Thaiszia - J. Bot., Košice, 35: 015–019, 2025
https://doi.org/10.33542/TJB2025-1-02

THAISZIA
JOURNAL OF BOTANY

Afrothamnium stipitatum (Mitt.) Enroth (Bryopyta) newly recorded in SW Asia, Saudi Arabia

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Hugonnot1 V., Pépin F. & Enroth J. (2025): *Afrothamnium stipitatum* (Mitt.) Enroth (Bryopyta) newly recorded in SW Asia, Saudi Arabia. – Thaiszia – J. Bot. 35: 015–019.

Abstract: The distribution of the mainly African Tropical moss *Afrothamnium stipitatum* (Mitt.) Enroth is extended to Asia, in Saudi Arabia. Morphological characters, global distribution and putative origin of the population are briefly discussed.

Keywords: *Orthostichellaceae*, relictual mosses, monsoon climate, Asir mountain, Saudi Arabia.

Introduction

Afrothamnium stipitatum (Mitt.) Enroth was long considered to belong to *Neckeraceae* Schimp. family, but was recently moved into the newly erected well supported *Orthostichellaceae* Enroth, Huttunen, Tangney, M.Stech & D.Quandt on the basis of a phylogenetic reconstruction. This family is mostly African and Neotropical, and contains stipitate or foliose large Tropical pleurocarpous mosses (Enroth et al. 2019).

Afrothamnium stipitatum, previously known as *Porothamnium stipitatum* (Mitt.) Touw ex De Sloover or *Porotrichum stipitatum* (Mitt.) W.R.Buck, is widely distributed in sub-Saharan Africa, plus the Comoro Islands, Madagascar, La Réunion (O'Shea 2006) and is also known from South America (French Guiana; Enroth 1996).

During March 2024 the first two authors discovered a large pleurocarpous moss that turned out to be *Afrothamnium stipitatum*, a species newly recorded for the

Arabian Peninsula. Here we provide a formal notice of this species' presence in Saudi Arabia and review its distribution, recognition and biogeography.

Methodology

Field surveys were conducted during January-February-March 2024, in the Asir mountain range (Saudi Arabia) with the aim of documenting the presence of noteworthy and/or previously unrecorded bryophyte taxa for the Peninsula. The objective is to contribute to the knowledge of a taxonomic group that remains relatively poorly known.

The selection of sites was guided by the examination of geological and topographical maps, as well as the presence of moisture sources (wadis, springs, wetlands). Additionally, the accessibility of the sites was assessed based on the existence of trails allowing an approach within walking distance (less than 5 km).

The specimens collected in the field are preserved in the bryological herbaria of the authors.

Results and Discussion

Afrothamnium stipitatum was collected in one locality in the mountains of South-Western Saudi Arabia (Fig. 1). The details of the locality and collect are as follows:

Saudi Arabia, Asir Mountain, Alsharaf Park, Tanomah, 2490 m, Exp. North, on dripping shady metamorphic rocks in Juniperus woodland, 21 March 2024; N18°56'29.01, E42°08'52.41'' (Private herbarium of VH; duplicate in H).

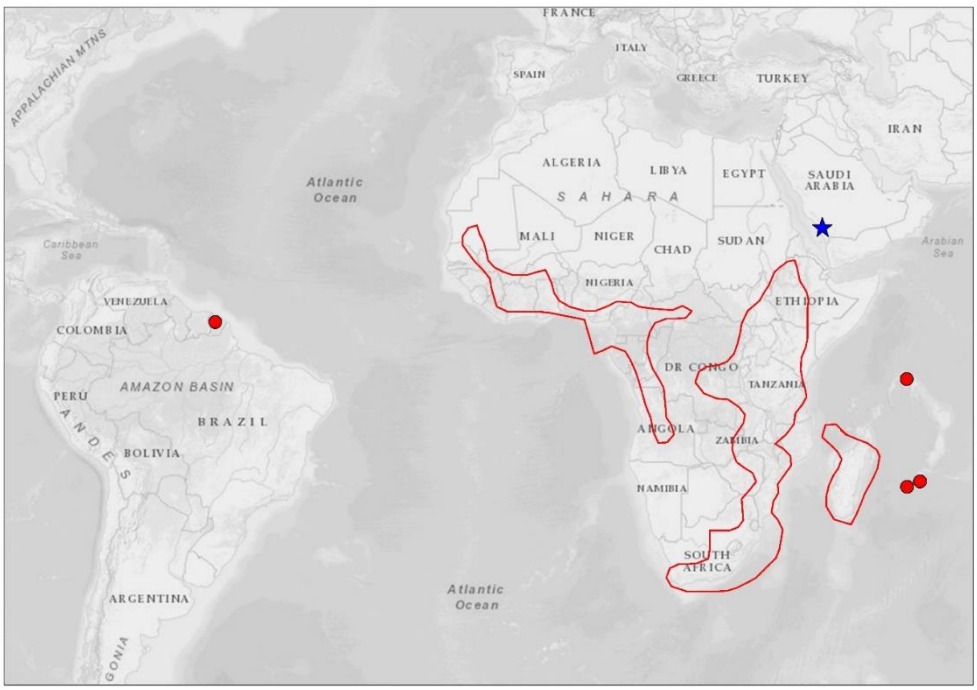

Fig. 1 Global distribution of *Afrothamnium stipitatum* (Mitt.) Enroth. (from De Sloover 1983; Enroth 1996; Gbif: https://www.gbif.org/fr/species/7862408); star: new Saudian locality.

The Arabian specimens do not exhibit the remarkable frondose architecture typical of well-developed individuals of *Afrothamnium stipitatum*, being only composed of small plants, without a distinct stipe and with many flagelliform axes and no trace of sexual buds nor sporophytes. The observed specimens were characterized by complanate habit, costate, asymmetrical and strongly serrate leaves (Fig. 2).

The species was observed under a dense canopy of a forest community belonging to *Myrsino africanae-Juniperetum procerae* (Deil & al Gifri 1998) which corresponds to evergreen montane Juniper woodland. It colonized one large vertical crack in a steep wall that was abundantly dripping at the moment of recording. This crack was facing North and, together with the surrounding dense forest vegetation, provided a very shady and humid environment. There were no associated bryophytes in this niche. The population covered approximately 0,5 m². Targeted surveys in other comparable cracks or neighbouring sites remained unsuccessful.

Discussion

Afrothamnium stipitatum is newly recorded for SW Asia as it is not mentioned in Kürschner & Frey (2020) or Taha (2019). The Arabian population is distant approximately 800 km from the nearest African known population, in the Simien Mounts, North Ethiopia. This is also the northernmost locality of the global area (North to 18° North latitude).

Afrothamnium stipitatum is a typically robust, stipitate frondose species that occasionally bears sporophytes (De Sloover 1983). The Arabian specimens, while being obviously depauperate, are still attributable to *A. stipitatum* by the peculiar

Fig. 2 *Afrothamnium stipitatum* (Mitt.) Enroth. from Alsharaf Park, Tanomah (1: strong marginal serration; 2: costa).

dark green colour and metallic lustre, strong costa ending in a dorsal spine, strongly serrate leaves and the relatively thin walls of the elongate laminal cells (Enroth 1996; Enroth et al. 2019). Such vegetatively reduced specimens were previously mentioned by De Sloover (1983) and they represent normal variability of this extremely polymorphic species.

The occurrence of pantropical (*Entodontopsis leucostega* (Brid.) Buck & Ireland: Kürschner et al. 2001), African or Asian paleotropical (*Hymenostylium crassinervium* Broth. & Dix.: Kürschner et al. 2001; *Claopodium prionophyllum* (C.Müll.) Broth: Kürschner 2000) or even neotropical (*Venturiella glaziovii* (Hampe) Pursell: Kürschner & Ochyra 2003) bryophyte taxa in South Arabia and Socotra Island has been repeatedly demonstrated. The occurrence of this significant tropical element is suggestive of a common flora and vegetation during the Tertiary, when Arabian Peninsula could serve as a migration bridge between Asia and Africa (Kürschner & Ochyra 2003) and when species' areas were presumably more continuous. Late Tertiary aridisation of the Peninsula forced this tropical flora to migrate south, in monsoon affected elevated mountains ranges, where their populations are today very fragmented and isolated (Kürschner et al. 2001). South Arabian Peninsula is influenced by mists and clouds of the tropical maritime air regime of the Indian Ocean and Tropical Africa which may account for its role in harbouring a significant suite of tropical taxa, but in the case of *Afrothamnium stipitatum*, the relevance of microhabitat should not be underestimated.

In Africa, where the core populations are known, it grows in mountain forests, mostly between 1500 and 2000 m a.s.l. where it frequently colonizes damp or dripping rock faces, near waterfalls or cascades, in the spray and water mist, in shaded or very shaded areas (De Sloover 1983). This strong dependence toward permanently irrigated habitat is substantiated by the recent and isolated observation of the unique Arabian population. Obviously, the species is here very rare, and certainly limited by the scarcity of available niches.

In the Arabian Peninsula, the putative strong relictual character, the isolated nature of most populations and the high number of concerned bryophyte taxa make them ideal candidates for phylogeographical reconstructions that could uncover hidden genetic variability and precise origins of populations.

Acknowledgement

Dr. Harald Kürschner critically read an early version of this manuscript and offered suggestions, for which the authors thanks him warmly.

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Received: September 9th 2024
Revised: October 13th 2024
Accepted: March 30th 2025