Eastwoodia Bdg. Monotypic shrub in areas adjacent to the San Joaquin Valley and other hot areas in middle California.
Tracyina Blake. Monotypic in northern California.
Phalacroseris Gray. A mountain monotype.
Raillardella Gray. A mountain genus also in Nevada on the Sierra Nevada boundary.

The plants known in California as tar-weeds are very common. The following genera, which were formerly included in *Hemizonia*, are considered to be distinct by some authors, namely: *Centromadia* Greene, *Calycadenia* DC., and *Blepharizonia* (Gray) Greene. All are endemic. *Madia* Mol. is also South American with one similar species. *Hemizonella* Gray, of this group, is a small annual but not exclusively Californian.

Most of the genera of *Compositae* are widely distributed but many endemic species are among them.

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VAUCHERIA SCHLEICHERI IN NORTH AMERICA

By Jules Brunel

In 1895, the Belgian botanist Émile de Wildeman, studying the Algae of J. Cl. Schleicher's herbarium at the University of Lausanne, found a new species of *Vaucheria*, which he named *V. Schleicheri* (1), after the name of the collector, a Swiss botanist who lived in the first decades of the 19th century. A good plate accompanied this original description.

Wildeman naturally knew nothing of the habitat of the new species, the label accompanying the specimen bearing only these words: *Conferva amphibia γ lucida. In fossis Vallesiae et Noville.* But he supposed it might have been collected in saline water, because there are salt springs in that part of the Valais where Schleicher lived and collected (fig. 1).

Heering (2), in 1921, included *V. Schleicheri* in his Siphonales of Central Europe, but his treatment is based entirely on the original description, nobody having found the plant again anywhere during the period 1895–1921. Wildeman's description and figures were carefully copied by Heering and an adequate key to species was prepared, enabling one to identify the plant with ease and certainty. The only difference between Wildeman's and Heering's descriptions lies in the fact that, whereas the former inferred that the habitat was inland brackish water, the German author affirmed that *V. Schleicheri* grew

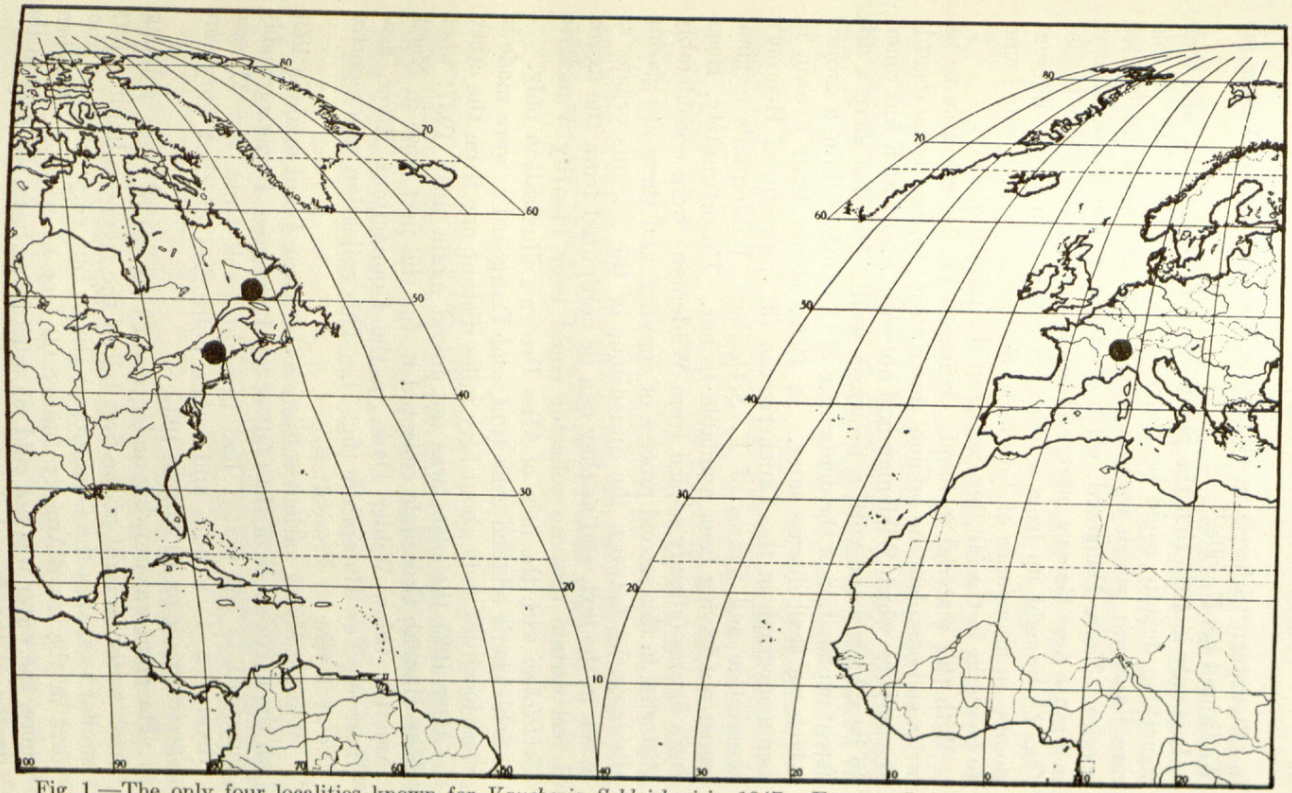

Fig. 1.—The only four localities known for *Vaucheria Schleicheri* in 1947. Europe: Switzerland (Valais) and France (lac d'Annecy, near the Swiss border). America: United States (Connecticut River) and Canada (Mingan River). Base map from Goode's series, copyrighted and published by the University of Chicago Press.

in salt water: "Schweiz in Gräben mit salzhaltigem Wasser im Wallis und bei Noville."

It is only in 1925 that the plant was collected again, and that something definite could be learned about the habitat of this rare *Vaucheria*, which we now know as a distinctly freshwater species. Pierre Dangeard, while dredging in the lac d'Annecy, in France near Geneva, about 35 miles west of the Swiss border (fig. 1), brought up from a depth of 60 feet, in three different points, an abundance of *Vaucheria Schleicheri*, which was found to be sterile in the fall, but fertile in the month of July.

With this material in hand, Dangeard (4, 7) was able to rewrite and complete the original description, especially as regards the oospore, which Wildeman had not seen, and which was found to be spherical and with a brownish wall. He also gave a different explanation of the dehiscence of the antheridium, a subject which we shall discuss later. In 1929, Helen Jean Brown, in her monograph of the Vaucheriaceae (5), reproduced Heering's description and figures of *V. Schleicheri*, Wildeman's original paper not having been available to her. Unfortunately, Heering's figures (already copied from Wildeman) were considerably distorted in this second process of copying, and there are glaring discrepancies between the dimensions of the various organs as given in the text, and as they can be computed from the figure. I feel certain that no collector could ever identify *Vaucheria Schleicheri* with the help of Miss Brown's illustration only.

Schleicher's original collection, and Dangeard's, were made in close localities, only about fifty miles distant one from the other.

After 1925 the plant was not found again until 1937, when Miss Hannah Croasdale collected it, for the first time in North America, below Wilder Dam, in the Connecticut River, near Hanover, New Hampshire (fig. 1). This collection was reported the next year by Prescott (6).

While studying various collections of Algae I had made in 1939 on the north shore of the Gulf of St. Lawrence, I was agreeably surprised to see that I had brought back from the Mingan River (fig. 1) a pure and fertile collection of that very rare species, made on 30 August 1939.

The plant was growing under about two feet of clear, running, fresh water, in sight of the first fall of the river—a habitat very similar to that in the Connecticut River, but very different from that in the lac d'Annecy (under 60 feet of water). Furthermore, the water was not cold, as must have been the case in the depths of the French lake.

Thanks to Dr. Prescott's kindness, I compared the New England material with mine from Mingan, and there is no doubt that the two plants are similar. On the other hand, the illustrations which accompany Wildeman's and Dangeard's descriptions enable us to identify with certainty the American and the European plants.

The precise spot where my Mingan collection was made was not far from the salt water of the Gulf, as I went up the river only a few miles, in a row-boat. But I found a confirmation of the freshness of the water in the presence, on the filaments of *Vaucheria*, of epiphytic Algae which, as far as I know, never tolerate the slightest salinity: *Oedogonium*, *Bulbochaete*, etc.

Vaucheria Schleicheri is a monoecious species, very neatly characterized by its big filaments (up to 180 μ in diameter), its spherical and sessile oogonia (up to 340 μ in diameter), its ovoid and sessile antheridia, parallel or nearly so to the filament, and forming groups of four or five at the proximity of each oogonium.

My observations have enabled me to complete, to correct and to confirm, on several points, the diagnoses of Wildeman and Dangeard. I must point out that my observations were made on material kept in 5% formaldehyde for several weeks. The contents of the filaments has not been shown in the accompanying plate, but the antheridia drawn empty were really so.

VEGETATIVE STRUCTURES

Cell wall.—The fortuitous presence of the broken end of a filament in the microscope field allowed me to determine the dual nature of the cell-wall (fig. g), the outer wall being slightly tinged with yellow, while the inner wall was absolutely hyaline.

Inner cellulose (?) thickenings.—P. A. Dangeard in a paper on "La structure des Vauchéries" (3, p. 249) reports that in *Vaucheria sessilis* DC., a subaerial species, "on rencontre parfois à l'intérieur des filaments des sortes d'épaississements internes de la membrane sous la forme de colonnes plus ou moins recourbées; elles présentent une sorte d'axe central et les stries nombreuses indiquent le mode de croissance; ces formations ont dû être signalées déjà: aussi je n'insiste pas."

These stratified thickenings, which had not yet been found in *Vaucheria Schleicheri* were observed in the material from the Mingan River (fig. h). The origin and significance of these structures are not yet well understood. The filament illustrated here had a definite constriction near the zone of inside thickenings. Whether there is any connection between these two phenomena is a matter of conjecture.

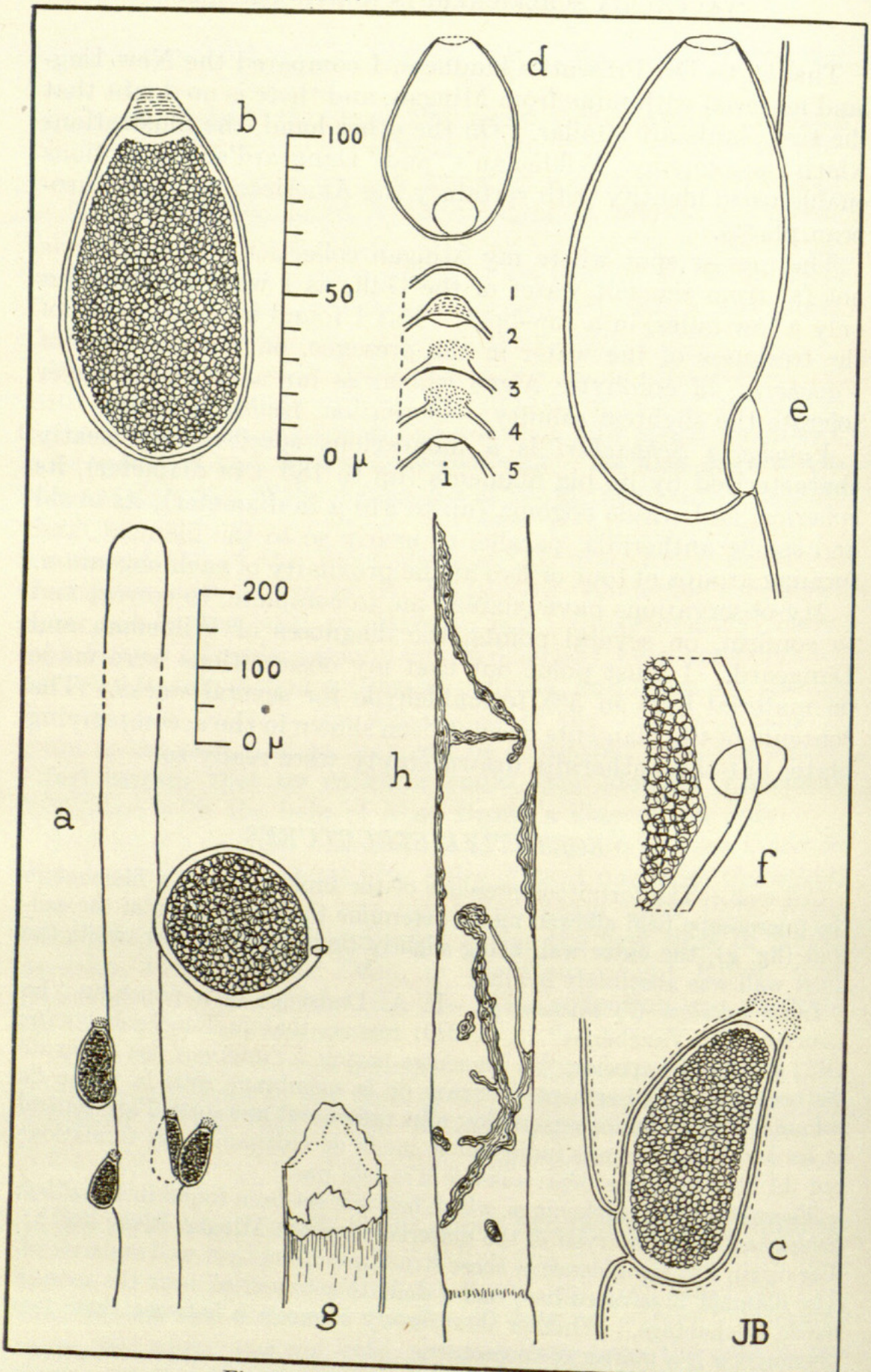

Fig. 2, VAUCHERIA SCHLEICHERI De Wild.

REPRODUCTIVE STRUCTURES

Oogonium.—The spherical oogonium is said by Pierre Dangeard (7, p. 194) to bear "à maturité une papille saillante à son sommet." I cannot say that I have observed such a papilla, but in at least one oogonium I have seen there was a definite, hyaline, egg-shaped gelatinous plug, measuring about 22 x 15 μ. I cannot say how this plug originates, but it was definitely there (fig. a and f). Furthermore, it was still easier to observe under high power (fig. f) because the contents of the oogonium had slightly contracted in the preservative fluid, leaving a clear zone underneath the cellulose membrane, and disclosing that part of the plug inside the oogonium.

Antheridium.—As my material contained many antheridia, full or empty, I measured twenty-three and could thus determine that functional antheridia may be much shorter than the measurements given by Wildeman and Dangeard seem to indicate, i. e. 62–150 μ as against 140–170 μ. The smallest and the largest functional antheridia observed are shown on the accompanying plate (fig. d and e).

Another matter relating to antheridia is that of their dehiscence. Wildeman had already observed that some antheridia, still full of sperms, were closed by a thin diaphragm only and that a stopper of some sort, above that diaphragm, was gone, leaving a saucer-shaped head. This mode of dehiscence prompted him to write that *V. Schleicheri* "possède dans l'anthéridie une particularité non encore rencontrée dans les autres espèces du genre" (1, p. 589).

Dangeard's observations, performed on living specimens, confirmed Wildeman's assumption that the diaphragm disappears suddenly towards the end of the dehiscence. He writes: "La déhiscence de l'anthéridie est due à la formation à son sommet d'un bouchon gélatineux formé par gélification de la paroi qui se dissout ensuite dans sa région externe, puis, peu de temps après, dans sa région interne constituant une sorte de diaphragme dont l'existence n'est que momentanée."

I have illustrated (fig. i, 1–5) the sequence of the phases of antheridial dehiscence as most of them can be observed on a large enough number of mature antheridia. Phase 2 corresponds to fig. b, phase 3 to fig. c, phase 5 to fig. d and e. Phases 1 and 4 were not actually seen, but it is evident that the process begins with a plain smooth cellulose membrane. Phase 4 is probably of very short duration, disappearance of the inner diaphragm being the last stage in the gelatinization of the "stopper" and very likely determining the sudden dehiscence of the antheridium and eruption of sperms.

I have not observed that the cellulose callus bears any internal conical outgrowth, as stated by Dangeard, but it is very likely that the process described and illustrated by the French botanist corresponds with the depressed diaphragm in my fig. b.

Table I gives comparative measurements of various parts of the plant. The four localities known at present are represented, but I am responsible for measurements of both the U. S. and Canadian material.

TABLE I

		Switzerland (Wildeman) 1895	France (Dangeard) 1925	U. S. A. (Croasdale-Prescott) 1937	Canada (Brunel) 1939	Extremes
Filaments:	diameter	120–180 μ	120–170 μ	128–194 μ	80–168 μ	80–194 μ
Oogonia:	diameter	280–340 μ	280–340 μ	.....	210–330 μ	210–340 μ
Antheridia:	length	140–170 μ	140–170 μ	97–167 μ	62–150 μ	62–170 μ
	diameter	47–80 μ	50–80 μ	48–63 μ	40–80 μ	40–80 μ
	aperture (diam.)	18 μ	8–15 μ	.....	12–21 μ	8–21 μ

Conclusions

From an ecological standpoint, it may be concluded that *Vaucheria Schleicheri* is a definitely freshwater species, but not strictly confined to deep waters as stated by Pierre Dangeard, since in both American localities it was growing under a few feet of water only.

Cytologically, our observations enable us to conclude that *V. Schleicheri* belongs to that group of species with chloroplasts devoid of pyrenoids, a point which had not yet been settled, and that we have been able to verify on both North American collections.

Literature Cited

(1) Wildeman, Emile de, *Vaucheria Schleicheri sp. nov.* Bull. Herb. Boissier, 3: 588–592. Pl. 16. 1895.

(2) Heering, W., *Siphonales.* In: Pascher, A., *Die Süsswasserflora Deutschlands, Oesterreichs und der Schweiz.* Heft 7: 83. 1921.

(3) Dangeard, P. A., *La structure des Vauchéries dans ses rapports avec la terminologie nouvelle des éléments cellulaires.* La Cellule, 35: 239–250. 1 pl. 1925.

(4) Dangeard, Pierre, *Note sur le Vaucheria Schleicheri De Wildeman dans le lac d'Annecy.* Le Botaniste, 16: 271–274. 1 pl. 1926.

(5) Brown, Helen Jean, *The Algal family Vaucheriaceae.* Trans. Amer. Micr. Soc. 48: 92. Pl. 15, Fig. 2. 1929.

(6) Prescott, Gerald W., *A new species and a new variety of the algal genus Vaucheria De Candolle, with notes on the genus.* Trans. Amer. Micr. Soc. 57: 3. 1938.

(7) Dangeard, Pierre, *Le genre Vaucheria, spécialement dans la région du sud-ouest de la France.* Le Botaniste, 29: 183–264. 20 fig. 5 pl. 1939.

Explanation of Figure 2

Vaucheria Schleicheri De Wild.—(a) End of a filament bearing an oogonium and four mature antheridia. (b) Mature antheridium showing inner diaphragm and formation of cellulose callus. (c) Slightly more mature antheridium (same as the one at extreme right in fig. a) showing the gelatinous plug at apex; inner diaphragm still present. Outer interrupted line marks pectic (?) layer. (d) Smallest measured antheridium

(empty); circle at base marks insertion point. (e) Largest measured antheridium (empty). (f) Detail of oogonium in fig. a, showing gelatinous plug. (g) Broken end of a filament showing the dual nature of the wall: outer wall slightly tinged with yellow, inner wall hyaline. (h) Stratified cellulose (?) thickenings inside a filament; lower end shows a definite constriction of the filament. (i) Five stages in the opening of the antheridium: 1) Plain cellulose membrane. 2) Thickening of the apex and formation of inner diaphragm and stratified cellulose callus. 3) Cellulose callus becoming a gelatinous plug; inner diaphragm still present. 4) Resorption of inner diaphragm, and completion of gelatinous plug. 5) Plug is gone, and antheridium emptied. (Figs. a, g, h, 200 μ scale; figs. b–f and i, 100 μ scale.)

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NEW FERNS FROM THE NORTHERN ANDES

By WILLIAM R. MAXON

Recent large collections of tropical American ferns received at the United States National Herbarium for identification have included a good many that apparently are new. Several of these from the northern Andes are described herewith as a small contribution toward making known this exceedingly rich fern flora. The first three are illustrated at slightly less than natural size by portions of the type specimens.

HYPOLEPIS **crassa** Maxon, sp. nov. PLATE 4.—Rhizoma late repens, brunnescens, ca. 5 mm. diam., sulcatum. Folia solitaria, ca. 70 cm. longa, suberecta; stipites 30–35 cm. longi, 3–5 mm. diam., e basi fusca castanei, tenuiter muriculati, leviter villosuli, pilis tortuosis mox delapsis; laminae subdeltoideae, acuminatae, 40 cm. longae, basi ca. 22 cm. latae, 2-pinnato-pinnatifidae, rhachi stipiti simili, flexuosa; pinnae ca. 12-jugae, subobliquae, triangulares vel superiores triangulari-oblongae, acutae, mediae 8–9 cm. longae, basi 3–5 cm. latae, infimae maximae, subopositae, petiolulatae (1.5 cm.), 12–15 cm. longae, basi 6–7 cm. latae; pinnulae ca. 9-jugae, majores plerumque late triangulari-oblongae, obtusae, 2.5–4.5 cm. longae, 1–3 cm. latae, basi pinnatisectae, sursum profunde pinnatifidae (segmentis ca. 6-jugis), ceterae omnino pinnatifidae, rhachibus minoribus subtus leviter sed persistente brunneo-villosulis, pilis paucis venas adeuntibus; segmenta coriacea, opaca, plerumque oblonga, crasse lobata, lobis vel dentibus perpaucis, brevibus, deltoideis, apice rotundatis, majoribus emarginatis; venae infra valde depressae, fertiles 1- vel interdum 2-furcatae; sori 1–3-jugi, magni (1.5 mm. diam.), submarginales, crenatura marginali magna, rigide recurva, omnino immutata, crasse eroso-dentata; sporangia annulo articulis ca. 17 formato cincta, sporis diplanatis, ellipsoidalibus, laevigatis, 30 μ longis, ca. 21 μ crassis.