

OBSERVATIONS ON THE GENUS *MYROTHECIUM*III. THE CYLINDRICAL-SPORED SPECIES OF  
*MYROTHECIUM* KNOWN IN BRITAIN

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(With Plate 2 and 1 Text-figure)

Since 1943 many additional collections of *Myrothecium* have been examined. *M. carmichaelii* Grev. and *M. roridum* Tode are now considered to be distinct species and a neotype for *M. roridum* Tode is proposed. A key to the cylindrical-spored species is given and their history reviewed.

When Preston (1943) first reviewed the genus *Myrothecium* only some ten living collections were available for comparison with the published exsiccata. He was able, however, to recognise the three classic species which Fries had accepted, viz. *M. inundatum*, *M. roridum* and *M. verrucaria*, each of which has been found in Britain, and he added *M. striatisporum* Preston to the British list (1948). Since then many more specimens have been seen and the purpose of this paper is to explain and, one hopes, to substantiate the resulting modified views now put forward concerning those species which have cylindrical spores.

*Generic description of Myrothecium*

*Sporodochia* small (0.1-1.5 mm. diam.), discoid, sessile or with very short stalks, often confluent, black, white rimmed; *spore mass* viscous and green when young, later becoming hard and black; *conidiophores* of branched, septate, hyaline hyphae, their apical cells surmounted by verticils of slenderly clavate, hyaline, finally agglutinated phialides; *spores* cylindrical, ovate or fusoid, continuous, hyaline to olive brown, often guttulate.

*Key to the cylindrical-spored species of Myrothecium mentioned in this paper**Sporodochia with setae*

Setae evanescent, thick-walled, septate, hyaline, about 100-300  $\mu$  long, 3-4  $\mu$  wide at the base tapering to 2  $\mu$  near the bluntly pointed apex. *Phialides* very slenderly clavate, hyaline, 9-22  $\times$  1-2  $\mu$ . *Spores* 3-4  $\times$  1-2  $\mu$ , cylindrical with rounded ends, subhyaline; known only on dried up agarics. *M. inundatum* Tode ex Fr.

*Sporodochia without setae*

Marginal ring consisting of hyaline, loosely intertwined, contorted, unseptate hyphae with blunt ends; fertile hyphae 3-4 celled, cells ca. 30  $\times$  3  $\mu$  at the base, 10  $\times$  1.5  $\mu$  at the apex. *Phialides* slenderly clavate, 10-12  $\times$  1-2  $\mu$ , usually arranged in whorls with 3-7 in each whorl.

1 Spores slender, at least five (usually 7-10) times as long as wide; 2-3 guttulate, subhyaline, black in mass; 8-13  $\times$  1-1.5 (rarely 2)  $\mu$ ; originally

on decaying vegetable matter; more recently on dead stems of species of *Thalictrum*, *Eupatorium* and *Iris* *M. carmichaelii* Grev.

- 2 Spores always less than five times as long as wide, hyaline or subhyaline, black in mass, often biguttulate; 5 (rarely 4)–11 × 1–3 (usually 2)  $\mu$ ; on moribund and dead stems of a diversity of cultivated plants, very rare on indigenous species in Britain *M. roridum* Tode ex Fr.

The remaining known British species have ellipsoid or fusoid spores, but they should, perhaps, be mentioned here:

*M. verrucaria* Ditmar: \* spores ellipsoid or lemon shaped, truncate, hyaline to subhyaline, black in mass, 6–10 × 2–2.5  $\mu$ .

*M. striatisporum* Preston: spores subfusoid, truncate, subhyaline to smoky olive brown, 7–12 × 2.5–3  $\mu$ .

The latter is at once recognizable by the spirally arranged ridges (about 15 in number) which give the epispore a characteristically fluted appearance.

#### EXSICCATA

(When any particular exsiccatum is referred to in the text the number preceding it here is quoted. The letter in parentheses indicates the herbarium where the specimen is to be found.)

#### *M. INUNDATUM*

1 (K). 'Myrothecium inundatum Tode, Fries, *S.M.*, III, p. 217' (scripsit J. F. Klotzsch). 'Carm.' (scripsit W. J. Hooker). 'Sporidia cylindrica. An varietatem Myrothecii roridi?' (scripsit M. J. Berkeley). Collected between 1825 and 1830.

2 (K). Fuckel's *Fungi Rhenani*, p. 165. 'Myrothecium inundatum Tode. Ad Agaricos putridos, raro. In Sylva Hostrichiensi.' (Cent. 2: publ. 1863.)

3 (K). Rabenhorst, *Fungi Europaei*, p. 517. 'Myrothecium inundatum Tode. *Mechl. Schw.* f. 39. Ditm. in Sturm's *D. Fl.* III, T3. Rabenhorst, *Handbuch*, I, p. 49. Ad Cantharellum cibarium aliosque fungos putridos, autimno...-chorst. leg. Dr T. H. Spree.' (Cent. 6: publ. 1863.)

4 (K). Rabenhorst, *Fungi Europaei*, p. 679. 'Myrothecium inundatum Tode, *Mechl.* Rabenhorst, *Handbuch*, I, p. 49. In agaricis et Russulis putricentibus prope Gratz Austriae leg. G. de Niessl.' (Cent. 7: publ. 1864.)

5 (K). 'Myrothecium inundatum in Russulam adustam, Swanage, Nov. 1857' (scripsit M. J. Berkeley). Collected C. E. Broome.

6 (K). 'Myrothecium Carmichaelii Grev. Ascot, 31 Oct. 1867' (scripsit M. J. Berkeley). [On an old agaric.]

7 (K). 'Myrothecium roridum Tode on Russula adusta; C. B. Plowright, King's Lynn, Aug. 1876.' M. C. Cooke, *Fungi Britannici Exsiccati*, ed. 2, p. 628.

8. 'Myrothecium inundatum Tode on Russula adusta North Wootton, May 1935, T. Petch.' (Herb. N.C.P. XV a.)

\* Evidence that the name *Myrothecium verrucaria* must rightly be attributed to Ditmar alone has yet to be considered in a subsequent paper.

9. *Myrothecium inundatum* Tode on *Russula adusta*; Wheatfen Broad, Norfolk; E. A. & M. B. Ellis; I.M.I. 5607, 25 May 1946; 8983, 10 June 1946.

*M. CARMICHAELII*

10 (E). '*Myrothecium Carmichaelii*, Grev. Appin. Capt. Carmichael.' Type (collected presumably before 1825.)

11. On *Eupatorium cannabinum*; Strumpshaw Marsh, Norfolk (burned in spring of previous year); E. A. Ellis, 3 April 1949. I.M.I. 34763.

12. On *Thalictrum flavum* (dead stems); Smee Hole, Wheatfen Broad, Norfolk; E. A. Ellis, 3 April 1949. I.M.I. 34815.

13. On *Iris pseudacorus* (dead stem); Broad Marsh, Wheatfen Broad, Norfolk; E. A. Ellis, 29 May 1950. I.M.I. 41597.

*M. RORIDUM*

14 (L). *Myrothecium verrucaria* Ditmar folder in Herb. Persoon Herb. Lugd. Bat. 910, 225-287.

'*Myrothecium nigrescens*.

*Myrothecium verrucaria* Ditm.

Peziza—Albertini et Schweinitz.

Ex Lusatia miserunt: Albertini et Schweinitz.'

(Perhaps the earliest extant collection of a *Myrothecium* with cylindrical conidia.) Fide auctores: 'In foliis excissimis subconfectis cucumerinis'; collected presumably before May 1804.

15 (G). Herbarium Berbey Boissier. 'No. 166 Nassau's Flora. *Myrothecium roridum* Tode; All(ium) sativ(um), in horto meo, Aut. Leopold Fuckel.' [Distributed in Fuckel's *Fungi Rhenani*, p. 166.] (Publ. 1863.)

16 (K). 'Fungi North America. *Myrothecium roridum* Tode, Aiken S.C(arolina). H. W. R(avenal).'

17 (PAD). Herb. P. A. Saccardo. '*Myrothecium roridum* Tode, Hymenula chartarum Padova. . . 76. I.' [P. A. Saccardo; on paper. Jan. 1876. Figured in *Fungi Italici*, Tab. 858; notable as probably the first specimen of a *Myrothecium* from which spore measurements were made and published.]

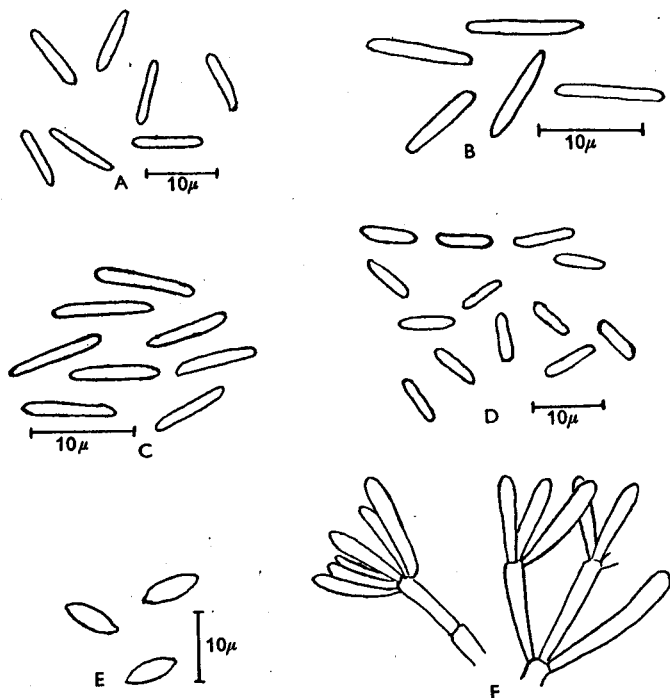
18 (BM). '*Myrothecium roridum* Tode on dying *Violas*. Oct. 1920' (scripsit W. B. Grove). [Earliest extant British collection of genuine *Myrothecium roridum*, as opposed to *M. inundatum* and *M. carmichaelii*.]

19. Herb. N.C.P.; isolation no. 63β. *Myrothecium roridum* Tode, from *Viola tricolor* (dying isolated plant); Wellington, Shropshire, 1934. [The earliest known isolation of *M. roridum* from a British collection; the collection was not preserved.]

20. Herb. N.C.P. Culture No. 6. *Myrothecium roridum* Tode from *Antirrhinum majus* (roots). F. T. Brooks, Aug. 1939.

21. Herb. N.C.P. No. 65. *Myrothecium roridum* Tode on inside of stem of unidentified Umbellifer; Collected J. Webster, 1951, Downton Gorge, Hereford foray, 17 Sept. 1951. [The only known collection of *M. roridum* growing spontaneously on a wild plant in Great Britain.]

In 1790 H. J. Tode proposed the genus *Myrothecium* with the diagnosis: '(Myrothecium). *Fungus cyathiformis; cupula superni volvata; repletura seminale lentoviscida.*' [Fungus cup-shaped; cups surrounded by a sheath; when filled with spores slowly sticky.] He described five species, *M. inundatum*, *M. roridum* and three others which, according to Fries (1829), belonged to quite other genera. The habitat of *M. roridum* was given as the damp remains of oak and pine branches, that of *M. inundatum* as a dried up agaric.



Text-fig. 1. A. Spores of *M. carmichaelii* from type specimen; B. Spores of *M. carmichaelii* from *Thalictrum flavum* (M.J. del.); C. Spores of *M. carmichaelii* from *Eupatorium cannabinum* (M.J. del.); D. Spores of *Peziza verrucaria* from exsic. in Herb. Persoon; E. Spores of *M. verrucaria* from exsic. J. B. Ellis; F.N.J. 2769. F. *M. roridum*; Fuckel No. 166 on *Allium*; conidiophores.  $\times 1500$  approx.

In 1809 Link emended Tode's generic diagnosis and accepted within the genus only *M. inundatum*. Since Tode had not described the spores, which would have been invisible to him, it seems that Link must have used the peculiar habitat of this species as his means of identifying it. He described it as follows: 'Sporangium figurae indeterminatæ. Peridium simplex, laxe floccosum tandem in medio evanescens. Sporidia minutissima globosa, prima ætate fluidiuscula, dein compacta.' [Sporangium of irregular shape. Peridium loosely woolly, at length disappearing at the centre. Spores very small globose, at first somewhat fluid then compact.]

*Note.* The spores are so small that they can appear globose as they rotate under the microscope. They were again described as globose by Ditmar (1813).

Persoon (1818, p. 114) referred to the genus and stated that *M. inundatum* is found only on dried agarics, thus: 'L'espèce ordinaire est le *Myrothecium viride* (*M. inundatum*, Sturm. Champ. cah. 1, t. 3.) dont le disque est un verte olivâtre: elles ne vient pas ailleurs que sur les Agarics secs, et particulièrement sur l'*Agaricus adustus* ou *nigricans*, Bull....'

Gray (1821) made what seems to be the first traceable reference to *Myrothecium* as a genus belonging to the British fungus flora by including in his list *M. inundatum* with the note 'On rotten fungi, autumn'. This entry of Gray's is perhaps the first occasion on which the name *Myrothecium* was used after 1 Jan. 1821.

About 1824-25 Carmichael collected the earliest extant specimens of *Myrothecium* in Great Britain. Some of these he sent to W. J. Hooker at Glasgow and others to R. K. Greville at Edinburgh.

Greville (Scottish Cryptogamic Flora, 1825) identified one of Carmichael's specimens as a new species, *M. Carmichaelii*, which, he said, differed from the other species known to him in having cylindrical spores. He stated: 'For the addition of this highly curious genus to the British Flora we are indebted to Captain Carmichael whose specimens are abundantly distinct from the other two species which have been described.' Greville refers to the spore shape of the other species thus: '*M. verrucaria* Ditm. has ovate sporules. *M. inundatum* (Tode) has globose ones: the three species have, however, such a strong resemblance to each other, that it is necessary to examine them under the microscope, in order to ascertain their distinctive characters.'

Greville's description of his new species was: '*Myrothecium Carmichaelii*. Carmichael's *Myrothecium*. Specific character. *Myrothecium Carmichaelii*; peridio polymorpho, candido; sporulis viridibus nigrescentibus cylindricis. *M. peridium* irregular in form, white; sporules green, becoming blackish, cylindrical. Hab. on masses of subputrescent vegetable substances. Appin, Captain Carmichael, viz. *Sporangia* of various forms, 1-3 lines in length or breadth, rarely exactly circular, often irregularly sinuose, white depressed. *Peridium* formed of an interwoven mass of fine filaments, which gradually give way, and at length altogether disappear towards the centre, leaving the mass of sporules exposed. *Sporules* forming a semifluid pulp in the young state, in the whole genus, at length compact but not pulverulent. In the present species they are exactly cylindrical.' He also records seeing what appear to have been the intertwining fertile hyphae and the phialides which make up the hymenial layer, thus: 'I have sometimes thought I perceived certain erect hyphae or cells throughout the whole central substance, within which the sporules are situated; this, however, remains to be confirmed.'

Fries (1829) referred *M. carmichaelii* to *M. roridum* and, along with *M. inundatum* he also accepted *M. verrucaria*. He distinguished these three species as follows: *M. roridum* disk swollen, spores cylindrical; *M. verrucaria* disk flattened, spores ovate; *M. inundatum*, disk flat, spores globose.

*Note.* Close examination of the three classic species has shown that the shape of the 'disk' is no sound criterion for their precise identification.

Within the period 1820-30, M. Klotzsch was assisting with the arrangement of Hooker's herbarium and there noticed that one of Carmichael's specimens of *M. inundatum* on a dried agaric (exsic. 1), had cylindrical, not globose, spores. This fact was referred to later by Berkeley (1836). He examined the specimen of *M. inundatum* previously seen by Klotzsch and confirmed that its spores were indeed cylindrical, annotating its label to this effect (exsic. 1). For this very reason, Berkeley regarded the fungus which his forerunners had accepted as *M. inundatum* as but a variety of *M. roridum*, to which species he had assigned all cylindrical-spored specimens of *Myrothecium*. It was thus that the name *M. roridum* was introduced into British fungology.

Berkeley wrote '1. *M. roridum* Tode, (Spangled Myrothecium), disk turgid, sporidia cylindric. Tode, Fung. mech. f. 38. Fr. Syst. Myc. v. 3, p. 217. *M. Carmichaelii*, Grev. Sc. Crypt. Fl. 140. On rotting plants, dried agarics, etc., Appin. Capt. Carmichael. The specimens on dried agarics, though agreeing at first sight with *M. inundatum*, have cylindric not globose *sporidia*. This fact was noticed by M. Klotzsch when inspecting Dr Hooker's herbarium and my own observations are in accordance with his. This is one among many instances of always have recourse to the microscope for the correct determination of the more minute fungi.'

*Note.* The first occasion in which the practice of measuring spores was introduced into British mycology was in Berkeley & Broome's *Notices of British Fungi*, No. 690 (1854). Accordingly Berkeley did not notice the marked difference in size of the spores of *M. inundatum* and of *M. carmichaelii*.

Exsic. No. 1, referred to in the preceding paragraphs, is notable as being the earliest extant specimen of *M. inundatum* collected in Britain and also the first in which the spores were recognized as being cylindrical. The latter fact was not further confirmed until Höhnel (1905) pronounced them to be oblong rod-shaped and not globose. Höhnel also recognized the long, white, evanescent setae, present in young specimens.

Saccardo (1880) identified *Myrothecium roridum* on wet paper and rotting stems of *Malva* and gave this description. '*M. roridum*, sporodochia, plana, atra, albormarginata, conidia cylindrica, utrinque obtusa 8-10 x 2 (raro 14 x 2)  $\mu$ , 2 guttulata, dilute olivacea, basidiis filiformibus 30 x 2  $\mu$  sulfata.' [*M. roridum*, sporodochia flat, black with a white margin, conidia cylindrical with blunt ends, 8-10 x 2 (rarely 14 x 2)  $\mu$ , biguttulate, pale olivaceous, supported on filiform basidia 30 x 2  $\mu$ ].

*Note.* It was not until after 1908 that Saccardo (1913) began to use the term *conidiophore*, instead of *basidium* to denote the spore-bearing cell of *Myrothecium*.

A preparation from W. B. Groves's collection (exsic. 18) has been examined and the identity with *M. roridum* confirmed. All previous British records of so-called *M. roridum* were, in fact, based on *M. inundatum* on dried agarics or on the type collection of *M. carmichaelii*.

*M. roridum* was next recorded in 1932 when it was found by Preston in a garden in Shropshire, again associated with dying violas. It was then identified by Miss E. M. Wakefield (exsic. 19).

During the period 1936-43, Brooks (1945) found *M. roridum* at Cambridge, where it was apparently parasitic upon the roots of *Antirrhinum majus*, *Lupinus ornatus*, and *Solanum tuberosum*; he isolated the fungus from these plants and sent cultures to Preston (exsic. 20).

The finding by E. A. Ellis of *M. carmichaelii* in 1949 on *Eupatorium cannabinum* and *Thalictrum flavum* (dead stems) in the Norfolk Broads (exsic. 11 and 12) was the first record in Great Britain or elsewhere since the first description. It was found again in 1950 (exsic. 13).

In 1951 we have the first instance, and so far the only one, of *M. roridum* on an uncultivated plant, growing in its natural habitat in Great Britain. This specimen was collected by Dr J. Webster from the hollow stem of an unidentified umbelliferous plant (exsic. 21). The fungus appears to be relatively rare in this country. On the other hand, it seems to be quite common in tropical and subtropical regions, frequently on leaf spots, as reference to Table 1 will show.

The few collections of *M. carmichaelii* which I have seen are all of British origin and were found on uncultivated plants or, as for the type, on plant debris.

When redescribing *M. roridum* as one of the three classic species Preston (1943) figured the spores of the type, *M. carmichaelii*, and also those of three other specimens which had been referred to *M. roridum* (exsic. 19 and 20). Although his figures show clearly the difference in length-width ratio between the spores of the type and those of the other three specimens, Preston decided to follow Fries and accept *M. carmichaelii* as the type for *M. roridum* since, at that time, there seemed insufficient evidence to justify a contrary view.

From the additional material which has become available since 1943 it has become evident that the spores of *M. carmichaelii* are consistently longer and more slender than those of *M. roridum* (see Tables 1 and 2). This difference is sufficiently clear to be appreciated at sight and the two fungi are thus readily distinguishable.

*Note.* Under modern conditions a single sporodochium of *M. roridum* can be relied upon to produce an immense number of sporodochia in artificial culture. This unfortunately does not apply to *M. carmichaelii* which remains persistently sterile on artificial media.

The facts set out in the foregoing paragraphs lead one to conclude that Fries's acceptance of *M. carmichaelii* as the type for *M. roridum* is no longer tenable and that, in the light of our present knowledge, these two should properly be regarded as distinct species.

The name *Myrothecium roridum* has been in existence for more than 150 years; it is being applied to numbers of collections and cultures over the whole world. For so long as *M. carmichaelii* was treated as a synonym of *M. roridum*, the type of *M. carmichaelii* could stand duty for *M. roridum* also, but now that the two are separated *M. roridum* is left without a type and a neotype for it must be sought.

For this neotype three possible specimens exist, these are:

(1) Specimen from an authentic collection of '*Peziza verrucaria*' A. & S. in Herb. Persoon (exsic. 14). Only a single stroma could be found on this material; the conidia are cylindrical.

Note. The name *Myrothecium verrucaria* Ditmar is reserved for a species with ovate, not cylindrical conidia.

(2) Fuckel's collection on *Allium sativum*, No. 166. In Herbar Berbey Bossier (exsic. 15). Through the courtesy of the Director of the Conservatoire botanique, Geneva, I have been able to examine this material. Sporodochia are present and the fungus can be identified with certainty

Table 1. Collections referred to *Myrothecium roridum*

(In order of average length of spores)

Herb. N.C.P.	Herb. I.M.I. no.	Spore range ( $\mu$ )	Average ( $\mu$ )	Host	Country of origin
	1520	4-6 x 1.5-2	5 x 1.8	<i>Rinorea microdon</i>	Tanganyika
	as <i>M. sp.</i>				
29	36519	5-6 x 1-1.5	5.4 x 1.2	<i>Hibiscus esculentus</i>	Malaya
20	34468	5-6 x 2	5.5 x 2	<i>Vigna sinensis</i>	Malaya
32	35585	5-6 x 1.5-2	5.6 x 1.9	<i>Glycine max</i>	Malaya
	24912	5-6 x 1.5-2	5.6 x 1.9	<i>V. sinensis</i>	Malaya
33a	37806	5-7 x 2-2.5	5.8 x 2.2	<i>Luffa acutangula</i>	Malaya
	1509	5-7 x 1.5-2	5.9 x 1.9	<i>Phaseolus mungo</i>	Tanganyika
61		5.5-6.5 x 2	6 x 2	<i>Lactuca sativa</i>	England
	1510	5-7 x 2	6 x 2	<i>P. vulgaris</i>	Sierra Leone
33	35614	6-7 x 2	6 x 2	<i>Luffa acutangula</i>	Malaya
	1512	5.5-7 x 2	6 x 2	<i>Canavalia ensiformis</i>	Sierra Leone
	1513	5-7 x 2-2.5	6.2 x 2.2		
	1506	6-7 x 2-3	6.2 x 2.2		
				<i>P. adenanthus</i>	Sierra Leone
9	37900	5-7 x 2	6.2 x 2	<i>Lupinus ornatus</i>	England
65	62420,	5-7 x 1.5-2	6.1 x 2	Umbelliferae sp.	England
	47245				
	13849	5-7 x 1.5-2	6.3 x 1.6	<i>V. sinensis</i>	India
	35611	5-8 x 2	6.1 x 2	<i>Psophocarpus tetragonolobus</i>	Malaya
	1511	6-7 x 2	6.3 x 2.1	<i>Phaseolus lunatus</i>	Sierra Leone
	1503	5.5-7 x 1.5-2	6.3 x 1.9	<i>Asystasia sp.</i>	Sierra Leone
849	1500	6-7 x 2	6.4 x 2	<i>Trichosanthes anguina</i>	Sierra Leone
	1498	6-7 x 2	6.3 x 2		
	1499	6-7 x 2	6.4 x 2		
	1501	6-8 x 1.5-2	6.5 x 1.9		
				<i>Luffa acutangula</i>	
				<i>Impatiens sultani</i>	
10	37901	5-7 x 1.5-2	6.5 x 2	<i>Solanum tuberosum</i>	England
	1516	5-8 x 1.5-2	6.5 x 2	<i>Sida rhombifolia</i>	Sierra Leone
	1519	6-7 x 2	6.5 x 2	<i>R. microdon</i>	Sierra Leone
	1507	6-7.5 x 1.5-2	6.6 x 2	<i>P. lunatus</i>	Nigeria
31	36408	5-7.5 x 1.5-2	6.6 x 1.9	<i>Musa sapientum</i>	Sierra Leone
54	44589	5.5-7.5 x 2-2.5	6.6 x 2.1	<i>Ficus sp.</i>	Ghana
57		5-8 x 1.5-2	6.4 x 1.9	<i>Viola tricolor</i>	England
59		5.5-7.5 x 1.5-2.5	6.6 x 2		
97		6-8 x 2	6.5 x 2		
L. Fuckel No. 166	(exsic. 15)			<i>Allium sativum</i>	Germany
21	34469	6-7.5 x 2	6.7 x 2	<i>Solanum melongena</i>	Malaya
	24909(c)	6-7 x 1.5-2	6.7-1.9	<i>Carica papaya</i>	Malaya
58		6-8 x 1.5-2	6.8 x 2	<i>Viola tricolor</i>	England
64	70234	6-8 x 1.5-3	6.9 x 2		
64a		6-8 x 2	6.9 x 2		
63β	62421	5.2-8 x 2-2.5	6.9 x 2		
1	1502	6-8 x 1-2	6.9 x 1.7	(isolated 1934)	
25	36559	6-8 x 1.5-2	6.9 x 1.9	<i>Asclepias curassavica</i>	Sierra Leone
	1515	7-8 x 1.5-2	7.1 x 1.9	<i>Justicia flava</i>	W. Africa
				<i>Hibiscus esculentus</i>	Tanganyika
92	69801	5.4-9 x c. 2	7.1 x c. 2	Paper (' <i>charta putri</i> ')	Italy
P. Saccardo Jan. 1876	(exsic. 17)				
4	1508	5-8 x 1.5-2	7.2 x 2	<i>Dolichos lablab</i>	Ghana
	1504	6-8 x 1-2	7.2 x 1.9	<i>P. adenanthus</i>	Sierra Leone

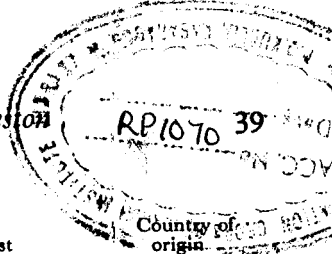


Table 1 (cont.)

Herb. N.C.P.	Herb. I.M.I. no.	Spore range ( $\mu$ )	Average ( $\mu$ )	Host	Country of origin
40a		6-8 x 1.5-2	7.3 x 1.7	Fen soil (isol.)	England
53	70238	6.2-7.6 x 2	7.3 x 2	<i>Pisum sativum</i>	England
	33307	6.5-8 x 1.5-2	7.3 x 1.7	<i>Lycopersicon esculentum</i>	China
849		5.5-9 x 2	7.4 x 2	<i>T. anguina</i>	W. Africa
37		5.5-8 x 1.5-2	7.4 x 2	<i>L. esculentum</i>	England
6	37899	6.9 x 2-2.5	7.5 x 2.2	<i>Antirrhinum majus</i>	England
26		6.0-8.5 x 1.5-2	7.6 x 1.9		
13a		7.5-9 x 1.5-2	8.1 x 2	<i>L. esculentum</i>	England
50		7.6-9.5 x 1.9-2.9	8.2 x 2.2		
62	70237	7-9 x 2	8.1 x 2		
74		7-10 x 2-2.5	8.2 x 2	<i>V. odorata</i> (cultivated)	England
880	1505	6-11 x 2-3	8.3 x 2.6	<i>Dolichos lablab</i>	Sierra Leone
12	1521	8-10 x 1.5-2.5	8.7 x 2	<i>V. odorata</i>	Tanganyika
23	70239	8-10 x 1.5-2.5	8.7 x 2	<i>L. esculentum</i>	England
38		7.5-10 x 2	8.9 x 2		
937	1514	6.5-10.4 x 1.5-2.5	9.4 x 2	<i>Hibiscus sp.</i>	Sierra Leone
24		8-10.5 x 2-3	9.3 x 2.4	<i>L. esculentum</i>	England

Table 2. Collections referred to *M. carmichaelii*

(All from Great Britain)

Herb. N.C.P.	Herb. I.M.I. no.	Spore range ( $\mu$ )	Average ( $\mu$ )	Host
—	44746	8-10 x 1-2	9.5 x 1.3	Decaying vegetable matter
Exsic. 11.	Type in Herb. Hort. Bot. Edinburgh.			
22	34815	8-13 x 1-2	11 x 1.3	<i>Thalictrum flavum</i>
22a	34763	8-10 x 1	8.7 x 1	<i>Eupatorium cannabinum</i>
89	41597	8.1-10.8 x 0.9-1.5	9.8 x 1.3	<i>Iris pseudacorus</i>

as *M. roridum* as maintained in this paper. Its spores are rod-like with rounded ends, averaging  $6.5 \times 2 \mu$ . In the same packet is a distinct *Myrothecium*, with hyaline setae, on *Orobanche rubens*; this is a species unknown to me.

Fuckel did not describe either of these specimens, but he did, however, record (1870, p. 364) finding *M. roridum* on the outer scales of onion from his garden and also on the stem of *Orobanche rubens*. The *M. roridum* on *Allium* was distributed by him as his 'Fungi Rhenani No. 166', but, so far as I can determine, no one has found sporodochia on these published specimens; there appears to be none on the exsiccatum in Herb. R.B.G., Kew.

(3) The specimen on decomposing paper ('*charta putri*') in the Saccardo Herbarium at Padua (exsic. 17). This specimen can be identified as *M. roridum*. Although the script accompanying it is not clear, it would seem to be that figured by Saccardo (1881, No. 585). His description (1880) has been quoted above. The spores, when remeasured, were  $5.7-9.5 \times 2 \mu$ . I do not know from what specimens Saccardo recorded spores measuring 'raro  $14 \times 2 \mu$ '.

Of these three specimens, (2) appears most appropriate to our purpose and I therefore propose Fuckel's Fungi Rhenani No. 166, on *Allium sativum* as a so-called neotype for *M. roridum* Tode ex Fries.

Spore measurements for this species (Table 1), as maintained in this

paper, extend over a remarkably wide range, within which, and more especially among the tropical specimens, one might perhaps discover the species *M. advena* Sacc. described by Saccardo (1908) as having spores  $6-7 \times 2 \mu$  and as occurring on leaf spots. I have not seen the type specimen of this species and do not propose to take up this name at present.

When beginning this review I was aware that *M. roridum* frequently occurs on leaf spots on tropical plants, though I have never found it myself occurring thus in Britain. Early experiments (Preston, 1936), however, had shown that spots were produced on the undetached leaves of healthy growing violas when inoculated with a spore suspension of *M. roridum* and I have never attributed any particular significance to this fact.

A point of real interest, with regard to Saccardo's description of *M. advena*, is that between 1908, when his first description was published, and its appearance in the Sylloge (1913), he had adopted the term *conidiophore* ('*conidiophoris fasciculatis*') to describe the spore-bearing cell in place of *basidium* ('*basidiis fasciculatis*') which he had used hitherto for that structure (cf. his description of *M. roridum* in 1880). His figures also show that when using the term *conidiophore* he was referring to the phialide itself as distinct from the filament on which it was carried.

When first reviewing the genus in 1943 I was unaware of the facts just mentioned but I have, throughout, continued to regard the conidiophores of *Myrothecium* as being made up of the branched, septate, fertile hyphae of which the phialides are a part, i.e. their terminal spore-bearing cells. The term *conidiophore* is so used throughout this paper.

It is a pleasure to acknowledge here the valuable assistance received from many quarters during the compilation of this paper. I am greatly indebted to the Directors of the following institutions for making available to me critical specimens from the herbaria in their charge: Orto Botanico, Padua; Herbarium, Jardins botanique, Geneva; Rijksherbarium, Leiden; Herbarium, Royal Botanic Gardens, Kew; Commonwealth Mycological Institute, Kew.

To my friend Mr E. W. Mason, formerly of Commonwealth Mycological Institute, I owe a special debt. Without his patient guidance through the mazes of nomenclature this paper would never have emerged therefrom. That he has, moreover, contributed very largely to its actual compilation will at once be clear to all British workers in this field.

I wish to thank Mr W. E. Perry who took all the photographs. I am equally grateful also to Mrs M. Jones for making the line drawings indicated by her initials and also to Miss J. Hickman for so kindly checking my references to all those specimens listed in the tables under Herb. I.M.I. numbers.

#### REFERENCES

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- BERKELEY, M. J. (1836). *Fungi. Smith's English flora* 5, 2, p. 323. Introduced the name *Myrothecium roridum* into British mycology on two collections both by Capt. Carmichael of Appin; one was the type collection of *M. carmichaelii* and the other was *M. inundatum* on an agaric.