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Buchbesprechung

J. P. FRAHM: Moose als Bioindikatoren. Biologische Arbeitsbücher, Bd. 57. 187 S., 77 Abb. Verlag Quelle & Meyer, Wiesbaden, 1998. ISBN 3-494-01271-7. Preis: kart. DM 32,80.

Dieses Buch ist der gelungene Versuch, die grundlegenden Erkenntnisse der bryologischen Bioindikationsforschung der letzten Jahrzehnte in knapper Form zusammengefaßt darzustellen und einem breiten Interessentenkreise auch außerhalb des Zirkels der damit befaßten Wissenschaftler zugänglich und vor allem nutzbar zu machen. In übersichtlicher Form nach Themenbereichen wie Wasser- und Luftverschmutzungsindikation geordnet, werden die verschiedenen Methoden charakterisiert und die wichtigsten Forschungsergebnisse vorgestellt. In dieser Synopse der in der Fachliteratur weit verstreuten Darstellungen liegt einer der Vorzüge dieses Werkes, der es auch dem mit der Materie bereits vertrauten Forscher zu einem wertvollen Kompendium werden läßt. Daß das Buch aber auch weit über den Kreis der Spezialisten hinaus von Interessierten als wirkliches Arbeitsbuch – ganz im Sinne des Serientitels – genutzt werden kann, wird durch einen umfangreichen „praktischen Teil" sichergestellt, der in verständlicher Form Anleitungen zu einer großen Zahl der verschiedensten Versuche liefert, mit deren Hilfe es jedem ermöglicht wird, sich selbst ein Bild von den Umweltverhältnissen seiner Heimat oder eines anderen Gebietes zu machen, wobei die gewonnenen Daten in zahlreichen Fällen auch für die Wissenschaft von Interesse sein werden. Besonders wertvoll ist dies zweifellos für den Unterricht an Schulen und Hochschulen, wo Versuche, deren Ergebnisse nicht von vorn herein feststehen, sondern von tatsächlichem Erkenntniswert bezüglich einer konkreten praktischen Fragestellung sind, erfahrungsgemäß das größere Interesse hervorrufen. Abgerundet wird das Ganze durch Bestimmungshilfen (Schlüssel und Beschreibungen) für die wichtigsten infrage kommenden Arten und Artengruppen. Besonders hervorgehoben seien in diesem Abschnitt die vielen praktischen Tips für das Mikroskopieren, Präparieren, Anfärben etc. Im einleitenden Kapitel des Buches kann sich der interessierte Leser über die Bioindikation im allgemeinen und über Charakter und spezifische Eigenschaften der Moose in ihrer besonderen Eignung für den genannten Zweck informieren.

Bei einer Neuauflage wären die leider recht zahlreichen sprachlichen und typographischen Fehler ebenso zu bereinigen wie die Verbuchung von Beryllium und Schwefel unter den Schwermetallen (S. 30 u. 32 bzw. 34), von Schiefern unter den Urgesteinen (S. 39), von NH_4OH unter den Säuren (S. 64) und diverse Fehler bei chemischen Formeln. Dubios auch die Aussage, daß Schwermetalle in den Vakuolen abgelagert würden (S. 30), nachdem es auf S. 6 geheißen hatte, daß die Moose keine Vakuolen besäßen.

Insgesamt jedenfalls ein für Fachleute wie interessierte Laien gleichermaßen empfehlenswertes Buch, dem eine weite Verbreitung sicher sein dürfte. Der moderate Preis kommt dem sehr entgegen.

V. OTTE, Berlin

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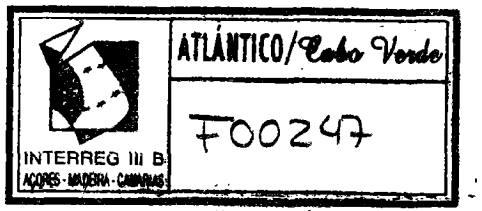
Tornabenea ribeirensis (Apiaceae) – a new species from São Nicolau, Cape Verde Islands (West Africa)[1]



With one Figure

Introduction and background

Many species of Apiaceae are found in the Macaronesien Region. Several have been introduced by human activities, but a number of taxa is endemic to the different archipelagos or even restricted to a single island. The following enumeration is based mainly on HANSEN & SUNDING (1993).

In the Azores 28 different taxa of Apiaceae occur, among them four endemic species [*Ammi huntii* WATSON, *A. trifoliatum* (WATSON) TREL., *Chaerophyllum azoricum* TREL., *Sanicula azorica* GUTHNICK ex SEUB.].

In Madeira the Apiaceae are very diverse and consist of 29 species and subspecies. From the archipelago two monotypic genera, *Melanoselinum decipiens* (SCHRAD. & J. C. WENDL.) HOFFM. and *Monizia edulis* LOWE and three endemic species [*Oenanthe divaricata* (R. BR.) MABB., *Imperatoria lowei* COSS. and *Bunium brevifolium* LOWE] are described.

The Canary Islands have the highest number of plant-species and a high level of endemism. 54 taxa of Apiaceae are recorded including three endemic genera (*Rutheopsis* A. HANSEN & KUNKEL, *Todaroa* PARL. and *Tinguarra* PARL.) and further 15 endemic taxa.

The Apiaceae are represented in the Cape Verde Islands by 12 species. Most of the taxa have been introduced by human activities (LOBIN & ZIZKA 1987) like *Anethum graveolens* L., *Apium graveolens* L., *Foeniculum vulgare* MILL., *Coriandrum sativum* L. or *Petrosilenum crispum* (MILL.) A.W.HILL. These species are cultivated and some of them later became weedy. Other species like *Ciclospermum leptophyllum* (PERS.) SPRAGUE (= *Apium leptophyllum*) are weeds of cultivated grounds or wasted lands. All these species are today widespread in temperate, subtropical or tropical regions all over the world. The only native species are to be found in the endemic genus *Tornabenea* PARL.

Taxonomic history of the genus *Tornabenea*

The first *Tornabenea* species was collected by TH. VOGEL in 1841. Recognizing this material as being undescribed, PARLATORE established 1849 a new genus *Tetrapleura* (PARLATORE in WEBB 1849) with a single species (*T. insularis* PARL.). Becoming later aware that this name was a homonym for *Tetrapleura* BENTH., he renamed the genus into *Tornabenea* PARL. (PARLATORE in WEBB 1850).

In 1851, J. A. SCHMIDT collected material, from which he described in 1852 *T. bischoffii* J. A. SCHMIDT and *T. hirta*.

The next species, *T. annua*, was described by A. BÉGUINOT in 1920 based on a collection made by L. Fea.

In 1935 *T. tenuissima* was established as a new species by A. CHEVALIER (CHEVALIER 1935a as *Melanoselinum tenuissimum*). All known *Tornabenea*-species have been placed

[1] Herrn Professor Günther Kunkel zu seinem 70. Geburtstag gewidmet.

by CHEVALIER (1935b) into the hitherto monotypic Madeirian genus *Melanoselinum* HOFFM. and in literature both genus-names have been used alternatively.

LOBIN (1986) compiled a catalogue of all taxa described from the Cape Verde Islands in which all *Tornabenea*-species have been enumerated. *T. hirta* was reduced to the synonymy of *T. insularis*.

Recently, a first Flora of the endemic vascular plants has been published (BROCHMANN et al. 1997), in which the present authors compiled provisionally the genus and described *T. humulis* LOBIN & K. H. SCHMIDT. A revision of the genus, including further descriptions of new taxa is under preparation by the present authors.

Materials and methods

Special attention has been paid to the genus *Tornabenea* by the second author since his first trip to the Cape Verde Islands in 1978. During nine different excursions many collections and many observations have been made by him. Another very important collection has been made in the 1980's by CH. BROCHMANN and Ø. H. RUSTAN from Oslo. From 1994–1996 TH. LEYENS and N. KILIAN again made several collections. In 1992 the present authors enforced activities on the investigation of *Tornabenea*: Two excursions have made in 1994 and 1996 in order to recollect material and to observe plants of nearly all taxa in their typical habitats in all Western islands, excluding Brava. Also all available herbarium specimens have been investigated.

Tornabenea ribeirensis K.H.SCHMIDT & W.LOBIN sp. nova

Fig. 1 a–d

Type: São Nicolau, nördlich Vila da Rib. Brava, in der Ribeira Tucuda bei Queimada, *W. LOBIN 2561*, 25. 11. 1982 (holotype B, isotype FR, Herb. W. Lobin, Herb. K. H. Schmidt).

Diagnosis

Planta aliquantum elegans et procera in omnibus partibus, habitus erectus, radix longa et procera, axis tenuis, internodia longa, nodia vix tumescens, folia tenua, in siccu tenuissime membranacea, segmenta ulterioriae ordinis cum lobo terminalia magna, umbella parva, pauca, flores parvi, mericarpia a dorso complanata, ellipsoideo usque at ovata, jugae marginalis alias dilatatis, jugae dorsales parvis sed distincte prominentibus.

Derivatio nominis: The species is named after its favorite growing sites, humid valleys (portug.: Ribeiras).

Description: Annual (or biennial) delicious herb, up to 80 cm; root slender, up to 20 cm or longer, not branched or with few weak branches; stems slender, not hairy, at their bases 1.8–3.5 mm in diameter; internodes very long, nodes scarcely thickened; leaves tender with thin light green, lamina deltoid to obovate in outline, without hairs, rarely the petioles of lower and middle stem leaves with few hairs; lower leaves of flowering and fruiting plants withered; middle stem leaves 7.5–24.0 × 6.5–16.0 cm, petioles 3–12 cm, lamina 4.5–18.0 cm long with 3–4 pairs of pinnae; pinnae mucronate, lower pinnae 3-partite with a very large terminal lobe; terminal lobes long stalked and deeply incised at their base, the distal parts only slightly incised or crenate; upper pinnae hardly 3-partite or undivided, hardly incised or crenate; primary umbels small, 3–4 cm in diameter; secondary umbells small, 1.7–3.6 cm in diameter; rays up to 25, with upwards directed bristles, during anthesis ± spreaded, when fruiting slightly constricted; involucral bracts 3–10 cm long, mainly undivided, rarely one bract bi- or trifid; involucellar bracts inconspicuous, 2–3 mm long, undivided; flowers small, with creamy-white petals; mericarps ca. 2.5 mm long (excluding style) and 1.5 mm wide, compressed dorsally, lateral (marginal) secondary ribs winged, dorsal primary and secondary ribs prominent, not winged, style ca 1 mm long, ± erect.

Distribution and ecology

Tornabenea ribeirensis sp. nova is endemic on São Nicolau. It has been collected only in a few valleys in the North of the island. No older collections made before 1979 are known.

During further intensive collection activities, only one flowering specimen with young

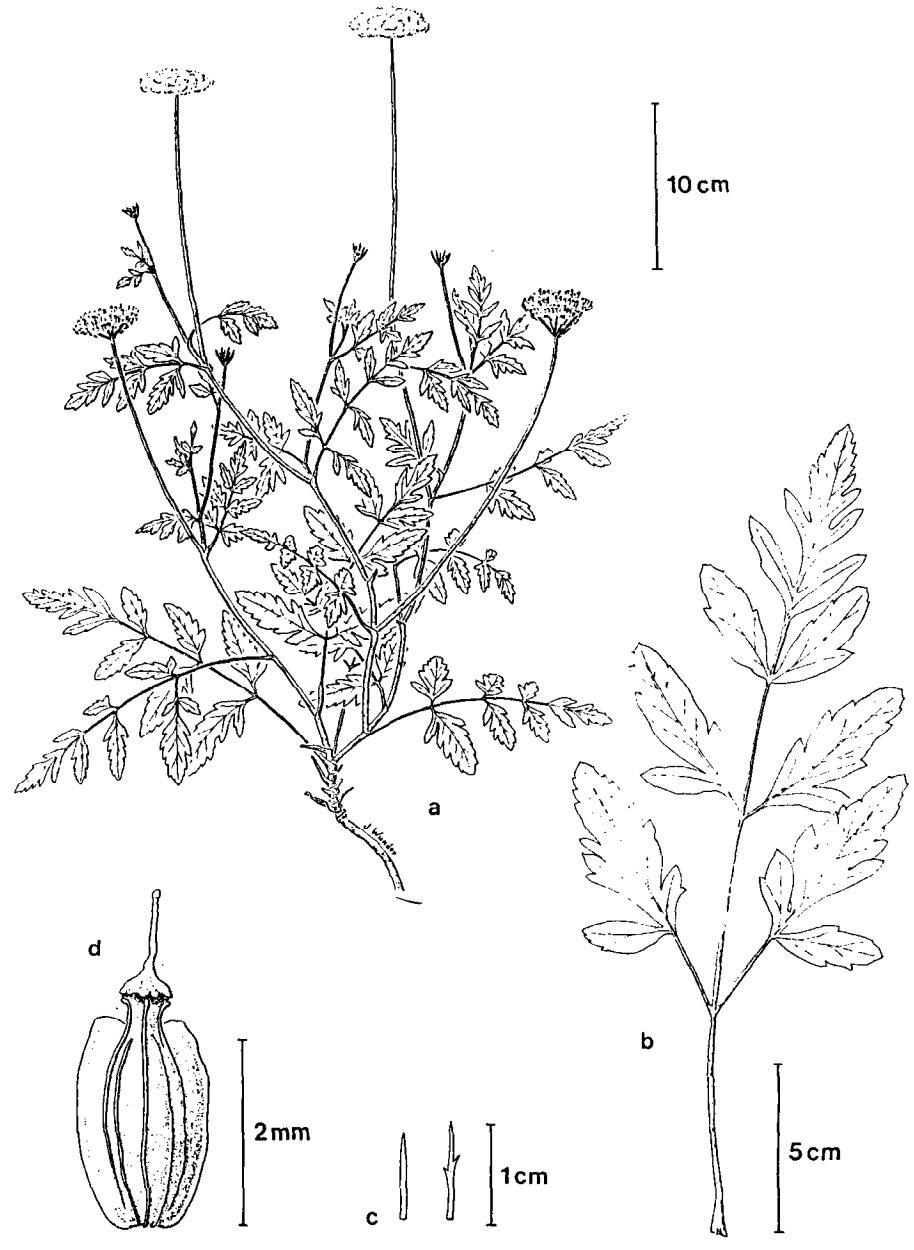


Fig. 1
Tornabenea ribeirensis sp. nova
a – habit (*LOBIN 2561*); b – leaf (*LOBIN 2561*); c – involucral bracts (*LOBIN 2561*); d – mericarp, dorsal view (*LOBIN 2561*)
Drawings: J. Wunder

fruits has been recollected in 1996 (*K. H. Schmidt*, CV/KS-1996-1) in the Ribeira Tucuda. Unfortunately, no specimen with ripe fruits has been recollected since Lobin's type collection. Additional non-flowering specimens from the Ribeira dos Carvoeiros (*Ch. Brochmann* and *Ø. H. Rustan*, CB 660/82, 01. 02. 1982) and from the Ribeira Tucuda (*I. Gomes, W. Lobin* and *K. H. Schmidt*, s.n., 16. 09. 1994) may belong to this species because of their leaf characters and habitats.

Since the species has been only collected a few times ecological data are not reliable. It seems to us that *T. ribeirensis* sp. nova is restricted to the shady and seasonally damp bottom of the valleys of very few Ribeiras in the North of the island. According to this growing sites, the species differs from all other known species of the genus which are generally found in open, not sheltered and sometimes extremely exposed habitats. In the Ribeira Tucuda the plants receive shelter from the dense canopy of Mango trees (*Mangifera indica*). The Mango tree plantation has replaced an indigenous vegetation (gallery-forests ?) consisting of small trees or shrubs (e. g. *Ficus gnaphalocarpa*) covering the bottom of the valleys. Interestingly, *T. ribeirensis* sp. nova is found at lower elevations from 100–200 m, whilst the other species except *T. humilis* occur in favourable mountains areas above 600 m.

The species may be annual or biennial. The roots are very slender but long and not developed as storage organs like those from the majority of the other *Tornabenea* species. The leaves are very tender and have a very thin lamina indicating that the species may be adapted to habitats which are characterized by general humidity.

Flowering season extends from October to November (or December), and ripe fruits are developed in December (or January). Nothing is known about visiting and pollination or on dispersal of the species.

Phytogeography

São Nicolau seems to be a diversity center of the genus *Tornabenea*, as three different taxa occur on this island:

Well known since a long time (around 1850) are the populations of a taxon known as *T. insularis* on the Monte Gordo and neighbouring localities. This taxon is probably related to the populations of *T. insularis* on the summit of the Monte Verde of the nearby island São Vicente and may differ on subspecific level.

Botanically of great interest are the mountain ranges (Alto das Cabaças) in the East of the island. These mountains have been only visited by botanists during the last 20 years and many interesting plants have been found. The most remarkable rediscovery was *Conyza schlechtendahlii* Bolle in 1994 (Gomes et al. 1995), an endemic species which was collected once in 1851 on the Monte Gordo in the West and thus was believed to be extinct. Also, new species turned up in the Alto das Cabaças, including populations of an undescribed *Tornabenea* species.

And the third, *T. ribeirensis* sp. nova, is restricted to the North of the island. All taxa found on São Nicolau prefer subhumid to humid regions as pointed out by Brochmann & Rustan (1987).

Conservation

Tornabenea ribeirensis sp. nova seems to be very rare and restricted to a few valleys in the North of São Nicolau. Humid, damp localities have become vey rare in the Cape Verde Islands, because naturally floating water has been widely used for irrigation of plantations. So, the new species may have had a wider distribution, but is today endangered by human activities. Another threat to this species may also be the introduction of aggressive invading species which prefer humid conditions. As only very few collections have been made, this species must be added to the red data list for the Cape Verde Islands (Leyens & Lobin 1996). We consider it as critically endangered (CR).

Specimens seen

São Nicolau: nördlich Vila da Ribeira Brava, in der Ribeira Tucuda bei Queimada, *W. Lobin 2561*, 25. 11. 1982 (B, FR, Herb. W. Lobin, Herb. K. H. Schmidt); in der Ribeira Funda, NW Estancia Bras, *W. Lobin 925*, 08. 10. 1979 (Herb. W. Lobin);

untere/mittlere Ribeira Tucuda, oberhalb der Ortschaft Queimada, stark schattig, in Feinerde zwischen Geröll im Ribeiragrund, unter Mangobäumen, *K. H. Schmidt, CV/KS-1996-1* (Herb. K. H. Schmidt).

Sterile plants, but probably belonging to *T. ribeirensis*:

São Nicolau: in der Ribeira Tucuda bei Queimada, *I. Gomes, W. Lobin & K. H. Schmidt, s.n.*, 16. 09. 1994 (Herb. W. Lobin, Herb. K. H. Schmidt); Ribeira dos Carvoeiros, 100 m, 24°18'–19', 16°38'–39', *Ch. Brochmann & O. H. Rustan, CB 660/82*, 01. 02. 1982 (O).

Acknowledgements

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