PAPERS AND PROCEEDINGS OF THE ROYAL SOCIETY OF TASMANIA, VOLUME 95

CHROMOSOME COMPLIMENTS OF THE TASMANIAN REPRESENTATIVES OF THE GENUS BLECHNUM.

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(With 4 figures.)

ABSTRACT

Within the Tasmanian representatives of the genus Blechnum there are two basic chromosome numbers of 28 and 33. All the Tasmanian species are diploid with the exception of B. *fluviatile* which is hexaploid. A morphological difference in the spores has been correlated with basic number. Evidence is put forward to suggest that the Tasmanian species B. *procerum* (Forst.) Swartz can no longer be regarded as conspecific with the New Zealand species at present known as B. *minor* (R.Br.) Cockayne.

INTRODUCTION.

The genus Blechnum is represented in Tasmania by nine species, though one, B. *cartilagineum* Swartz, is of doubtful occurrence at the present day. Of the remaining eight species, six are clearly defined, viz., B. *fluviatile* (R.Br.) Lowe ex Salom., B. *lanceolatum* (R.Br.) Sturm, B. *nudum* (Labill.) Mett. ex Luerss., B. *patersonii* (R.Br.) Mett., B. *penna-marina* (Poir.) Kuhn. and B. *vulcanicum* (Blume) Kuhn., while the other two species, B. *minus* (R.Br.) Ettings and B. *procerum* (Forst.) Swartz, present what appears to be a continuous range of variation between two extreme forms to which the species names have been applied. The present work is a part of that undertaken in connection with a study of the variation existing in this complex, with a view to determining the causes of this variation and to solving the taxonomic problems which prevail.

A similar complex is reported from New Zealand, and the nomenclature of the two groups has become confused. The names used in this paper for the Tasmanian species are those published by Wakefield (1957). To avoid further confusion at this stage, both B. *minus* and B. *procerum* as understood in Tasmania are illustrated in Figs. 3 and 4.

MATERIALS AND METHODS.

The haploid chromosome numbers have been determined for each of the eight species using iron-aceto-carmine squashes of the spore mother-cells according to the method described by Darlington and La Cour (1947). Mature spores from each species were stained in lacto-phenol aniline blue according to the method described by Harris (1955).

OBSERVATIONS AND DISCUSSION.

The haploid chromosome complements are illustrated in Fig. 1, and a list of the chromosome numbers determined on the Tasmanian material is given in Table 1. It can be seen from this that there are the two unrelated basic numbers of 28 and 33 in the group. Chambers, in an unpublished survey of the New Zealand species, has found the same two basic numbers. The species he has examined include three also occurring in Tasmania. These are B. *lanceolatum*, B. *penna-marina* and B. *fluviatile* for which he reports n = 33. The chromosome numbers for the first two species are in agreement with those of the Tasmanian material.

In B. *fluviatile* Chambers also discovered a sub-alpine race for which n = 66. Although there was a tendency for the pinnae of the sub-alpine type to be more midely spaced along the rachis, it was impossible to separate the two on morphological grounds. The Tasmanian species has a chromosome number of n = 99, and appears to be identical with the New Zealand species both in morphology and in the characteristics of the spore.

Chambers also reported that a polyploid series based on the number 28 exists among the New Zealand representatives of the genus. In the absence of any evidence of cross polyploidy between the two series, it seems likely that there has been parallel evolution within the genus.

An attempt has been made to determine whether there are any morphological characters associated with the two different basic numbers. Fig. 2 illustrates the only difference which has so far been correlated with basic number. It can be seen that the spores of all species possess a perispore. However the spores are of two morphological types corresponding to the two cytological conditions. Spores of B. *lanceolatum*, B. *patersonii*, B. *penna-marina*, B. *vulcanicum* and B. *fluviatile*, belonging to plants characterised by the basic number 33, have a thick, smooth perispore of the same shape as the spore. Spores of B. *minus*, B. *nudum* and B. *procerum*, belonging to plants characterised by the basic number 28, have a thin, hyaline perispore bearing irregular crests.

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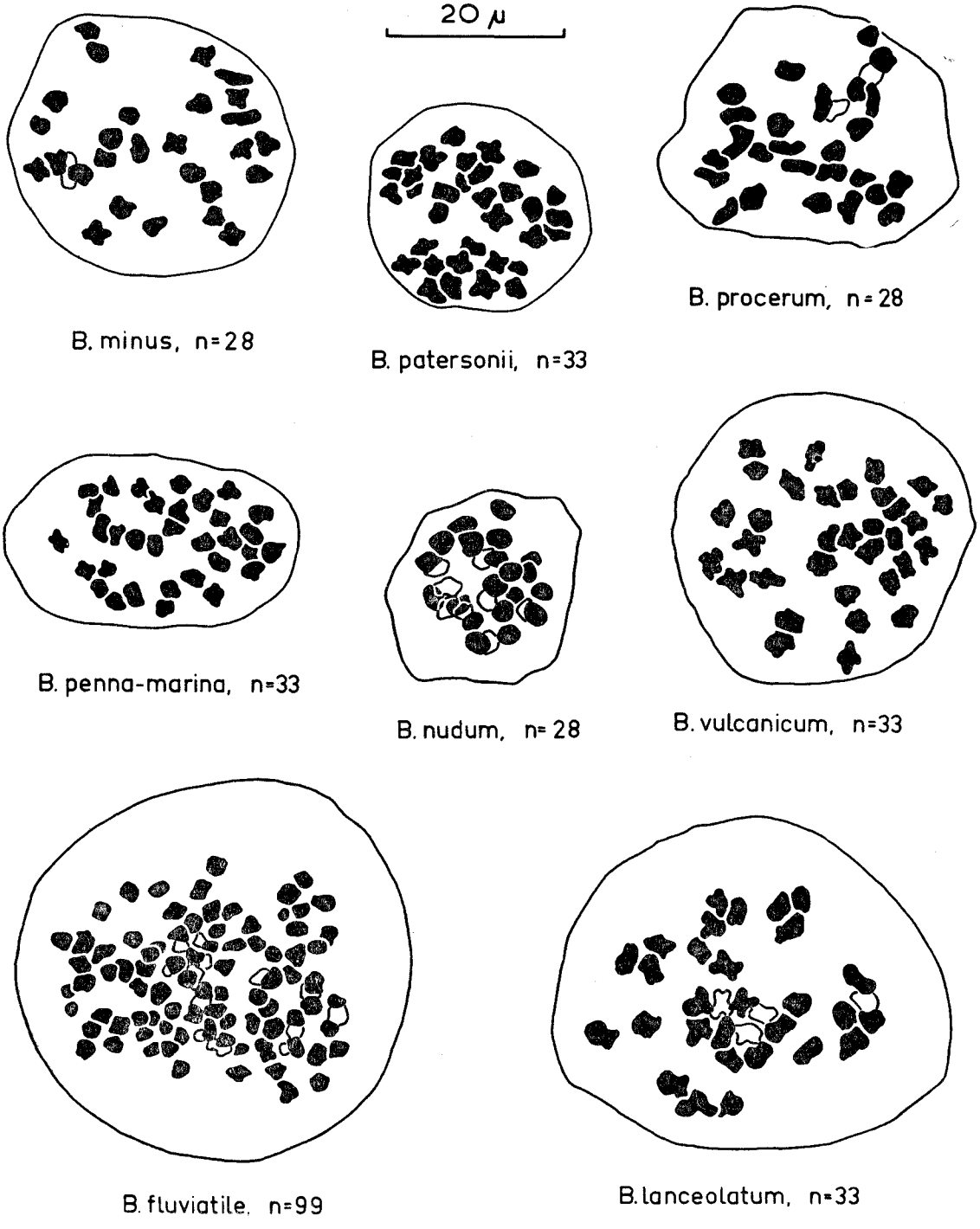

FIG. 1.—Haploid chromosome complements of the Tasmanian representatives of the genus Blechnum. Iron-aceto-carmine squashes of meiosis in the spore mother-cells.

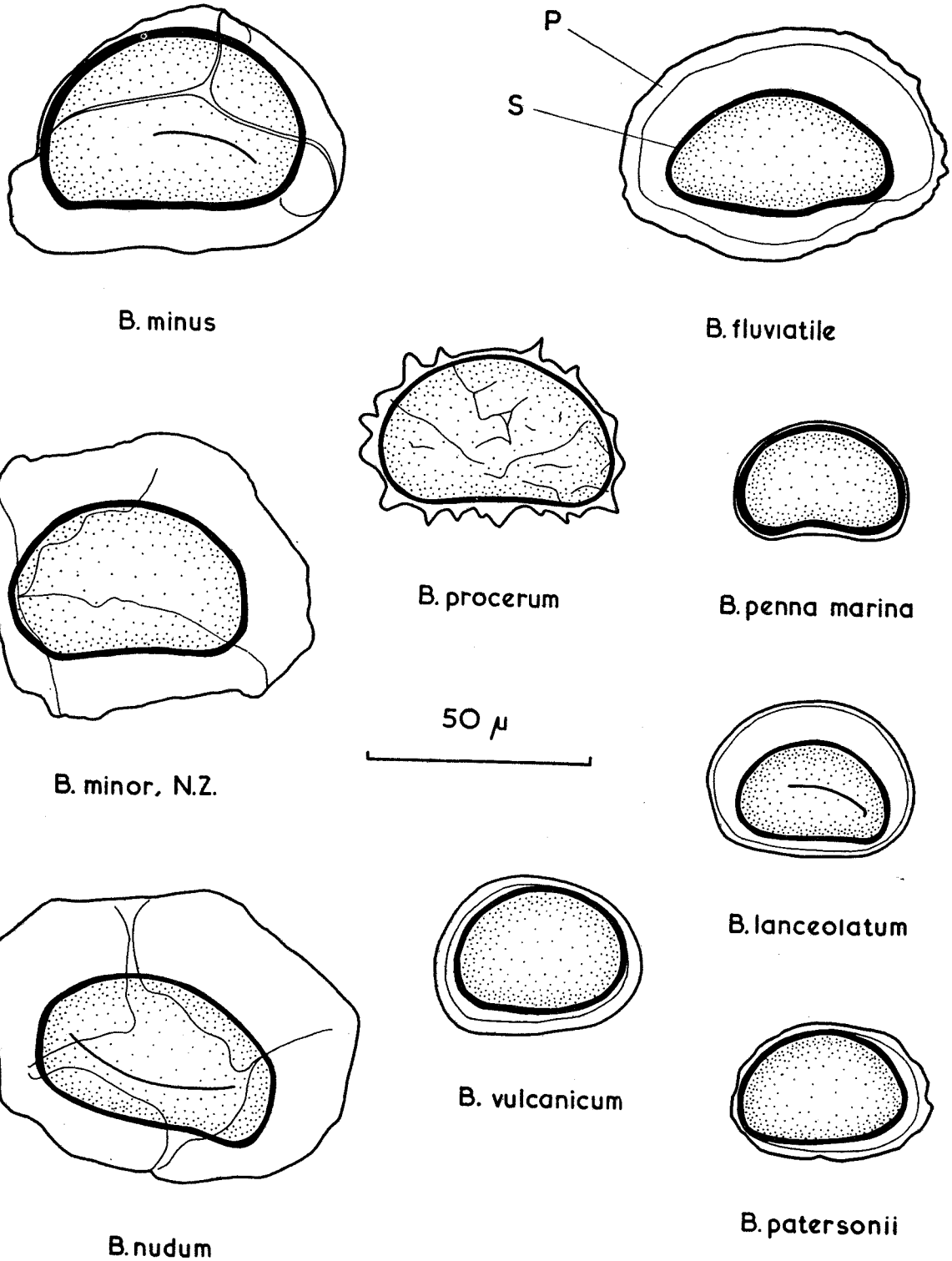

FIG. 2.—Drawings of spores of the Tasmanian representatives of the genus Blechnum and also of the New Zealand species B. minor, showing the nature of the perispore. P = perispore, S = spore wall. The spores of B. *minus*, B *nudum* and B. *procerum* possess a thin hyaline perispore bearing irregular cresets (crested, Table I). Those of B. *lanceolatum*, B. *patersonii*. B. *penna-marina*, B. *vulcanicum* and B. *fluviatile* possess a thick perispore of similar shape to the spore (smooth, Table I).

The New Zealand species B. *minor* (R.Br.) Cockayne has been generally regarded as conspecific with the Tasmanian species B. *procerum* (Forst.) Swartz.[1] However this seems very unlikely, since Chambers has recorded the chromosome number of B. *minor* as n = 56, and the spores, as shown in Fig. 2, have a perispore of similar structure to that seen in the Tasmanian species B. *nudum* and B. *minus*. This is of a totally different nature from the perispore seen in B. *procerum*. A closer morphological comparison of the two species is at present being undertaken.

Manton (1950) and Brownlie (1954) recorded a chromosome number of n = 34 for the European species B. *spicant* and the New Zealand species B. *penna-marina* and B. *vulcanicum* respectively. These numbers have not been found in Tasmanian material.

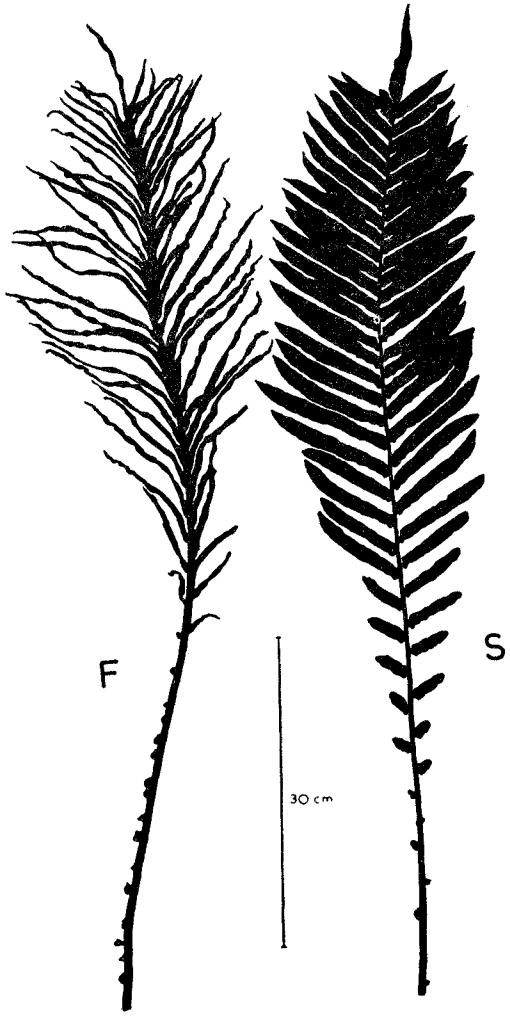

FIG. 3.—Typical fronds of the Tasmanian species *Blechnum minus* (R.Br.) Ettings. S, sterile frond; F, fertile frond. Base of the rachis in the fertile frond twisted so that the basal pinnae appear to be all on the one side.

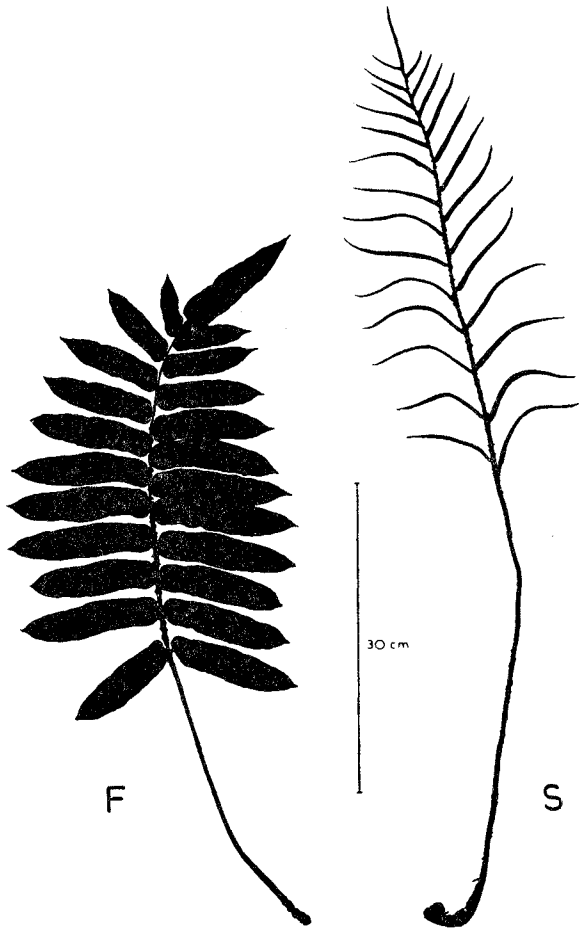

FIG. 4.—Typical frond of the Tasmanian species *Blechnum procerum* (Forst.) Swartz. S, sterile frond; F, fertile frond.

ACKNOWLEDGEMENTS.

I would like to record my thanks to the following: Professor H. N. Barber, of the Department of Botany, University of Tasmania, for his interest in this work and also for making available to me the facilities of his department; Dr. W. M. Curtis, also of the above department, under whose supervision this work was carried out, for her many helpful criticisms during the course of this work; Mr. T. C. Chambers, of the Department of Botany, University of Sydney, for permission to quote the results of his unpublished work on the New Zealand species of the genus Blechnum.

[1] Bentham (1878), P.373; Cheeseman (1906), P.981; Rodway 1903), P.283; Wakefield (1955), P.39.

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TABLE 1.

Chromosome numbers of the Tasmanian species of the genus Blechnum.

Species.	Haploid Chromosome Number	Nature of Perispore	Source of Material
B. minus	28	crested	Ulverstone
B. nudum	28	crested	Forth Falls, National Park
B. procerum	28	crested	Arve Valley, Florentine Valley
B. lanceolatum	33	smooth	Hellyer Gorge, Mt. Wellington
B. patersonii	33	smooth	St. Columba Falls
B. penna-marina	33	smooth	Hellyer Gorge, Mt. Wellington
B. vulcanicum	33	smooth	Hellyer Gorge, Collinsvale
B. fluviatile	99	smooth	Hellyer Gorge, Collinsvale, Mt. Wellington
B. cartilaginium	....	....	Not collected