Identity of the moss Symblepharis rhacomitriodes Dixon, and a discussion of the status of Grimmia abyssinica (Müll. Hal.) Mitt.

Autor(en): **Price, Michelle / Maier, Eva / Ellis, Len**

Objekttyp: **Article**

Zeitschrift: **Candollea : journal international de botanique systématique = international journal of systematic botany**

Band (Jahr): **58 (2003)**

Heft 2

PDF erstellt am: **21.07.2024**

Persistenter Link: https://doi.org/10.5169/seals-879303

Identity of the moss Symblepharis rhacomitriodes Dixon, and a discussion of the status of Grimmia abyssinica (Müll. Hal.) Mitt.

MICHELLE PRICE, EVA MAIER & LEN ELLIS

ABSTRACT

PRICE, M., E. MAIER & L. ELLIS (2003). Identity of the moss Symblepharis rhacomitriodes Dixon, and a discussion of the status of Grimmia abyssinica (Müll. Hal.) Mitt. *Candollea* 58: 289-295. In English, English, French and German abstracts.

Recent studies of the genus *Symblepharis* Mont. indicate that its sole representative in Africa, *Symblepharis rhacomitriodes* Dixon, is conspecific with *Grimmia abyssinica* (Müll. Hal.) Mitt. Therefore, *Symblepharis* can be excluded from the African moss flora. Furthermore, newly observed features are reported that support the recognition of *G. abyssinica* as an autonomous taxon. A full description of *G. abyssinica* is presented.

RÉSUMÉ

PRICE, M., E. MAIER & L. ELLIS (2003). Identité de la mousse Symblepharis rhacomitriodes Dixon, et discussion du statut de Grimmia abyssinica (Müll. Hal.) Mitt. *Candollea* 58: 289-295. En anglais, résumés anglais, français et allemand.

Des études récentes concernant le genre *Symblepharis* Mont. démontrent que son représentant unique en Afrique, le *Symblepharis rhacomitriodes* Dixon, est conspécifique avec *Grimmia abyssinica* (Müll. Hal.) Mitt. Ainsi le genre *Symblepharis* doit être exclu de la bryoflore africaine. Une description détaillée de *G. abyssinica* est présentée. Des caractères spécifiques mis en évidence récemment montrent que *G. abyssinica* est un taxon autonome.

ZUSAMMENFASSUNG

PRICE, M., E. MAIER & L. ELLIS (2003). Zur Kenntnis von Symblepharis rhacomitrioides Dixon und der systematischen Stellung von Grimmia abyssinica (Müll. Hal.) Mitt. (Musci). *Candollea* 58: 289-295. In Englisch, englische, französische und deutsche Zusammenfassungen.

Neuerdings an der Gattung *Symblepharis* Mont. durchgeführte Untersuchungen zeigen, dass der einzige afrikanische Vertreter, *Symblepharis rhacomitrioides* Dixon, mit *Grimmia abyssinica* (Müll. Hal.) Mitt. konspezifisch ist. Deshalb muss die Gattung *Symblepharis* aus der afrikanischen Moosflora ausgeschieden werden. *Grimmia abyssinica* wird eingehend beschrieben. Neu erkannte Merkmale zeigen, dass *G. abyssinica* eine eigenständige Art ist.

KEY-WORDS: Grimmia – *GRIMMIACEAE* – Moss – Africa – *Symblepharis* – Taxonomy.

CODEN: CNDLAR
ISSN: 0373-2967
58(2) 289 (2003)

Introduction

The genus *Symblepharis* Mont. is largely distributed in the New World and Asian tropics, and *Symblepharis rhacomitroides* Dixon, the single species described from Africa, was a phytogeographical anomaly. Investigation of the type of *S. rhacomitrioides* in BM revealed that it possessed many *Grimmia*-like features, in particular its leaf lamina, which is mostly composed of the 'racomitrioid' cells from which the name of the species was derived. A search through the species of *Grimmia* held in BM and G showed that the type of *S. rhacomitrioides* closely resembles that of *Grimmia abyssinica* (Müll. Hal.) Mitt., a distinct species that had previously been placed in the synonomy of *G. fuscolutea*.

Symblepharis rhacomitrioides was described by DIXON (1933) based on a collection by Miss M. Steele on Mount Cameroon (Africa, Cameroon). Unsure of its true affinities Dixon noted: "A remarkable plant, not quite easy to place in the absence of fruit. The areolation, with the exception of the extreme basal cells, is entirely Rhacomitrioid, as I have seen it in no other plant outside Grimmiaceae." The 'Trichostomoid' appearance of the moss is noted and its 'Rhacomitrioid' leaf cells are clearly illustrated on a sheet in Dixon's extensive collection of bryological notes held in BM (**Fig. 1**). In his protologue, Dixon compared *Steele s. n.* with *Symblepharis helicophylla* Mont. and *S. reinwardtii* (Dozy & Molk.) Mitt. in the family *Dicranaceae*. He recognised similarities between the shoots and leaves of these species and those of *Steele s. n.* He especially noted a similar leaf areolation in *Steele s. n.* to illustrations of leaf cells in *S. reinwardtii* by SALMON (1898). On the basis of these observations Dixon placed his new species in *Symblepharis*.

Species of *Symblepharis* are characterised by their moderately spaced leaves that are crispate and curled when dry. The leaves are lanceolate-subulate from an ovate, strongly sheathing base. In the costa the guide cells form a single, internal horizontal layer, and in most species, the

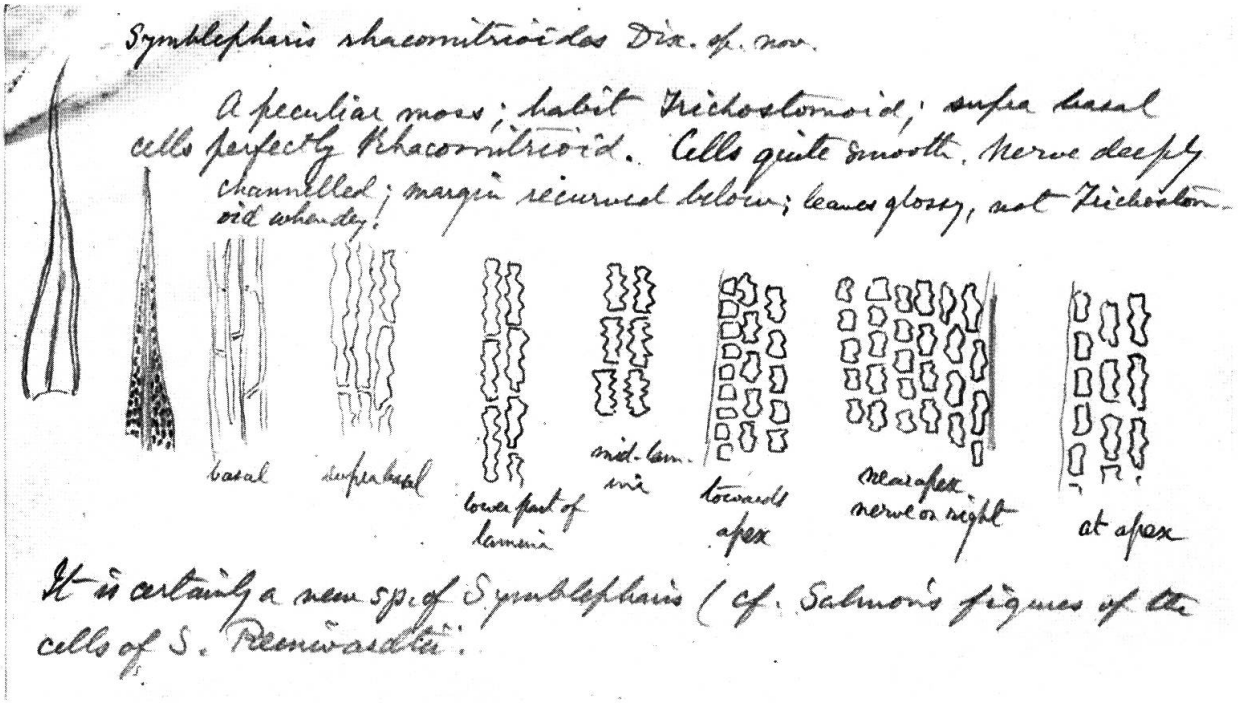

Fig. 1. – A copy of the notes from the archives of H. N. Dixon, courtesy of the Natural History Museum, London.

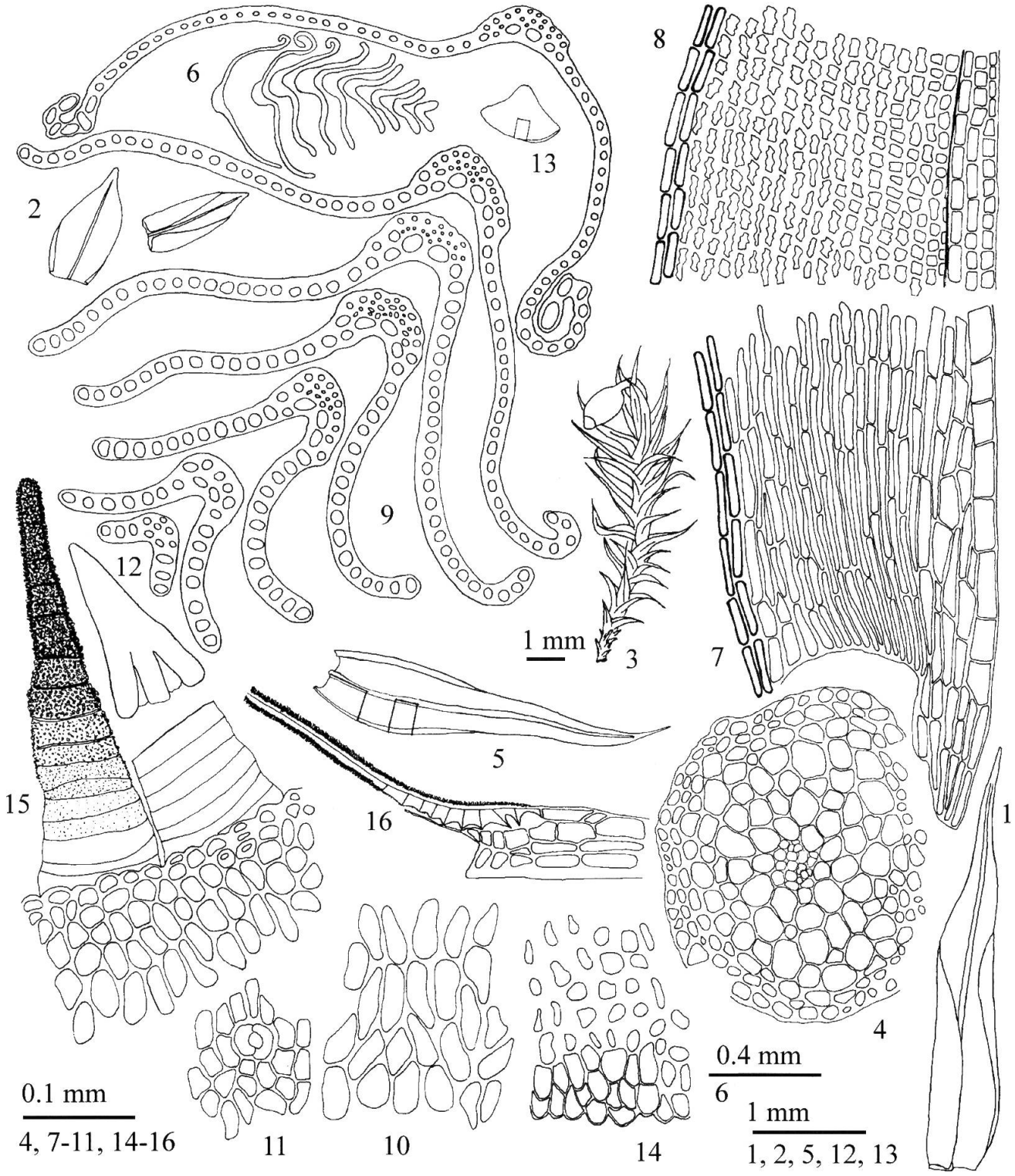

Fig. 2. – *Grimmia abyssinica* (Müll. Hal.) Mitt.: **1**, perichaetial leaf; **2**, perigonial leaves; **3**, plant with sporophyte in wet state; **4**, transverse section of stem; **5**, leaf; **6**, outlines of transverse sections of leaf (leaf form in situ); **7**, cells in leaf base; **8**, cells in transitional region and lower lamina; **9**, transverse sections of leaf; **10**, exothecial cells (middle of capsule); **11**, stoma; **12**, calyptra; **13**, operculum; **14**, cells at rim of operculum; **15**, peristome, outer side; **16**, longitudinal section of peristome tooth. [**1-4**, **10-11**, **13-16**, *Schimper s. n.* (BM); **5**, **7-8**, *Pócs & Ochyra 88 152/Y* (G); **6**, **9**, *Balázs 81/h* (G); **12**, *Troll s. n.* (BM)] [Drawings E. Maier]

cells of the lamina are smooth-walled, showing notable differentiation between the long, rectangular cells in the leaf base and the isodiametric cells in mid-leaf and above. Only in *S. reinwardtii*, which is otherwise typical of *Symplepharis*, do the cells of the lamina approach the 'racomitrioid' pattern found in many species of the family *Grimmiaceae*. Sporophytes in species of *Symplepharis* consist of an erect capsule on a straight seta.

The original specimen of *S. rhacomitrioides* (*Steele s. n.*) most closely resembles collections of *G. abyssinica* in BM and G (**Fig. 2.1-16** & **Fig. 3.1-6**). The leaves in *G. abyssinica* and in *Steele s. n.* have a lanceolate subula extending from an elliptical base (**Fig. 3.1, 3.4**), are non-sheathing and are not crispate when dry. They have a similarly structured costa with a layer of guide cells forming the ventral surface (**Fig. 3.3, 3.6**). The cells of the lamina are elongate-rectangular, becoming smaller from the base of the leaf toward the apex. In the leaf base these cells have smooth walls (**Fig. 3.2, 3.5**), but above the base the walls of the cells are strongly sinuose, i.e. 'racomitrioid' (**Fig. 2.8**). *Steele s. n.* lacks sporophytes, but those in *G. abyssinica* have pendulous capsules on curving setae. *Symblepharis rhacomitrioides* is clearly unrelated to *Symblepharis* and is best placed as a synonym of *G. abyssinica* (see below). The collection of *Steele s. n.*, the basis for *S. rhacomitrioides*, is the only moss collection to have been described or recorded as representing a species of *Symblepharis* from Africa (O'SHEA, 1995). The genus *Symblepharis* can therefore be excluded from the African moss flora.

Grimmia abyssinica (Müll. Hal.) Mitt. in J. Proc. Linn. Soc., Bot. 7: 152. 1863. ≡ *Guembelia abyssinica* Müll. Hal., Syn. Musc. Frond. 1: 772. 1849. **Type: ETHIOPIA (**Abyssinia**):** "Schimperi iter Abyssinicum. Sectio secunda. No. 435. In siccis ad rupes inde a limitibus arbornm [sic] et fruticum usque ad cacumen montis Silke, monte alpestri Silke", 18.II.1840, *W. Schimper s. n.* (Lecto-: MO, [designated by MUÑOZ & PANDO, 2000]; isolecto-: BM!, FH, G!, GOET!, H-BR, JE, NY, PC) (**Fig. 2.1-16**).

= *Symblepharis rhacomitrioides* Dixon in Ann. Bryol. 6: 21. 1933. **Type: CAMEROON:** "Mt. Cameroon, 10-14,000 ft.", I.1932, *Miss M. Steele s. n.* (BM!), ***syn. nov.***

Plants in compact cushions, adherent to substrate by rhizoids, young shoots originating from older stem parts, with appressed leaflets. ***Stems*** (**Fig. 2.3**) erect, up to 90 mm high with branches running parallel to the stem and reaching nearly to the same height; largely composed of thin-walled cells, central strand narrow (**Fig 2.4**). ***Leaves*** (**Fig. 2.5**) 2.0-4.0 mm long excluding hair-point; loosely arranged around stem, around lower part of stem erect, in comal tuft, when dry contorted and irregularly wavy, when moistened older leaves quickly spreading, younger leaves spreading more slowly, when wet erecto-patent to patulous; elongate-lanceolate, long-subulate from a decurrent, elongate-ovate base, tapering from broadest part of leaf to an acuminate apex, mostly muticous, or with nearly smooth hair-points of different lengths. *Leaf-form*, in situ, (**Fig. 2.6**) concave near insertion with plica in one side of lower lamina, distally keeled (± 45°), keel narrowing into apical region; margin on one side of leaf recurved from insertion or proximal leaf base to mid-leaf, on opposite side revolute from base to mid-leaf (sometimes less strongly recurved), from mid-leaf to apex plane. ***Lamina*** unistratose, occasionally with bistratose margins; cells in leaf base (**Fig. 2.7**) mostly narrowly elongate rectangular but in marginal rows broader and shorter, walls thin to thickened, smooth to slightly nodulose; above the leaf base (**Fig. 2.8**) rectangular, becoming shorter towards the margins, walls thickened and sinuose; in upper lamina mostly isodiametric with quadrate to rounded lumina. ***Costa*** percurrent; in dorsal view stout, of nearly uniform width but slightly narrowing in the leaf base; viewed in transverse-section (**Fig. 2.9**) dorsal side at insertion and in the leaf base broadly rounded, more narrowly and prominently rounded above; on ventral side forming a channel, broad at leaf base, narrowing distally; a layer of guide cells forming ventral surface, from insertion into proximal leaf 6 in number, reducing to 4-5 around mid-leaf, and to 2 in apical region; cells of dorsal surface weakly differentiated; from insertion to apical region a large band of substereids lies between the guide cells and the dorsal superficial cells, in apical region cells uniform, hydroids lacking throughout.

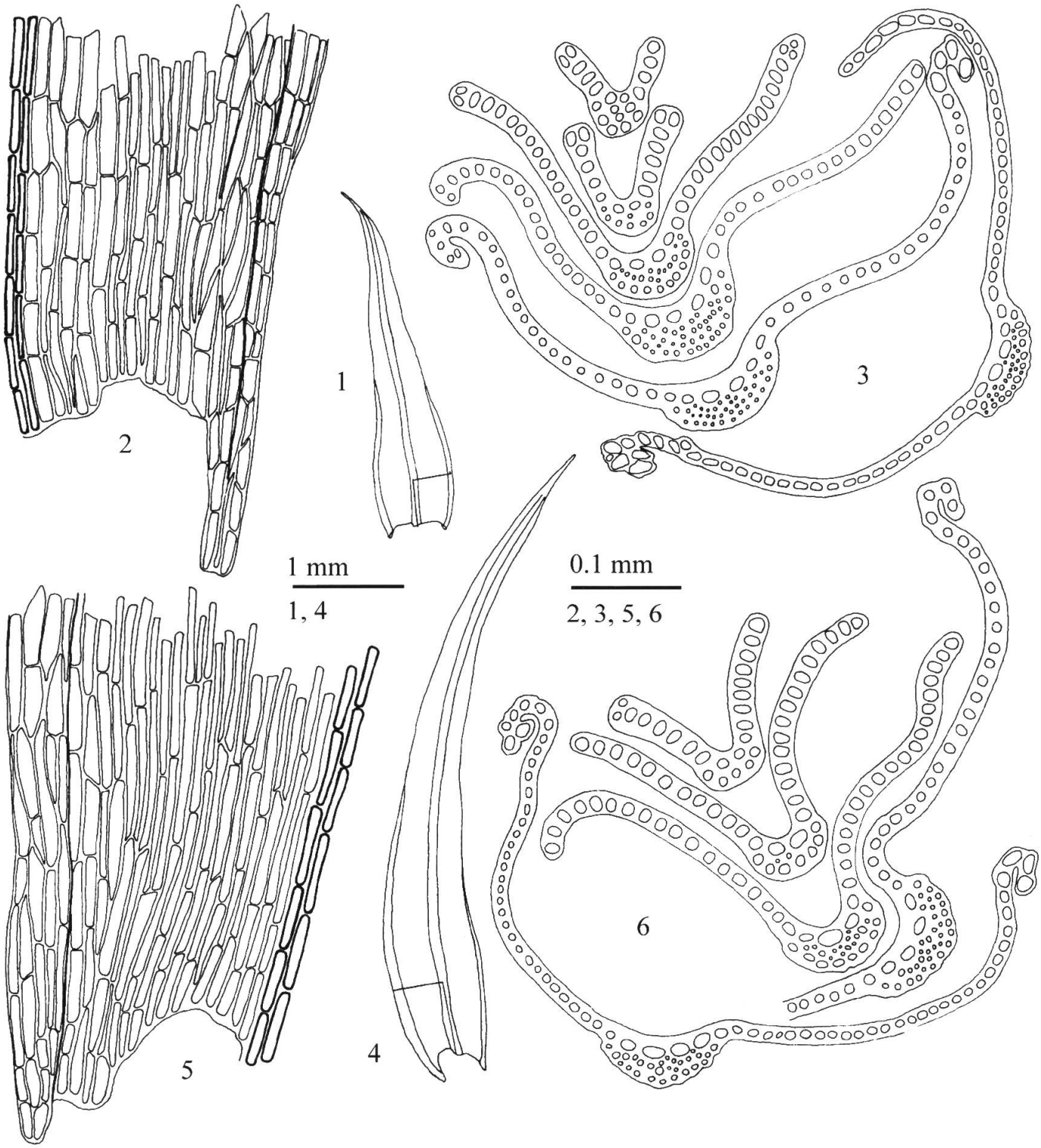

Fig. 3. – Analysis of the type specimens of *Grimmia abyssinica* (Müll. Hal.) Mitt.: **1**, leaf; **2**, cells in leaf base; **3**, transverse sections of leaf, and *Symblepharis rhacomitrioides* Dixon: **4**, leaf; **5**, cells in leaf base; **6**, transverse sections of leaf. [**1-3**, *Schimper s. n.* (BM); **4-6**, *Steele s. n.* (BM)] [Drawings E. Maier]

Monoicous (gonioautoicous). Perichaetia terminal; ***innermost perichaetial leaves*** **(Fig.2.1)** 3-4 mm long, with an elongate-ovate leaf base rapidly narrowing into a shortly lanceolate apical part, scarcely or only slightly sheathing for up to 2/3 of leaf length, hyaline from base to broadest part of leaf; ***costa*** of nearly same width throughout, excurrent in a short, nearly smooth hair-point. Perigonia several per shoot below perichaetium, occurring in multifoliose buds on short stalks in leaf axils; ***innermost perigonial leaves*** **(Fig. 2.2)** 0.7-1.0 mm long, with slightly sheathing, broadly ovate base, tapering to acute muticous apex, hyaline except at apex, costa vanishing below apex, paraphyses few.

Sporophyte. ***Seta*** up to 3 mm long, when wet hooked to arcuate **(Fig. 2.3)**, ***vaginula*** 0.8-1.0 mm long, with ochrea. ***Capsules*** emergent, pendulous or horizontal, ovate to globose, with a short neck, after dehiscence slightly constricted at orifice, ribbed; exothecial cells **(Fig. 2.10)** elliptical, short to elongated with incrassate walls; stomata **(Fig. 2.11)** numerous, arranged on neck in single row; annulus composed of 3 to 4 rows of cells, revoluble, falling off as ring-like fragments. ***Calyptra*** **(Fig. 2.12)** mitrate. ***Operculum*** **(Fig. 2.13)** conical with a crenulate basal rim and a short, obtuse beak, largely composed of irregular, extremely thick-walled cells of various sizes, basal rim **(Fig. 2.14)** formed by 3 rows of rounded, thin-walled cells. ***Peristome*** **(Fig. 2.15)** inserted below orifice, in longitudinal section teeth separated from exothecium by 1-2 layers of cells **(Fig. 2.16)**; teeth lanceolate from a broad base, simple, or in upper part divided into two unequal branches; dorsal plates thicker than ventral plates, ventral and dorsal plates in upper part of tooth coarsely papillose, ventral plates in lower part of tooth densely covered by rounded papillae, 2-3 lowermost dorsal plates smooth; trabeculae thin near insertion, in lower third of tooth small, protruding and closely set, in upper part of tooth not apparent; traces of prostome present.

Spores 12-16 μm, smooth to finely granulose.

Ecology and distribution. – Found growing on rocks and soil, between 3400 and 4500 m elevation in the mountains of west and east Africa (Cameroon, Ethiopia, Kenya and Tanzania). DIXON (1933) noted an affinity between mosses found on Mount Cameroon, the highest point in Western Africa, and those mosses found in the mountains of Ethiopia and East Africa, a relationship exemplified by the distribution of *G. abyssinica*.

Selected specimens examined. – A total of twenty-seven specimens were examined as part of this study, included here are representatives for each country. **CAMEROON**. "Cameroon Mountain, 12,000 ft", 1862, *Mann s. n.* (BM); "Among lava bolders, 12,500 ft alt., Cameroon Mountain, British Cameroons", XI.1951, *Hopkins s. n.* (BM, G); "On lava rocks near the summit of Mt. Cameroun, 4000 m", 27.XI.1967, *Balázs 81/h* (G). **ETHIOPIA** (Abyssinia). "In Abyssinia M. Semen", *Schimper s. n.* (BM); "Abyssinia", *Stendner s. n.* (BM). **KENYA**. "Maromoru Route Mt. Kenya (western sector), 11,000 ft.", 28.VIII.1949, *Schelpe 2856* (BM). **TANZANIA**. "Arusha District; Mt. Meru: Engare Narok gorge, 3400-3500 m", 24-25.VI.1988, *Pócs & Ochyra 88 152/Y* (G); "Meru, Gipfelregion auf Felsen, 3800-4500 m", 12.IV.1934, *Troll 5801* (BM, G).

Diagnostic characters for G. abyssinica. – Costa with six guide cells at the leaf insertion, four-five guide cells at mid-leaf; no hydroids throughout; and the upper half of the peristome teeth densely and coarsely papillose on both surfaces, lower plates smooth on dorsal surface, papillose on ventral surface.

Taxonomic and nomenclatural history of *Grimmia abyssinica*

There has been some confusion over the authorship of *Grimmia abyssinica* (Müll. Hal.) Mitt. The combination was first used by BRUCH & SCHIMPER (1845) in an account of the different distributions of *Grimmia* species and cited as "...et Schimper a découvert sur la crête neigeuse du Semen et Abyssiniae, élevée de 12,000', les beaux *Grimmia abyssinica* et *Schimperi.*" This was probably based on the same material as that which subsequently became the type of *G. abyssinica*. The specimen *Schimper s. n.* had been widely distributed under number *435* in an exsiccate series *Schimperi iter Abyssinicum, Sectio secunda* collected by Georg Heinrich Wilhelm Schimper, a cousin of the co-author of *Bryologia Europaea*, Wilhelm Philipp Schimper

(VEGTER, 1983). The name '*Grimmia abyssinica*' was still lacking a description and remained invalid when HAMPE (1846) included it in a list of *Grimmia* species to be incorporated in his new genus *Guembelia*. The feature supposedly common to these listed species was the possession of a cucullate calyptra.

MÜLLER (1849) first validly published *G. abyssinica* as a species of *Guembelia* (i.e. *Guembelia abyssinica* Müll. Hal.). He followed the same concept of *Guembelia* as HAMPE (1846), based upon the shape of the calyptra. However, Müller had not seen this structure in *Guembelia abyssinica* ('*Calyptram non vidimus*') and was therefore unaware that it possessed a mitrate calyptra that would have excluded it from the genus *Guembelia*, as defined at the time. MÜLLER (1849) also erroneously described *Guembelia abyssinica* as dioecious. MITTEN (1863), having examined a collection by Mann from Cameroon (BM), correctly observed the species to be monoicous. In the same paper, he effected the first publication of the combination *Grimmia abyssinica* (Müll. Hal.) Mitt.

MUÑOZ & PANDO (2000) placed *G. abyssinica* in synonymy with *G. fuscolutea* Hook. However, GREVEN (2003) treated *G. abyssinica* as a distinct species but offered no further explanation for this decision. An examination of material from BM and G has revealed previously unnoticed features that support Greven's view. In *G. abyssinica* cross-section of the costa at leaf insertion consists of a row of six guide cells and at mid-leaf there are four-five guide cells, the distal half of the peristome teeth are covered with large, short, blunt papillae and the lower plates on the dorsal surface are smooth (Fig. 2.9, 2.15). In contrast, the costa at leaf insertion in *G. fuscolutea* has a row of four guide cells, and two guide cells at mid-leaf, the peristome teeth are papillose from insertion to apex, with coarse papillae (MAIER, 2002). The number of guide cells in the costa at the leaf insertion, and at mid-leaf are strong characters that separate *G. abyssinica* from *G. fuscolutea*. The degree of papillosity of the peristome teeth also differs between these two species, although this character, as with many other morphological characters, is subject to variability.

ACKNOWLEDGEMENTS

Conservatoire et Jardin botaniques de la Ville de Genève is gratefully acknowledged for financial support, to the first author, for a visit to Natural History Museum London (BM). The Natural History Museum is thanked for allowing access to the Dixon archives. We thank Jesús Muñoz and Patrick Perret for reviewing and improving this manuscript.

REFERENCES

BRUCH, P. & W. P. SCHIMPER (1845). Grimmia. *In:* BRUCH, P. & al., *Bryol. Europ.* 3: 103-133.

DIXON, H. N. (1933). Mosses collected on Mt. Cameroon. *Ann. Bryol.* 6: 20-30.

GREVEN, H. C. (2003). *Grimmias of the World.* Leiden: Backhuys Publishers.

HAMPE, C. (1846). Bryologische Notizen. Aus einem Briefe des Herrn A. Hampe. *Bot. Zeitung (Berlin)* 4: 124-125.

MAIER, E. (2002). The genus Grimmia (Musci, Grimmiaceae) in the Himalaya. *Candollea* 57: 143-238.

MITTEN, W. (1863). On the Musci and Hepaticae from the Cameroons Mountain and from the River Niger. *J. Proc. Linn. Soc., Bot.* 7: 147-169.

MÜLLER, C. (1849). *Synopsis Muscorum Frondosorum ominum hucusque Cognitorum* 1: 1-812. Berlin: Forstener.

MUÑOZ, J. & F. PANDO (2000). A world synopsis of the genus Grimmia (Musci, Grimmiaceae). *Monogr. Syst. Bot. Missouri Bot. Gard.* 83: 1-133.

O'SHEA, B. (1995). Checklist of the mosses of sub-Saharan Africa. *Trop. Bryol.* 10: 91-198.

SALMON, E. S. (1898). A revision of the genus Symblepharis Montagne. *J. Linn. Soc., Bot.* 33: 486-500.

VEGTER, I. H. (1983). Index Herbariorum, part II (5). Collectors N—R. *Regnum Veg.* 109: 577-1213.

Addresses of the authors: MP (communicating author) & EM: Conservatoire et Jardin botaniques de la Ville de Genève, Case postale 60, CH-1292 Chambésy-GE, Switzerland. Email: Michelle.Price@cjb.ville-ge.ch

LE: Natural History Museum, Cromwell Road, London. Email: L.Ellis@nhm.ac.uk