

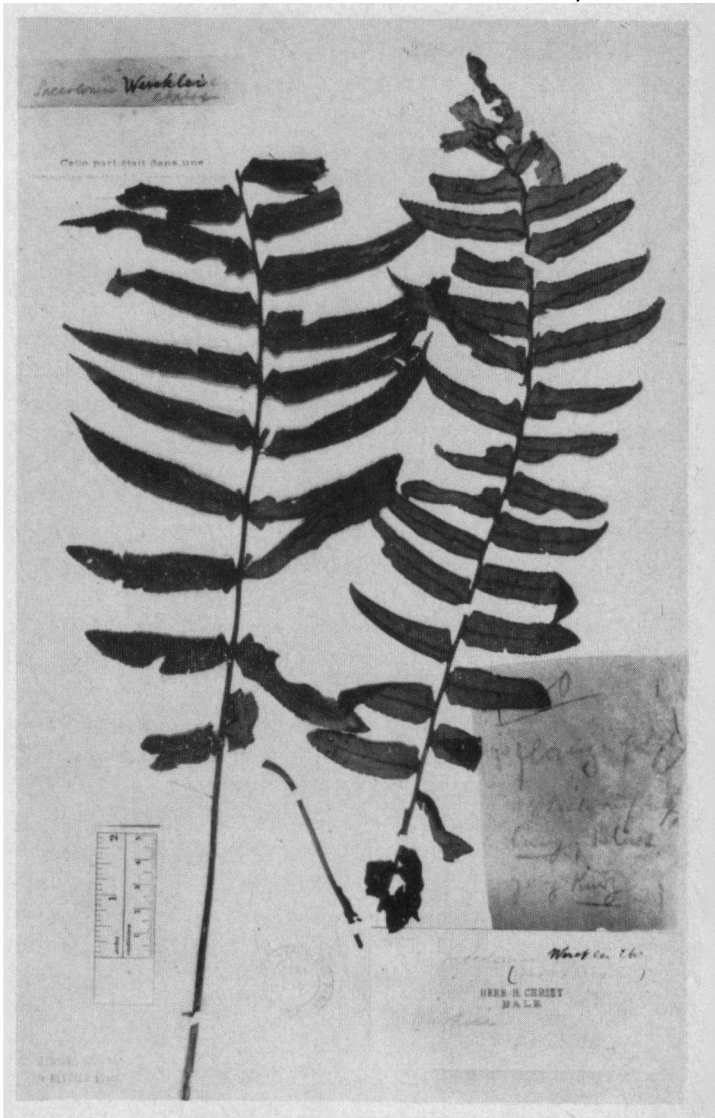
The Taxonomic Position of *Saccoloma wercklei* Christ

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In 1904, H. Christ described a fern collected by C. Wercklé in Costa Rica as *Saccoloma wercklei*. It was listed under *Saccoloma* in Christensen's Index Filicum (1906), but appeared as a species of doubtful position, perhaps belonging to *Ormoloma*, in the Third Supplement (1934, p. 170). This was probably based on the authority of Maxon's comments (1933, p. 144), given in connection with his description of the latter genus. Apparently neither Christensen nor Maxon had seen the type-specimen.

When preparing a revision of the Lindsaeoid ferns of the New World (1957), I borrowed the type-specimen of *S. wercklei* from the Paris Herbarium, in which Christ's herbarium is incorporated, in order to ascertain whether that species did or did not belong in *Ormoloma*.

The type, as far as I know the only material extant, is rather poor (pl. 13). It consists of two laminas with the upper parts of the petioles; the apex of one lamina is missing, and in the other it is somewhat folded and shrivelled. No rhizome is present. Nevertheless it was immediately clear that inclusion either in *Saccoloma* or in *Ormoloma* was not justified. The only species of *Saccoloma* in its modern, restricted sense, *S. elegans*, has glabrous leaves, a rachis with two grooves on the adaxial side, separated by a more or less prominent ridge and connected with a groove on the midrib of the pinnae, and subequal, long-cuneate pinna-bases, as opposed to the hairy rachis and abaxial side of the midrib, the single adaxial rachis-groove without connection with the midribs of the pinnae (pl. 14, fig. B3) and subtruncate, more or less auriculate pinna-bases in *S. wercklei*. Moreover, the leaf-top consists of confluent reduced pinnae, whereas in *S. elegans* there is a distinct free terminal pinna. The latter character, the structure of the rachis, the presence

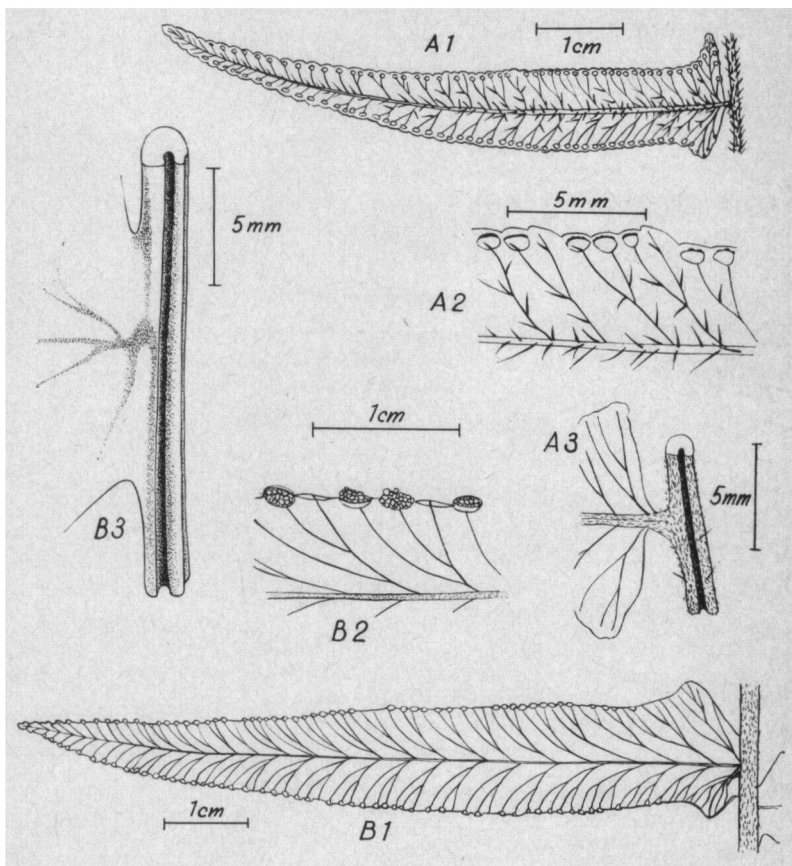


TYPE-SPECIMEN OF SACCOLOMA WERCKLEI

of rufous articulate hairs, and the sori, which project beyond the margin, exclude *S. wercklei* from *Ormoloma*.

There is, however, a resemblance to the Old-World fern *Microlepia hookeriana* (Wall.) Presl. On closer examination this resemblance proved to be more than superficial. Both species agree in their simply pinnate lamina with a few somewhat reduced basal pinnae and a rather abruptly contracted leaf-tip with confluent reduced pinnae, a single groove on the adaxial surface of the rachis with completely continuous borders, the pinnae being inserted below (that is, slightly to the abaxial side of) the edge of the groove (*pl. 13, fig. B3*), lanceolate, acute or shortly acuminate pinnae with a subtruncate base produced in a distinct auricle on the anterior and not rarely in a less pronounced auricle on the posterior side, and the presence of rufous articulate hairs. The differences may be summed up as follows:

	<i>M. hookeriana</i>	<i>"S." wercklei</i>
petiole and rachis	on both sides, but especially in the adaxial groove, densely clothed with large articulate up to 2 mm. long hairs	adaxially glabrous, laterally and abaxially with a very short tomentum of articulate hairs
midrib of pinnae	adaxially with similar but shorter hairs, abaxially with scattered hairs (which are also found on the lateral veins)	adaxially glabrous, abaxially with a similar indument as the rachis
pinnae	truncate at the base, with a very short petiolule (< 1 mm.), except those of the leaf-apex, which are sessile	all sessile, the posterior base \pm completely adnate to decurrent, the anterior base half-free
veins	mostly once-forked	mostly 3-4 times-forked
sori	intramarginal, i.e. the indusium not equalling the margin (Pl. II, A 2)	indusium equalling the margin, fused with a marginal lobe to form a cup-shaped structure (Pl. II, B 2)



A. *MICROLEPIA HOOKERIANA*; B. *SACCOLOMA WERCKLEI*. 1, PINNA; 2, DETAIL OF PINNA; 3, JUNCTION OF PINNA WITH RACHIS

	<i>M. hookeriana</i>	" <i>S.</i> " <i>wercklei</i>
sporangia	annulus with 18-21 indurated cells; head ca. 290 × 225 μ	annulus with 12-15 indurated cells; head ca. 230 × 175 μ
spores	trilete, pale yellowish, smooth, ca. 40 × 28 μ	trilete, dark brown, minutely tuberculate, ca. 30 × 25 μ

In addition, the sori of *M. hookeriana* are densely paraphysate with long articulate hairs; no such paraphyses were found in "*S.*" *wercklei*, but this might be due to the poor state of preservation, although it is not very likely. The indument of "*S.*" *wercklei* consists of short, articulate hairs, though a few one- or few-celled acicular hairs with thickened walls were also present. In *M. hookeriana*, on the other hand, the bases of the hairs have thickened cell-walls.

These differences distinguish the two species without difficulty, but they are much less pronounced than the points of resemblance mentioned above, and therefore I believe that they should be included in one genus. This brings up the question in what genus they must be placed. *Microlepidia hookeriana* occupies a somewhat isolated position in the genus, and has been made the type of a distinct genus, *Scypholepidia* J. Smith (1875, p. 261). This was supposed to be related to *Nephrolepis* by reason of articulate pinnae, but there is actually no articulation at all, as was pointed out by Copeland (1947, p. 51). There is only a thickening at the base of the midrib which probably serves a mechanical purpose (a similar thickening is present in "*S.*" *wercklei*, although the pinnae are adnate; it is clearly visible from the adaxial side). Recently, however, Tagawa (1951, p. 187) defended the separation of *Scypholepidia* from *Microlepidia* on other grounds, namely, the frequent occurrence of an auricle on the posterior side of the pinna-base, and the open angle between midrib and veins. The second character

I find to be of little relevancy, the difference being gradual rather than fundamental; but the first one seems to be of importance. I should like, however, to express it in a somewhat different way. In *M. hookeriana* (and in "*S.*" *wercklei*) the basal lateral veins are opposite, and I find it impossible to decide whether the leaf is anadromic or catadromic. The leaf-tissue extends on both sides to the same level (Pl. II, fig. B1). In all other *Microlepia*s known to me, the leaf is distinctly anadromic, the basal vein on the anterior side being much closer to the pinna-base than the one on the posterior side, and the leaf-tissue is cut away much more strongly on this side. Possibly the presence of the swelling at the base of the midrib described above is an additional differentiating character; I have not observed it in any other *Microlepia*. It seems to me that *Scypholepia* can be kept up as a subgenus or perhaps preferably as a section of *Microlepia*. Christensen's listing of *Scypholepia* under *Microlepia* (1906, p. xxxviii) was probably intended as reduction to sectional rank.

The following new combination becomes necessary:
MICROLEPIA wercklei (Christ) Kramer, *comb. nov.*

BASIONYM: *Saccoloma Wercklei* Christ, Bull. Herb. Boiss. II. 4: 1100. 1904.

TYPE: *Wercklé* 320 from Costa Rica, without precise locality (P!).

The following corrections and additions to Christ's description, besides those already referred to above, may be given:

Petiole ca. 2 mm. in diam. Pinnae alternate or the lower ones opposite, up to 1.5 cm. wide, chartaceous. Indusium cup-shaped, consisting of the membranous abaxial (true) indusium and a more rigid marginal lobe, the two parts completely fused; receptacle very short.

Wercklé's field-notes say "(Pflanze folgt) Stiele aufrecht, lang; Blatt ganz kurz," which probably means

that the petiole is much longer than the lamina.

The inclusion of *S. wercklei* in *Microlepia* may cause surprise because of the marginal position of the sori, because *Microlepia* is distinguished from *Dennstaedtia*, its closest relative, by its intramarginal sori. *S. wercklei* is, however, so close to *Microlepia hookeriana*, as shown above, that inclusion in *Dennstaedtia* would be highly artificial. The distinction between *Dennstaedtia* and *Microlepia* should probably be redrawn on the basis of new and more numerous characters, or perhaps altogether abandoned.

A few words may be said about the phytogeographic aspect of the relationship between *M. hookeriana* and *M. wercklei*. At first sight it may be astonishing that the closest relative of a Costa Rican fern would be found in southeastern Asia (Tagawa, *loc. cit.*, gives the range of *M. hookeriana* as eastern India to southeastern China, Tongking, Formosa, Okinawa, to Borneo, Sumatra, and Java). Yet there are a few other examples of a more or less similar type of distribution. *Loxogramme*, *Coniogramme*, and *Schaffneria* each have one species in the Cordilleras of Central America and all others in southern and/or eastern Asia or in the adjacent Pacific islands. Copeland assumes that they have crossed the North Pacific. I do not know in what way this is supposed to have happened, and the solution of the problem may be more complex; but at least the phenomenon in *Microlepia* is not unique, and therefore the distribution does not provide an argument against our taxonomic conclusion. Incidentally, *M. wercklei* is the third species of *Microlepia* known from the American continent, the others being the pantropic *M. speluncae* (L.) Moore and the closely allied *M. jamaicensis* (Hook.) Fée of Jamaica and Hispaniola.

I tender my sincere thanks to Mme. Tardieu-Blot, Curator of the Fern Herbarium of Paris, for the loan

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