PTERIDOPHYTA

SYSTEMATIC STUDIES IN THE GENUS *MOHRIA* (ANEMIACEAE). V. KARYOLOGY

Mohria Sw. *Actinostachys* Wall., *Anemia* Sw., *Lygodium* Sw. and *Schizaea* J. Smith constitute the schizaeoid ferns. They are commonly placed in a single family, the Schizaeaceae (Engl. & Prantl 1898–1902; Bower 1923; Christensen 1938; Copeland 1947; Tryon & Tryon 1982; Tryon & Lugardon 1991) because of their sporangium morphology. The 'schizaeaceous' sporangium type, however, appears to be polyphyletic (Mickel 1974) and the morphological differences between these genera are significant. The subdivision of this assemblage into distinct families, the Anemiaceae (*Anemia* and *Mohria*), Lygodiaceae (*Lygodium*) and the Schizaeaceae (*Actinostachys* and *Schizaea*) has therefore recently gained wider acceptance (Nayar 1970; Bierhorst 1971; Löve *et al.* 1977; Clifford & Constantine 1980; De la Sota & Morbelli 1987).

Anemia and *Mohria* are dissimilar in frond morphology but are evidently related in view of similarities in their anatomy (Prantl 1881; Bower 1918; Roux *et al.* 1992), trichomes (Mickel 1962; Roux 1992a) and spores (Nayar 1968; Roux 1992b). The similarity in their chromosome numbers also supports this view.

The chromosome numbers of the genera also endorse the proposed subdivision:

Anemiaceae
Anemia: n = 38 (Mickel 1962; Lovis 1977); n = 76, 114 (Mickel 1982).
Mohria: n = 38 (Mickel 1962; Lovis 1977)

Lygodiaceae
Lygodium: 2n = 56 (Roy & Manton 1965); 2n = 58 (Manton & Sledge 1954; Roy & Manton 1965); 2n = 60 (Wagner 1963; Manton & Sledge 1954); 2n = 112 (Roy & Manton 1965); 2n = 116 (Manton & Sledge 1954); 2n = 120 (Roy & Manton 1965).

Schizaeaceae
Actinostachys: 2n = 280 (Mitui 1973); n = 325 ± 30 (Lovis in Holttum 1959); 2n = ± 1120 (Abraham *et al.* 1962).
Schizaea: 2n = ± 144 (Araujo in Löve 1976); 2n = 154 (Lovis 1958); 2n = ± 188 (Brownlie 1965); 2n = ± 540 (Brownlie 1965).

Prior to this study, the chromosome number of only one of the seven species of *Mohria* currently recognised had been known (Lovis & Roy 1964). Chromosome numbers have now been determined for all the species except for *M. lepigera* (Baker) Baker, for which no live material was available.

MATERIAL AND METHODS

Live plants were collected and cultivated at the National Botanical Garden, Kirstenbosch. Cytological investigations were made either on root tip mitosis, or meiosis in spore mother cells. A minimum of three cells per specimen were examined. Actively growing material was collected and placed in a saturated solution of 1-bromonaphtalene for 12 hours at ± + 4°C. The roots were then washed and transferred to 3:1 absolute ethanol:glacial acetic acid, and stored for 12 hours at –4°C. Hydrolysis was done using 5N HCl for 10–12 minutes at room temperature. The roots were then washed and squashed in aceto-orcein. Photographs were taken on a Zeiss 'Axoscop' photomicroscope using Ilford PanF film, using phase contrast and magnifications of × 1600. Voucher specimens are deposited in the Compton Herbarium (NBG).

RESULTS AND DISCUSSION

For each species, every plant that has been investigated is cited with its locality. Counts obtained from root tip mitosis are given as 2n numbers and those obtained from spore mother cells as an n number.

Mohria caffrorum (L.) Desv.: 2n = 76 (Figure 4A)

CAPE.—3118 (Vanrhynsdorp): summit of Gifberg, (–DD), *Roux 2014*; summit of Matsikamma, (–DD), *Roux 2015*. 3318 (Cape Town): Malmesbury, (–BC), *Duncan s.n.*; western slope of Tierberg, (–DC), *Roux 2005*. 3319 (Worcester): summit of Gydo Pass, (–AA), *Roux 2022*. 3325 (Port Elizabeth): The Meadows, Elands River, (–CA), *Yates 30*.

Mohria marginalis (Sav.) J.P. Roux: 2n = 76 (Figure 4B)

O.F.S.—2828 (Bethlehem): Qwa Qwa, road to the Sentinel, (–DB), *Roux 907*.

Mohria nudiuscula J.P. Roux: 2n = 152

NATAL.—3029 (Kokstad): Weza, Ingeli Forest, (–DB), *Roux 2329*.

Mohria rigida J.P. Roux: 2n = 152 (Figure 4C)

NATAL.—3029 (Kokstad): Weza, Ingeli Forest, (–DB), *Roux 2331*.

Mohria saxatilis J.P. Roux: n = 76 (Figure 5A)

CAPE.—3219 (Wuppertal): road to Heuningvlei, (–AA), *Roux 2000*.

Mohria vestita Baker: 2n = 152 (Figure 5B)

TRANSVAAL.—2730 (Vryheid): 6 km from turnoff to Lüneburg, (–AD), *Roux 2264, 2265*.

LESOTHO.—3027 (Lady Grey): Lebelonyane Pass, (–BB), *Roux 2224*.

CAPE.—3126 (Queenstown): Hangklip, (–DD), *Steiner s.n.*

Lovis & Roy (1964) reported a chromosome number of 2n = 152 for what they believed to be *M. caffrorum*. *M. caffrorum*, however, is restricted to the Cape Province. It is suggested that their material which was obtained from Woodbush in the Transvaal is *M. vestita*, a species common in that area.

Although metacentric and submetacentric chromosomes are present most chromosomes appear to be of the acrocentric type.

CONCLUSIONS

The chromosome numbers reported here confirm the closer affinity of *Mohria* with *Anemia* than with any of the other schizaeoid genera. Two karyotypes, 2n = 76 and 2n = 152, are known in *Mohria* whereas in *Anemia* apogamous triploids and hexaploids have also been reported (Mickel 1962). The base number of x = 38 for *Mohria* and *Anemia*, accepted here is in conflict with that of Löve *et al.* (1977) who claim it to be x = 19.

Aneuploidy occurs in Lygodiaceae and Schizaeaceae but is not known in the Anemiaceae.

ACKNOWLEDGEMENTS

I wish to express my thanks to Jeanette Loedolff for printing the photographs.

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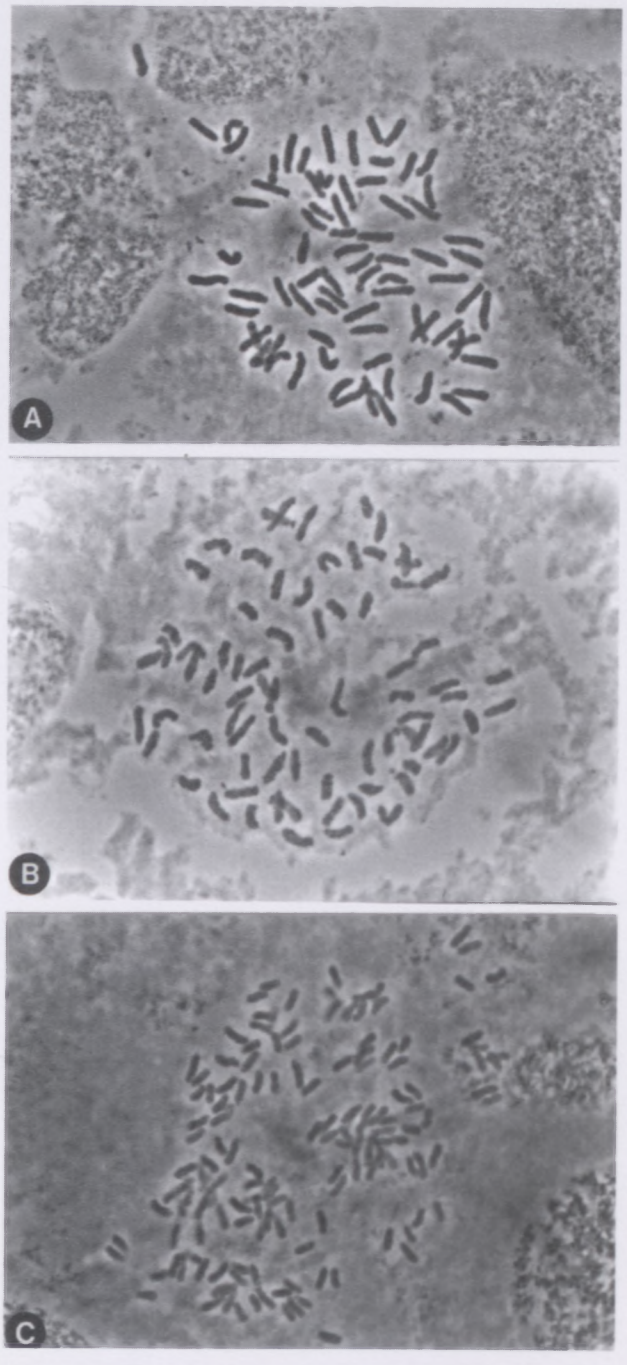

FIGURE 4.—Root tip mitosis in *Mohria* species. A, *M. caffrorum, Duncan s.n.*, showing 76 chromosomes; B, *M. marginalis, Roux 907*, showing 76 chromosomes; C, *M. rigida, Roux 2331*, showing 152 chromosomes.

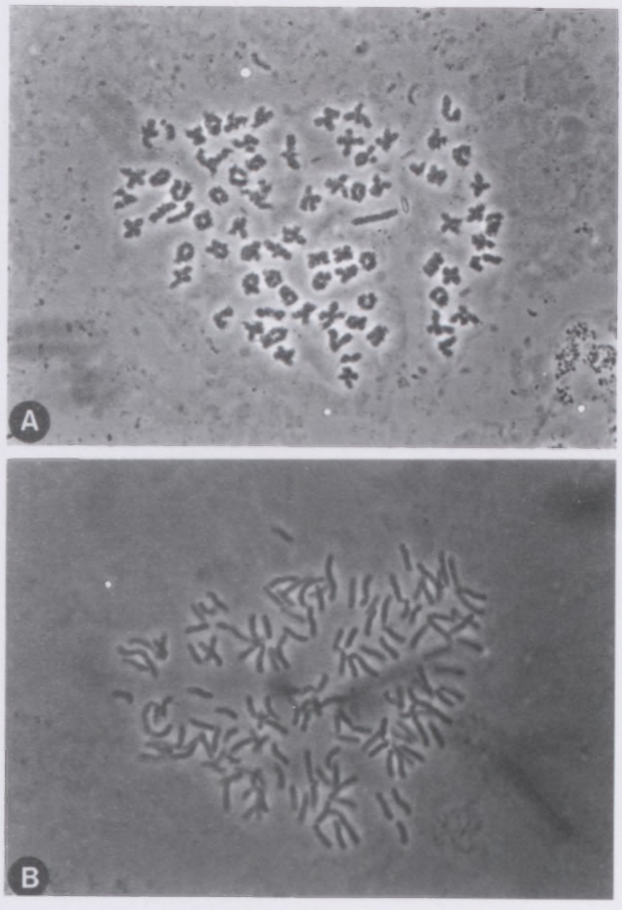

FIGURE 5.—Meiotic and somatic chromosomes in *Mohria* species. A, spore mother cell meiosis in *M. saxatilis, Roux 2000*, showing 76 bivalents; B, root tip mitosis in *M. vestita, Steiner s.n.*, showing 152 chromosomes.

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MS. received: 1993-05-14.