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***Erpodium glaziovii* (Erpodiaceae, Bryopsida) and further novelties from the Arabian Peninsula**  
**Additions to the Bryophyte Flora of the Arabian Peninsula and Socotra 4**

**Abstract**

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Based on a recent bryophyte collection from the hitherto botanically neglected Al-Mahra Governorate in Yemen, the rare neotropical *Erpodium glaziovii* (Erpodiaceae) as well as *Cololejeunea minutissima* subsp. *minutissima* and the pantropical *Lopholejeunea nigricans* (Lejeuneaceae) are reported for the first time from the Arabian Peninsula. They are an important element of the epiphytic bryophyte flora in the monsoon-affected, endemic S Arabian *Anogeissus dhofarica* woodland and confirm the repeatedly demonstrated xerotropical character of this part of the Arabian Peninsula.

**Introduction**

During a recent field trip to the monsoon-affected escarpment mountains of the Al-Mahra Governorate in Yemen (i.e. Fartak Mountains, Hawf Mountains), three epiphytic bryophytes were collected by the first author, which turned out to be new records for the Arabian Peninsula (cf. Kürschner 2000). They include the pantropical liverworts *Cololejeunea minutissima* subsp. *minutissima* and *Lopholejeunea nigricans*, whilst the moss *Erpodium glaziovii* is a remarkable new record with a highly interesting range extension for this rare species. All three species presented in this article show a high affinity to the endemic, deciduous *Anogeissus dhofarica* woodland, a unique feature of the monsoon-affected centre of the Arabian south coast, replacing the widespread *Acacia-Commiphora* woodland in the most humid and sea facing sites between 300 and 1200 m. The presence of monsoonal woodland has been well known from Dhofar in Oman (Ghazanfar 1991, Kürschner 1998). The existence of a smaller portion in neighbouring Yemen (Hawf Mountains), in contrast, remained almost unknown until recently (cf. Kilian & al. 2002). A hundred kilometres further west and entirely isolated from the main stands in Hawf, the Fartak Mountains also shelter outposts of the *Anogeissus dhofarica* woodland and its epiphytes, representing the westernmost localities. All three species confirm the repeatedly demonstrated xerotropical character of the flora of this part of the Arabian Peninsula, which had a common tropical

flora and vegetation during the early Tertiary, when migration and exchange between the xerotropical floras of Asia and Africa were possible across the Arabian Peninsula. Due to the aridisation of the entire region in the late Tertiary, the xerotropical flora was forced into the south of the Arabian Peninsula, isolated from Africa and Asia, and with increasing aridity, finally fragmented and limited to a few refugia. Especially in the monsoon-affected mountains along the south coast and on the island of Socotra such island-like refugia with relict vegetation complexes have survived to the present, showing close floristic affinities to tropical Africa and Asia (Kürschner 2000, Kürschner & al. 2001, Kilian & al. 2002).

The voucher material is kept at B and its duplicates are preserved in the personal herbarium of the first author.

***Erpodium glaziovii* Hampe (*Erpodiaceae*, *Bryopsida*) – Fig. 1**

The Yemeni plants are strongly epiphytic and confined to the upper zone of the monsoon-affected *Anogeissus dhofarica* woodland. They are quite frequent in the Hawf Mountains (border area to Oman), but still occur in the isolated *A. dhofarica* remnants of the Fartak Mountains, a hundred kilometres further west. The species is a corticole and its plants are relatively small and slender, creeping in dark green mats on the trunks and branches of *A. dhofarica* A. J. Scott, *Acacia etbaica* Schweinf. and *Acokanthera schimperi* (A. DC.) Benth., all important components of the woodland. The stems are to 1 cm long, sparingly branched, and the leaves are evenly spaced, soft, loosely erect when dry, more or less complanate when moist, 0.6–0.8 mm long, ovate to elliptical, acute and ecostate. The laminal cells are smooth throughout, rhombic to subhexagonal in the upper and median parts, quadrate, rounded-quadrate to oblate at the base. The perichaetial leaves are somewhat enlarged, broader than the vegetative leaves, acute. The capsule is shortly exserted, obloid to short-cylindrical, wide-mouthed and gymnostomous. The spores are spherical, brown, granulate, 25–32 µm in diameter. All these characters fit well in the typical phenotype of *Erpodium glaziovii*, as known from the Neotropics.

*Erpodium glaziovii* is a distinct species of *E.* sect. *Stephanostoma*, which comprises species characterized by smooth laminal cells, somewhat complanate leaves and clearly emergent capsules (Crum 1972). It seems to be closely related to *E. distichium* Wager & Dixon from South Africa, which, however, differs in its ligulate, broadly and bluntly acute, sheathing perichaetial leaves, capsules distinctly narrowed at the mouth and somewhat larger spores, 35–38 µm in diameter (Magill & Rooy 1998).

Neither *Erpodium glaziovii* nor any other member of the genus has been reported from the Arabian Peninsula. The Yemeni localities therefore represent a remarkable range extension of this species, which hitherto has been considered to be a neotropical lowland species, extending from sea level to 610 m (Delgadillo & al. 1995). The species was originally described from Rio de Janeiro in Brazil (Hampe 1872), in which country it appears to have its main centre of occurrence. It is widespread in eastern and southeastern Brazil in the provinces of Bahia, Espírito Santo, Minas Gerais, Mato Grosso do Sul, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul and occasional in Amazonas (Yano 1981, 1989, 1995, 1996). In South America it is also known from two localities from Paraguay (Crum 1972, Buck 1985). Additionally, the species occurs rarely in Central America, namely in the Dominican Republic in the West Indies (Buck & Steere 1983) and in the states of San Luis Potosí and Tamaulipas in Mexico (Pursell 1994).

The present distribution pattern of *Erpodium glaziovii* may appear to be strange but it is not exceptional in the *Erpodiaceae*, and other species of this genus exhibit similar patterns. For instance, *E. biseriatum* (Aust.) Aust. is known from the Neotropics and occurs then widely scattered in the Paleotropics, including Tanzania in East Africa, India, Java and Thailand in Asia, and Australia. Further examples are *E. coronatum* (Hook. & Wils.) Mitt., which is an Afro-American species, common throughout the Neotropics from Mexico to Argentina and rare in Cameroon in West Africa; *E. beccari* Müll. Hal. ex Vent. is scattered in the Neotropics (Mexico, Bolivia, Brasil, Paraguay, Argentina) and next occurs in East (Kis 1985) and South Africa (Magill & van

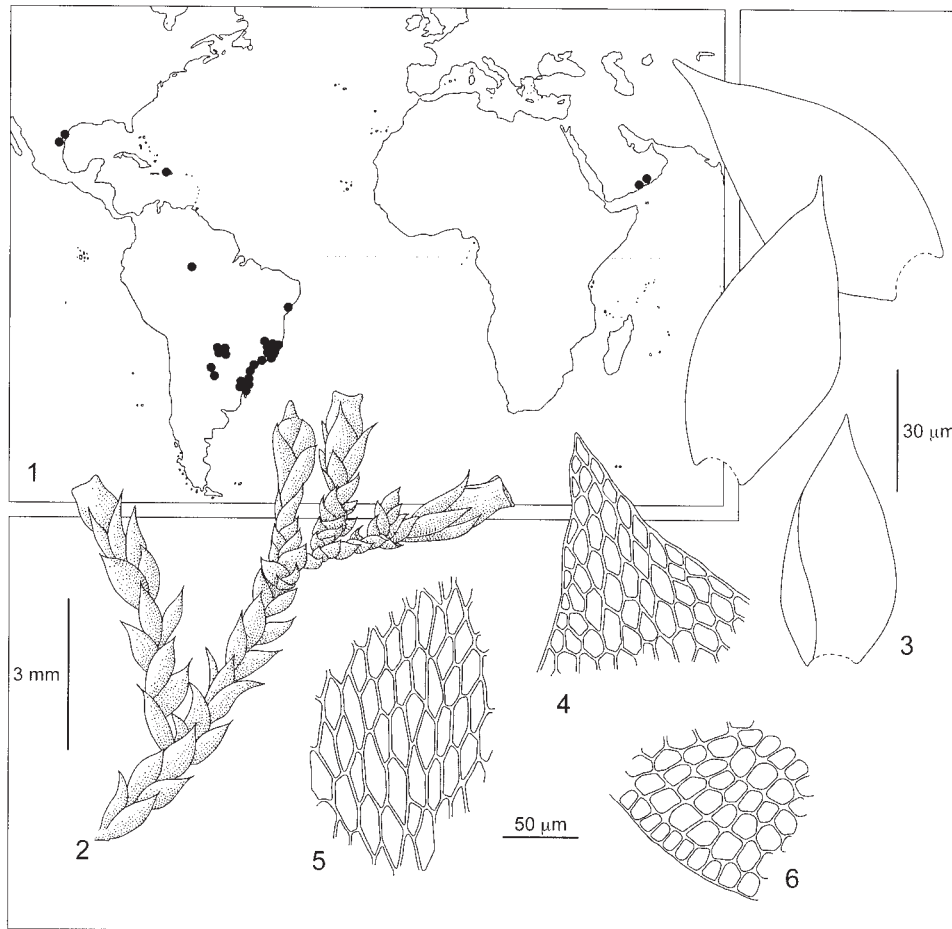


Fig. 1. *Erpodium glaziovii* Hampe – 1: global distribution; 2: habit; 3: leaves; 4: leaf apex; 5: mid-leaf cells; 6: basal leaf cells (all drawn from *Kürschner 01-1286*, herb. Kürschner).

Rooy 1998) and Madagascar (Tixier 1979 as *E. hanningtonii*). *Aulacopilum tumidulum* Thwait. & Mitt. shows nearly the same distribution pattern as *E. glaziovii* – it is very scattered in the Neotropics (Mexico and Paraguay) and in the Paletropics known only from Sri Lanka (Crum 1972).

*Specimen examined.* – YEMEN: AL-MAHRA: Northern Fartak Mountains, Jabal Karmum, island-like remnants of *Anogeissus dhofarica* woodland, 15°50'N, 51°59'E, 940 m, epiphytic on twigs of *Acokanthera schimperi*, 16.10.2001, *H. Kürschner 01-1403, 01-1405* (B, herb. Kürschner); Hawf Mountains, Uteq area northeast of Al Ayn, *Anogeissus dhofarica* woodland, 16°39'N, 52°58'E, 1150 m, epiphytic on bark of *Anogeissus dhofarica*, 30.9.2001, *H. Kürschner 01-1313* (B, herb. Kürschner); Hawf Mountains, Jabal Chattan northeast of Al Ayn, *Anogeissus dhofarica* woodland, 780 m, epiphytic on twigs of *Anogeissus dhofarica*, 29.9.2001, *H. Kürschner 01-1286* (B, KRAM, herb. Kürschner); Hawf Mountains, near Cha'rud northwest of Damqawt, 16°34'N, 52°46'E, 700 m, epiphytic on twigs of *Acacia etbaica*, 2.10.2001, *H. Kürschner 01-1327* (B, herb. Kürschner).

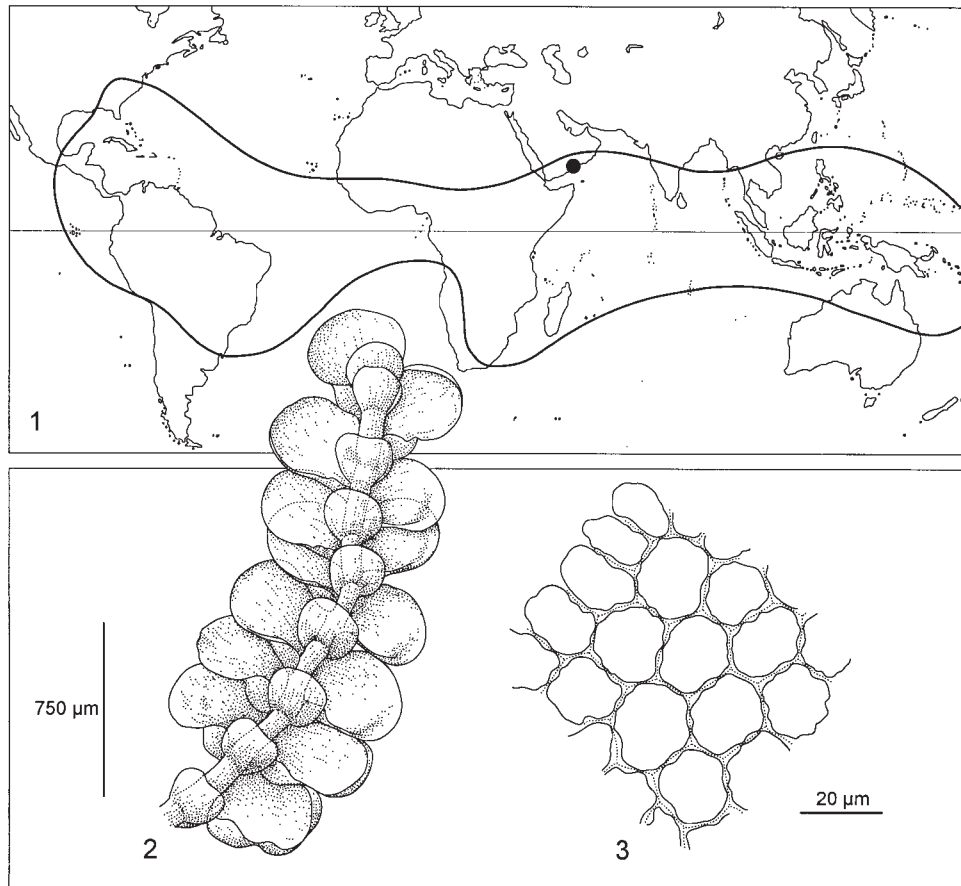


Fig. 2. *Lopholejeunea nigricans* (Lindenb.) Schiffn. – 1: global distribution; 2: habit (ventral view); 3: mid-leaf cells (all drawn from Kürschner 01-1415, herb. Kürschner).

*Cololejeunea minutissima* (Sm.) Schiffn. subsp. *minutissima* (Lejeuneaceae, Hepaticopsida)

This is a very small and easily overlooked, nearly sub-cosmopolitan pioneer (Europe, Macaronesia, Africa, North America, Asia and Australia), which is widely distributed in moderately humid, fairly exposed or insulated micro-habitats (Paton 1999). In Al-Mahra it is found on the bark of *Jatropha dhofarica* Radcliffe-Smith, a characteristic shrub or tree of the *Anogeissus dhofarica* woodland, accompanying other epiphytes such as *Entodontopsis leucostega* (Brid.) Buck & Ireland (Kürschner & al. 2001), *Erpodium glaziovii* Hampe and *Hyophila involuta* (Hook.) A. Jaeger. The westernmost localities are in the Fartak Mountains, where it also grows epibryically on *Lopholejeunea nigricans*. The Yemeni plants are very tiny, pale to bright yellow-green and filiform. The leaves are distant, patent to suberect, broadly oval, with a rounded apex. The lobules are  $\pm$  oval, 3/4 to almost as long as the lobe and inflated. Gemmae, which are common and abundant in European material, are lacking. Sporophytes were not seen.

*Specimen examined.* – YEMEN: AL-MAHRA: Hawf Mountains, Uteq area northeast of Al Ayn, *Anogeissus dhofarica* woodland, 16°39'N, 52°58'E, 1150 m, epiphytic on *Jatropha dhofarica*, 30.9.2001, H. Kürschner 01-1314, det.: T. Pócs (B, herb. Kürschner); Fartak Mountains, north-

east of Khadifud, island-like remnants of *Anogeissus dhofarica* woodland, 15°39'N, 52°12'E, 780 m, epibryous on *Lopholejeunea nigricans*, 10.10.2001, H. Kürschner 01-1415 p.p. (B, herb. Kürschner).

***Lopholejeunea nigricans*** (Lindenb.) Schiffn. (*Lejeuneaceae*, *Hepaticopsida*) – Fig. 2

The specimen from Yemen exhibits all the typical features of the species. The plants are irregularly pinnate and typically form black patches on bark and trunks. The leaves are contiguous to imbricate, with an ovate-oblong, asymmetrically dorsal lobe with obtuse apex. The mid-leaf cells are 20-35 µm wide, with medium sized trigones and frequent intermediate thickenings. The lobules are ovoid-oblong, weakly to strongly inflated along the keel and distally usually flattened. The underleaves are subimbricate, transversally ovate to suborbiculate and variable in size. Perianths and sporophytes were not seen.

*Specimen examined.* – YEMEN: Al-Mahra, Fartak Mountains, northeast of Khadifud, island-like remnants of *Anogeissus dhofarica* woodland, 15°39'N, 52°12'E, 780 m, epiphytic on *Acokanthera schimperi*, 10.10.2001, H. Kürschner 01-1415, det.: R. L. Zhu (B, herb. Kürschner).

*Lopholejeunea nigricans* is a pantropical, somewhat weedy and the most widespread species of the genus (Gradstein 1994). It is common in tropical Africa and was described under many different names (Wigginton & Grolle 1996). It is common in the lowland and submontane elevations, often in rather sunny locations and is tolerant to desiccation. In the Fartak Mountains it is common on *Acokanthera schimperi* in the island-like remnants of *Anogeissus dhofarica* woodland, but was not seen in the denser and more humid woodland of the Hawf Mountains near the border with Oman.

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