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Dicranum tauricum Sapjegin (Dicranaceae) new for the Canton of Geneva, Switzerland.

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Abstract

Dicranum tauricum Sapjegin, alternatively known as *Orthodicranum tauricum* (Sapjegin) Smirnova, is newly reported from the canton of Geneva. It is found on native and non-native trees planted in the Botanical Garden and adjacent public parks on the northern shore of Lac Léman (Lake Geneva). Geneva populations grow as scattered tufts of a few stems that are up to 15 mm in height. Vegetative propagules were observed on broken leaf apices of *in situ* populations of *D. tauricum* in Geneva and on both the broken leaf apices and leaf-tip fragments of this species grown in *in vitro* culture.

Introduction

Dicranum tauricum Sapjegin, a small acrocarpous moss in the Dicranaceae, is found in Europe and North America where it grows mainly on tree trunks or rotten wood as compact cushions or tufts (Nebel & Philippi, 2000; Hedenäs & Bisang, 2004; Smith, 2004; Enroth, 1989). This species has stems up to 40 mm tall and it can be recognised by its lanceolate, erect and mostly straight leaves that are stiff and fragile in the upper part (see illustrations and treatment in Ignatova & Fedosov, 2008), a characteristic it shares with both *D. viride* Sull. & Lesq. and *D. fragilifolium* Lindb. *Dicranum tauricum* differs from the two latter species, and in fact from all other European members of *Dicranum* subgen. *Orthodicranum* Bruch & Schimp., by its lack of stereid bands in the costa, seen in cross-section (Hegewald, 1991a: 118). *Dicranum tauricum* is dioicous (separate male and female plants) and, across many parts of its range, it is rarely found in fruit. The propagation and dispersal of this species, at least on a local scale, is effected by vegetative propagules (perennial protonemal gemmae - see Duckett *et al.*, 1998; Duckett & Ligrone, 1992) or by fragmentation of the plants themselves, namely of the leaf tips (Enroth, 1989). Propagules have been seen developing on protonema filaments, and from broken leaf apices and leaf-tip fragments in culture and on the broken leaf apices of plants in wild populations in Geneva (Fig. 1).

The recognition of the genus *Orthodicranum* in floras and regional treatments differs with some authors recognising it at the generic level and others as a synonym of *Dicranum* (Allen 1998; Corley *et al.*, 1982; Enroth, 1989; Hill *et al.*, 2006; Ignatova, & Fedosov, 2008). Herein, to accord with the Bryophyte Redlist of Switzerland (Schnyder *et al.*, 2004) all *Dicranum* subgen. *Orthodicranum* Bruch & Schimp. members are treated under the genus *Dicranum*.

Dicranum tauricum in Europe

Dicranum tauricum was considered a boreal and montane-sub-oceanic species (Gradstein, 1970; Hegewald 1972) but Enroth (1989), on evaluating the distribu-

tion data for this species, remarked that it extended further northwards in oceanic areas, often into the northern boreal zone, whereas it was restricted to temperate to southern boreal zones in continental areas. This species has now been reported from a far more extensive range across Europe incorporating Scandinavia, the countries of western, central and eastern Europe (Enroth, 1989; Erzberger, 1999; Fojcik, 1998; Nebel & Philippi, 2000; Sabovljevic, 2008; Hegewald, 1991b, Hill *et al.*, 2006) and the territories of the former USSR (Ignatov & Afonina, 1992; Czernyadjeva, 2005). Hegewald (1991b) questioned the notion that this species was spreading within Europe citing that it was possibly overlooked due to its association with often bryologically poor habitats or the possible confusion of it with other taxa. If this species has indeed been spreading then an alternate hypothesis is that its spread could be linked to acidification (Söderström, 1992; Farmer *et al.*, 1992; Hedenäs & Bisang, 2004), as it is considered an acidophilous species that is slightly toxitolerant (Frahm, 1998). In the absence of detailed historical inventories of areas where it has now been recorded establishing its status as a “new arrival” remains problematic.

Dicranum tauricum in Switzerland

At the beginning of the 1900's this species (under *Dicranum strictum* Schleich. ex D. Mohr *nom. illeg.* = *D. tauricum*, fide Corley *et al.*, 1981), was reported from around twenty localities in Switzerland (see in Amman *et al.*, 1918). Collection records from before 1978, mostly from between the late 1800's and early 1900's, are known from the following cantons: Bern (6), Jura (1), Tessin (2), Vaud (15), and Valais (34) (NISM, 2008). This species was reported by Amman *et al.* (1918) to be an ‘Xérophile. Humicole. Calcifuge tolerant’ species and it was considered to be most frequent in the altitudinal range of 1000 to 2400 m in the Jura and Alps (Rhône basin, and the Aar and Po). Currently, collections made between 1978 and 2008 are known for the cantons of Aargau (5), Basel (1), Bern (1), Grisons (3), Neuchâtel (1), Tessin (1), Valais (21), Vaud (1) and Zürich (2) (NISM, 2008). This species in Switzerland is placed in the category Least Concern (LC) in the Bryophyte Redlist of Switzerland (Schnyder *et al.*, 2004).

Dicranum tauricum in Geneva

The first catalogue of mosses from the Geneva region (Guinet, 1888) contained only one report of *D. tauricum*, as *D. strictum*, from “Le Buet” in the Département Haute-Savoie, France (Burgisser & Price, 2005). This species has recently been collected from the canton of Geneva and is reported herein as a new cantonal record. It was first found growing on a pine tree in the Botanical Garden and was subsequently observed on trees (*Catalpa*, *Quercus*, *Sequoia*) in the city parks bordering Lac Léman (Lake Geneva).

Geneva specimens: Canton of Geneva. Commune of Chambésy: Jardin Botanique, entre la Villa du Chêne et la volière. Sur le tronc d'un conifère (*Pinus nigra* Arnold), 03.11.2003, *Burgisser s.n.* (Herb. Burgisser). Commune of Ge-



Fig. 1. Gemmae in *Dicranum tauricum* Sapjegin. Gemmae and chloronema filaments formed on a broken leaf apex (A). Protonemal gemmae (B). Plants grown in anoxic culture on Parkers medium from specimen Price & Buck 3689 (G). Photos by Sarah Buck.

neva: Park Barton, on large Oak between WTO carpark and International College. Branches fallen from tree, 28.07.2003, *Price, Maier & Burgisser 2917* (G); Next to entrance to Parc de l'ancien BIT. On trunk tree near WTO carpark, 16.11.2004, *Price 3676* (G); On tree near to parking lot of WTO (in Park Barton). On bark of *Catalpa* sp., 30.11.2004, *Price & Buck 3689* (G); 27.02.2009, *Price & Lang 3813* (G); In plantation of *Sequoia* next to International College. On *Sequoia* trunk, 4.12.2005, *Price 3743* (G). To date all populations found in Geneva are epiphytic and all are rather depauperate (stems no more than 15 mm in height and growing in tufts of up to 3-4 stems).

Distribution and ecology in Geneva

In Geneva *D. tauricum* is currently known from planted native and non-native trees in the Botanical Garden and its adjacent lakeside public parks. It grows in scattered tufts of several stems in the crevices of tree bark, presenting a very different aspect to populations from more natural habitats within Switzerland, and elsewhere, where the plants tend to form small cushions or compact tufts. In Geneva it is frequently found in association with *Dicranoweisia cirrata* (Hedw.) Lindb., a species first reported from a tree in one of the city parks in Geneva in 1990 (Papert, 1990). Both species are assumed to be relatively recent arrivals in the canton as no specimens of either species have been found in G (misidentified or otherwise) and no mention of them was made by the bryologists who were active in the canton a century ago (Guinet, 1888; see records in Burgisser & Price, 2005).

Taxonomy of *Dicranum tauricum*

Some interesting nomenclatural and taxonomic issues are associated with the species *D. tauricum*, as discussed in Gradstein (1970). The date of the valid publication of the name *D. tauricum*, the whereabouts of type material for it and its relationship to the illegal homonym *D. strictum* Schleich. ex. D. Mohr described based on material collected from Switzerland are all currently under investigation (Price *et al.*, in prep.).

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