Chromosome Numbers in Some Pacific Pteridophyta

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ABSTRACT: Haploid chromosome complements are recorded for two species of Psilotaceae, and for 36 species and one variety of ferns (27 species from New Caledonia, 7 species and 1 variety from New Zealand, and 1 species from New Guinea).

It is suggested that *Schizaea fistulosa* Labill. and *Schizaea fistulosa* var. *australis* Gaud. are specifically distinct. A further suggestion is made that the cytologically varied species of *Lindsaea* together with such genera as *Loxsoma* and *Leptolepia* may constitute a distinct fern family.

THE VALUE OF CYTOLOGICAL RECORDS of the type listed below lies in the contributions they can make to an understanding of relationships within groups of plants. Information such as this complements earlier morphological work, and can be used only in conjunction with such records, for it is in itself merely another morphological criterion. It can either support previously held views or point the way to more detailed research and possible re-examination of certain accepted relationships.

The majority of chromosome numbers listed here are from New Caledonian species of ferns, this island having been selected because of the great interest that its flora arouses in relation to phytogeography and plant relationships in the Pacific. This island possesses in its fern flora species and genera which are less closely allied to recent Malaysian forms than those in the bulk of Pacific island floras. In this respect is it similar to New Zealand.

Reasonable samplings of chromosome numbers in ferns have already been done in Ceylon (Manton & Sledge, 1954), Malaya (Manton, 1954), New Zealand (Brownlie, 1954, 1957, 1958, 1961), and in India by Mehra and his associates (Mehra, 1961). These samplings come from the two extremities of the arc from continental Asia to New Zealand, so that any records from the area between are of particular interest.

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NOTES ON CRITICAL GENERA

Schizaea

Records of chromosome counts in this genus are few (Lovis, 1958; Brownlie, 1961) but these bear out the generally held belief that the present species are relics only of an old flora. The present two counts would indicate that *Schizaea fistulosa* Labill. and *Schizaea australis* Gaud. should be regarded as two distinct species, the latter confined to mountain and southern areas of New Zealand, the former having a much wider range.

Lindsaea

Several species of this genus from Ceylon and Malaya have been recorded by Manton, mostly with a base number of n = 50, but the impression that it is probably an unnatural assemblage is suggesed by the numbers of n = c.40 and c.47 for two species listed here and of n = 34 and c.42 for two other species (*L. linearis* Sw. and *L. trichomanoides* Dry.) from New Zealand. It is possible that here we have two morphologically parallel groups representing two geologically widely-spaced periods of development, those of the n = 50 group being a recently diversified section comparable with such modern families as the Aspleniaceae and the Polypodiaceae, and the other section being remnants of a much older flora. Several species of this older group occur in New Caledonia, but cytological information on these is still lacking. Manton (1958) has already indicated the complexity of Copeland's Pteridaceae.

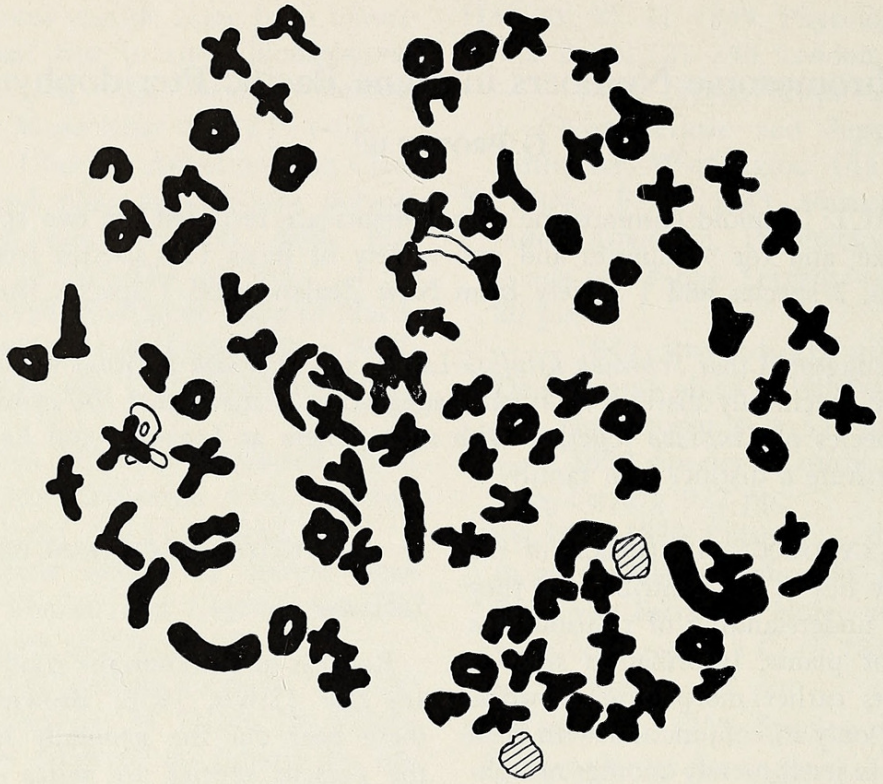

FIG. 1. Meiosis in *Schizaea fistulosa* Labill. var. *australis* Gaud. n = 94. × 1250.

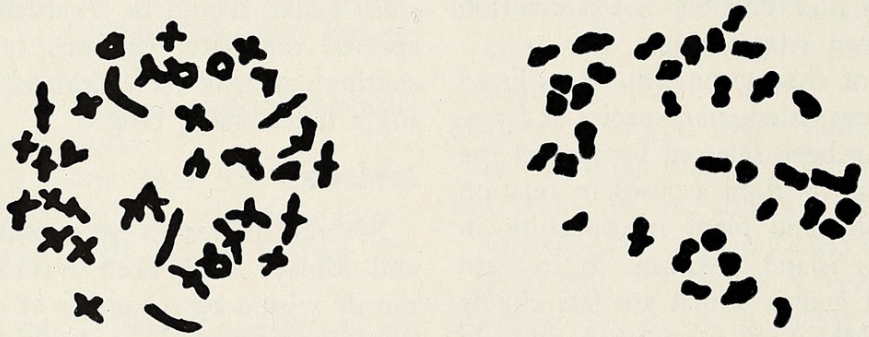

FIG. 2 (*left*). Meiosis in *Hymenophyllum atrovirens* Col. n = 36. × 750.
FIG. 3 (*right*). Meiosis in *Hymenophyllum rufescens* T. Kirk. n = 36. × 750.

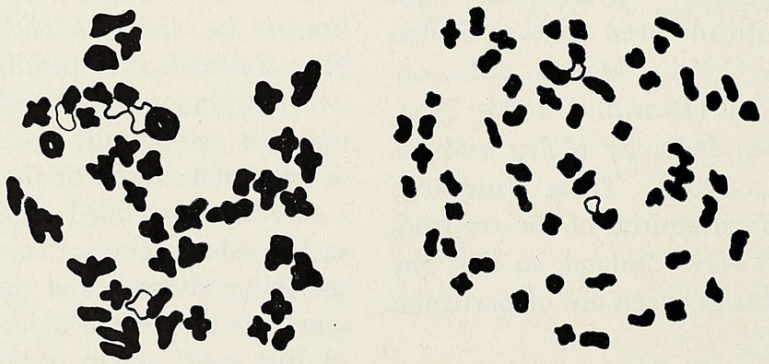

FIG. 4 (*left*). Meiosis in *Lindsaea vieillardii* Mett. n = c.47. × 1000.
FIG. 5 (*right*). *Pteris ensiformis* Burm. n = 58. × 1250.

Loxsoma

The rather isolated position of this genus has been accepted in most classifications where, in association with the Central American *Loxsomopsis,* it is elevated to the position of a distinct family. Cytologically this genus appears to be related to the older section within *Lindsaea.* Also to this group probably belongs the genus *Leptolepia,* with a chromosome complement of n = c.47 (Brownlie, 1961).

Teratophyllum

This genus was placed in close association with *Bolbitis* and *Elaphoglossum* by Holttum

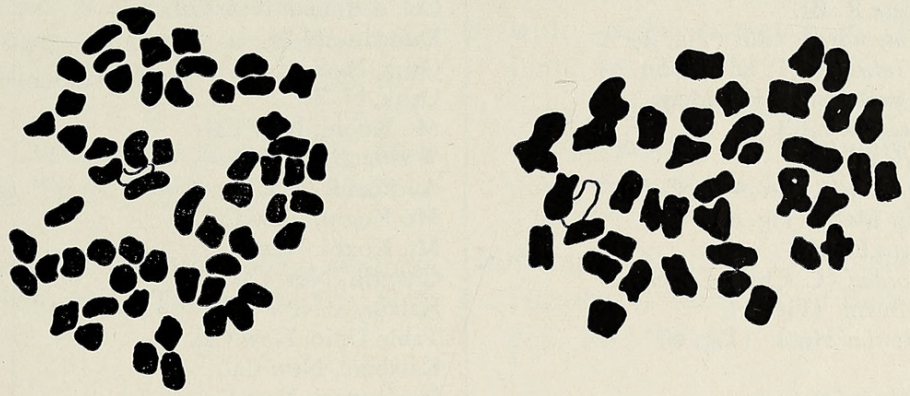

FIG. 6 (*left*). Meiosis in *Pteris novae-caledoniae* Hook. n = 58. × 1250.
FIG. 7 (*right*). *Tectaria seemanni* (Fourn.) Copel. n = 40. × 1250.

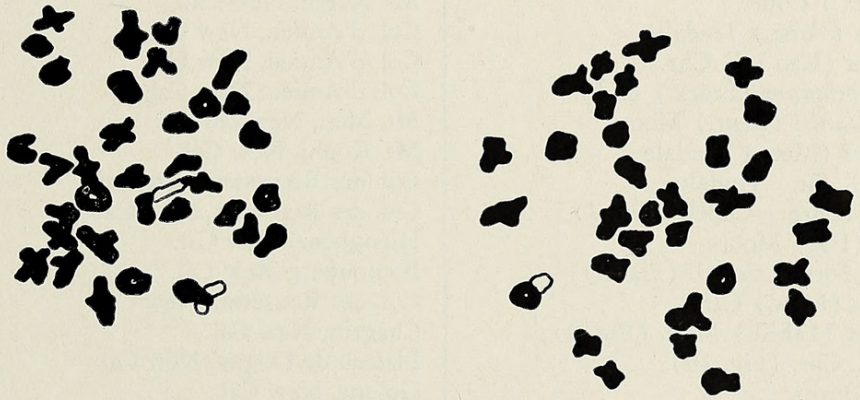

FIG. 8 (*left*). Meiosis in *Cyclosorus invisus* (Forst.) Copel. n = 36. × 1250.
FIG. 9 (*right*). *Blechnum obtusatum* (Labill.) Mett. n = 33. × 750.

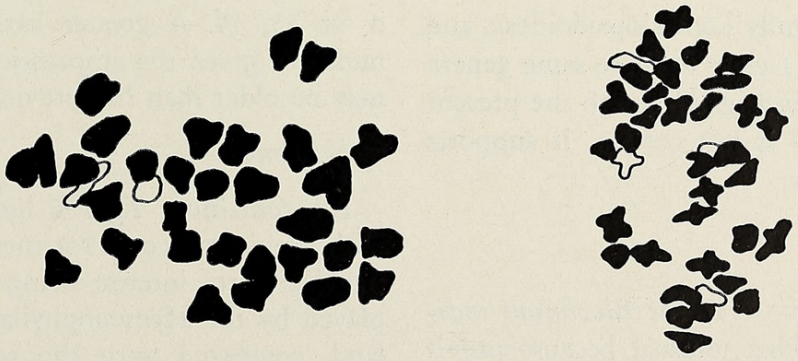

FIG. 10 (*left*). Meiosis in *Blechnum moorei* C. Chr. n = 33. × 1250.
FIG. 11 (*right*). *Drynaria rigidula* Bedd. n = 37. × 1250.

TABLE 1

LIST OF SPECIES AND CHROMOSOME NUMBERS

SPECIES	LOCALITY	CHROMOSOME NUMBER
Tmesipteris tannensis (Spreng.) Bernh.	Westland, N. Z.	n = c.108
Psilotum nudum (L.) Beauv.	Yaté, New Cal.	n = c.210
Schizaea fistulosa Labill.	Takaka, N. Z.	n = c.270
Schizaea fistulosa var. *australis* Gaud. (Fig. 1)	Upper Waimakariri, N. Z.	n = 94
Gleichenia dicarpa R. Br.	Plaine des Lacs, New Cal.	n = 22
Gleichenia brackenridgei Fourn.	Mt. Koghi, New Cal.	n = 34
Gleichenia flabellata R. Br.	Col. d'Amieu, New Cal.	n = 34
Hymenophyllum atrovirens Col. (Fig. 2)	Dunedin, N. Z.	n = 36
Hymenophyllum refuscens T. Kirk (Fig. 3)	Otira, N. Z.	n = 36
Hymenophyllum malingii (Hk.) Mett.	Otira, N. Z.	n = 36
Trichomanes dentatum v.d.B.	Mt. Koghi, New Cal.	n = 36
Trichomanes lyallii Hk.	Westland, N. Z.	n = 36
Loxsoma cunninghamii R. Br. ex A. Cunn.	Auckland, N. Z.	n = c.47
Lindsaea vieillardii Mett. (Fig. 4)	Mt. Koghi, New Cal.	n = c.47
Lindsaea prolongata Fourn.	Mt. Koghi, New Cal.	n = c.40
Sphenomeris deltoidea (C. Chr.) Copel.	Chagrin, New Cal.	n = c.88
Pteris ensiformis Burm. (Fig. 5)	Kalabéré, New Cal.	n = 58
Pteris novae-caledoniae Hook. (Fig. 6)	Table Unio, New Cal.	n = 58
Pteris vittata L.	Kalabéré, New Cal.	n = 58
Adiantum hispidulum Sw.	Bouloupari, New Cal.	n = c.175
Adiantum fulvum Raoul	New Plymouth, N. Z.	n = 58
Aspleniopsis decipiens Mett.	Mt. Koghi, New Cal.	n = c.58
Davallia solida (Forst.) Sw.	Boguen R., New Cal.	n = 40
Cyathea alata (Fourn.) Copel.	Mt. Koghi, New Cal.	n = 69
Arachniodes aristata (Forst.) Tindale	Col. d'Amieu, New Cal.	n = 82
Bolbitis lonchophora (Kze.) C. Chr.	Col. d'Amieu, New Cal.	n = 82
Teratophyllum wilkesianum (Brack.) Holtt.	Col. d'Amieu, New Cal.	n = c.40
Elaphoglossum vieillardii (Mett.) Moore	Mt. Mou, New Cal.	n = 82
Lastreopsis vieillardii (Mett.) Tindale	Mt. Koghi, New Cal.	n = 41
Lastreopsis tenera (R. Br.) Tindale	Col. des Rousettes, New Cal.	n = 41
Tectaria seemanni (Fourn.) Copel. (Fig. 7)	Col. des Rousettes, New Cal.	n = 40
Cionidium moorei (Hk.) Moore	Hiénghène, New Cal.	n = 40
Cyclosorus invisus (Forst.) Copel. (Fig. 8)	Bouloupari, New Cal.	n = 36
Diplazium sororium (Mett.) Carr.	Col. des Rousettes, New Cal.	n = c.121
Blechnum obtusatum (Labill.) Mett. (Fig. 9)	Chagrin, New Cal.	n = 33
Blechnum moorei C. Chr. (Fig. 10)	Plateau de Dogny, New Cal.	n = 33
Blechnum indicum Burm.	Golone, New Cal.	n = c.37
Drynaria rigidula Bedd. (Fig. 11)	Mt. Koghi, New Cal.	n = 37
Crypsinus albidosquamatus (Bl.) Copel.	Ilaga Valley, W. New Guinea	n = 36

(1947) in a sub-family Lomariopsidoideae, and by Copeland (1947) close to these same genera in his family Aspidiaceae. Although the present count of n = c.40 is not certain, it supports this association.

Blechnum

The count of n = c.37 for *Blechnum indicum* appears somewhat unusual because previously this genus appeared to have only two sections, one based on n = 28, the other on n = 33, 34. A greater variation in the base numbers gives the impression that the family may be older than has previously been thought.

Other genera

All remaining figures listed are in accord with previous records for these genera, the only two factors of interest being the constancy displayed by the Hymenophyllaceae in New Zealand, compared with the records from Asia, and the very high polyploidy of the New Caledonian form of *Psilotum nudum*.