Additions to the bryophyte flora of the Acores

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Summary: Based on collections by the author made in September 2001, Conocephalum salebrosum, Hydrogonium ehrenbergii, Breutelia chrysocoma and Campylopus pilifer var. brevirameus are reported as new to the Azores. Seven species are reported as new to Sâo Miguel. Various notes and keys are provided for several taxa.

Introduction

In September 2001, the lichenologist Felix Schumm and I spent a week on the Acores Island Sâo Miguel. During this trip, a small number of new records were made, which are listed here. The specimens are kept in the herbarium of the author (BONN).

The history of the bryological exploration of the Acores was compiled by Frahm (2005b) and the bryofloras of the different islands of the Azores were evaluated by Frahm (2005a). A checklist was provided by Sjögren (2001). It includes 438 species including 15 dubious records. The record of Sphagnum pylaisii goes back on a misidentification (Frahm & Sabovljevic 2006) and the record of Neckera crispa is wrong (Hedenäs 1992). Ditrichum punctulatum was omitted but recorded before as Campylopus marginatulus. Vanderpoorten et al. (2007) list the African Lepidozia stuhlmannii for the Azores (without details). Hedenäs (1992) lists Heteropcladium wulfsbergii for the Azores (without details). Another three species are reported here as new for the archipelago, which results in a total of about 428 species.

List of localities

1 Grata da Cova, Kraterrand des Lagoa Azul, 37.87953° N, 25.77402° W, 525 m, 19.09.2011

2 Portugal, Azoren, Sâo Miguel, Ufer des Lagoa Azul, 37.87493° N, 25.79012° W, 260 m, 19.09.2011

3 Furnas, bei den Fumarolen im Ortszentrum, 37.77263° N, 25.3456° W, 210 m, 20.09.2011

4 Capella, Roccella an Mauern aus vulkanischem Gestein, 37.83006° N, 25.67379° W, 10 m, 20.09.2011

5 Caldeira Velha südlich Ribeira Grande nördlich des Lagoa da Fogo, 37.78461° N, 25.50096° W, 355 m, 21.09.2011

6 Calluna Heide beim Kraterrand des Lagoa da Fogo, 37.77021° N, 25.78774° W, 722 m, 21.09.2011

7 Lombadas, Erica-Gebüsch, 37.77652° N, 25.45940° W, 570 m, 21.09.2011

8 Lagoa Congro, Wald aus Laurus azoricus, 37.75404° N, 25.40870° W, 508 m, 21.09.2011

9 Ribeira dos Caldeiroes, Parque Natural da Ribeira dos Caldeirões, 37.84156° N, 25.26749° W, 184 m, 22.09.2011

10 Retransmissor do Pico do Bartolomeu, 37.77825° N, 25.16886° W, 885 m, 22.09.2011

11 Parque de Endémicas da Reservada Florestal de Recreiro da Cancela do Cinzeiro, 37.79914° N, 25.16790° W, 600 m, 22.09.2011.

12 Lagoa de Sâo Brás, 37.79156° N, 25.40664° W, 627 m, 23.09.2011.

13 Salto do Cavalo, 37.78861° N, 25.28467° W, 786 m, 23.09.2011.

14 Gafanhoto nördlich von Furnas, 37.79866° N, 25.31351° W, 640 m, 23.09.2011

15 Pico do Ferro nördlich des Lagoa das Furnas, 37.77267° N, 25.23392° W, 560 m, 23.09.2011

16 Badebucht von Rabo de Peixe, 37.81434° N, 25.56168° W, 25 m, 23.09.2011

17 Calhetas, Küste, 37.82090° N, 25.60475° W, 24 m, 23.09.2011.

18 zwischen Provoacao und Nordeste, Miradoro Tronqueira, Area Protegida da Tronqueira e planalto dos Graminhais, 37.79635° N, 25.18474° W, 682 m, 24.09.2011. Laurus azoricus, Erica azorica Wald.

As shown by the present and previous publications, the exploration of the Azores is not yet completed. A major problem is that common epipithets ("azorica") are applied to the collections (Breutelia azorica, Herbertus azoricus), which tgurn out to belong top different species. A revision of the genera, however, has rarely be performed. As the past studies of Campylopus by the author and of Plagiochila by Jochen Heinrichs revealed, many new records of species and new synonyms showed up, and it is to be expected that many (mainly neo-)tropical taxa are undiscovered amongst the collections.

For some genera, keys are provided which include the Azorean species. The advantage is, that the identifier has not to struggle with big keys including all European taxa but just the few recorded from the Azores. The disadvantage is that species so far not recorded from the Azores can easily by misnamed.

* new island record
** new to the Acores

Hepatics

**Conocephalum salebrosum
This species was recently distinguished from C. conicum and is also present on S. Miguel. It was collected in (8) but is probably more widespread for instances on trailbanks and forest floor, where it can be macroscopically separated by the dull green not glossy colour. It might be that this is the first record also for Macaronesia, but both species seem to have the same range in which they inhabit different ecological niches.

Frullania tamarisci var. azorica
(6) This variety was described by the author (Frahm 2006) based upon the longly apiculate leaves from Terceira and Pico. The value of this taxon was doubted by several hepaticologists, however, molecular studies (Heinrichs et al. 2010) proved that this taxon is well delimited from Frullania tamarisci s.str. The material used for this study was from S. Miguel. The identification of the

personal collection from S. Miguel revealed that the variety has no ocelli (fig. 9) and keys out to F. teneriffae, which has, however, wider underleaves. This will be another distinctive character to separate var. azorica from var. tamarisci (fig. 10), which has ocelli.

Key to the Azorean species of Plagiochila

1 Leaves not decurrent
  2 Leaves 2-lobed. P. exigua
  2* Leaves with several teeth
    3 Leaves as long as wide. Cuticle smooth. P. punctata
    3* Leaves longer than wide. Cucticle rough. P. papillifolia
1* Leaves decurrent.
  4 Leaves with a median vitta.
    5 Plants with phenolic smell. Antical leaf margin entire. P. bifaria
    5* Plants without phenolic smell. Antical leaf margin toothed. P. retrorsa
  4* Leaves without vitta. P. longispina

Plagiochila bifaria varies much with respect to the colour (yellowish, brownish or green), size, expression of the vitta, length of teeth and even in the kind of odour, which suggests that there are infraspecific taxa or even different species included.

*Riccia huebeneriana
(12), on soil at margin of pond. Formerly only known from Terceira.

Key to the Azorean species of Scapania
1 Leaves almost entire. Plants to 1,5 cm long and 1-2 mm wide.
  2 Leaves not bordered. S. scandica
  2* Leaves border by 1-4 rows of thick walled cells. S. curta
1* Leaf margins dentate. Plants 1-10 cm tall.
  3 Underlobe convex, retrors. Plants light green to yellowish. S. gracilis
  3* Underlobe flat, erect. Plants green.
    4 Stem blackish. On rocks in waterfalls, streams etc. S. undulata
    4* Stems greenish. On soil and rocks.
      5 Leaves keeled. underlobe smaller. S. nemorea
      5* Leaves not keeled, patent, lobes almost of same size. S. compacta

Scapania gracilis is the species which is most easily identified in the field by its retrorse concave underlobe. Müller (1955-59) characterizes the species by teeth 3-5 cells long and 2-3 cells wide at base, which does not fit most of the plants I have collected, which have only teeth 1 cell long. But also the illustration provided by Müller shows short teeth.

*Scapania scandica (fig. 8)
(12) on trunk of Cryptomeria. This species was so far only recorded from Pico. It shall be up to 1 cm long (Müller 1955-59), however, my collection is up to 1,5 cm, perhaps due to the moister habitat as compared with other parts of the ranges. Another observation was made at Pico de Bartholomeu, of which only pictures exist, which, however, show the typical perianths with entire mouth.

Mosses

**Breutelia chrysocoma
(18) in Laurus – Erica shrub on soil and litter. The species (figs. 1-2) is much more robust than B. azorica (fig. 3-4). It differs anatomically by the leaf bases clasping the stem and the patent upper parts of the leaves. Breutelia chrysocoma is said to be an European endemic species in spite of the fact that all other species are tropical montane or southern hemispheric and is known from the west coast of Europe from NW Spain to SW Norway and – surprisingly from a limited region in Switzerland. It was also found in Germany in the 19. century. Breutelia azorica is found only on the Azores (M, T, J ,P ,F ,L, not S, G, C, Frahm 2005a) and not on any other Macaronesian Island (Frahm & Häusler 2006). Considering the fact that many if not most species described as endemics from the Macaronesian islands proved to be synonyms of tropical species, it cannot be excluded that this is also the fact with B. azorica. It can be supposed that B. chrysocoma is growing not only in this locality and might perhaps be overlooked since B. azorica was said to be the only species of the genus in the Azores and all specimens of the genus were attributed to this species. Therefore a herbarium revision would be desirable.

Campylopus
A key for the Azorean species was provided by Frahm (1999). In the meantime, C. introflexus was added to the bryoflora of the Azores. This species from the southern hemisphere, neophytic in Europe, is probably introduced by tourists (as well as in Iceland). This is supported by the occurrence in touristic places such as the fumaroles in Furnas.

(Campylopus atrovirens)
was once recorded for Terceira (Frahm 1999). The oceanic distribution of this species would allow this species to occur in the Azores, however, a herbarium specimen does not exist and so this record is doubtful. Perhaps this species was confused with C. cygneus, which is quite similar but differs in the shortly rectangular or quadrate upper laminal cells. Campylopus atrovirens has elongate oval upper laminal cells and a hairpoint.

*Campylopus incrassatus
(7) New to Sâo Miguel.

*Campylopus introflexus
(3) New to Sâo Miguel. Surprisingly a mixed tuft between sterile C. pilifer with male C. introflexus was discovered, which raises the possibility of the origin of hybrids between these closely related and formerly vicariant species.

Campylopus flaccidus
is known in whole Macaronesia only from Sâo Miguel, where it is not rare in the central part (Lagoa do Fogo, where it has usually been collected, Lombadas) but also in the East (Pico Verde area, Pico Bartholomeu). The population of this African species is apparently sterile, which may count for the limited range.

Campylopus pilifer **var. brevirameus
(3) This variety has only 2 lamellae instead of 3-4 in var. pilifer and 5-6 in var. lamellatus. It resembles almost C. introflexus in this respect but has erect hair points. The taxon was previously known from Argentina, the East African islands and Brittany (Frahm & Stech 2006). The occurrence in Argentina and the East African islands is regions, where the ranges of both species overlap. In Brittany as well as in Sâo Miguel, it was found in mixed tufts with C. introflexus, which supports the assumption that this taxon could be a hybrid between C. pilifer and C. introflexus. Molecular analyses (Frahm & Stech 2009) do not support this hypothesis.

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Ditrichum punctulatum
(12). This subantarctic species lacks in the checklist by Sjögren (2001). It was recorded before as Campylopus marginatulus from Madeira and the Azores.

Heterocladium wulfsbergii
was reported for the Azores (without details) by Hedenäs (1992). It was collected at locality (8).

**Hydrogonium ehrenbergii (fig. 7)
(5) on wet rocks near solfataras, with Eucladium verticillatum.

*Neckera cephalonica (fig. 6)
(8) This species was so far reported only from Pico. It has been found on tree trunks in a laurel forest. Neckera crispa was indicated with question mark for S. Miguel, but it is probable that this record was confused with N. cephalonica. According to Hedenäs (1992), "all Macaronesian material…except for one locality in Madeira, has turned out to belong to other species."

*Philonotis uncinata (fig. 5)
(9) The specimen has typical uncinate stems, however, almost smooth laminal cells, which can be explained that this pantropical species "is a complex of varying expressions". (Sharp et al. 1994). The blunt leaf tip and subpercurrent costae refer the plants to var. gracillima (Aongstr.) Fleisch.

*Rhytidiadelphus loreus
(7, 13) So far only known from Terceira and Pico.

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Figs. 1-2.Breutelia chrysocoma.

Figs. 3-4: Breutelia azorica.

Fig. 5: Philonotis uncinata.

Fig. 6: Neckera cephalonica

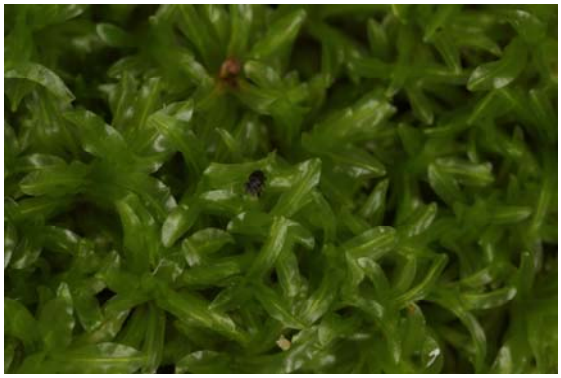

Fig. 7: Hydrogonium ehrenbergii

Fig. 8: Scapania scandica

Fig. 9: Frullania tamarisci var. azorica, sharply acuminate leaf tips, no ocelli

Fig. 10: Frullania tamarisci s.str. bluntly acuminate leaf tips, ocelli

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