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An updated list of the bryological literature on Iran

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Abstract: This paper presents the most up-to-date list of bryophyte literature on Iran. Hundred and one published and two unpublished documents since 1860 are listed. The most recent recorded number for bryophytes of Iran based on the various publications is 534 species. The history of the exploration of the bryoflora of Iran is also presented.

Key words: bryophytes, Asia, bibliography, flora.

Introduction

This paper presents the updated compilation of published papers on Iranian bryophytes. Kürschner & Frey (2011) published a systematic treatise on liverworts, mosses and hornworts in Southwest Asia including identification keys to genera and species. This survey includes the area of the Islamic Republic of Iran, but some contributions published by Iranian bryologists have not been cited.

As background information, a brief history of the bryological exploration of Iran and on the eco-geography of the country is given.

History

The first taxonomic exploration on the bryophytes of Iran dates back to Buhse's investigation in 1860 where 43 species in 16 genera and 13 families were recorded. This study was followed by several European investigations (Juratzka & Milde 1870, Fehlner 1885, Brotherus 1888, 1892, 1906, Wettstein 1889, Schiffner 1897, 1901, 1908, 1913, Bornmüller 1908, 1910, 1911, 1915, Nicholson 1920, Baumgartner 1939, Gilli 1941, Froehlich 1950, 1952–53, 1959, Reimers 1957, Rungby 1959 and Jovet-Ast 1960). In 1959 Wendelbo, the curator of the botanical garden of the University of Bergen, visited various parts of Iran (Wendelbo 1961) to make collections of vascular plants. Some bryophytes (mosses) were also collected and handed over to Størmer for identification. Størmer (1963) studied these collections and listed 89 determined species. The mosses of Iran have also been studied by Kilpper (1964), Townsend (1966), Tregubov & Tregubov (1969–70) and Frey & Probst (1973, 1974, 1974a). The liverworts which were listed by Frey in 1974 report approximately 30 species. Frey & Kürschner (1977, 1983) during a geobotanical research trip to Iran, added 63 (23 + 40,

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respectively) moss taxa as new to the bryophytic flora of Iran's northern provinces. They also described some epiphytic moss taxa of north Iran in their atlas (Frey & Kürschner 1979) and gave a first overview on the literature of the bryophytes related to Iran (Frey & Kürschner 1981). In their paper 18 references to hepatics and 30 references to mosses were reported. These authors described Iranian highlands as being distinguished by the large number of species and their wealth of neoendemic species, hence referred to the Hyrcanian forests on the southern coast of the Caspian Sea for its paleoendemics taxa. For instance, *Palamocladium euchloron* (family Brachytheciaceae) is regarded as a tropical relict species split off and adapted to conditions in this forest area.

In 1997 Kürschner presented a list of the bryological publications on Iran and other SW Asian countries. Since the beginning of 21th century, several investigations have been made by the above-mentioned bryologists as well as some Iranian botanists (Kürschner 2001, Kürschner 2008, Kürschner et al. 2000, Akhani & Kürschner 2004, Kürschner & Frey 2011, Fereidounfar et al. 2011, Shirzadian 2011, 2012, Shirzadian et al. 2011, 2014, 2015; Zare et al. 2011, Akhoondi Darzikolaei et al. 2014).

Based on the latest publications the total number of species of bryophytes in Iran has reached 534 species: 2 hornworts (Anthocerotophyta), 70 liverworts (Marchantiophyta) and 462 mosses (Bryophyta).

Eco-geography

Iran, with about 1,684,000 km^2 surface area, is mainly known as a mountainous country. As Zohary (1973) mentioned "The striking topographical feature of this country is that its central part is tightly barred by more or less complex mountain ranges". This central part, usually termed the Central Iranian Plateau, is a very dry desert area. The mountain ranges that surround this plateau are part of the "Alpid folding system". Because of its geographical situation, Iran has a very diverse climate and consequently a rich flora.

However most parts of Iran do not provide preferred habitats for bryophytes, there are two regions with considerably diverse biotopes for a wide range of bryophytes: the Alborz Mountains with their adjacent forests located in the northern part of Iran, and Zagros Oak Steppe forests, forming a rather broad belt in western and South-western Iran (Zohary 1973).

Endemic species

According to Kürschner & Frey (2011), six endemic species can be found in Iran:

Bryum pseudotriquetrum (Hedw.) P. Gaertn., B. Mey. & Scherb. var. *bornmülleri* Schiffn. (Bryaceae);
Philonotis seriata Mitt. var. *persica* Schiffn. (Bartramiaceae);
Pseudoleskeella laxiramea (Schiffn.) Broth. (Leskeellaceae / Pseudoleskeellaceae);
Rhynchostegiella teneriffae (Mont.) Dikse & Bouman var. *persica* (Schiffn.) Kürschner (Brachytheciaceae);
Tortula demawendica Schiffn. (Pottiaceae);
Trichostomum mildeanum Jur. (Potticeae).

This low percentage of endemism in the bryoflora of Iran is surprising compared to the high number of endemic species in the flowering plants. This may be the result that the bryoflora of Iran is an immigrant flora and maybe also the ancient hyrcanian forests are not the centre of genetic diversity for at least part of the bryophytes. But it may also be the result of the incomplete exploration of the Iranian bryoflora.

Number of bryophyte specimens in Iranian herbaria

Based on Index Herbariorum (THIERS 2008+) around 820.000 specimens are deposited in Iran's indexed herbaria (25 herbaria). But it is estimated that, the amount of collections which are not indexed may have ¼ to ½ of the specimens given in the indexed herbaria. Therefore the total of the plant specimens in Iranian herbaria may range between 1,000.000 to 1,200.000 (nearly 1,500.000, most optimistically).

However, the information for specimens of bryophytes collected by the authors give a percentage of estimated 0.4 to 0.5 percent of the total specimen number, i.e. around 5000 specimens of bryophytes. This is due to the fact that most of the historic collections are housed in European herbaria and there are still few specialists working in Iran.

Future

An important necessary task is the preparation of an up-to-date checklist of the bryophytes of Iran, replacing the ones published by GHAHREMAN et al. (2003) and AKHANI & KÜRSCHNER (2004). This checklist could be a web-based infrastructure with day-by-day updates.

Iranian botanical literatures on bryophytes

The followings list embraces all found references concerning the bryophytes of Iran. The journals are cited with the abbreviations following BRIDSON (2004).

An analysis of the places of publication shows a historic centre in Vienna (14 publications – the specimens could be found in W or WU) and an active working group in Berlin (specimens in B, resp. BSB). Iranian contributions are mainly published in Rostaniha (11) or Iranian Journal of Botany (7).

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