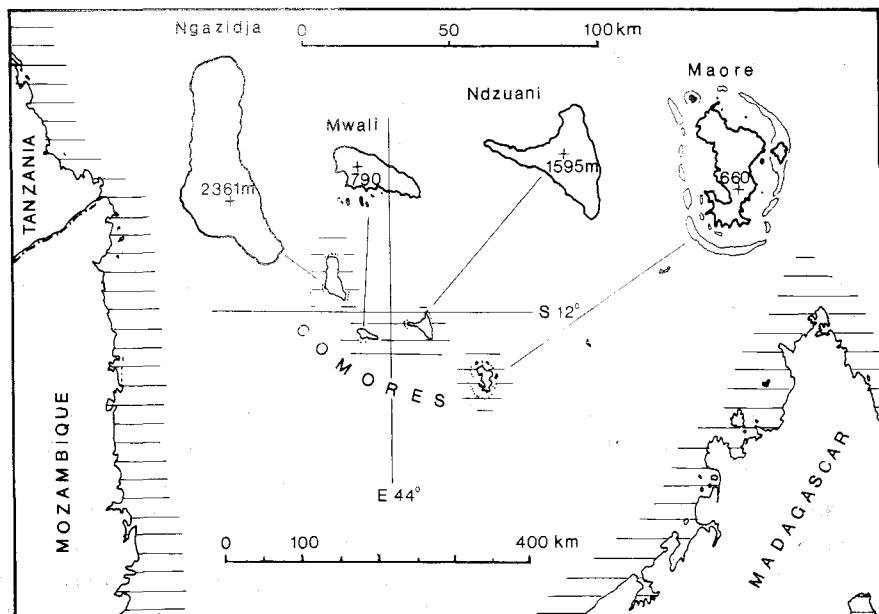
ABSTRACT. *Colura hattoriana* spec. nov. and *Cololejeunea magillii* spec. nov. are described from the Comoro Archipelago. A brief analysis on the epiphyllous bryoflora of the islands is given.

INTRODUCTION

The four large and many small islands of Comoro Archipelago occupy 2034 km² in the Indian Ocean at 280 km distance from the African continent and some 350 km from the northern end of Madagascar (see map 1). The Comoro Islands are built up of volcanic rock (alkaline basalts, nephelin, nephelinite, phonolite). The volcanoes started to develop above a hot spot 8 million years ago and with the continuous movement of the plate above, an island chain developed similar to the Hawaiian Islands (Emerick & Duncan 1982, Nougier et al. 1986). In our case the Maore (Mayotte) Island at the South-East end is the oldest and Ngazidja (Grande Comore) at the North-West is the most recent. The radiometric analyses put the age of Maore between 5 and 8 million years. Although Maore is the lowest (660 m) and most eroded, it was once the highest among them. The isles of the southeast portion are submerging, as is shown by the very well developed atoll ring around Maore, following the pattern described in Darwin's atoll theory (Stieltjes 1988). At present the youngest Ngazidja is the highest island (Karthala, 2263 m). The volcanoes emerge from 3000 m depth, from the ocean floor of Cretaceous age. The climate of the islands varies between superhumid to semiarid. The SW slopes of Karthala enjoy more than 5000 mm precipitation per year while its lee slopes or the great part of Maore does not receive more than 1000 mm. The rainfall records of other islands lie between these extremes. Cyclones reach the islands every 10th year on the average. The annual mean temperature is 25.6°C at the coast. As the thermic gradient against the altitude is relatively high (0.7°C/100 m), the mean temperature is estimated to be 10°C on the 2263 m high summit of the active Karthala volcano, where frosts can occur and the upper forest line does not go higher than 1600–1800 m. As there was never land connection between the Comoros and mainland Africa or Madagascar and the age of the islands is quite different from each other (Maore 6–8, Moheli 3–4, Anjouan 1–3 million years old while Ngazidja is of almost recent origin), they prove to be an excellent "experimental ground" for flora development by long and short range air dispersal.

The bryoflora of the Comoro Islands is not well known, compared to nearby Madagascar or Réunion, which proved to be more attractive for most botanists (conf. Crosby et al. 1983). Maore (Mayotte) island is an exception, from where the French bryologists have

¹ Eszterházy Teachers' College, Dept. of Botany, EGER, pf. 43, H-3301, Hungary.



Map 1. The topography of the Comoro Archipelago. At the upper side the islands are enlarged, with their highest point indicated.

published data since the end of last century regularly (Bescherelle 1885, Renauld 1898 and many others). The earliest reports on Comoro mosses seem to be those by C. Müller in Peters (1864) and by C. Müller (1876), based on the collection of Hildebrandt. Records on liverworts are more scattered, especially in the last century. Probably Hildebrandt's and Humblot's collections were the first, published in different papers of Stephani (1884, 1886, 1888, 1891 and others). Renauld (1909) in his essay on *Leucoloma* includes a list of hepatics from Ngazidja (Grande Comore) Island and Madagascar (Greene & Harrington 1989). The modern revisions covering the area of the Indian Ocean islands (e.g. Gradstein 1975; Jones 1962, 1975, 1977; Jovet-Ast 1953, 1954; Tixier 1985; Van den Berghen 1976, 1984) contain only a few records from the Comoro islands. The only paper dedicated to Comoro Hepaticae was the one by Herzog (1947), ironically dealing also with an old collection Hildebrandt made in 1875.

During my years in Tanzania, I have been always very much interested to study the Comoro bryoflora for its unique position, but in 1991 I finally succeeded to visit the islands. This time I stayed there privately, for only three weeks, accompanied by a Swedish botanist, Mr. Stephen Manktelow (UPS) and we were able to visit the summit area of Karthala volcano on Ngazidja island and a few places in Ndzuanu. The beginning of very heavy rains by the end of March ended our stay. The second time, from July 25 to September 4, 1992, a better planned expedition sponsored by the National Geographic Society, together with Dr. Robert E. Magill (MO), we were able to visit all islands at least for a short while and could collect in all major forest reserves. These collections enable us to present

a comprehensive picture on the bryoflora of Comoro Archipelago and to analyse the flora in detail, comparing the different islands with each other and the whole archipelago with the bryoflora of neighbouring land masses. An amateur naturalist, Mr. Attila Rupf from Budapest, accompanied us during this trip at his own expense.

During the two expeditions we collected some 2500 specimens (1200 Musci and 1300 Hepaticae) with an adequate number of duplicates. In the present paper I am dealing with the epiphylls collected during the second trip by us on all the four islands, at 15 localities (see Table 1). They belong to 69 liverwort and to 4 moss taxa. 44 of them proved to be new for the flora of the Comoro Islands, 3 for the whole of Africa (previously known, as Indomalayan species restricted to Asia) and 3 of them proved to be new for science. 2 of these new species are described below, as follows:

***Colura hattoriana* Pócs sp. nov. (Sectio *Harmophyllum* Grolle) (*Eucolura* Jovet-Ast)**

(Plate 1. Figs. 1–12)

Planta epiphylla pallide viridis, caespites irregulariter ramosis, 6–10 mm in diametro. Caules ad 4–5 mm longi, 50–90 μ m crassi, cum foliis 2.5 mm lati. Folia contigua, 0.9–1.5 mm longa, 0.3–0.5 mm lata. Saccus conicus, 0.1–0.3 $\times$ 0.3 mm, acutissimus cellulis 1–3 pellucidis terminatus. Clypeus (valva) orbicularis, cellulis 11–12 centralibus et 15–16 hyalinibus composita. Amphigastria asymmetrico bilobata. Gemmae 30–32 cellulares.

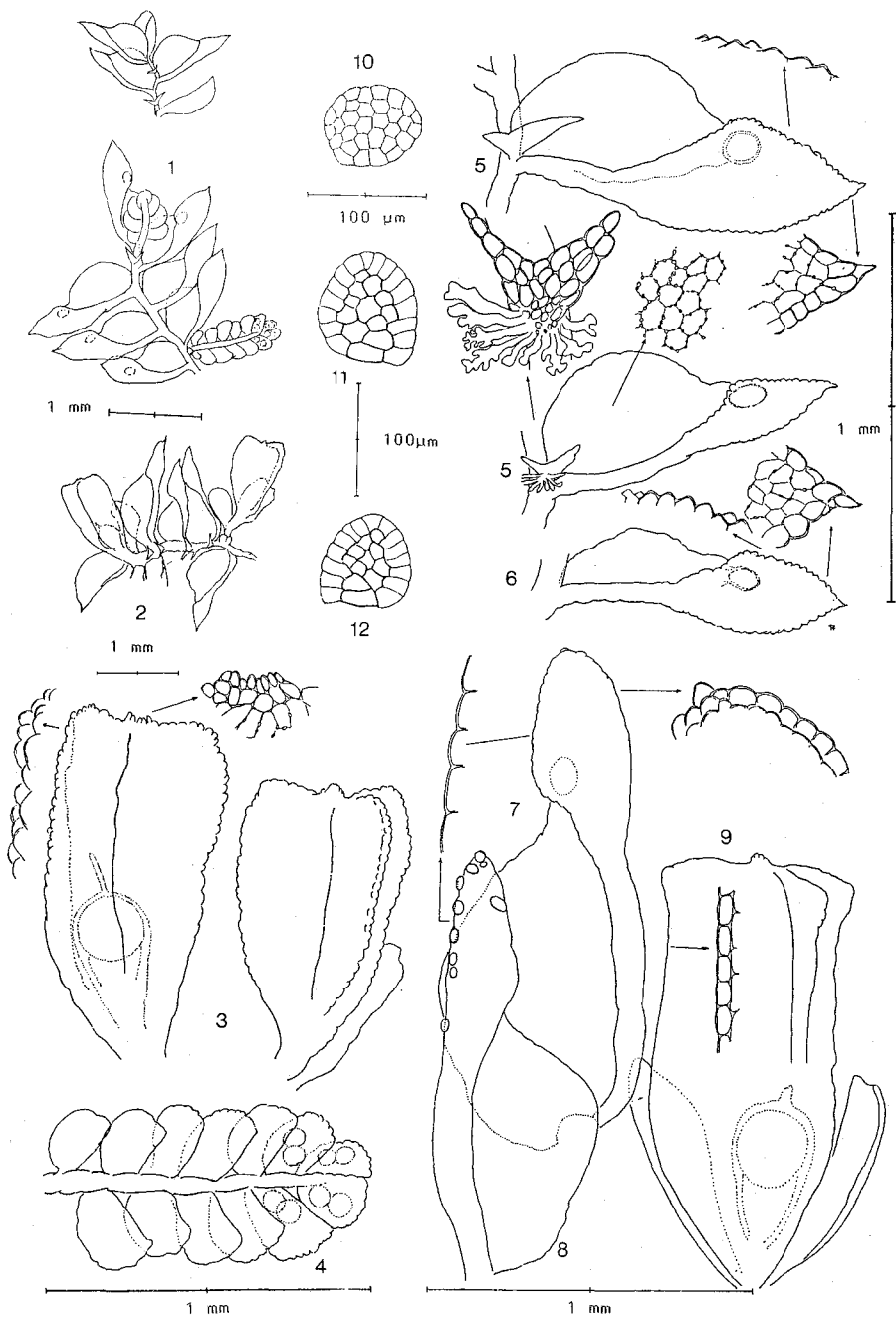
Dioica. Perianthia 0.8–1 mm alta, 0.5 mm lata, obovata, late tripartita; sessilia in ramis brevissimis. Alae perianthiorum et sacculi foliorum cellulis conicis vel hemisphaericis mamillata. Androecia in spicis apicalibus vel lateralibus, 3–12 jugis antheridiis geminatis. Species nova in honorem hepaticologi illustrissimi Doctoris Sinske Hattori dedicata.

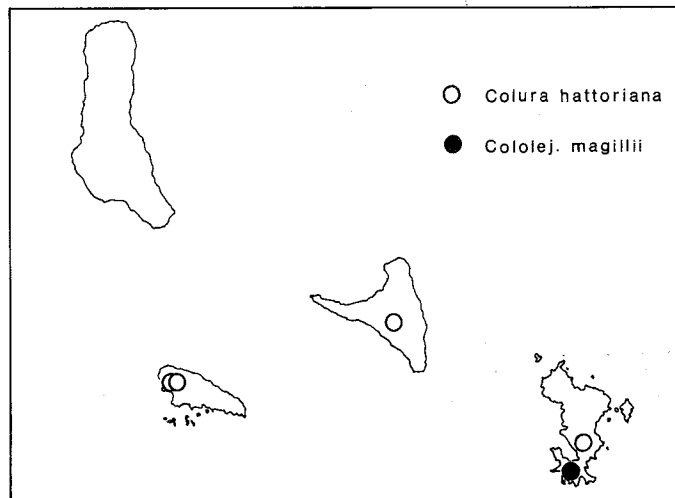
Holotypus: Pócs 92100/AH, in Herbario Academiae Paedagogicae Agriensis (EGR) deposita. Isotypus in Herbario Horti Botanici Missouriensis (MO) et in Herbario Instituti Botanici Hattoriani (NICH) sunt conservati. Paratypi: Pócs 9273/BG, 9294/AH, 9298/AH in EGR, G, MO, NY et P depositi sunt.

Medium sized, pale green plants in irregular shaped mats of 6–10 mm diameter loosely adherent to different angiosperm leaves. Stems 50–90 μ m thick. Leafy shoots up to 5 mm length and 2.5 mm width. Leaves 0.9–1.5 mm long, 0.3–0.5 mm broad. Lamina cells isodiametric, 20–30 μ m wide, thin walled, with moderate angular and intermediate thickenings. Sac 0.1–0.3 broad, 0.3 mm long, with rectangular, averaging 20 $\times$ 30 μ m wide cells. Apex of sac acute, ending in 1–3 vitreous cells. The valve broad ovate, 70–100 μ m wide, with 11–12 median and 15–16 hyaline marginal cells. Underleaves small and distant, with very unequal lobes, each 3–5 cells broad. Gemmae rare, up to 32 cells.

Dioicous. Perianths 0.8–1 mm long, 0.5 mm broad, obovate, with 3 broad and long wings and with a very low beak. Bracts half the length of the perianth, slightly notched at their apex. Both the lobule sac and the perianth wing cells conically or at least hemisphaerically protuberant. Androecia either apical on the main axis or forming long lateral branches with 3–12 pairs of bracts, each with 2 antheridia. The new species is dedicated to the memory of the excellent hepaticologist and generous friend, Dr. Sinske Hattori.

Typus: Pócs 92100/AH: Comoro Archipelago, Mwali (Moheli) Island, montane mossy rainforest on the SSW ridge leading to the summit with Chalet St. Antoine, at 600 m alt. (12°17'S, 43°40'E)





Map 2. The distribution of the new species.

30.Aug.1992. (Holotypus: EGR, Isotypus: MO, NICH). Paratypes: Pócs 9298/AH (EGR, MO): as the Holotype, but in secondary, lowland rainforest near Miringoni village at 250 m alt. (12°18'S, 43°40'E) 30.Aug.1992. Pócs 9273/BG (EGR, MO, G, NICH): Comoro Archipelago, Ndzouani (Anjouan) Island, montane rainforest on the SE ridge of Mt. Ntringi called Dongojou at the E side of Lake Dzalandze, at 1000–1200 m alt. (12°13'S, 44°25'E) Aug.1992. Pócs 9294/AH (EGR, MO, G, NY, NICH, P): Comoro Archipelago, Maore (Mayotte) Island. Montane mossy forest on the summit ridge of Mt. Bénara at 650 m alt. (12°52'40"S, 45°09'30"E) 25.Aug.1992. All the above specimens were collected together by T. Pócs, R. E. Magill & A. Rupf. (See distribution on Map 2).

Colura hattoriana seems to be related to a natural group of species of the Sectio *Eucolura* including the Afro-American *Colura digitalis* (Mitt.) Steph. and the continental African *C. dusenii* Steph. (see distribution in Pócs 1991a) or *Colura benoistii* Jovet-Ast, *C. heimii* Jovet-Ast and *C. obesa* Jovet-Ast on Madagascar. Its perianth with very large wings approaches only *C. heimii* from the above group. By the number of valve cells *C. hattoriana* is close to *C. dusenii*. But *C. hattoriana* differs by its constantly very acute sac (resembling the otherwise quite different Asian *C. conica* (Sde Lac.) Goeb. or *C. herzogii* Jovet-Ast) and by the conically protruding leaf and perianth cells from all African *Eucolura* species.

***Cololejeunea magillii* Pócs sp. nov. (Plate 2, Figs. 13–20)**

Planta epiphylla parva sicca olivaceo-viridis, caespites densis diametro 8–12 mm for-

Plate I. Figs. 1–6 and 10–12. *Colura hattoriana* sp. nov. 1–2. Male and female plants. 3. Perianths. 4. Male branch. 5–6. Leaves and underleaf. 10. Gemma. 11 and 12. Valves. Figs 7–9. *Colura digitalis* (Mitt.) Steph. for comparison. 7–8. Leaves. 9. Perianth. Figs. 1, 3–5 and 10 are based on the type of *C. hattoriana*, 2 and 12 are drawn from 9298/AH, 6 and 11 from 9294/AH. 7 and 9 are based on Pócs 9066/C from the Kilimanjaro and 8 on Pócs 6946/AE from the East Usambara Mountains, Tanzania.

mans. Caules ad 6–8 mm longus, 40–70 μm crassi, cum foliis 1–1.5 mm lati, dense ramificati. Folia subimbricata, trianguliter ovata, 375–430 μm longa et 210–300 μm lata, cellulis unipapillosis. Lobuli approx. 150 μm longi, inflati. Dens proximalis subnullus, dens apicalis bicellularis, obtusus, basi interiori papillam hyalinam ferens. Gemmae 16–20 cellulares. Stylus nullus.

Dioica? Perianthia 450 μm altae et 200 μm latae, conico-obovatae, tricarinatae et cellulis conicis mamillato-spinosa. Androecia ignota. Species dedicata collegae bryologicae Doctori Roberti Magilli.

Holotypus: Pócs 9287/AD, in herbario Academiae Paedagogicae Agriensis (EGR) deposita, Isotypi in herbarii Horti Botanici Missouriensis (MO) et Laboratorii Botanici Hattoriani (NICH) sunt conservati.

Small, in dry stage olive green plants growing in very dense mats of 6–12 mm diameter on fern leaflets. Stems 40–70 μm thick, densely, irregular bipinnately branched with Lejeunea type branches. Leafy shoots 6–8 mm long and 1–1.5 mm wide. Leaves broad triangular ovate, 375–430 μm long and 210–300 μm wide. At the base of the lobe 20×40 μm cells form a pseudovitta not sharply delimited from the neighbouring tissue. Median cells $18\text{--}20 \times 30$ μm with small, sometimes nodular trigones and with irregular intermediate thickenings, most of them unipapillose. Marginal cells much smaller, $7\text{--}9 \times 10\text{--}12$ μm in size, with evenly thickened walls. Lobule ovate and inflated, about 150 μm long, forming a keel about $2/5$ of the lobe length with conically protuberant cells. The apical tooth 2 celled with obtuse apex and with hyaline papilla at its inner base. Proximal tooth very low or absent. Cells of the free margin and the lobule center elongated, relatively thin walled without thickenings, $6\text{--}7 \times 15\text{--}20$ μm . Gemmae with 16–20 cells. No stylus.

Probably dioicous. Perianth obovate, 450 μm long and 200 μm broad, with short beak. Bracts simple, entire or slightly dentate, often unequal in size, approximating half of the perianth length. This species is dedicated to my colleague and companion in difficult and interesting collecting trips, Dr. R. E. Magill from the Missouri Botanical Garden.

Typus: Pócs 9287/AD: Comoro Archipelago, southern part of Maore (Mayotte) Island. Chungui (Choungui) peak above the village of the same name. Mesic evergreen forest on the S slope of the steep volcanic dome ("piton") built up of alkaline phonolite, at 300–500 m alt. ($12^{\circ}57'S$, $45^{\circ}08'E$, see Map 2), collected by T. Pócs, R. E. Magill & A. Rupf on 22. Aug. 1992. (Holotypus: EGR, Isotypes: MO, NICH).

This species resembles the pantropical *Cololejeunea platyneura* (Spruce) S. Arnell (synonymized by Tixier 1992 with the Asian *C. bichiana* P. Tix. and with the African *C. usambarensis* E. W. Jones), but differs clearly by its completely different, symmetric, triangular ovate leaf shape and by its different lobule (*C. platyneura* has 25–30 cells broad, falcate leaves, lobule with acute proximal tooth and the hyaline papilla is at the proximal base of the apical tooth. The perianth keels and lobule vitta are smooth.)

THE EPIPHYLLOUS BRYOFLORA OF COMORO ISLANDS

The following analysis is based on the epiphyllous (leaf inhabiting, follicolous) bryoflora, which was carefully collected in all rainforest habitats of each island, where they occur. Hence it represents well the composition and diversity of the bryoflora at different

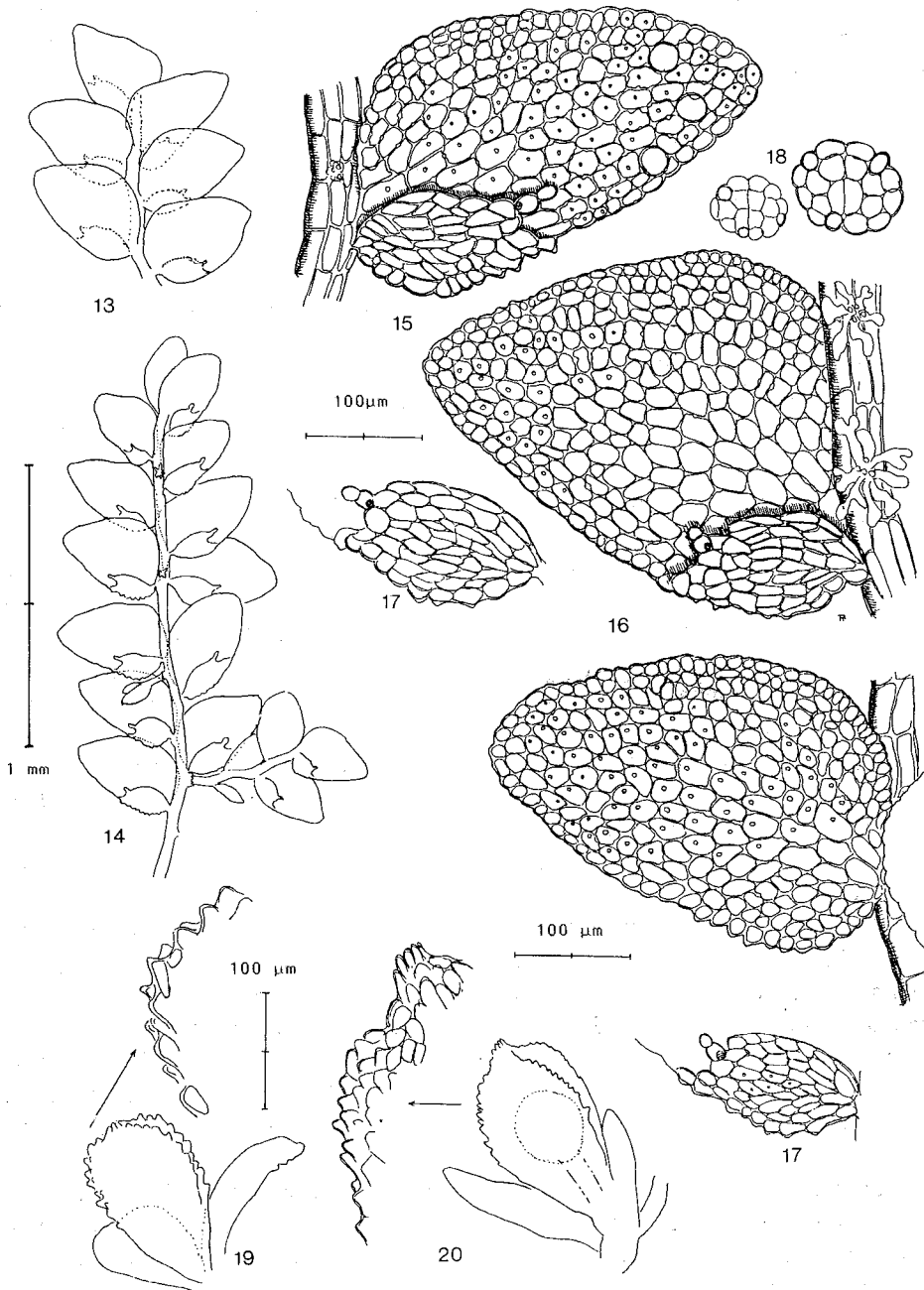


Plate II. Figs. 13–20. *Cololejeunea magillii* sp. nov. Figs. 13–14. are sterile shoots from two sides, 15 and 16. Leaves. 17. Lobules. 18. Gemmae. 19–20. Perianths. All drawn from the type No. 9287/AD.

localities. The * sign before the name in the first column means that the record is new to the Comoro Islands and two ** means that the species was hitherto known only from tropical Asia and is new for the whole of Africa. Species new to science are marked by bold letters. In the following four columns the number of localities, where the considered species on the specific island occur/then the number of specimens collected are given. The last column gives in five classes (representing <20, <40, <60, <80 and <100%) the frequency of the species summarizing the occurrences in the 15 analysed localities.

Four species out of the 73 (5.5%) are endemic to the Comoro Islands: *Cololejeunea magillii* Pócs, *C. stenophylla* Herz., *Colura hattoriana* Pócs and an undescribed *Lejeunea* (*Pleurolejeunea*) species. The *Cololejeunea* species seem to be neoendemics related to other African species.

There are 7 "Lemurian" subendemics (using the term "Lemurian" in the sense of Tixier, 1978), which were previously known only from Madagascar, on the Mascarenes or on the Seychelles islands and prove to be new for the Comoros. These are *Caudalejeunea madagassa* Steph., *Cololejeunea onraedtii* P. Tix., *Cololejeunea xaverii* (Lac.) E. W. Jones, *Colura benoistii* S.Jov.-Ast., *Colura heimii* S.Jov.-Ast., *Microlejeunea dispar* S.Jov.-Ast. and *Microlejeunea inflata* Steph. A further 6 species form the East African-Lemurian group: *Cheilolejeunea surrepens* (Mitt.) E. W. Jones, *Cololejeunea duvigneaudii* E. W. Jones, *C. hyalino-marginata* Nees ex Grolle, *Cololejeunea tanzaniae* Pócs, *Drepanolejeunea madagascariensis* (Steph.) Grolle and *D. trematodes* (Nees) Bischler. Most of the above records were new to the Comoros.

The rest of the species can be subdivided into two main groups, the African species and the bi- and tricontinental disjuncts. Among the African species we distinguish the tropical African group, with 8 lowland and 5 montane species. They are widely distributed in tropical Africa, both on the continent and on Madagascar-Mascarenes. The 9 East African montane species do not occur in West Africa, only in the mountains from Central Africa through East Africa. Six of them extend their distribution also to Madagascar and the Mascarenes. Some of them (e.g. *Lejeunea tabularis* Spreng.) are common also in South Africa. There is an interesting group of 3 species (*Colura dusenii* Steph., *Drepanolejeunea pocsii* Grolle and *Lejeunea cyathearum* E. W. Jones), which were previously known only in continental East Africa and they reach eastwards to the limit of their distribution on the Comoro Islands, not being known from Madagascar and/or from the Mascarenes. Interestingly, there are also 2 species of West African distribution, which do not occur in Central, East or in South Africa, only after a large gap on the Comoros, like *Cardiolejeunea papilionacea* (Steph.) Schust. and *Prionolejeunea principensis* Vand. Bergh.

Among the disjunct species we distinguish the Afro-Asian taxa under the name of Palaeotropical element. Eleven of them are widely distributed both in Africa and in the Indo-malayan-Oceanian region. Seven others reach westwards to the Comoro Islands but do not occur (or extremely rare) in Continental Africa. Such Asian elements are *Cololejeunea cuneata* (L. & L.) Steph., *Cololejeunea* (*Cryptolejeunea*) *inflectens* (Mitt.) Bened., *Drepanolejeunea tenuis* (Nees) Schiffn., *D. vesiculosa* ssp. *affinis* (Schiffn.) Herz.,

Table 1. The epiphyllous bryophytes at 15 localities of the four Comoro islands.

Number of localities Altitudes in m Name of species	Ngazidja	Ndzouani	Mwali	Maore	Fr
	3 750–1850	6 280–1500	2 400–660	4 300–600	
HEPATICAEE					
* <i>Aphanolejeunea exigua</i>	1/3				I
* <i>Caudalejeunea madagassa</i>			1/9		I
* <i>Cardiolejeunea papilionacea</i>	1/2				I
* <i>Cheilolejeunea decursiva</i>		1/1			I
* <i>Ch. involuta</i>	1/7	1/1	2/4		II
* <i>Ch. krakakammae</i>	1/1				I
* <i>Ch. serpentina</i>	1/2				I
* <i>Ch. surrepens</i>	1/1	2/8	1/1	1/1	II
<i>Ch. montagnei</i>		1/1			I
* <i>Chiloscyphus fragrans</i>	1/3				I
* <i>Cololejeunea bolombensis</i>				2/7	I
<i>C. crenatiflora</i>	1/1	1/2	2/14	2/14	II
* <i>C. cuneata</i>	1/1		1/1		I
* <i>C. distalopapillata</i>	2/8	6/13	1/2	3/20	IV
* <i>C. duvigneaudii</i>	2/6	2/3		1/2	II
* <i>C. elegans</i>		1/6			I
<i>C. hillebrandii</i>	1/1	3/8			II
<i>C. hyalino-marginata</i>	1/3	5/25	2/5	2/50	IV
* <i>C. inflectens</i>		1/1	1/2		I
* <i>C. magillii</i>				1/3	I
* <i>C. onraedtii</i>		1/2			I
<i>C. pusilla</i> var. <i>obtusifolia</i>		1/1	1/1	1/2	I
<i>C. stenophylla</i>		1/7	2/5	2/19	II
* <i>C. tanzaniae</i>	1/4	3/14		2/4	II
* <i>C. xaverii</i>	1/5	1/3			I
* <i>Colura benoistii</i>		1/1			I
<i>C. digitalis</i>	3/9	5/9			III
* <i>C. dusenii</i>	1/2				I
* <i>C. hattoriana</i>	1/1	1/4	2/7	1/7	II
* <i>C. heimii</i>				2/4	I
<i>C. tenuicornis</i>	1/1	1/1			I
<i>Dendroceros</i> sp.	2/2	2/7	1/1		II
<i>Diplasiolejeunea cavifolia</i>	1/1	1/5			I
* <i>D. symoensii</i>	1/2	2/4			I
* <i>Drepanolejeunea cultrella</i>	1/5	5/7			I
* <i>D. madagascariensis</i>		3/10	1/5		II
* <i>D. physaeifolia</i>	1/3	2/4			I

Table 1. (Continued)

Number of localities Altitudes in m Name of species	Ngazidja 3 750–1850	Ndzouani 6 280–1500	Mwali 2 400–660	Maore 4 300–600	Fr
* <i>D. pocsii</i>		1/2			I
** <i>D. riddleana</i>				1/2	I
** <i>D. tenuis</i>		1/1		1/2	I
* <i>D. trematodes</i>	1/3	4/9	2/4	1/4	III
** <i>D. vesiculosa</i> ssp. <i>affinis</i>			1/2		I
* <i>Frullania angulata</i>		1/3			I
<i>F. apicalis</i>	1/1	2/3			I
<i>Lejeunea acuta</i>		2/6			I
<i>L. alata</i>			1/4		I
* <i>L. caespitosa</i>	1/3	4/6	2/3	3/8	IV
* <i>L. confusa</i>			1/2		I
* <i>L. cyathearum</i>	2/6				I
* <i>L. flavovirens</i>	1/1	2/3			I
* <i>L. (Pleurolej.) sp. nov.</i>	1/2				I
* <i>Lejeunea tabularis</i>		1/2			I
* <i>Leptolejeunea epiphylla</i>	1/2	2/10	1/2	3/25	III
* <i>L. maculata</i>	3/15	6/65	2/7	3/14	V
* <i>Metzgeria australis</i>			1/1		I
* <i>M. consanguinea</i>	2/4				I
<i>Microlejeunea africana</i>	2/1	5/9	2/2	1/2	IV
* <i>M. cf. dispar</i>	1/2	3/7	1/2	1/4	II
* <i>M. inflata</i>		2/16			I
<i>Microlejeunea sp.</i>	1/1			1/1	I
* <i>Odontolejeunea lunulata</i>	1/2	3/7	1/2		II
<i>Prionolejeunea grata</i>	1/9	1/2			I
* <i>P. principensis</i>		1/2			I
<i>Radula flaccida</i>	1/7	2/3	2/5	3/11	III
* <i>R. recurvifolia</i>		1/1			I
* <i>R. stenocalyx</i>	1/8	2/3	1/1		II
<i>Radula sp.</i>			1/2		I
* <i>Rectolejeunea brittoniae</i>		1/1			I
<i>Telaranea nematodes</i>	1/2				I
MUSCI					
<i>Aerobrydium subpiligerum</i>	1/1			1/1	I
<i>Daltonia sp.</i>		1/1			I
<i>Floribundaria floribunda</i>	1/2		1/1		I
<i>Leucoloma dichelymoides</i>		1/2			I

Drepanolejeunea riddleana Steph., *Lejeunea acuta* Gott. and *Leptolejeunea epiphylla* (Mitt.) Steph.

There are 4 Afro-American disjuncts. 3 of them are montane and 1 lowland tropical species. One species is Atlantic-European-Afromontane disjunct, namely *Aphanolejeunea microscopica* (Tayl.) Evans.

There are a further 4 species, which are considered to be Panropical, occurring in all tropical continents. There is 1 Southern Pantemperate species, *Telaranea nematodes* (Gott. ex Aust.) Howe. Finally the distribution of 4 unidentified species is unknown.

Summarizing the distribution of the observed 73 epiphyllous species, they divide, as follows:

Endemic species of the Comoro Islands:	4
Lemurian subendemics:	7
Lemurian-East African:	6
East African:	9
West African:	2
Tropical African:	13
Atlantic Euro-African:	1
Palaeotropical:	18
Afro-American:	4
Panropical:	4
Southern temperate:	1
unknown distribution	4
Total:	73

The relatively high number of endemic and subendemic species, in spite of the young age of the islands compared to some mountains in East Africa of roughly similar size, can be correlated with the insular flora development. Mount Kilimanjaro, similar in age and size, has only 2% of the bryophytes endemic (Pócs 1991b). On the mainland only very old (Precambrian) crystalline mountains have numbers of endemic bryophytes comparable to the Comoros (Usambara Mountains have 5.47% of endemic bryophytes, Pócs 1988, 1990). The more isolated Galápagos Islands, although similar to the Comoros in origin and age, have an even higher number of endemic bryophytes (6% among Musci but 16% among Hepaticae, Gradstein & Weber 1982).

ACKNOWLEDGEMENTS

The Author is indebted to the American National Geographic Society for funding their expedition to the Comoros (Grant No. 4699-92) and to the Hungarian National Science Foundation (OTKA, Grant No.941) for sponsoring his research on this topic at home. The author wishes to thank Dr. W. B. Schofield of University of British Columbia for reading the manuscript.

REFERENCES

Bescherelle, E. 1885. Florule bryologique de Mayotte. Ann. Sci. Nat. Bot. ser. 7, 2: 82-98.

- Emerick, G. M. & R. A. Duncan 1982. Age progressive volcanism in the Comores archipelago, western Indian ocean and implication for Somali plate tectonics. *Earth Planet. Sci., Lett.* 60: 415–428.
- Crosby, M. R., U. & W. Schultze-Motel 1983. Katalog der Laubmoose von Madagascar und den umliegenden Inseln. *Willdenowia* 13: 187–255.
- Gradstein, S. R. 1975. A taxonomic monograph of the genus *Acrolejeunea* (Hepaticae), with an arrangement of the genera of Ptychanthoideae. *Bryophytorum Bibliotheca* 4: 162 pp + 14 pl.
- Gradstein, S. R. & W. A. Weber 1982. Bryogeography of the Galapagos Islands. *J. Hattori Bot. Lab.* 52: 127–152.
- Greene, S. & A. J. Harrington 1989. The conspectus of bryological taxonomic literature, Part 2. Guide to national and regional literature. *Bryophytorum Bibliotheca* 37: 321 pp.
- Herzog, Th. 1947. Hepaticae von der Comoreninsel Johanna. *Bot. Not.* 100: 317–334.
- Jones, E. W. 1962. African Hepatics XV. Plagiochila in tropical Africa. *Trans. Brit. Bryol. Soc.* 4: 253–325.
- Jones, E. W. 1975. African Hepatics. XXVII. *Bazzania*. *J. Bryol.* 8: 299–316.
- Jones, E. W. 1977. African Hepatics. XXX. The genus *Radula* Dumortier. *J. Bryol.* 9: 461–504.
- Jovet-Ast, S. 1953. Le genre *Colura*: Hépatiques. Lejeuneaceae, Diplasiae. *Rev. Bryol. Lichénol.* 22: 206–312.
- Jovet-Ast, S. 1954. Le genre *Colura*: Hépatiques. Lejeuneaceae, Diplasiae. *Rev. Bryol. Lichénol.* 23: 1–22.
- Müller, C. 1864. Musci. In: W. C. H. Peters, *Naturwissenschaftliche Reise nach Mossambique. Botanik II*: 565–566.
- Müller, C. 1876. Musci Hildebrandtiani in Archipelago Comorensi et in Somalia litoris Africani anno 1875 ab J. M. Hildebrandt lecti. *Linnaea* 40: 225–300.
- Nougier, J., J. M. Cantagrel & J. P. Korche 1986. The Comores archipelago in the western Indian Ocean: volcanology, geochronology and geodynamic setting. *J. Afr. Earth Sciences* 5: 135–145.
- Pócs, T. 1978. Epiphyllous communities and their distribution in East Africa. *Bryophytorum Bibliotheca* 13: 681–713.
- Pócs, T. 1988. Checklist: Bryophyta of the Usambara Mountains. In: Anonymus (Ed.), *The SAREC supported Integrated Usambara Rain Forest Project, Tanzania. Report for the period 1983–1987, Appendix 2*. Uppsala, 14 pp.
- Pócs, T. 1990. Geography and ecology of Usambara's bryophytes. In: I. Hedberg & E. Persson (Eds.), *Research for Conservation of Tanzanian Catchment Forests. Proceedings from a workshop held in Morogoro, Tanzania March 13–17, 1989*. Uppsala: 71–85.
- Pócs, T. 1991a. The genus *Colura* in East Africa. *Bull. brit. Bryol. Soc.* 57: 33–39.
- Pócs, T. 1991b. The significance of lower plant in the conservation of Mount Kilimanjaro. In: W. D. Newmark (Ed.), *The Conservation of Mount Kilimanjaro*. IUCN, Gland & Cambridge: 21–33.
- Renauld, F. 1898. *Prodrome de la flore bryologique de Madagascar, des Mascareignes et des Comores*. Monaco: 296pp.
- Renauld, F. 1909. *Essai sur les Leucoloma et supplément au Prodrome.....* Monaco: 139pp.
- Stephani, F. 1884. Die Gattung *Radula*. *Hedwigia* 23: 129–137.
- Stephani, F. 1886. Hepaticarum species novae vel minus cognitae. VIII. *Hedwigia* 25: 233–249.
- Stephani, F. 1888. Hepaticae Africanae. *Hedwigia* 27: 59–113.
- Stephani, F. 1891. Hepaticae. *Bull. Soc. Roy. Bot. Belg.* 30: 194–207.
- Stieltjes, L. 1988. Carte géologique de la France. Mayotte. (Archipel des Comores). Echelle 1/50000. Notice explicative. BRGM, Orléans: 135 pp.

- Vanden Berghen, C. 1976. Frullaniaceae (Hepaticae) africanae. Bull. Jard. Bot. Nat. Belg. 46: 1–220.
- Vanden Berghen, C. 1984. Le genre *Lopholejeunea* (Spruce) Schiffn. (Lejeuneaceae, Hepaticae) en Afrique. Bull. Jard. Bot. Nat. Belg. 54: 393–464.
- Tixier, P. 1978. La spéciation lémurienne et les Lejeuneacées. Le cas du genre *Diplasiolejeunea*. Bryophytorum Bibliotheca 13: 621–645.
- Tixier, P. 1985. Contribution à la connaissance des Cololejeuneoideae. Bryophytorum Bibliotheca 27: 439 pp.
- Tixier, P. 1992. Les phyllocenoses et la biogéographie. Le genre *Cololejeunea* et la notion d'espèces “furtives”. *Cololejeunea platyneura* (Spruce) S. S. Arnell. C. R. Soc. Biogéogr. 68: 77–87.
-