A RECORD OF CYSTOPTERIS REGIA (L.) DESVAUX (PTERIDOPHYTA), FROM IRAN

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Cystopteris regia (L.) Desvaux *(Pteridophyta)* is recorded from Iran. Based on morphological, sporological and ecological investigations, it is possible to distinguish this species from *C. fragilis* (L.) Bernh. and *C. dickieana* Sim. Its discovery in the Elburz mountains represents an extension of its range. In western Eurasia *C. regia* is now known to occur from the Pyrenees in western Europe to the Caucasus and Elburz in the East.

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گزارش گونه‌ای از سرخس *(Cystopteris regia)* از ایران

توماس دنک

گونه *Cystopteris regia* (L.) Desvaux از ایران گزارش می‌گردد. این گونه براساس ویژگیهای ظاهری، هاگ و اکولوژی از گونه‌های *C. dickieana* Sim. و *C. fragilis* (L.) Bernh. قابل تفکیک است. انتشار گونه *C. regia* در منطقه اروپا - آسیای غربی از پیرنه در غرب اروپا تا قفقاز و کوههای البرز گسترش می‌یابد.

Introduction

In the course of an expedition to Iran in September 1996, which the author undertook in connection with a research project sponsored by the Austrian Science Foundation (FWF, project 11412-BIO), *Cystopteris regia* (L.) Desvaux was encountered. Formerly, Parsa (1978) recorded the species from Iran as *C. regia* (L.) Presl., but without referring to a herbarium specimen, giving a questionable distribution for the species. The herbarium material yields spores, which enable it to be differentiated from *C. dickieana* Sim. A light microscopic and electron microscopic (SEM) investigation coupled with an investigation of the morphology of the frond confirmed the identity as *Cystopteris regia* (L.) Desvaux. It is possible to distinguish this species from *C. fragilis* (L.) Bernh. on both morphological and ecological grounds. *C. regia* appears to be restricted to mountainous regions from western Europe to the Caucasus and Elburz, while *C. fragilis* is subcosmopolitan and occurs over a wide rage of altitudes (Tryon & Lugardon 1991). The species and its habitat in Iran are described and the systematic position of *C. regia* within the *C. fragilis* species aggregate discussed.

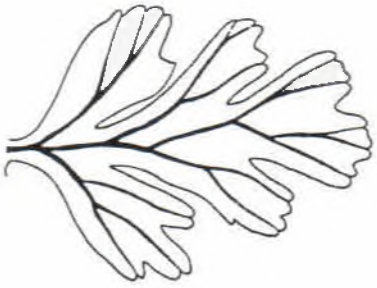

Fig. 1. *Cystopteris regia,* part of frond showing end pinnules emarginate, the notch being fed by a vein (×10).

Diagnosis

Habit similar to *Asplenium fissum* Kit. ex Willd. Length of frond (13-) 14-16 (-18) cm, maximum breadth 4-5 cm. Petiole (4-) 7-8 (-9) cm. Frond including petiole broadly lanceolate, ratio of lamina to petiole (2.8-) 2-15: 1. End pinnule mostly emarginate, the notch being fed by a vein (see Fig. 1) (In *Cystopteris fragilis* the vein ends in an acute apex.) Spores 27-29 μm in diameter and (40-) 41-43 (-44) μm in length. Spores with echinate perispore when fully mature (plate I, nos. 1, 3, 5), smooth when immature (plate I, no. 2).

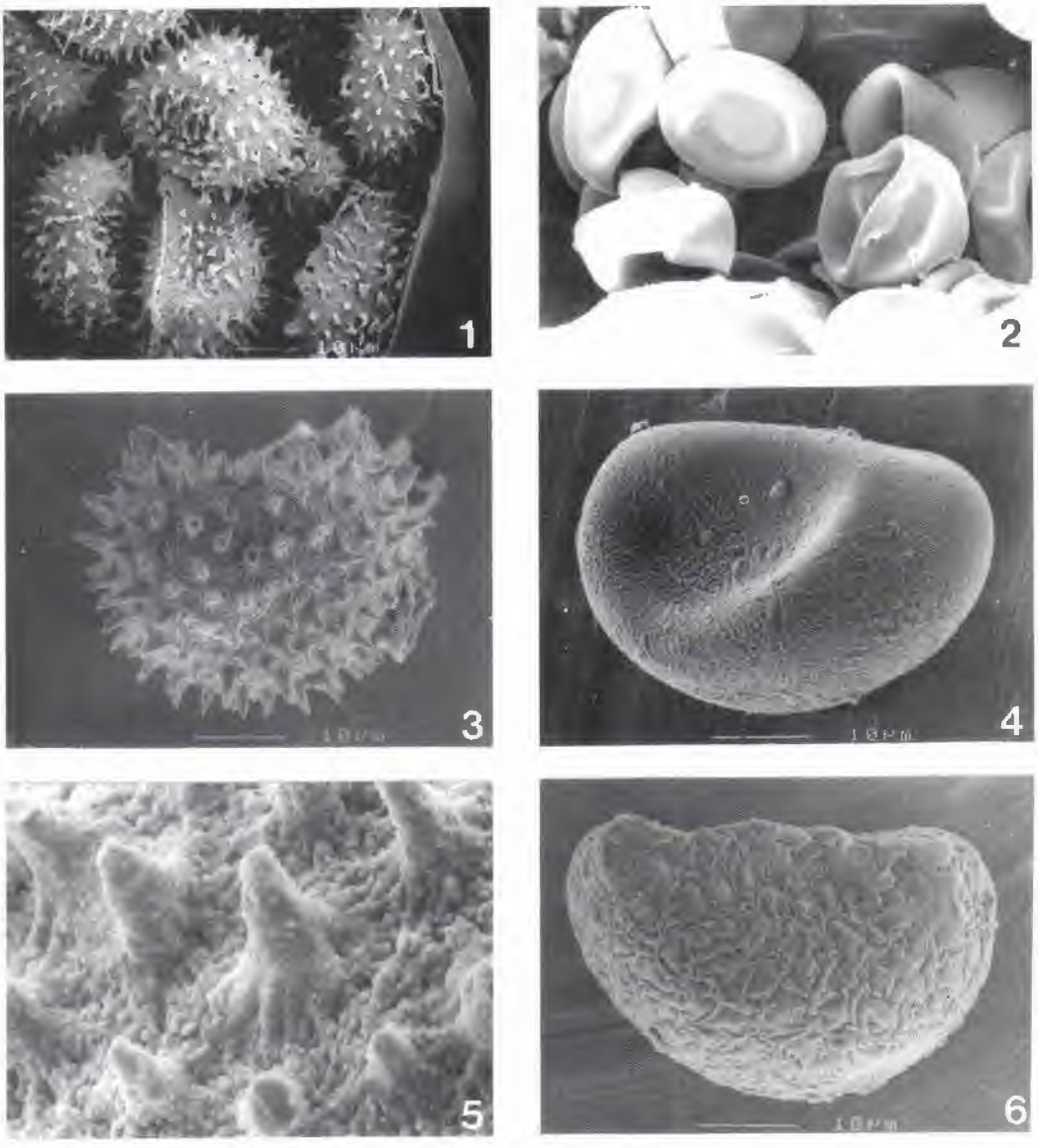

Plate I. Spores in *Cystopteris regia*. -Nos. 1, 3, 5. fully mature with echinate perispore; no. 2. immature; no. 4. after acetolysis with smooth surface; no. 6. rugate surface.

Spines of echinate spores 2-3 μm long, at least their own width apart. After acetolysis (artificial fossilisation) the perispore is sometimes removed, resulting in spores with a smooth surface (exospore, plate 1, no. 4). In addition a type with rugate surface occurs (plate 1, no. 6).

Locality

Northern Iran, East Central Elburz, Province Mazandaran, Sangdeh near Pol-e-Safid, between Sngdeh, and the mountain Naro (Rocky Mountain). Altitude 2200-2300 m above sea-level.

Habitat

Limestone scree covered by large populations of the fern surrounded by *Arabis rimarum , Sedum lenkoranicum, Cruciata glabra, Alchemilla* sp., *Symphyandra odontosepala, Daphne pontica, Berberis integerrima.* The last two named form a transition to knee-high *Fagus orientalis,* which finally leads to fully developed beech forest.

Discussion

In Davis (1965) *Cystopteris regia* is considered to be a synonym for *C. fragilis.* In Europe (Tutin et al. 1993; Hegi et al. 1984; Fischer 1995) and the Caucasus (Komarov 1934; Gagnidze 1971; Latschaschvili & Mamukelaschvili 1986) the species are thought to be distinct. The differentiation appears to be acceptable on both morphological and ecological grounds. *Cystopteris regia* is a species of high altitudes and tends to occur in open habitats, e. g. limestone scree and wet rocks. Dostal (in Hegi et al. 1984) distinguishes two varieties of *C. regia:* var. *regia,* which is typical for subalpine altitudes and var. *alpina*, which occurs in high alpine areas. The Iranian type is close to var. *regia.*

Cystopteris fragilis ranges from lowlands to highlands. It is basiphilous, but is also found in humid forests on silicate rocks. In Iran as a whole it is a characteristic species of shaded, moist broad-leaved forests.

In temperate western Eurasia *Cystopteris fragilis* and *C. regia* are found in more oceanic regions than *C. dickieana* (Hörandl 1989). Only in the boreal zone and in inner alpine regions does. *C. dickieana* become more common and spreads into oceanic areas (Iceland, Scotland, Scandinavia; Jalas & Suominen 1972, Map 88). In North Central Siberia and northeastern Siberia *C.*

dickeana is more widely distributed than *C. fragilis* (Malysev 1976 p. 92; Krasnoborov 1988 p. 136). The occurence of *C. dickieana* on the humid flanks of the Elburz mountains, which Wendelbo (1976) considered a possibility but was unable to prove for lack of sporulating material, is therefore unlikely. On the other hand, the occurrence of *C. regia* in Iran represents a plausible extension of its range from the Alps to the Great Caucasus.

The morphological differentiation based on the end pinnules (emarginate versus acute) can be easily ascertained using Iranian herbarium material. In this way it should be possible to establish the distribution of both species more accurately. Collectors should be made aware of the distinctions, so that they take more note of differences in the habitat. This would help in any revision of the *C. fragilis* species aggregate.

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