

## ***Frullania fragilifolia* (Taylor) Gottsche, Lindenb. & Nees (Frullaniaceae, Marchantiophyta), a suboceanic mountainous species new to the bryophyte flora of Turkey**

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**Abstract** – *Frullania fragilifolia* (Taylor) Gottsche, Lindenb. & Nees is a cortico-saxicolous liverwort which is reported for the first time from Turkey. The species is described from material collected in the southern Amanos range (Mount Musa), of the Mediterranean phytogeographic region, which has an oceanic climate with high annual rainfall (937-1124 mm) and strong humid conditions. Turkish plants are described and illustrated.

**Liverwort / *Frullania fragilifolia* / Frullaniaceae / Mount Musa / Turkey / New report**

### **INTRODUCTION**

*Frullania* Raddi is a genus of worldwide distribution, including species with a wide range in holarctic regions and contains over one thousand binomials (von Konrat & Braggins, 2001; Yuzawa, 1991).

The genus is easily recognized by the basically asymmetrically trifid leaf, consisting of a large dorsal lobe; a smaller, often inflated, lobule; and a small, but conspicuous ventral-most stylus. But, species are systematically difficult due to their high polymorphism (Sim-Sim, 1999).

According to the latest list of Turkish bryophytes (Kürschner & Erdağ, 2005), prior to this study, five taxa of *Frullania* have been recognized as occurring in Turkey: *Frullania dilatata* (L.) Dumort. var. *dilatata*, *Frullania dilatata* (L.) Dumort. var. *blanda* De Not., *Frullania jackii* Gottsche, *Frullania tamarisci* (L.) Dumort. var. *atrovirens* Carr. and *Frullania tamarisci* (L.) Dumort. var. *tamarisci*. The present study reports a sixth taxon which was characterized by Düll (1983) as a suboceanic mountainous species of the genus. Description and illustration of the taxon further contributes to the bryoflora of Turkey.

The description and illustrations are based on Turkish herbarium specimens collected from southern Amanos range (Mount Musa) in March 2005 and August 2006. Identification of the specimens were based on the species concepts of *Frullania fragilifolia* outlined and illustrated by Smith (1991); Paton (1999); Arnell (1981); and Sim-Sim (1999). The morphological drawings were

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made with a drawing attachment. Specimens are deposited in the herbaria of ADA and AYDN.

***Frullania fragilifolia*** (Taylor) Gottsche, Lindenb. & Nees

**Figs 1-6**

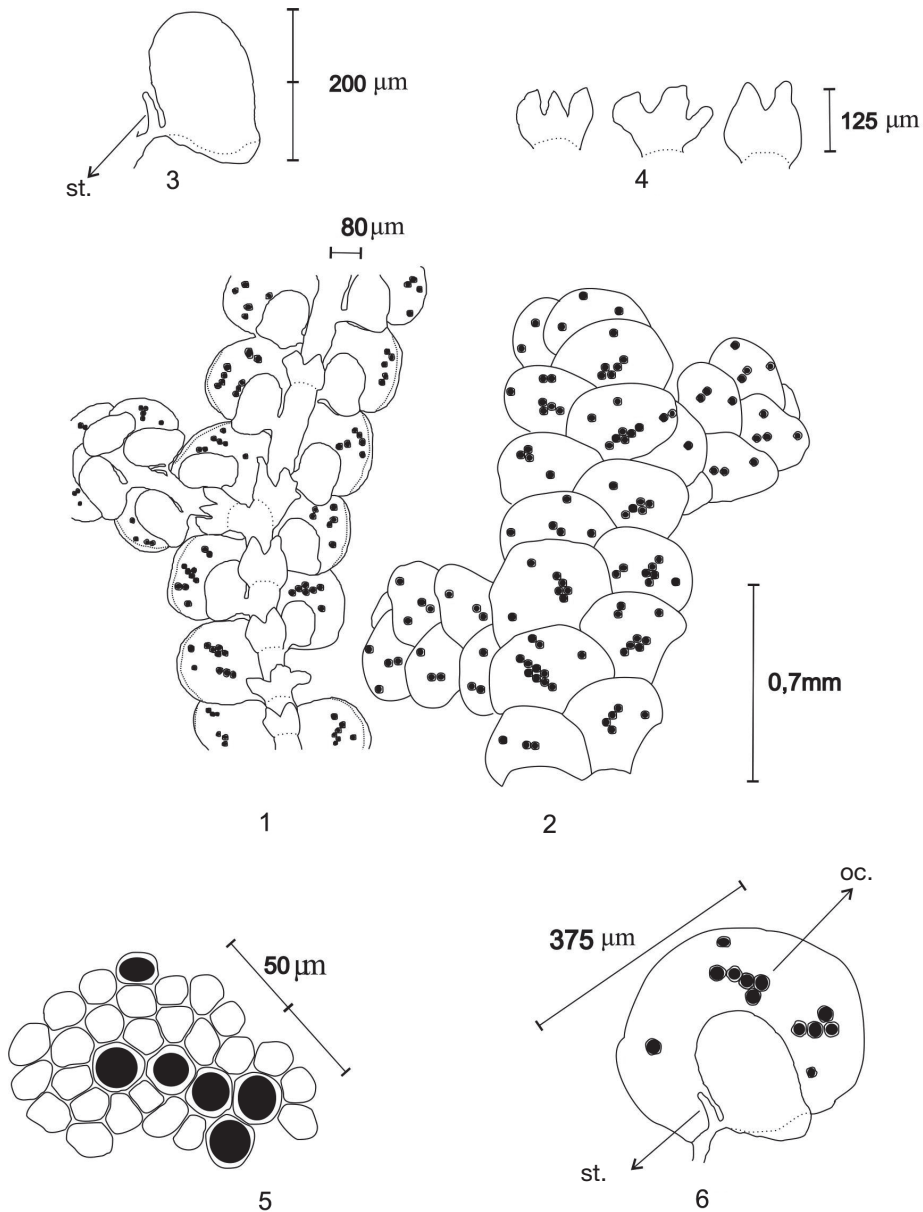
**Basionym:** *Jungermannia fragilifolia* Taylor *Annals and Magazine of Natural History* 12: 172. 1843.

**Plants** thin, glossy, mats, red or reddish brown, to 2cm long with leafy shoots; strongly aromatic. **Leafy shoots** 0,7mm wide; **stem** irregularly 1-2 (-3) pinnately branched and 80 µm wide, partially denuded. **Leaves** approximate to imbricate or sometimes distant; dorsal lobe appressed or elevated, to 375 µm wide and to 450 µm long from antical margin to apex, suborbicular to obliquely ovate, usually convex, apex rounded, plane, or narrowly decurved; ventral lobe mostly obovate, helmet-shape, to 100 × 200 µm, slightly longer than to nearly twice as long as wide, narrower than underleaves, narrowed at base, rarely evolute; stylus uniseriate above, lobed or dentate at base. **Lobe cells** 20-25 µm wide; trigones minute to moderately large and convex; ocelli scattered, present in most leaves and also often in a broad line from base towards mid-lobe. **Oil bodies** 1-3 (4) per cell, 4 × 6 µm, compound, oil bodies in ocelli faintly granular. **Underleaves** 1,5-3 times wider than stem, to 125 µm long, decurrent at base, bilobed, cuneiform, margins plane, edentate, sometimes with a blunt tooth (1-2), sinus mostly 1/4-2/5 underleaf length, acute or narrowly rounded, lobes obtuse, obliquely truncate. **Asexual reproduction** by caducous leaf lobes and lobules. Dioicous, sporophyte unknown in Turkey. **Male inflorescences** to 750 × 660 µm, discoid or reniform in outline, bracts in 2-4 pairs. **Female bracts and bracteole** to 1,2 mm long, about 1/2 bilobed, apices acute or acuminate, terminating in 1-2 cells, or bract lobe broadly rounded, margins dentate-serrate and also variously lobed, usually with numerous scattered ocelli. **Perianths** to 1,0 × 1,5 mm, obovate-obcordate, without ocelli but sometimes with glistening oil globules, **beak** to 110 × 110 µm. Sporophytes rather rare, April-July, October, elaters 11-14 on each valve (Paton, 1999).

**Differentiation:** *Frullania fragilifolia* is easily recognized from other Turkish *Frullania* species by the caducous leaves and partially denuded stems. The rounded leaf lobes differ from *F. tamarisci*. Forms with the ocelli in a median rows of *Frullania fragilifolia* may be confused with *F. microphylla* but differ in the shape of the underleaves. The underleaves of *Frullania fragilifolia* are cuneiform and decurrent at the base, whereas the underleaves of *Frullania microphylla* are oblong, more deeply divided and not decurrent at the base.

#### A key to the *Frullania* species of Turkey

- 1 Dorsal lobes of leaves with ocelli. .... 2  
Dorsal lobes of leaves without ocelli. .... 3
- 2 Plants medium sized, dorsal lobes recurved, apex usually acute, acuminate or apiculate, leaves not caducous, ocelli in an uniseriate ± unbroken line in mid-lob towards apex and towards base ..... *Frullania tamarisci*  
Plants small sized, dorsal lobes plain, apex broadly rounded, leaves sometimes caducous, ocelli scattered. .... *Frullania fragilifolia*
- 3 Ventral lobes helmet-shaped, wide-mouthed, underleaves bilobed, apex acute. .... *Frullania dilatata*  
Ventral lobes hemispherical, underleaves reniform-circular, apex emerginate or entire. .... *Frullania jackii*



Figs 1-6. *Frullania fragilifolia*. 1. Ventral view. 2. Dorsal view. 3. Ventral lobe. 4. Underleaves. 5. Median cells of dorsal lobes with ocelli. 6. Dorsal lobe with ventral lobe (st. Stylus; oc. Ocelli).

**Habitat and substrate:** *Frullania fragilifolia* grows in mixed woodlands of *Quercus cerris* L. and *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe. The taxon preferentially grows on steep or vertical surfaces of acid to base-rich rocks, rarely on limestone, trunks and branches of deciduous woodland, occasionally on

conifers, on lichens and bryophytes. The species is particularly common on trunks of *Pinus nigra* subsp. *pallasiana*.

*Frullania fragilifolia* is acidophytic (pH 4,9-5,6)-sub-neutrophytic [pH 5,7-7,0 (-7,5)], hygrophytic-mesophytic, sciophytic-photophytic, mesotherm-thermophytic (Dierßen, 2001). It has been found together with many associates such as *Frullania tamarisci* (L.) Dumort. var. *tamarisci*, *F. dilatata* (L.) Dumort., *Radula complanata* (L.) Dumort., *Hypnum cupressiforme* Hedw., *Neckera crispa* Hedw. and *Leskea polycarpa* Ehrh. ex Hedw.

**Distribution:** Iceland, Faeroes, Sweden, Norway, Finland, Denmark, British Isles, Germany, Spain, Hungary, Russia, Corsica, Sardinia, Sicily, Aegean Islands, Canaries, Azores, and extending to Japan (Paton, 1999; Smith, 1991; Arnell, 1981; Sim-Sim, 1999; Casas, 1998; Erzberger & Papp, 2004).

Specimen examined:

Turkey, Hatay (Antakya), Samandağ, Mount Musa, Yolaşan place, full shade, moist, northern slope, in *Quercus cerris* L. forest, on trunk of *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe., northern exposure alt. ca 950 m, coll. Ezer, 31.08.2006, T.E.1433 (36° 13' 613" N and 35° 54' 061" E); Hatay (Antakya), Samandağ, Mount Musa, İkiztepe, Dumangözü place, partial shade, moist, northern slope, in *Quercus cerris* L. forest, on trunk of *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe., northern exposure alt. ca 1115m, coll. Ezer, 19.03.2005, T.E. 1285 (36° 14' 796" N and 35° 54' 381" E).

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