

**A natural bi-generic fern hybrid between *Christella dentata* and  
*Pneumatopteris afra*, from Ghana**

**Nat. Quansah**

Biological Sciences Department, University of London, Goldsmiths' College,  
New Cross, London SE14 6NW, U.K.

and

**David S. Edwards**

Botany Department, University of Cape Coast, Cape Coast, Ghana

An illustrated account is given of a natural bi-generic fern hybrid and its putative parents, *Christella dentata* (Forsk.) Holtt. and *Pneumatopteris afra* (Chr.) Holtt. from Ghana.

The hybrid possesses the genomes of the two parents ( $n = 144$  for the hybrid and  $n = 72$  each for *C. dentata* and *P. afra*) and is easily distinguished from them by having crenate to pinnately-lobed pinnae margins, 2–3 pairs of veins anastomosing; glabrous to setose sporangia and abortive and abnormal spores.

The hybrid is found where the putative parents grow together and these three taxa are widespread in the forest zones of Ghana.

**Biology and distribution of *Asplenium s.l.* in the West Balkans**

**A. Z. Lovric**

Coastal Botany and Herbarium Adriaticum, Institute 'R. Boskovic',  
P.O. Box 1016, YU-41001, Zagreb, Yugoslavia

*Asplenium sensu lato* is the most abundant and diversified fern genus in limestone karst and ophiolite mounts of the Dinaric Alps and Adriatic Archipelago of Yugoslavia. Much of its abundance derives from the considerable drought-tolerance of members of this genus.

*Asplenium hybridum* (Milde) Bange is endemic to the Kvarner islands (northeast Adriatic), and its new northernmost localities are in the Krk and Prvic isles (Senj Archipelago). It occurs mostly in the aerosaline maritime rockwoods of semi-temperate pseudomaquis type (*Quercus virgiliana*–*Euphorbia wulfenii* communities), and this species is one of the most resistant native ferns to high soil salinity. Horvatic (1939) and his subsequent collaborators have listed *A. hybridum* as a member of coastal cave and maritime spring habitats in *Adiantum capillus veneris*–*Phyllitis sagittata* communities, in the eastern Adriatic. These records are, however, problematic, for the morphology, cuticular structure, and karyotype ( $2n = 72$ ) of these specimens suggest their close affinity to the salt-tolerant *A. sagittatum* f. *hemioniti-folium*.

The earlier indications of *Ceterach officinarum* DC. in the inland calcareous rocks of Croatia are now known to be *A. javorkeanum* (Vida) Soo. This latter species is very

frequent, together with *A. dolomiticum* Love, in at least one hundred localities across the karst plateaus of Lika and Kordum, mostly in *Cymbalaria pallida* communities. Both *A. dolomiticum* and *A. javorkeanum* are also present on Adriatic coastal mounts and on the insular peaks of Cres, Krk, Brac and Peljesac. True *A. ceterach* L. is limited to the very coast and isles. It is excessively rare inland and restricted to a few cliffs and gorges in the ophiolite mounts of northern Bosnia and central Croatia (Mt Zrinska Gora). Here it grows in *Cheilanthes marantae*–*Polygonum moesiacum* communities, together with *A. cuneifolium* Viv., *A. adulterinum* Milde and *Cheilanthes marantae* (L.) Domin. Former records of all these species (e.g. Schlosser and Vukotinovic 1869) elsewhere on calcareous mountains of Croatia are unsubstantiated and remain problematic. *Pteridium tauricum* Grossg. has been confirmed recently for the northeast Adriatic coast, and for the intermontane valleys of the west Dinaric Alps, growing in xeric oakwoods and pinewoods on both limestone and serpentine.

The interesting affinities and co-existence of *A. scolopendrium*, *A. sagittatum*, *A. hybridum*, *A. javorkeanum* and *A. ceterach* growing sympatrically in the Kvarner isles is a centre for the *Phyllitis*–*Ceterach* complex in the northeast Adriatic. Their origin here may be related to the Adriatic microplate drifting across the Tethys ocean during Cretaceous–Paleogene. Thus Lovric (1975) proposed a revised genus *Phyllitis* Hill with the section *Phyllitis* (incl. *P. scolopendrium*, *P. sagittata*, and *P. hybrida*), and section *Ceterach* (DC.) Lovr., to include *Phyllitis javorkeana* (Vida) Lovr., *p. ceterach* (L.) Lovr. and *P. aurea* (Link) Lovr.

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### Hybridisation and speciation in the genus *Dryopteris* in Pico, Azores

Mary Gibby and Christopher R. Fraser-Jenkins

Department of Botany, British Museum (Natural History), Cromwell Road,  
London SW7 5BD, U.K.

The species and hybrids of *Dryopteris* in Pico have recently been described in detail by Fraser-Jenkins (1983). Five species are present (two of which are endemic) and they have given rise to five endemic hybrids. Cytological analysis of the species and hybrids has elucidated the inter-relationships of the species, and provided evidence that one of the species has evolved in the Azores, by hybridisation and chromosome duplication. This is described in Figure 1.

Of the hybrids, only one clump has been found of *D. × picoensis*, but two or more individuals of each of the other hybrids are known from Pico. Considering these finds were made in two days of field work, there appears to be quite a high frequency of hybridisation in the island.

Both the tetraploid species, *D. dilatata* and *D. crispifolia*, have been shown to be allotetraploid (Gibby *et al.* 1978; Gibby, in prep.), and chromosome pairing in all the