

## *Anomodon longifolius* (Anomodontaceae, Bryopsida) new to the bryophyte flora of Turkey

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**Abstract:** *Anomodon longifolius* (Schleich. ex Brid.) Hartm. is reported for the first time from Turkey, bringing the total number of *Anomodon* species known from Turkey to 6. This record extends its distribution range to the Western Black Sea region of Turkey. The nearest localities to Turkey for this species are in Bulgaria, Greece, the Caucasus, and Iran. This submeridional species was collected from 3 different localities (in Bolu and Bartın provinces) in Turkey. A site description, illustrations, and diagnostic characters of the Turkish specimens are given, together with notes on its distribution and ecology.

**Key words:** Bryophytes, *Anomodon*, mosses, Anomodontaceae, Turkish bryoflora

### *Anomodon longifolius* (Anomodontaceae, Bryopsida) Türkiye bryofit florası için yeni

**Özet:** *Anomodon longifolius* (Schleich. ex Brid.) Hartm. Türkiye'den ilk kez rapor edilmektedir. Bu kayıt *Anomodon* cinsinin Türkiye'den bilinen tür sayısını altıya yükseltmektedir. Ayrıca, bu kayıt onun dağılım aralığını Türkiye'nin Batı Karadeniz Bölgesine doğru genişletiyor. Bu tür için Türkiye'ye en yakın lokaliteler Bulgaristan, Yunanistan, Kafkaslar ve İran'dadır. Bu submeridional vejetasyon zonundaki tür, Türkiye'nin Bolu ve Bartın illerinden üç farklı lokaliteden toplanmıştır. Bu yeni kayıt, bir alan tanıtımı, Türkiye örneklerinin şekilleri, teşhis karakterleri, dağılımı ve ekolojisi üzerine notlarla birlikte verildi.

**Anahtar sözcükler:** Bryofitler, *Anomodon*, karayosunları, Anomodontaceae, Türkiye bryofit florası

#### Introduction

Unfortunately, knowledge of the Turkish bryoflora is still far from complete. To date, neither Turkish or foreign bryologists have visited difficult to access

regions, especially in south-eastern Turkey. Nevertheless, some more recent additions (e.g. Uyar, 2003; Uyar & Ören, 2005; Kara et al., 2007; Ezer et al., 2008; Abay et al., 2007, 2009; Uyar et al., 2008; Keçeli

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et al., 2008; Özdemir & Uyar, 2008; Erdağ & Kürschner, 2009; Kırmacı et al., 2009; Tonguç Yayıntaş, 2009) with increasing research activities in the area indicate that quite a number of new discoveries may be expected. In our opinion, rich sources in one respect are older collections from Turkey, which, although sometimes difficult to find, are kept at various herbaria in Europe, including England. One of them is the Turkish bryophyte collection of E. Nyholm, which includes approximately 5500 specimens, kept at the Swedish Museum of Natural History (S). While the second author was studying this collection he discovered the specimens of *Anomodon longifolius* (Schleich. ex Brid.) Hartm., which were collected by Engelmark and Elsa Nyholm in 1974 from the vicinity of Bolu province in Turkey. After that, these specimens were examined and confirmed. Moreover, we recently collected new specimens of this species in the Küre Mountains National Park, which lies between Kastamonu and Bartın, in the Western Black Sea region of Turkey (Figure 1). The specimens are kept at the UYAR herbarium (Zonguldak).

The members of Anomodontaceae similar to Thuidiaceae were previously united with this family. However, the main differences among them are their stems; without paraphyllia, leaf cells; rounded-

hexagonal, papillose and capsules; erect, cylindrical-like as in Leskeaceae. In Turkey this family contains only the members of *Anomodon* Hook. & Taylor.

This genus has about 30 species distributed through Europe, Asia, N. Africa, America, and Australasia (Smith, 2004). *Anomodon* is a small genus represented by 5 species in the Turkish bryoflora: *A. attenuatus* (Hedw.) Huebener, *A. rostratus* (Hedw.) Schimp., *A. rugelii* (Müll.Hal.) Keissl., *A. tristis* (Ces.) Sull. & Lesq., and *A. viticulosus* (Hedw.) Hook. & Taylor (Uyar & Çetin, 2004; Kürschner & Erdağ, 2005; Tonguç Yayıntaş, 2008). Here we report a sixth species of the genus: *Anomodon longifolius*. The nearest localities of *A. longifolius* are in Bulgaria, Greece, Caucasus (Georgia and Azerbaijan), and Iran (Ignatov & Afonina, 1992; Natcheva & Ganeva, 2005; Kürschner, 2006). Apparently, this report contributes a remarkable distributional gap of this species towards south-west Asia. In addition, in this bryological note a description, illustration of the diagnostic characters, and the distribution of this species in Turkey, based on our own records, are given.

## Results

*Anomodon longifolius* (Schleich. ex Brid.) Hartm. (Figure 2).

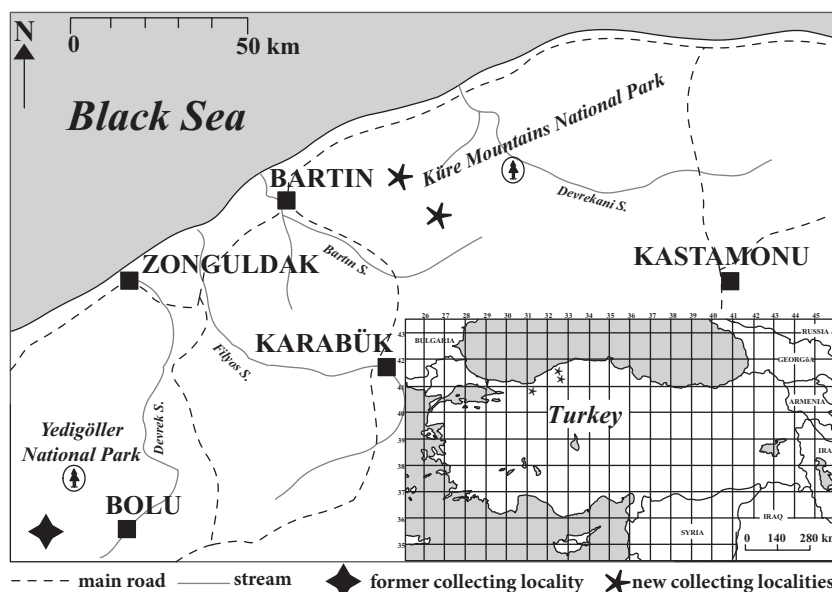


Figure 1. Distribution map of *Anomodon longifolius* in Turkey based on our own records.

Plants rather slender in yellowish green to brownish loosely tufts, primary stems stoloniform, secondary stems 1.5-4 cm long untidy branches, sometimes flagelliform and branches somewhat fasciculate, erect. Leaves loosely and imbricate when dry, erect-spreading, sometimes secund when moist, 1-2.1 mm long, from decurrent ovate base tapering to acuminate apex; margin finely crenulate almost

throughout the leaf; nerve strong, yellowish green, extending to below apex; cells short, incrassate and conically unipapillose on each face, more or less homogeneous rounded-hexagonal 7-10  $\mu\text{m}$  wide in mid-leaf, alar cells faintly enlarged, especially basal marginal cells transversely rectangular. Specimens are sterile.

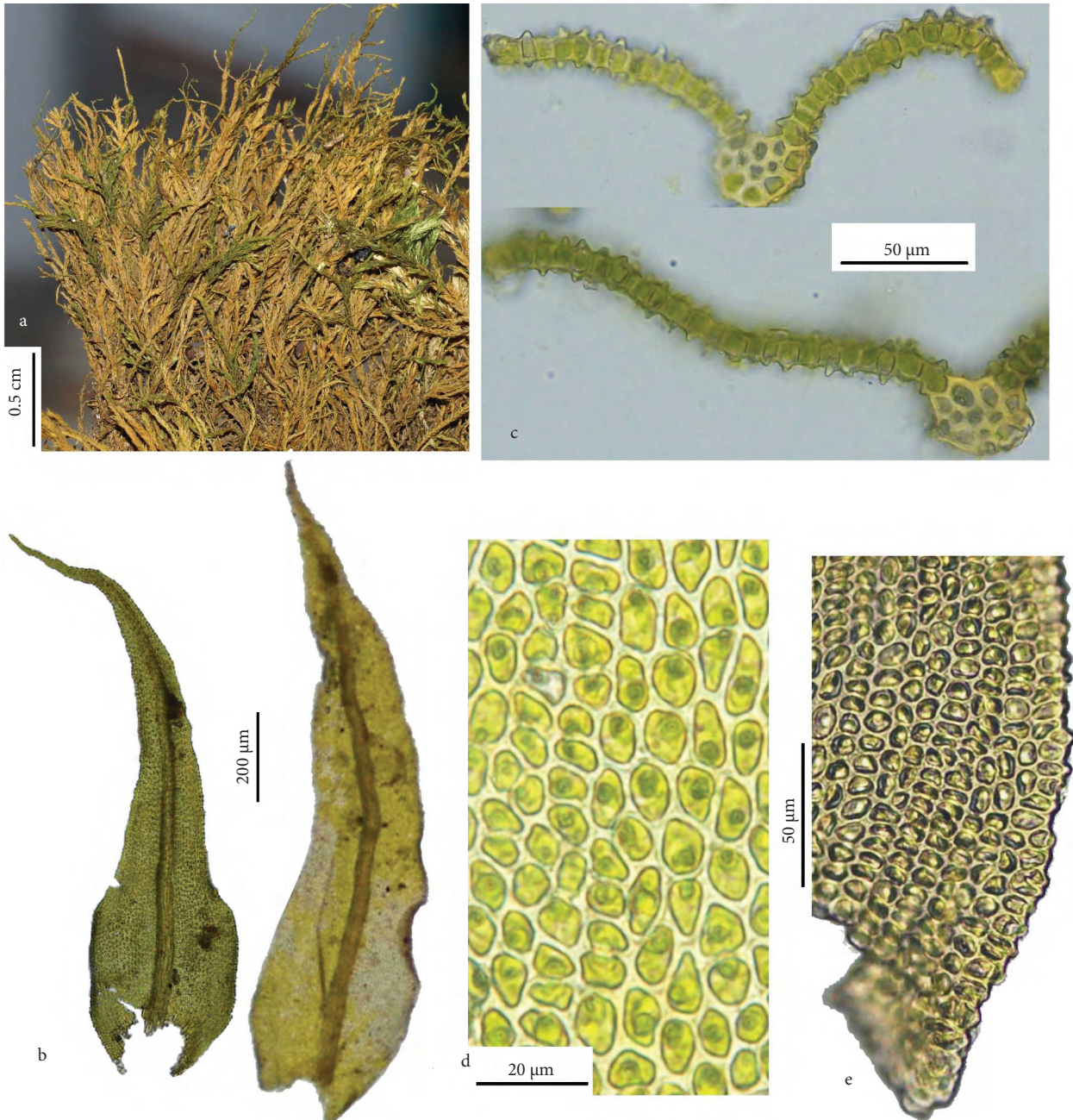


Figure 2. *Anomodon longifolius*: a- Habit, b- Leaves, c- Cross sections of leaf, d- Mid-leaf cells, e- Angular cells.

This species varies in about the same manner as the species of the genera *Heterocladium*, *Pseudoleskella*, and others: in extremely dry and shaded habitats the stems and branches become filiform, strongly elongated and stoloniform with small scattered leaves. On the other hand, when the plant grows in exposed habitats the stems and branches are shortened. However, all forms of *Anomodon longifolius* are easily known by the longly acuminate leaves and leaf cells with unipapillose on each face (Nyholm, 1979).

#### Specimens examined

**Turkey:** Province Bolu, Yeşilköy, around Koru Motel, on trunk of an old *Carpinus betulus* L., ca. 700 m a.s.l., 11.11.1974 T-B. Engelmark & Elsa Nyholm 913/74. Herb. (S) reg. nr. 96610 and 13.11.1974 T-B. Engelmark & Elsa Nyholm 995/74. Herb. (S) reg. nr. 96609.

Province Bartın, Ulus town, Alpi Kayası district in Küre Mountains National Park, on sandstones under mixed forest, ca. 1056 m a.s.l., N 41°38'17.6"E 032°36'56.0", 18.04.2009, ÖREN 22/09; Ulu high plateau, in front of İnönü cave, on rugged limestone under mixed forest ca. 960 m a.s.l., N 41°32'23.0"E 032°46'42.8", 20.04.2009, ÖREN 44/09.

**World Distribution:** Europe, Caucasus (Azerbaijan, Georgia), Siberia, Iran, Sakhalin, Japan, North America (Smith, 2004; Sabovljević et al., 2008; Ignatov & Afonina, 1992; Frey & Kürschner, 1991; Cerda & Düll, 2009).

#### Site Description

The specimens collected in Turkey come from 3 different localities of grey-brown podzolic soils and brown forest soils. New collecting localities of the species in Bartın province usually occur in the under layer of a typical Oceanic climatic forest vegetation, dominated by *Carpinus betulus* L., *Fagus orientalis* Lipsky, *Abies nordmanniana* (Stev.) Spach subsp. *bornmuelleriana* (Mattf.) Coode & Cullen, *Laurocerasus officinalis* Roemer, *Buxus sempervirens*

L., *Corylus avellana* L., and *Taxus baccata* L. However, the former specimens were collected in deciduous mixed forests especially on trunks of old *Carpinus betulus* L. under the type of the East Mediterranean climate precipitation type I, namely the rainiest months of the year are December, January, and February and the least rainy month is August (Akman, 1999). Consequently, collecting sites of all the specimens in Turkey are located in Euro-Siberian phytogeographic region. Already most of the *Anomodon* species are typical components in the understorey of most Euro-Siberian deciduous and evergreen forest formations (Kürschner, 2008).

Accompanying moss species in these localities are epilithic, mesophytic species such as *Anomodon viticulosus* (Hedw.) Hook. & Taylor, *Neckera complanata* (Hedw.) Huebener, *Isothecium myosuroides* Brid. var. *brachythecioides* (Dixon) Braithw., *Plagiopus oederianus* (Sw.) H.A.Crum & L.E.Anderson, and *Timmia austriaca* Hedw., and 1 epilithic, xerophytic species: *Homalothecium sericeum* (Hedw.) Schimp.

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