

On the Genus *Lopharia* Kalchbrenner & MacOwan.

By

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Summary.

Four species of *Lopharia* have previously been described. Of these, *L. lirellosa* Kalchbr. & MacOwan is regarded as a synonym of *L. mirabilis* (B. & Br.) Pat. It is shown that the external morphology of the hymenium, upon which the genus *Lopharia* is based, is a variable and unreliable character. Over several collections, intergrading states of the hymenium link the species *L. mirabilis*, *Stereum turgidum* Lloyd and *Stereum cinerascens* (Schw.) Masee, and no constant differences can be demonstrated in the internal structure of these three species. *S. turgidum* and *L. mirabilis* are accordingly recognised as synonyms of *Stereum cinerascens*, and the genus *Lopharia* is sunk under the genus *Stereum* Pers. ex S. F. Gray.

Lopharia dregeana (Berk.) Talbot is found to be cospecific with *Irpex vellereus* B. & Br., and the new combination *Irpex dregeanus* is made. It is suggested that *Lopharia javanica* P. Henn. & E. Nym. may be based on a collection of *Lopharia mirabilis* with immature spores. A sporograph supports this supposition, but detailed evidence is lacking as the type of *L. javanica* was not available for study.

The writer examined type or authentic material of most of the species discussed here. Such material is indicated by an exclamation mark (!) after the specific epithets listed in this paper.

History of the genus *Lopharia*.

In 1873, Berkeley & Broome described *Radulum mirabile* from Ceylon, in the following words (in Journ. Linn. Soc. Bot. 14, p. 61):—

558 RADULUM MIRABILE, B. & Br. Primum orbiculare tomentosum, demum confluens; hymenio perfecto hispidulo (No. 328). On dead wood. 5 inches long, 2 broad.

From this description it is certain that the species could not be recognised again, but the type specimen was preserved in Kew Herbarium, where Masee studied it and in 1892 (in Grevillea 21, p. 2, Pl. 182, fig. 8-9) erected a new genus, *Thwaitesiella*, with the single species *T. mirabilis* (B. & Br.) Masee. The description and illustrations were competently executed.

Meanwhile, in 1881, Kalchbrenner and MacOwan had erected the genus *Lopharia* (in Grevillea 10, p. 58) on the single species *L. lirellosa*, with the following diagnosis:—

LOPHARIA, K. et M. On. Hymenium cartilagineo-membranaceum glabrum, contiguum, in rugas interruptas, cristato-incisas elevatum, Phlebiae maxime affine; sed in hac rugae acie integerrima gaudet.

LOPHARIA LIRELLOSA, K. et M. On. Effusa, plana, pallide rufescenti carnea, subpruinosa, ambitu determinato, villosociliatulo, albidiore; plicis interruptis, varie curvatis, subramosis, cristato-incisas. Somerset East (1. MacOwan). Ligno arcte adnata, placas oblongas formans. Plicae ad formam lirellarum Graphidis eurvatae.

In 1895, Patouillard (in Bull. Soc. Myc. de Fr. 11, pp. 13–15, Pl. 1) recognised two species of *Lopharia*, viz. *L. lirellosa* and *L. mirabilis*, the latter being transferred from the genus *Radulum*. Masee's genus *Thwaitesiella* lapsed into synonymy. Patouillard distinguished the two species on the disposition of the hymenial crests and teeth, which he stated were more or less concentric and radiating about a central papilla in *L. mirabilis*, but irregular in *L. lirellosa*. He observed that the specific difference was but slight and that the two were generically inseparable. He commented on the similarity in internal structure of *Lopharia* and *Stereum* but differentiated the two by the external appearance of the hymenium, which is smooth in *Stereum*. He noted that young specimens of *L. mirabilis* were smooth and resembled a resupinate, orbicular *Stereum*. In effect, he said that *Stereum* was a simple form related to the more highly developed *Lopharia* and *Cladoderris* forms, between which there were obvious similarities.

With the accumulation in the herbaria of specimens determined as *L. mirabilis* and *L. lirellosa*, it has become evident that their separation on the basis suggested by Patouillard is untenable. Their type specimens may show minor differences, but no specific difference is maintained when a large number of collections is examined. The hymenial configuration is variable and intergrades between the two forms even in a single collection. Petch (in Ann. Roy. Bot. Gard. Perad. 4, 1910, 410) noted von Höhnel's opinion that the two species might be identical. After examining the types and several other collections of both, the writer is convinced that they are synonymous and henceforth in this paper refers both to the species *L. mirabilis*. He is aware that other mycologists have recognised this synonymy in practice, but was able to find only one statement of it in the literature at his disposal (van der Byl, 1934, loc. cit. infra), and accordingly published the following nomenclator (in Bothalia 6, 1951, 56). *Stereum turgidum* is now added to this list of species:—

Lopharia mirabilis (B. & Br.) Patouillard in Bull. Soc. Myc. de Fr. 11 (1895) 14, Pl. 1, Essai Taxon. sur les Hym. (1900) 74; Petch in Ann. Roy. Bot. Gard. Perpa. 4 (1910) 410; van der Byl in Ann. Univ. Stellenbosch 12 (1934) 2, fig. 1.

Radulum mirabile B. & Br. (!) in Journ. Linn. Soc. Bot. 14 (1873) 61; Saccardo, Syll. Fung. 6 (1888) 496.

Thwaitesiella mirabilis (B. & Br.) Masee in Grevillea 21 (1892) 3, Pl. 182, fig. 8–9.

Lopharia lirellosa Kalchbr. & MacOwan (!) in Grevillea 10 (1881) 58; Patouillard (1895, loc. cit.).

Licentia yao-chanica Pilát in Ann. Mycol. 38 (1940) 66, text fig. 2, Tab. 1, figs. 1–3.

Stereum turgidum Lloyd (!) in Lloyd Myc. Writ. 5 (1916) L. 63, Note 502; Stevenson & Cash in Bull. Lloyd Library 35 (1936) 58.

Stereum caperatum Lloyd (!) in Lloyd Myc. Writ. 4 (1916) 549, fig. 751. [non *S. caperatum* (Berk. & Mont.) Masee].

The writer has not seen specimens of *Licentia yao-chanica*, but Pilát's description, photographs and figures leave no doubt that this is the same species as *Lopharia mirabilis*, and that the genus *Licentia* should lapse.

In the paper referred to above (Talbot, loc. cit.), the very marked similarity of *L. mirabilis* and *Stereum cinerascens* (Schw.) Masee, was noted. Since then the type specimen of *Stereum turgidum* has been seen and is obviously referable to *L. mirabilis*. A detailed comparison of these three species has now been made and is presented below.

Comparison of *Lopharia mirabilis*, *Stereum turgidum* and *Stereum cinerascens*.

(1) Gross morphology of the hymenium.

Stereum turgidum is interesting as a close link between extreme forms of *L. mirabilis* and *S. cinerascens*. Its type specimen is effuso-reflexed with a light-coloured hymenium covered with irregular warts, teeth or incised ridges, not very regularly arranged but nevertheless more or less radiating. Part of the hymenium is perfectly smooth, and on other parts there are only a few, minute, scattered tubercles. Most specimens of *S. cinerascens* are quite smooth, and some tend to crack on drying to reveal a silky subiculum. Some others show a feeble development of hymenial papillae. *L. mirabilis* shows either a geometrical or an irregular pattern in the distribution of its papillae, teeth, or incised ridges, and may even bear shallow pores bounded by incised ridges. The hymenium is usually uncracked, but may crack as in *S. cinerascens*.

The possession of incised ridges and crests, or teeth, the chief character of the genus *Lopharia*, is by no means constant.

(2) Tissue distribution.

It was first thought that the distribution of the cystidia in the tissues might provide a constant difference between the three species. Sixteen sections of different collections of the three species were made. Some are illustrated in Fig. 1 to show that intergrading occurs.

FIG. 1. See pg. 345.

Characteristic specimens of *L. mirabilis* tend to be thinner and possess a single stratum of hymenial cystidia mostly projecting above the hymenium, while characteristic *S. cinerascens* tends to be thicker and have deeply embedded cystidia as well as those projecting from the hymenium. Air spaces are common in *S. cinerascens*. Every possible variation between these two extremes is shown in the single piece of the type specimen of *S. turgidum* preserved in Pretoria Herbarium.

As shown in Fig. 1, other characters of tissue distribution are also unreliable as points of difference. Here it should be noted that the tissue indicated as a basal seam subtending the surface hairs, varies in density. It is sometimes almost undifferentiated, but more often forms a narrow or wide, light-coloured zone, with well-defined boundaries.

Measurements of the microscopic features, excluding spores, of *L. mirabilis*, *S. cinerascens* and *S. turgidum*, are summarised in Table 1.

TABLE 1.
MEASUREMENTS OF MICROSCOPIC CHARACTERS.

	<i>L. mirabilis</i> .	<i>S. cinerascens</i> .	<i>S. turgidum</i> .
Basidia.....	50-65 × 9-11 μ	40-50-(80) × 9-10 μ	45-68 × (5)-9 μ
Cystidia.....	66-130 × 13-21 μ	100-150 × 12-24 μ	50-90-130 × 16-24 μ
Hypphae.....	3-4 μ	3.5-4-4.5 μ	3.4-5 μ
Hairs.....	4 μ	3.5-4-4.5 μ	3.4-5 μ
Thickness in section, excluding hairs and ridges.....	250-300 μ	250-400-800 μ	390-600 μ

The measurements given in Table 1 were made several months apart and without reference to each other. They show some differences, as is to be expected from measuring only a few representatives of each type of organ, but also show a close enough correspondence to be accepted as additional evidence for the identity of the three species.

(3) Spore size and shape.

Ninety spores of *L. mirabilis* distributed among eleven collections, ninety-one of *S. cinerascens* distributed among eight collections, and fifty of *S. turgidum* from the type collection only, were measured. After the manner of Corner (in *New Phytologist* 46, 1947, 195), a sporograph was plotted from the spore measurements of each species and the result is shown in Fig. 2.

FIG. 2. See pg. 346.

The sporographs indicate that the spores of all three species correspond in shape throughout the stages of their development. The sporograph links, for example, globose spores measuring 5×5 micrometer units, with oblong or elliptical ones measuring 6×12 micrometer units (Note: 1 micrometer unit = 1.1μ). This suggests that the spores of *Lopharia javanica* (cited as $5-6 \times 5-7 \mu$) may have been immature, and that this species, if apparently different from *L. mirabilis* only in spore characters, may in fact be the same species. That is only supposition, and needs to be tested by reference to the type specimen, which is not available.

Statistical calculations from the spore measurements were made, and are shown in Table 2.

TABLE 2.
SPORE MEASUREMENTS.

Fungus.	Extreme Range in Microns.	Mean Values in Microns.	Micrometer Units.	
			Mean Length.	Mean Width.
<i>Stereum cinerascens</i> (91 readings on 11 collections)	5.5-14.3 \times 4.4-8.8	10.6 \times 6.1	9.73 S.D. \pm 1.41	5.59 S.D. \pm 0.70
<i>Lopharia mirabilis</i> (90 readings on 8 collections)	5.5-13.2 \times 4.4-7.7	10.7 \times 6.2	9.63 S.D. \pm 1.49	5.54 S.D. \pm 0.88
<i>Stereum turgidum</i> (50 readings on 1 collection)	6.6-14.3 \times 4.4-8.8	11.8 \times 6.2	10.72 S.D. \pm 1.42	5.68 S.D. \pm 0.22

Comparing *S. cinerascens* and *L. mirabilis*:—

Difference in lengths = 0.10 micrometer divisions.

Standard Error of difference = \pm 0.22. Difference insignificant.

Difference in widths = 0.05 micrometer divisions.

Standard Error of difference = \pm 0.12. Difference insignificant.

Comparing *Stereum cinerascens* and *Stereum turgidum*:—

Difference in lengths = 0.99 micrometer divisions.

Standard Error of difference = \pm 0.17. Difference significant.

Difference in Widths = 0.09 micrometer divisions.

Standard Error of difference = 0.21. Difference insignificant.

In these comparisons there is a statistically significant difference only between the lengths of the spores of *S. cinerascens* and *S. turgidum*. It should be remembered that the comparison was made on a series of specimens growing on different substrata and collected and preserved at different stages of development. In the case of *S. cinerascens*, the fact that eleven collections were examined tends to smooth out these differences, but there is no such effect in *S. turgidum* of which only one collection was available. In general these statistics give a useful confirmation of the identity of the three species. For the purposes of mycological taxonomy, and taking into account the variety of conditions under which the fungi grew, a difference in mean length of the spores of only about 1μ is scarcely worth consideration.

The foregoing evidence of macro- and microscopic characters establishes the identity of *L. mirabilis*, *S. turgidum* and *S. cinerascens* as a single variable species, for which the specific epithet *cinerascens* has priority. To decide the genus in which this species should be placed, it is necessary to consider the types of the genera *Lopharia* and *Stereum*.

Typification of the genera *Stereum* and *Lopharia*.

The genus *Stereum* Pers. ex S. F. Gray is accepted as validly published without conservation (Rogers in Farlowia 3, 1949, 450). An acceptable type species for the genus has already been selected by Rogers (in Farlowia 3, 1949, pp. 450, 480) and independently by Donk (in Bull. Bot. Gard. Buitenzorg, ser. iii, 18, 1949, 98-99), from among the five species first listed by S. F. Gray (in A Natural Arrangement of British Plants 1, 1821, 652). This species is *Stereum hirsutum*, an eminently reasonable selection which preserves the name *Stereum* in its present sense and conforms to the Rules of Nomenclature.

Lopharia was erected as a monotypic genus with the species *L. lirelloso*, which is thus the type species. This species, as has been shown, is synonymous with *L. mirabilis*, but even if it were possible to point out specific differences these would not materially affect the subsequent discussion on the status of the genus.

The type species of the genus *Lopharia* possesses the internal structure and tissue distribution characteristic of the type species of the genus *Stereum*, except for the presence of cystidia in the former. As we do not recognise cystidia as of generic significance in *Stereum*, and, taking into account the demonstrable variability of the hymenium in *Lopharia*, there remains no bar to reducing *Lopharia* to synonymy with *Stereum*. The correct name for the species represented by the morphological forms known as *Radulum mirabile* (1873), *Thelephora cinerascens* (1832), and *Stereum turgidum* (1916), is *Stereum cinerascens* (Schw.) Masee. This species may be considered as the type species of the genus *Lloydella* Bres., being the first species listed under that genus by Bresadola (in Lloyd Myc. Writ. 1, 1901, 51), and conforming to the author's description of that genus. However, we do not recognise the genus *Lloydella*, which differs from *Stereum* only in the possession of cystidia.

By combining the nomenclators given for *Lopharia mirabilis* in this paper, and for *Stereum cinerascens* in a previous paper (Talbot, loc. cit.) a rather full synonymy is obtained for *Stereum cinerascens*, in which the writer has examined the type or authentic material for all the following species: *Stereum cinerascens* (Schw.) Masee, *Corticium aschistum* Berk. & Curt., *Peniophora berkeleyi* Cooke, *Stereum moricola* Berk., *Stereum dissitum* Berk., *Corticium ephedium* Berk. & Curt., *Peniophora occidentalis* Ellis & Everh., *Lopharia mirabilis* (B. & Br.) Pat., *Lopharia lirelloso* Kalchbr. & MacOwan, *Stereum caperatum* Lloyd, *Stereum turgidum* Lloyd.

Other species of *Lopharia*.

Two other species of *Lopharia* have been described. The first, *L. javanica* P. Henn. & E. Nym. (in Monsunia 1, 1889, 144), is said by Petch (loc. cit.) to appear to differ from

L. mirabilis only in the size of its spores. It is suggested earlier in this paper that if this is really the only difference, then the sporograph may be used to relate the two species.

The last species of *Lopharia* to be described was *L. dregeana* (Berk.) Talbot, which the writer transferred from *Corticium* (Talbot, loc. cit.), and at the time expressed doubt in the choice of genus. As the genus *Lopharia* has now been shown to be untenable, it is necessary to reconsider *L. dregeana*. That combination was made in good faith, but too hastily, for the writer has now discovered that *Irpex vellereus* Berk. & Br. (!) is cospecific with the irpicoid forms of *L. dregeana* which he noted earlier. Here then is another group of species, all with identical microscopic characters but varying in the convolution of the hymenium. The hymenial variations intergrade and cannot be accepted as constituting specific differences. The group is composed of *Corticium dregeanum* Berk. (!) having a smooth hymenium except for a few, small, scattered tubercles, *Lopharia dregeana* (Berk.) Talbot in which the former species was associated with further specimens bearing a lopharioid hymenium, and *Irpex vellereus* Berk. & Br., with irpicoid, flattened teeth coalesced at the base or containing specimens with longer, discrete, hydrinoid teeth.

Irpex lacteus Fr. was chosen as the lectotype species of the genus *Irpex* Fries, by Clements & Shear (The Genera of Fungi, 1931, p. 346), from among the species first described by Fries (Elenchus Fung. 1, 1828, 142-148). Reasons for this choice were not given, but as it is thought to preserve the name *Irpex* in its present usage, it is adopted here. With the genus thus typified it is clear that *Irpex vellereus* has been correctly classified as to genus, but as the specific epithet *dregeanum* has priority the new combination *Irpex dregeanus* (Berk.) Talbot is necessary. The synonymy of this species is set out below.

Irpex dregeanus* (Berk.) Talbot *comb. nov.

Corticium dregeanum Berkeley (!) in Hooker's Lond. Journ. Bot. 5 (1846) 3; Saccardo, Syll. Fung. 6 (1888) 636; Montagne in Ann. Sci. Nat. ser. iii, 7 (1847) 174.

Hymenochaete dregeana (Berk.) Masee in Journ. Linn. Soc. Bot. 27 (1890) 114.

Lopharia dregeana (Berk.) Talbot in Bothalia 6 (1951) 57.

Irpex vellereus Berk. & Br. (!) in Journ. Linn. Soc. Bot. 14 (1873) 61; Saccardo, Syll. Fung. 6 (1888) 489; van der Byl in Ann. Univ. Stellenbosch 12 (1934) 4, figs. 5-6.

The author is much indebted to Dr. R. W. G. Dennis of Kew Herbarium, to Dr. D. P. Rogers, and to the Director and Staff of the Commonwealth Mycological Herbarium, for illuminating discussions of some problems in nomenclature.

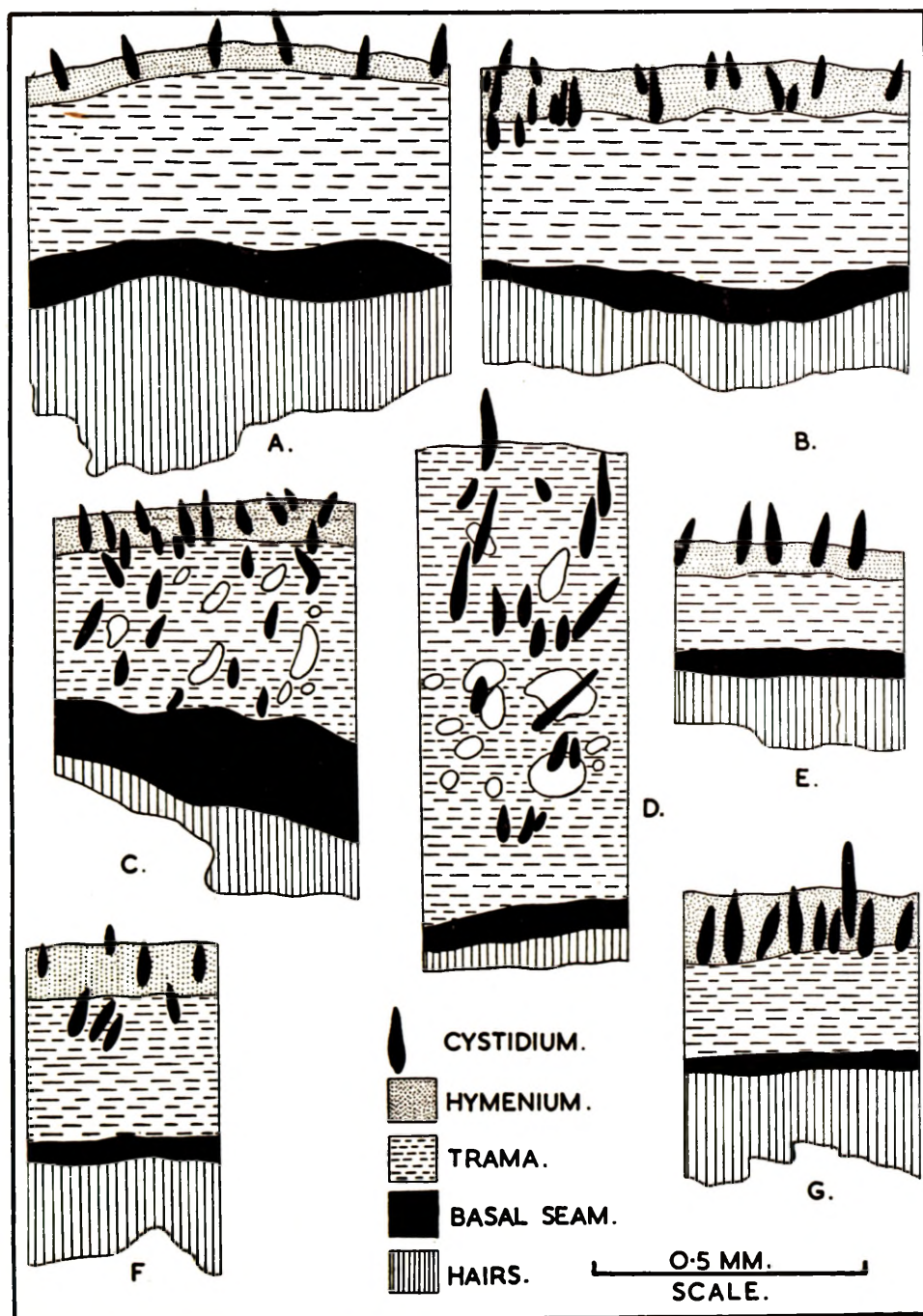


FIG. 1.—Sections of the fructifications of *Stereum turgidum* (A, B, C), *Stereum cinerascens* (D, F) and *Lopharia mirabilis* (E, G), drawn diagrammatically with the aid of a camera lucida to show variation and intergrading of internal characters, and also to show the distribution of the tissues.

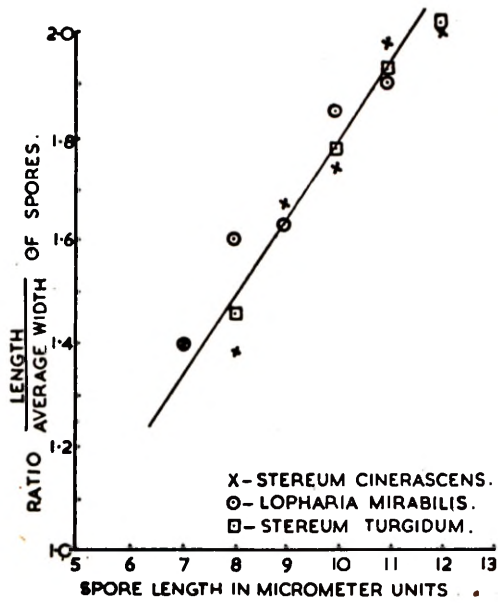


FIG. 2.—Sporographs of *Stereum cinerascens*, *Lopharia mirabilis* and *Stereum turgidum*, relating the length of the spores to the ratio length/average width of spores. Points determined by less than five readings are not shown on the graph.