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## Nineteen new records to the bryophyte flora of Socotra Island Additions to the Bryophyte Flora of the Arabian Peninsula and Socotra 5.

### Abstract

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Based on recent bryophyte collections 19 new records are added to the bryophyte flora of the island of Socotra (Hadhramout governorate, Yemen), increasing the hitherto known number of species to 74 (one hornwort, 30 liverworts, 43 mosses). Outstanding among the new finds are the xerotropical, palaeo-African liverworts *Frullania schimperi* (Frullaniaceae), *Radula comorensis* (Radulaceae), *Riccia argenteolimbata* (Ricciaceae), as well as the pantropical moss *Braunia secunda* (Hedwigiaceae), which are shortly described and illustrated. In addition, one hornwort, *Anthoceros punctatus*, and the family Grimmiaceae (*Grimmia laevigata*, *G. longirostris*, *G. trichophylla*) are reported for the first time from the Socotra archipelago. Finally, an updated checklist for Socotra is given, including all accepted names and synonyms from the literature applied to Socotra.

### Introduction

Socotra, belonging to the governorate Hadhramout, Yemen, still is one of the most fascinating islands in the Indian Ocean and long has attracted botanists due to its high phytodiversity and exceptional phytogeographical relationships. Nevertheless, knowledge of its flora still is far from being completely documented, and continued investigations are required. This holds true especially for the bryophyte flora, the study of which began with the Balfour expedition in 1880 (I. B. Balfour, A. Scott, Lt. Cockburn 1879-1880, B. S. C.). This first collection revealed 11 mosses and five liverworts (see Checklist, below), which were recorded by Mitten (1888). Only one year later, in 1881, Georg Schweinfurth visited the island as a member of the Riebeck expedition. He collected a few bryophytes, these being identified by Müller (1901) and enumerated by Long (1986). Apparently, he collected only four mosses and one liverwort (*Plagiochasma beccarianum*), the latter mentioned by Bischler (1978). This collection increased the number of species to 13 mosses and six liverworts.

After these two expeditions, Socotra was long neglected by bryologists and no further collections are known until in 1967, A. R. Smith, together with the Middle East Command Expedition,

collected on the island again. His bryophyte collection included nine mosses (identified by C. C. Townsend) and three liverworts (identified by E. W. Jones; cf. Townsend 1969), raising the number of known species to 19 mosses and eight liverworts. Outstanding among these finds was *Tortella smithii*, a new species named in honour of the collector.

Shortly thereafter, Socotra again became 'terra incognita' for bryologists until, in the mid 1990's, the changing political situation and the unification of Yemen once again made it possible for botanical expeditions to visit the island (e.g., A. N. Al-Gifri, Aden, 1994; B. Mies, Düsseldorf, 1994, 1996, 1998, 1999; P. Hein & E. von Raab-Straube, Berlin, 1996; N. Kilian & al., Berlin, 2002). Their collections included many bryophytes, increasing the total number of species to 48 (15 liverworts, 33 mosses; cf. Al-Gifri & al. 1995, Kürschner 1998, 1999, 2000a-b). Among these finds, *Sematophyllum socotrense* was a species new to science.

Within the framework of the Yemeni German BIOTA (BIODiversity monitoring Transect Analysis) Project funded by the German Federal Ministry of Education and Research (bmb+f), the author had the opportunity to visit Socotra Island in 2002 and 2003. Again, six liverworts and one palaeotropical Asian moss, *Papillaria crocea*, could be added to the flora by the 2002 expedition (Kürschner 2003a).

In spring 2003, extensive bryophyte collections from the hitherto neglected high mountain area of the western Haghier Mountains, as well as the western Qalansiyah area and the southern Noged plain (Qa'ara Plateau) revealed 19 new records. Outstanding among these are the xerotropical, palaeo-African liverworts *Frullania schimperii* (*Frullaniaceae*), *Radula comorensis* (*Radulaceae*), *Riccia argenteolimbata* (*Ricciaceae*) and the pantropical moss *Braunia secunda* (*Hedwigiaceae*), which, together with two new records from the 2002 collections, are shortly described and illustrated below. These tropical bryophytes concentrate in the foggy and misty higher parts of the western Haghier Mountains, dominated by an Afro-montane, xerophytic woodland. Again, most of the new records impressively demonstrate the strong xerotropical floristic relationships of the Socotran bryoflora. In addition, for the first time, one hornwort, *Anthoceros punctatus*, and three species of *Grimmiaceae* (*Grimmia laevigata*, *G. longirostris*, *G. trichophylla*) are recorded, increasing the number of species known up to now to 74 (one hornwort, 30 liverworts, 43 mosses). At this occasion, an updated bryophyte checklist for Socotra is given, including all accepted names and synonyms applied to Socotra from the literature.

## New bryophyte records for Socotra Island

### *Anthocerotopsida*

#### *Anthoceros punctatus* L.

Haghier Mountains, upper Wadi Ayhaft, 12°36'21.1"N, 53°59'33.5"E, 350 m, on calcareous sinter near a spring, 14.3.2003, *H. Kürschner 03-131* (B, herb. Kürschner); Qalansiyah, Ma'alalah Plateau, 12°39'20.2"N, 53°26'38.3"E, 330 m, on soil beneath rocks, 8.3.2003, *H. Kürschner 03-25* (B, herb. Kürschner).

A subcosmopolitan species, widely distributed in the tropical and temperate parts of the world. In Africa disjunct [Cape Verde Islands, Democratic Republic of Congo (Zaire), Rwanda; cf. Wigginton & Grolle 1996]. SW Asian records are from the Caucasus region and Turkey (Frey & Kürschner 1991).

### *Hepaticopsida*

#### *Marchantiidae*

#### *Cleveaceae*

#### *Athalamia spathysii* (Lindenb.) S. Hatt.

Haghier Mountains, upper Wadi Ayhaft (Ziroyq), 12°35'13.8"N, 54°00'48.1"E, 1060 m, on soil beneath overhanging rocks, 13.3.2003, *H. Kürschner 03-120* (B, herb. Kürschner).

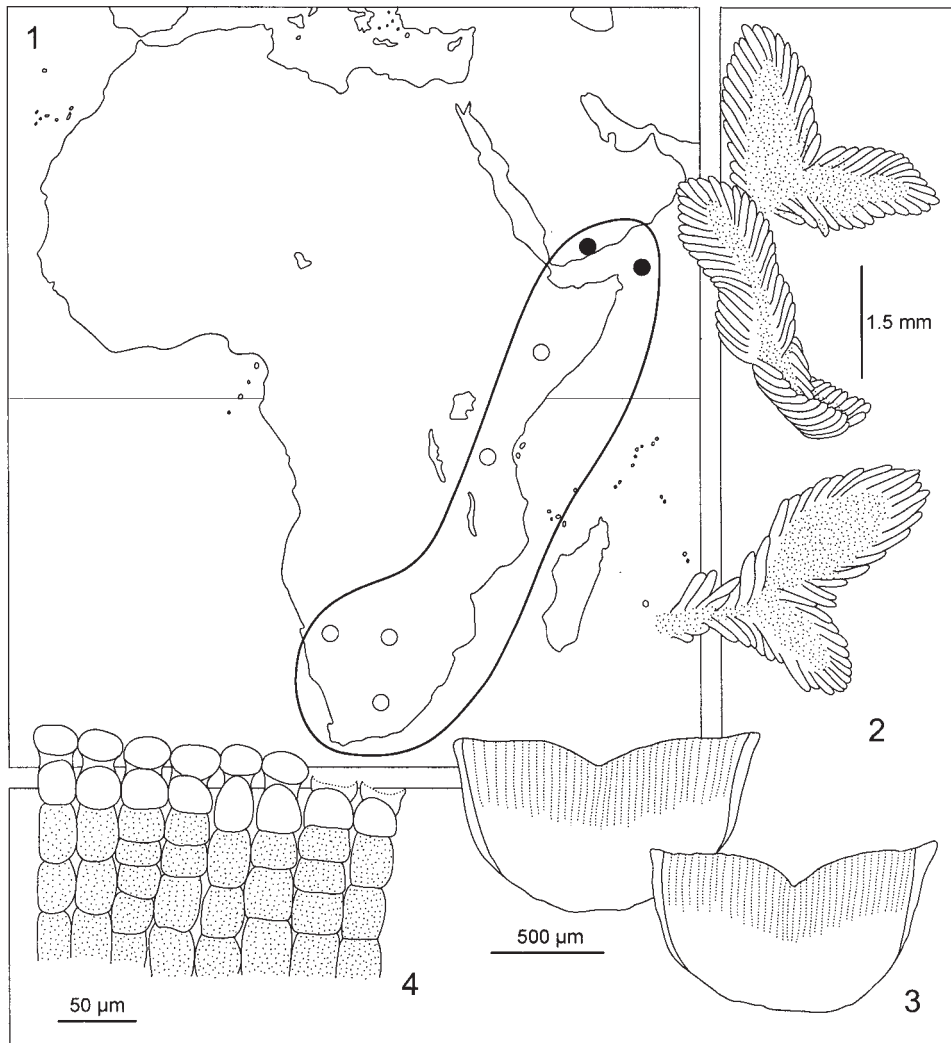


Fig. 1. *Riccia argenteolimbata* O. H. Volk & Perold – 1: distribution (open circles: country records only); 2: habit; 3: cross-section of thallus; 4: dorsal epithelium with upper cell layers (all drawn from Kürschner 03-149, herb. Kürschner).

A circum-Tethyan (Mesogean) species, widely distributed in the Mediterranean and Macaronesian region. In Africa disjunct (Namibia, Tanzania, cf. Wigginton & Grolle 1996). SW Asian records are from Israel, Jordan, Turkey and the Yemen mainland (Frey & Kürschner 1988).

#### *Oxymitraceae*

##### *Oxymitra incrassata* (Brot.) Sérgio & Sim-Sim

Haghier Mountains, upper Wadi Ayhaft (Ziroyq), 12°34'45.6"N, 54°00'32"E, 1060 m, on soil beneath overhanging rocks, mixed with *Targionia hypophylla*, 13.3.2003, H. Kürschner 03-117a (B, herb. Kürschner).

A species of xerotherm-Pangean origin, widely distributed in the Mediterranean region, Macaronesia, N Africa and SW Asia, with a major disjunction in South America. SW Asian records are from Israel, Turkey and the Yemen mainland (Frey & Kürschner 1988, Kürschner 2003b).

### **Ricciaceae**

#### ***Riccia argenteolimbata*** O. H. Volk & Perold – Fig. 1

Thalli small, in gregarious patches, greenish grey; margins strongly inflexed when dry, exposing the appressed, stiff, white scales; thallus segments short, obovate-ligulate, 2-7 × 0.7-1.5 mm, to 0.9 mm thick, in cross-section nearly as wide as thick, thallus margins acute; dorsal epithelium in regular pattern, upper cells globose, hyaline, soon collapsing; cells in second layer without chloroplasts; air-pores mostly triangular, small; assimilation tissue in compact vertical columns of 8-10 rectangular cells, up to 450 µm thick; sporangia not seen in Socotran material.

Noged plain, Qa'ara Plateau, 12°20'22.1"N, 53°44'37.7"E, 470 m, in limestone rock crevices, 18.3.2003, *H. Kürschner 03-149* (B, herb. Kürschner).

A xerotropical palaeo-African species, widespread in Botswana, Kenya, Namibia, South Africa (Northern Province, North-West, Free State, Northern Cape) and Tanzania (Perold 1999, Wigginton & Grolle 1996), see Fig. 1.1. Recently reported from the Arabian Peninsula [Yemen: governorate Abyan, Jabal Arays (Kürschner 2003b)], where it is a character species of the Riccietum *jovet-astae* ("astii") - *argenteolimbatae* Kürschner 2003. This community, rich in marchantioid liverworts, is typical for shallow depressions and soils overlying volcanic rock outcrops in the understorey of the monsoon-affected *Sterculia africana* subsp. *arabica* woodland.

#### ***Riccia atromarginata*** Levier var. *jovet-astiae* ("jovet-astii") Rauh & Buchloh

Near Ghodom, south of Qalansiyah, 12°38'56.4"N, 53°24'02"E, 160 m, in earthy rock fissures, 7.3.2003, *H. Kürschner 03-22, 03-23* (B, herb. Kürschner); Noged plain, Roqab area, 12°34'49.6"N, 54°09'55.6"E, 400 m, on soil in limestone crevices, 17.3.2003, *H. Kürschner 03-136* (B, herb. Kürschner).

A xerotropical palaeo-African species, known from Madagascar (type) and the S and SE Arabian Peninsula (Oman, United Arab Emirates and the southern Yemen; Al-Gifri & Kürschner 1996, Frey & Kürschner 1991, Kürschner & Böer 1999).

### **Targioniaceae**

#### ***Targionia hypophylla*** L.

Haghier Mountains, upper Wadi Ayhaft (Ziroyq), 12°34'45.6"N, 54°00'32"E, 1060 m, on soil beneath overhanging rocks, mixed with *Oxymitra incrassata*, 13.3.2003, *H. Kürschner 03-116, 117b* (B, herb. Kürschner).

A species of xerotherm-Pangean origin, distributed throughout the warm temperate and subtropical parts of the world. On the Arabian Peninsula known from Oman, Saudi Arabia, United Arab Emirates and the mainland of Yemen (Frey & Kürschner 1988, Kürschner & Böer 1999).

### **Jungermanniiidae**

#### **Radulaceae**

#### ***Radula comorensis*** Steph. – Fig. 2

Plants light green, robust, shoots 1.5-1.9 mm wide, sparsely and divaricately branched; leaves oval, 0.9 × 0.7 mm, distant to slightly imbricate, slightly crossing the stem; keel concave or straight, lobule rather small, slightly wider than long, sharply ampliate but rarely crossing stem; mid-leaf cells thin-walled, 15-18 µm, cuticle smooth; perianths and sporophytes not seen in Socotran material.

Haghier Mountains, Skent, Arra'bin area, 12°34'22.7"N, 54°01'02.7"E, 1470 m, on granite rock, 12.3.2003, *H. Kürschner 03-91, 03-95* (B, herb. Kürschner).

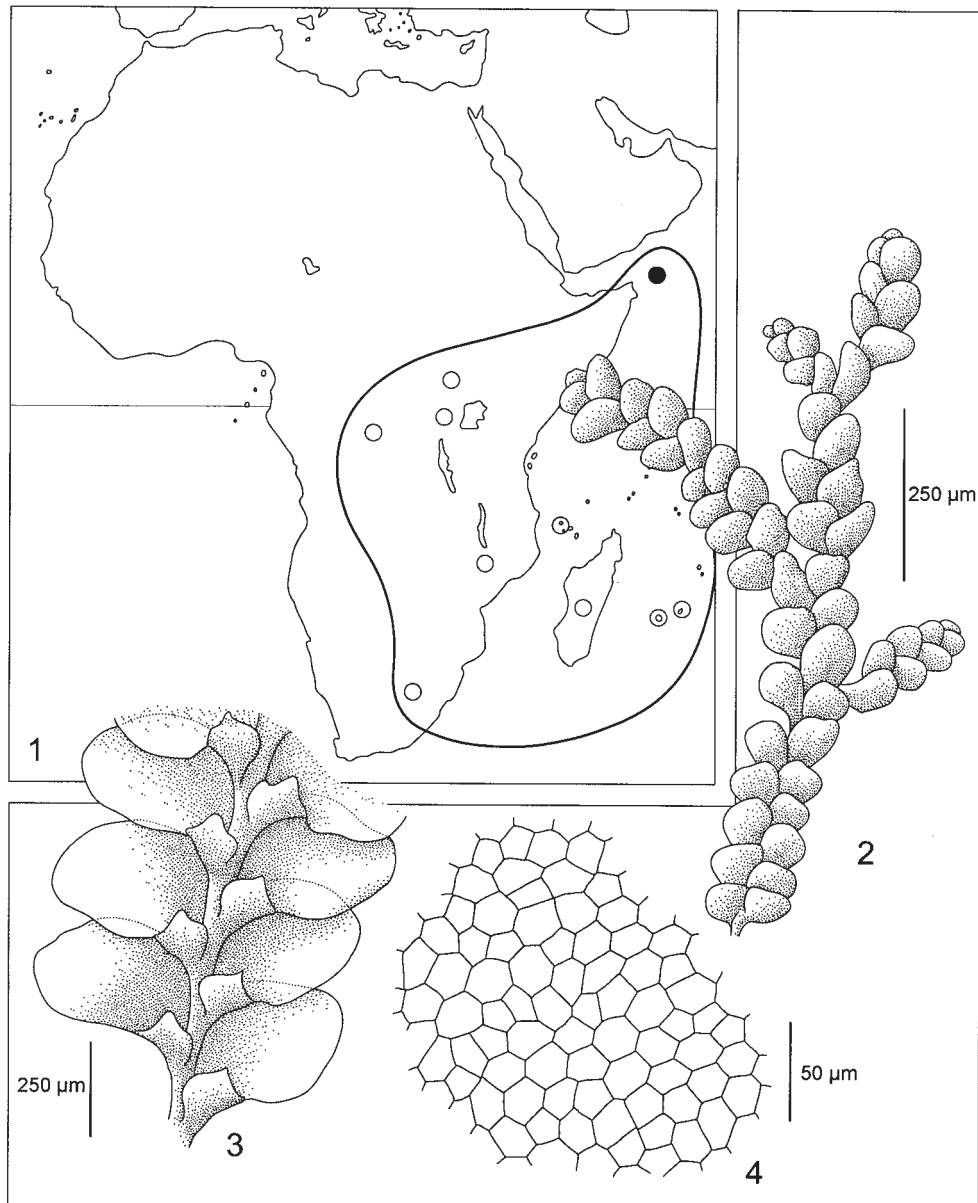


Fig. 2. *Radula comorensis* Steph. – 1: distribution (open circles: country records only); 2: habit (dorsal view); 3: habit (ventral view); 4: mid-leaf cells (all drawn from Kürschner 03-91, herb. Kürschner).

A xerotropical palaeo-African species, distributed in the upper montane belt of the Democratic Republic of Congo (Zaire), Comoro Islands, Madagascar, Malawi, Mauritius, Réunion (frequent from 1200-1600 m altitude on trees in forests and on sheltered rocks, Jones 1977), Rwanda, South Africa (Lesotho) and Uganda (Wigginton 2002).

***Radula quadrata*** Gottsche

Haghier Mountains, Skent, Sha'ha area, 12°34'31.1"N, 54°01'17.9"E, 1520 m, on granite rock, 12.3.2003, *H. Kürschner 03-102* (B, herb. Kürschner); Haghier Mountains, Momheit Skent, 12°34'32.7"N, 54°01'37.4"E, 1500 m, epiphytic on *Sideroxylon discolor*, 11.3.2003, *H. Kürschner 03-73* (B, herb. Kürschner).

A pantropical species, reported throughout the tropical and subtropical Americas (Brazil, Guatemala, Mexico, Schuster 1980) and Africa [Cameroon, Comoro Islands, Democratic Republic of Congo (Zaire), Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Réunion, Rwanda, South Africa, Tanzania (Jones 1977, as *R. recurvifolia*) and Uganda (Wigginton 2002, Wigginton & Grolle 1996)].

***Radula voluta*** Taylor ex Gottsche, Lindenb. & Nees

Haghier Mountains, Skent, Sha'ha area, 12°34'31.1"N, 54°01'17.9"E, 1520 m, epiphytic on *Euclia divinorum*, 12.3.2003, *H. Kürschner 03-103* (B, herb. Kürschner).

A pantropical species, widely distributed in Africa [Bioco, Democratic Republic of Congo (Zaire), Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Réunion, Rwanda, South Africa, Tanzania, Uganda (Jones 1977, Wigginton 2002, Wigginton & Grolle 1996)], tropical America (Brazil, Peru), and North America (North Carolina, Tennessee; Schuster 1980). Also occurring in Europe, where it represents a rare, scattered, southern Atlantic species, known only from England (Cumberland), W Ireland, Scotland, and Wales.

**Frullaniaceae*****Frullania schimperi*** Nees – Fig. 3

Plants brownish, creeping, to 4-6 (-8) cm long; leaves incubous, imbricate, ovate-reniform, obtuse, often incurved at apex and sometimes acute; ventral lobes of leaves claviform, 2 × as long as wide; stylus setaceous, consisting of 3-4 cells, up to 60 (-90) µm long; leaf cells isodiametric, irregularly sinuose, 12-18 × 15-25 µm, apical cells subquadrate, 10-12 × 11-14 µm; trigones well developed and confluent in basal cells; underleaves distant, suborbicular, slightly auriculate, 3-5 × as wide as the stem, shallowly divided up to 1/5-1/4; lobes rounded, obtuse; underleaf margins frequently recurved; perianths and sporophytes not seen in Socotran material.

Haghier Mountains, Skent, Arra'bin area, Wadi Antanqatan, 12°34'20.7"N, 54°01'03"E, 1470 m, epiphytic on *Pittosporum viridiflorum*, 12.3.2003, *H. Kürschner 03-80* (B, herb. Kürschner).

A xerotropical palaeo-African (Afro-montane) species, distributed in the upper montane belt of Burundi, Cameroon, Ethiopia, Kenya, Madagascar, Tanzania, Rwanda and Uganda (Vanden Berghen 1976, Wigginton 2002, Wigginton & Grolle 1996; Fig. 3.1). Distinguished from the similar, but much more widely distributed *F. apicalis* Mitt. by its underleaves, which are much wider (3-5 × as wide as stem), having rounded, obtuse and short lobes, as well as revolute margins.

**Bryopsida****Pottiaceae*****Anoetangium aestivum*** (Hedw.) Mitt.

Haghier Mountains, Aduno Demele, 12°34'26.3"N, 54°03'07.1"E, 1030 m, granite rock fissures, 10.3.2003, *H. Kürschner 03-34* (B, herb. Kürschner); Haghier Mountains, upper Wadi Ayhaft (Ziroyq), 12°35'29.2"N, 54°00'40.2"E, 600 m, wet, granite rock near a spring, 14.3.2003, *H. Kürschner 03-127* (B, herb. Kürschner).

A northern species, previous Arabian reports only from mainland Yemen (Kürschner 2000a).

***Didymodon cordatus*** Jur.

Haghier Mountains, Aduno Demele, 12°34'26.3"N, 54°03'07.1"E, 1030 m, 10.3.2003, *H. Kürschner 03-35* (B, herb. Kürschner).

A northern species with southern character, widely distributed in central and S Europe. SW Asian records from Syria, Turkey and Saudi Arabia (Frey & Kürschner 1988, 1991, Kürschner 2000a).

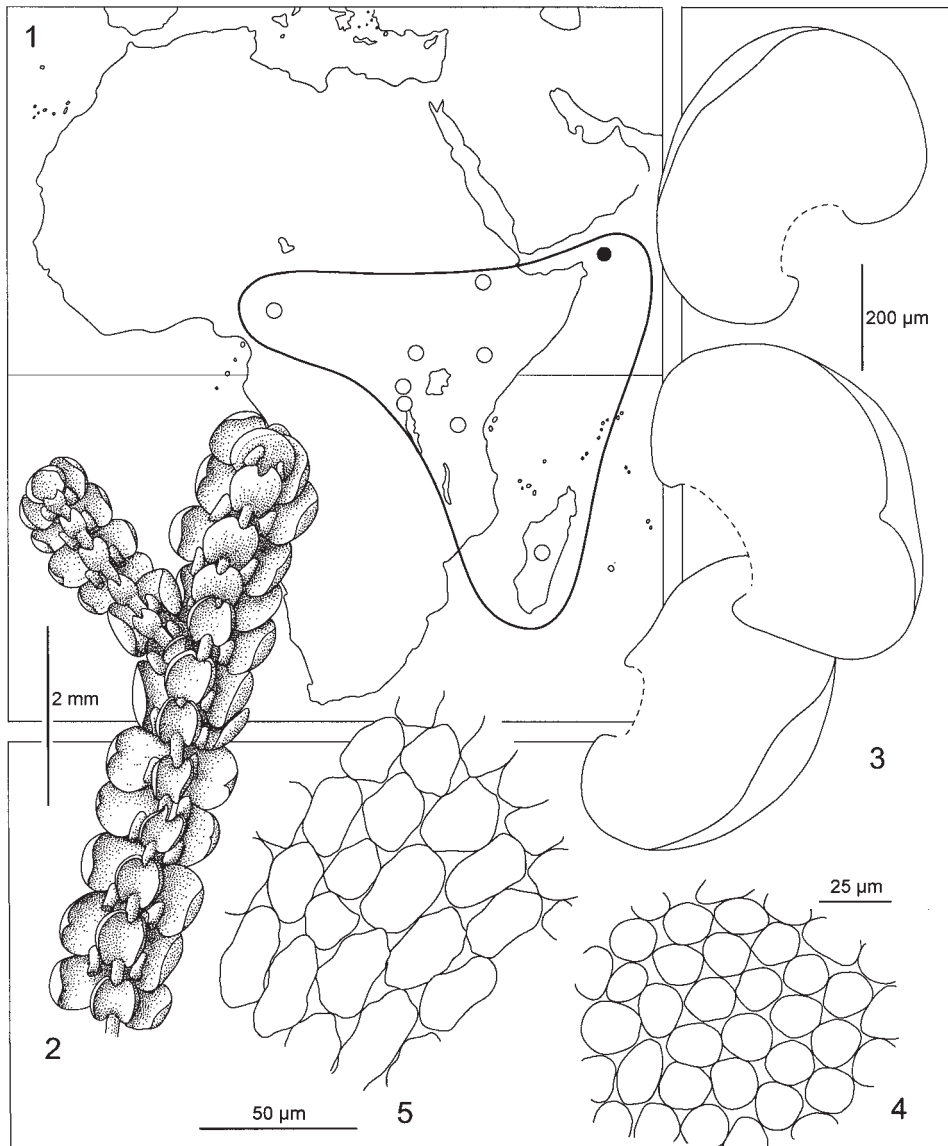


Fig. 3. *Frullania schimperi* Nees – 1: distribution (open circles: country records only); 2: habit (ventral view); 3: leaves; 4: mid-leaf cells; 5: basal leaf cells (all drawn from *Kürschner 03-80*, herb. Kürschner).

***Trichostomum crispulum* Bruch**

Diksam Plateau south of Muri, 12°31'N, 53°56'E, 840 m, in rock fissures, 25.3.2002, *H. Kürschner 02-188a* (B, herb. Kürschner).

A northern species with sub-Mediterranean character, widely distributed in Eurasia, N Africa, North America and SW Asia (Iran, Iraq, Israel, Jordan, Lebanon, Saudi Arabia, Syria, Turkey, United Arab Emirates and Yemen; Frey & Kürschner 1988, 1991).

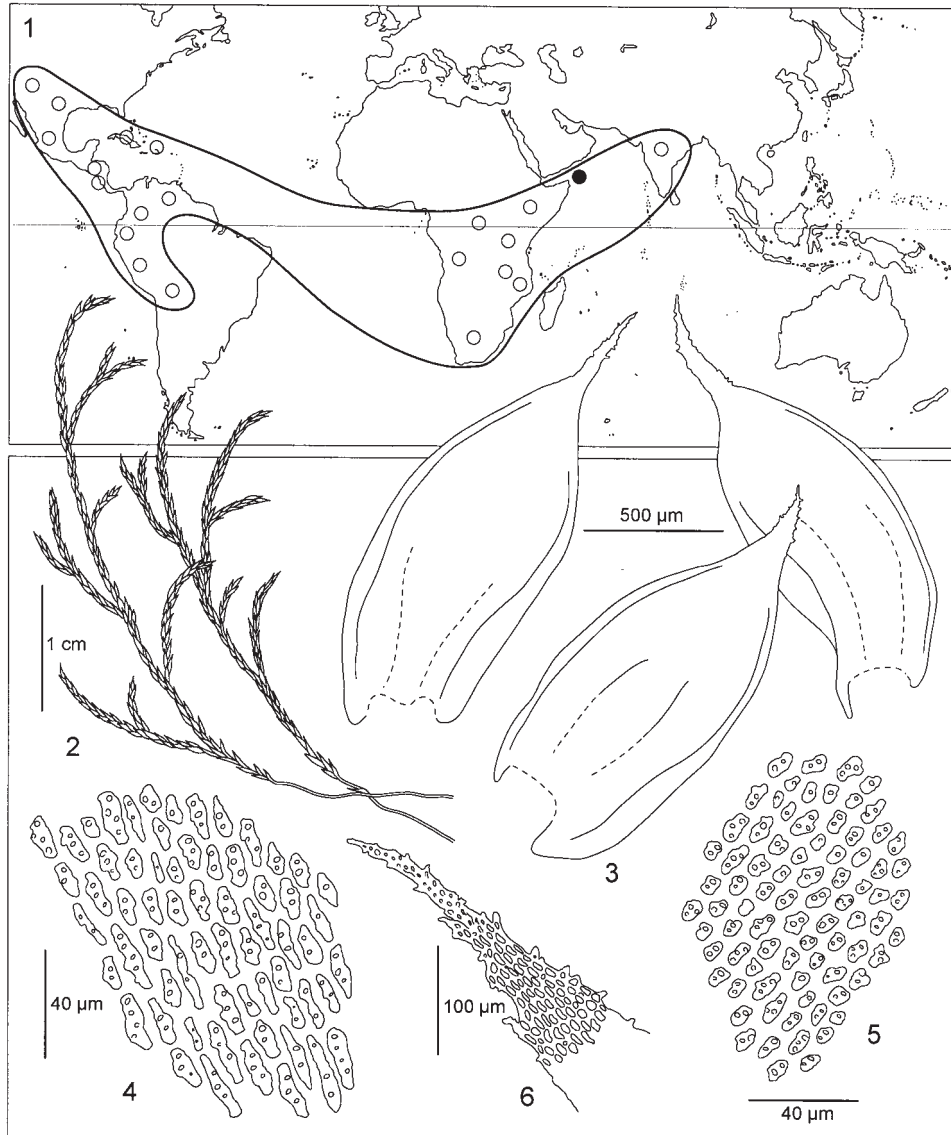


Fig. 4. *Braunia secunda* (Hook.) Bruch & Schimp. – 1: Distribution (open circles: country records only); 2: habit; 3: leaves; 4: mid-leaf cells; 5: basal leaf cells; 6: pointed leaf apex (all drawn from Kürschner 03-60, herb. Kürschner).

***Weissia condensata* (Voit) Lindb.**

Noged plain, Qa'ara Plateau, 12°20'22.1"N, 53°44'37.7"E, 470 m, in rock crevices, 18.3.2003, H. Kürschner 03-150, 03-151 (B, herb. Kürschner).

A species of northern origin with sub-Mediterranean-sub-Atlantic character. Widely distributed in S and W Europe, the Mediterranean region, N Africa, North America, SW Asia and New Zealand. For the Arabian Peninsula recorded from Oman, United Arab Emirates, Saudi Arabia and mainland Yemen (Al-Gifri & Kürschner 1996, Frey & Kürschner 1988, Kürschner & Böer 1999).



**Grimmiaceae*****Grimmia laevigata*** (Brid.) Brid.

Haghier Mountains, Skent, Sha'ha area, 12°34'31.1"N, 54°01'17.9"E, 1520 m, on granite rocks, 12.3.2003, *H. Kürschner 03-98* (B, herb. Kürschner).

A nearly cosmopolitan species, widely distributed in Europe, Africa, America, Asia and Australia. Reported in SW Asia from Afghanistan, Iran, Iraq, Israel, Jordan, Lebanon, Saudi Arabia, Syria and Turkey (Frey & Kürschner 1988, 1991).

***Grimmia longirostris*** Hook. (Syn.: *G. affinis* Hornsch.)

Haghier Mountains, Skent, Arra'bin area, Wadi Antanqatan, 12°34'20.7"N, 54°01'03"E, 1460 m, on granite rocks, 12.3.2003, *H. Kürschner 03-77* (B, herb. Kürschner).

A nearly cosmopolitan species, widely distributed in Europe, Africa, North, Central and South America as well as Asia. SW Asian records are from Iran and Turkey (Frey & Kürschner 1991).

***Grimmia trichophylla*** Grev.

Haghier Mountains, Skent, Arra'bin area, Wadi Antanqatan, 12°34'20.7"N, 54°01'03"E, 1470 m, on granite rocks, 12.3.2003, *H. Kürschner 03-86* (B, herb. Kürschner).

A nearly cosmopolitan species, widely distributed in Europe, Africa, North, Central and South America, temperate and tropical Asia, Australasia, New Zealand. SW Asian records are from Afghanistan, Iran, Iraq, Israel, Jordan, Lebanon, Saudi Arabia, Syria and Turkey (Frey & Kürschner 1988, 1991, Kürschner 2000c).

**Bryaceae*****Bryum caespiticium*** Hedw.

Diksam Plateau south of Muri, 12°31'N, 53°56'E, 840 m, in rock fissures, 25.3.2002, *H. Kürschner 02-184* (B, herb. Kürschner).

A nearly cosmopolitan species widely distributed in Eurasia, North and Central Africa, America, Australia and Oceania. SW Asian records are from Afghanistan, Iran, Iraq, Israel, Jordan, Lebanon, Saudi Arabia, Syria, Turkey, United Arab Emirates and Yemen (Frey & Kürschner 1988, 1991).

**Hedwigiaceae*****Braunia secunda*** (Hook.) Bruch & Schimp. – Fig. 4

Plants about 5-10 cm long, in dense, yellowish or brown mats; stems irregularly branched, often producing stoloniform branches; branches often curved; leaves oblong-ovate, imbricate to erect-spreading when dry, spreading when moist, ± plicate, acuminate or variously piliferous, sometimes hair-pointed; margins recurved in the lower half; leaf cells subquadrate to short-rectangular above, linear at the base, very thick-walled, with numerous, rounded papillae; sporophytes not seen in Socotran material.

Haghier Mountains, pass near Tweleq to Skent, 12°34'37.5"N, 54°02'14.1"E, 1200 m, on granite rocks, 11.3.2003, *H. Kürschner 03-60* (B, herb. Kürschner).

A xerotropical species, widely distributed in Africa [Angola, Democratic Republic of Congo (Zaire), Ethiopia, Kenya, Malawi, Mozambique, Rwanda, South Africa (Lesotho, Natal, Transvaal, Swaziland), Tanzania, Uganda, Zimbabwe (O'Shea 1995)], Asia (India), Western USA (Arizona, Texas), and Central and South America [Bolivia, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico, Peru and Venezuela (Delgadillo & al. 1995)].

**Checklist of the bryophytes of Socotra**

The following checklist includes all published names and synonyms applied to Socotra in the literature. The arrangement is strictly alphabetical to make the finding of a name easier. The reference where the taxon is mentioned first is given in square brackets. Accepted names are given in bold italic, synonyms in regular italic with an indication (arrow) to the correct and accepted name.

***Anthocerotopsida******Anthoceros*** L. (*Anthocerotaceae*)*Anthoceros punctatus* L. [hoc. loc.]***Hepaticopsida******Asterella*** P.Beauv. (*Aytoniaceae*)*Asterella pappii* (Gola) Grolle [Mitten 1888]***Athalamia*** Falconer (*Cleveaceae*)*Athalamia spathysii* (Lindenb.) S. Hatt. [hoc. loc.]***Exormotheca*** Mitt. (*Exormothecaceae*)*Exormotheca pustulosa* Mitt. [Kürschner 2003a]*Fimbriaria* Nees → *Asterella**Fimbriaria pusilla* Mitt. → *Asterella pappii****Fossombronia*** Raddi (*Fossombroniaceae*)*Fossombronia crispa* Nees [Al-Gifri & al. 1995]***Frullania*** Raddi (*Frullaniaceae*)*Frullania ericoides* (Nees) Mont. [Mitten 1888]*Frullania schimperi* Nees [hoc. loc.]*Frullania socotrana* Mitt. [Mitten 1888]*Frullania squarrosa* Nees → *Frullania ericoides**Frullania trinervis*(Lehm.) Drège [Kürschner 2000b]***Lejeunea*** Lib. (*Lejeuneaceae*)*Lejeunea cavifolia* (Ehrh.) Lindb. [Mitten 1888]*Lejeunea rhodesiae* (Sim) R. M. Schust. [Kürschner 2003a]*Lejeunea serpyllifolia* Lib. → *Lejeunea cavifolia****Mannia*** Opiz (*Aytoniaceae*)*Mannia androgyna* (L.) A. Evans [Kürschner 2003a]***Marchesinia*** Gray (*Lejeuneaceae*)*Marchesinia excavata* (Mitt.) Schiffn. [Kürschner 2000b, as *M. mackaii* (Hook.) Gray]***Mastigolejeunea*** (Spruce) Schiffn. (*Lejeuneaceae*)*Mastigolejeunea auriculata* Steph. [Kürschner 2003a]***Microlejeunea*** Steph. (*Lejeuneaceae*)*Microlejeunea africana* Steph. [Kürschner 2000b]***Otione*** Corda → *Plagiochasma**Otione aitonia* (Lindenb. & Nees) Mitt. → *Plagiochasma rupestre****Oxymitra*** Bisch. ex Lindenb. (*Oxymitraceae*)*Oxymitra incrassata* (Brot.) Sérgio & Sim-Sim [hoc. loc.]***Pellia*** Raddi (*Pelliaceae*)*Pellia epiphylla* (L.) Corda [Kürschner 2003a]***Plagiochasma*** Lehm. & Lindenb. (*Aytoniaceae*)*Plagiochasma appendiculatum* Lehm. & Lindenb. [Jones 1969]*Plagiochasma beccarianum* Steph. [Bischler 1978]

*Plagiochasma fischeriana* (Steph.) Steph. ('*P. fischeri*') → *Plagiochasma appendiculatum*  
*Plagiochasma rupestre* (J. R. & G. Forst.) Steph. [Mitten 1888]

**Radula** Dumort. (*Radulaceae*)

*Radula appressa* Mitt. [Kürschner 2000b]  
*Radula comorensis* Steph. [hoc. loc.]  
*Radula quadrata* Gottsche [hoc. loc.]  
*Radula voluta* Taylor ex Gottsche, Lindenb. & Nees [hoc. loc.]

**Riccia** L. (*Ricciaceae*)

*Riccia argenteolimbata* O. H. Volk & Perold [hoc. loc.]  
*Riccia atromarginata* Levier var. *jovent-astiae* Rauh & Buchloh [hoc. loc.]  
*Riccia crinita* Taylor [Jones 1969]  
*Riccia macrocarpa* Levier [Al-Gifri & al. 1995]  
*Riccia trabutania* Steph. [Al-Gifri & al. 1995]  
*Riccia trichocarpa* M. Howe → *Riccia crinita*

**Southbya** Spruce (*Arnellaceae*)

*Southbya nigrella* (De Not.) Henriq. [Kürschner 2003a]

**Targionia** L. (*Targioniaceae*)

*Targionia hypophylla* L. [hoc. loc.]

**Bryopsida**

*Anictangium mariei* Besch. → *Barbula indica*

**Anoetangium** Schwaegr. (*Pottiaceae*)

*Anoetangium aestivum* (Hedw.) Mitt. [hoc. loc.]  
*Anoetangium balfourii* Mitt. → *Barbula indica*

**Anomobryum** Schimp. (*Bryaceae*)

*Anomobryum filiforme* (Dicks.) Husn. → *Anomobryum julaceum*  
*Anomobryum julaceum* (P. Gaertn., E. Mey. & Scherb.) Schimp. [Townsend 1969]

**Barbula** Hedw. (*Pottiaceae*)

*Barbula indica* (Hook.) Spreng. [Mitten 1888]  
*Barbula riebeckii* Müll. Hal. → *Pleurochaete squarrosa*  
*Barbula schweinfurthiana* Müll. Hal. [Müller 1901]  
*Barbula schweinfurthii* Müll. Hal. → *Weissia artocosana*

**Bartramia** Hedw. (*Bartramiaceae*)

*Bartramia pungens* Mitt. → *Philonotis pungens*

**Brachymenium** Schwaegr. (*Bryaceae*)

*Brachymenium nepalense* Hook. [Townsend 1969]  
*Brachymenium* sp. [Mitten 1888]

**Braunia** Bruch & Schimp. (*Hedwigiaceae*)

*Braunia secunda* (Hook.) Bruch & Schimp. [hoc. loc.]

**Bryum** Hedw. (*Bryaceae*)

*Bryum arachnoideum* Müll. Hal. [Kürschner 1999]  
*Bryum caespiticium* Hedw. [hoc. loc.]  
*Bryum capillare* Hedw. [Al-Gifri & al. 1995]  
*Bryum dichotomum* Hedw. [Mitten 1888]

**Campylopus** Brid. (*Dicranaceae*)

*Campylopus introflexus* var. *polytrichoides* (De Not.) Giacom. → *Campylopus pilifer*  
*Campylopus pilifer* Brid. [Mitten 1888]  
*Campylopus polytrichoides* De Not. → *Campylopus pilifer*  
*Campylopus schweinfurthii* Müll. Hal. → *Campylopus pilifer*

- Didymodon* Hedw. (*Pottiaceae*)  
*Didymodon cordatus* Jur. [hoc. loc.]
- Edentella* Müll. Hal. → *Pseudosymblepharis*  
*Edentella schweinfurthii* Müll.Hal. → *Weissia artocosana*
- Entosthodon* Schwaegr. (*Funariaceae*)  
*Entosthodon fascicularis* (Hedw.) Müll.Hal. [Al-Gifri & al. 1995]
- Eucladium* Bruch & Schimp. (*Pottiaceae*)  
*Eucladium verticillatum* (Brid.) Bruch & Schimp. [Al-Gifri & al. 1995]
- Fabronia* Raddi (*Fabroniaceae*)  
*Fabronia socotrana* Mitt. [Mitten 1888]
- Fissidens* Hedw. (*Fissidentaceae*)  
*Fissidens megalotis* subsp. *helictocaulos* (Müll. Hal.) Brugg.-Nann. [Kürschner 1999]  
*Fissidens pellucidus* Hornsch. [Kürschner 1999]  
*Fissidens serratus* Müll. Hal. [Kürschner 1998]
- Grimmia* Hedw. (*Grimmiaceae*)  
*Grimmia laevigata* (Brid.) Brid. [hoc. loc.]  
*Grimmia longirostris* Hook. [hoc. loc.]  
*Grimmia trichophylla* Grev. [hoc. loc.]
- Gyroweisia* Schimp. (*Pottiaceae*)  
*Gyroweisia reflexa* (Brid.) Schimp. [Al-Gifri & al. 1995]
- Hymenostomum* R. Br. → *Weissia*  
*Hymenostomum socotrana* (Mitt.) Broth. → *Weissia socotrana*
- Hyophila* Brid. (*Pottiaceae*)  
*Hyophila involuta* (Hook.) A. Jaeger [Al-Gifri & al. 1995]  
*Hyophila punctulata* (Mitt.) Kindb. [Mitten 1888]
- Macrocoma* (Müll.Hal.) Grout (*Macromitriaceae*)  
*Macrocoma abyssinica* (Müll. Hal.) Vitt [Townsend 1969]
- Macromitrium* Brid. (*Macromitriaceae*)  
*Macromitrium abyssinicum* Müll. Hal. → *Macrocoma abyssinica*
- Palamocladium* Müll. Hal. (*Brachytheciaceae*)  
*Palamocladium leskeoides* (Hook.) E. Britton [Townsend 1969]  
*Palamocladium nilgheriense* (Mont.) Müll. Hal. → *Palamocladium leskeoides*
- Papillaria* (Müll. Hal.) Müll. Hal. (*Meteoriaceae*)  
*Papillaria crocea* (Hampe) A. Jaeger [Kürschner 2003a]
- Philonotis* Brid. (*Bartramiaceae*)  
*Philonotis pungens* (Mitt.) Mitt. [Mitten 1888]
- Pleurochaete* Lindb. (*Pottiaceae*)  
*Pleurochaete squarrosa* (Brid.) Lindb. [Long 1986]
- Pseudosymblepharis* Broth. (*Pottiaceae*)  
*Pseudosymblepharis angustata* (Mitt.) Hilp. [Townsend 1969]  
*Pseudosymblepharis socotrana* (Mitt.) Thér. → *Weissia artocosana*
- Racopilum* P. Beauv. (*Racopilaceae*)  
*Racopilum capense* Müll. Hal. [Kürschner 1999]
- Schlotheimia* Brid. (*Macromitriaceae*)  
*Schlotheimia balfourii* Mitt. [Mitten 1888]
- Sematophyllum* Mitt. (*Sematophyllaceae*)  
*Sematophyllum socotrense* Buck [Al-Gifri & al. 1995]

- Semibarbula* Herzog ex Hilp. (*Pottiaceae*)  
*Semibarbula indica* (Hook.) Herzog ex Hilp. → *Barbula indica*
- Symblepharis* Mont. (*Pottiaceae*)  
*Symblepharis socotrana* Mitt. → *Weissia artocosana*
- Syntrichia* Brid. (*Pottiaceae*)  
*Syntrichia fragilis* (Taylor) Ochyra [Kürschner 1999]
- Tortella* (Lindb.) Limpr. (*Pottiaceae*)  
*Tortella humilis* (Hedw.) Jenn. [Mitten 1888]  
*Tortella nitida* (Lindb.) Broth. [Kürschner 2000a]  
*Tortella smithii* Townsend [Townsend 1969]
- Tortula* Hedw. (*Pottiaceae*)  
*Tortula caespitosa* Schwaegr. → *Tortella humilis*
- Trichostomum* Bruch (*Pottiaceae*)  
*Trichostomum brachydontium* Bruch [Al-Gifri & al. 1995]  
*Trichostomum crispulum* Bruch [hoc. loc.]
- Weissia* Hedw. (*Pottiaceae*)  
*Weissia artocosana* (Mitt.) Zander [Mitten 1888]  
*Weissia condensa* (Voit) Lindb. [hoc. loc.]  
*Weissia punctulata* Mitt. → *Hyophila punctulata*  
*Weissia socotrana* Mitt. [Mitten 1888]

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