NEW OR RARE SPECIES OF MYCETOZOA.

By G. Lister, F.L.S.

(Plate 558.)

During the last few years several entirely new species of Mycetozoa have been discovered; and some forms, previously regarded as varieties only, have been found to retain their characters so well that it is more convenient to regard them as distinct species. The following notes refer to these and also to certain other species rarely met with hitherto:—

Badhamia viridescens Meylan, in Bull. Soc. Vaud. Sc. Nat., 1921. Plasmodium? Sporangia scattered or loosely clustered, stalked, globose, 0·5 to 0·8 mm. diam., pale sulphur-yellow or grey with a yellow base; sporangium-wall rugulose with dense deposits of lime-granules. Stalk 0·1 to 0·3 mm. high, furrowed, orange, or yellow above, orange-brown below, translucent when mounted, expanded at the base. Capillitium a coarse network of tubes charged with yellow or colourless lime-granules, sometimes with a few connecting hyaline threads. Spores lilac, nearly smooth, 8 to 10 μ diam. *Habitat* on dead wood.

This species appears to have been found first by Miss A. Hibbert-Ware in the Altyre Woods, Elginshire, in Sept. 1912, on lichen on a dead oak bough. In November, 1913, M. Ch. Meylan collected it at Côte aux Fées in the Jura mountains, at an altitude of 1100 metres; he again met with it near there in Sept. 1920. At one time we regarded it as a form of *Craterium aureum* Rost., to which it bears considerable resemblance; the *Badhamia*-like capillitium and the pale spores appear, however, to be constant distinguishing characters. The sporangia show a tendency to open by petal-like lobes.

Physarum atrum Schwein. The first British gathering of this inconspicuous species was made last September by the Rev. W. Cran, who found it on decaying shoots of Scots pine, at Durris, Aberdeenshire. The small purplish-grey sporangia are nearly destitute of calcareous deposits, and are less heaped together than is usual in this species. *P. atrum* is not unfrequent in fir woods in New England. In Europe it has been found several times in mixed woods near Berlin by Dr. Jahn; in Moldavia Dr. Marcel Brandza writes that it is abundant in mountain pine-woods, whence he has sent us fine examples.

Physarum digitatum G. Lister & Farquharson. Besides the type obtained by the late Mr. C. O. Farquharson in South Nigeria, this species has been found in the Knysna Forest, Cape Province, South Africa, by Miss A. V. Duthie. Part of a third gathering, collected at Preston, Ohio, by the late A. P. Morgan in 1895, was kindly sent me by Prof. Macbride. I had regarded it as a form of *P. virescens* Ditm., but the heaped clusters of small clay-coloured sporangia and the small spores marked with scattered clusters of warts agree in all respects with *P. digitatum*.

Physarum gyrosum Rost. The colour of the plasmodium of this species has been described as either white, creamy-white, yellow,

or dull dirty white. Mr. K. Minakata records the appearance of a large plasmodium on the surface of the ground, near Tanabe, Japan, in October, 1918; it was at first white, but turned pale blue "as clear as Amazonite." He sends a coloured sketch of the striking appearance of the plasmodium as it spread in a network of blue veins over the wooden stopper of a "saké" cask, which had been laid on the ground in the hope that sporangia might form on it rather than on the crumbling soil: where the plasmodium dried rapidly the blue colour changed to milk-white, then cream-coloured, and at length to blood-red and blackish. Mr. Minakata refers to on old Chinese tradition that the blood of an innocent victim will reappear year after year on the spot where he was murdered, not as blood-red but as sky-blue in colour, and suggests that blue plasmodium of *P. gyrosum* emerging from the ground may have given origin to the belief.

Physarum ovisporum, n. sp. (Pl. 558, figs. 1, 1 *a*, *b*.) Plasmodium white. Sporangia scattered, sessile, white, pulvinate, or forming cylindrical, straight, curved, or irregular plasmodiocarps 0·5 to 0·8 mm. diam.; sporangium-wall minutely roughened with rounded deposits of lime-granules, often with smoother areas where the lime is thinly and evenly distributed. Capillitium consisting of numerous rounded white lime-knots, varying much in size, connected by short hyaline threads. Spores rich purple-brown or red-brown, either globose, 9 to 11 μ diam., or oval and 10×12 to $13\,\mu$, minutely warted, usually marked on one side with a pale smooth line of dehiscence. *Habitat* on dead leaves. This rather puzzling form has been met with in late autumn and winter in the neighbourhood of Lyme Regis, Dorset, for the last thirty years; it has been found also in East Dorset, near Porlock, Somerset, and at Chingford, Essex. Although apparently allied to *P. vernum* Somm. and to *P. compressum* Alb. & Schw., it cannot well be attached as a variety to either of these species. From the former it differs in the minutely granular surface of the sporangium-wall and in the neat rounded lime-knots, and from *P. compressum* in the sporangia being always sessile and not compressed. When the spores are oval and marked with a line of dehiscence, they are unlike those of any other species in the genus; they are, however, occasionally globose and uniformly thickened. Even then the other distinguishing characters appear to be of sufficient importance and constancy for this form to acquire specific distinction.

Didymium Trochus Lister. By the rule of priority this name must be replaced by *D. vaccinum* (Durieu & Montagne) Buchet, see Bull. Soc. Myc. de France, xxxvi. 110 (1920). M. S. Buchet has made recently a careful revision of the collection of Mycetozoa in the Paris Museum, and has found there the type of *Diderma vaccinum* Dur. & Mont. It was collected near Algiers, in February 1840, on fallen branches of Opuntia. The sporangia are ochraceous-grey in colour and correspond, M. Buchet finds, in all respects with those of *Didymium Trochus*. This conclusion, as he courteously points out, confirms the suggestion put forward in *Mycetozoa*, ed. 2, p. 107, based on the resemblance of the illustration of *Diderma vaccinum* (in Expl. Sc. Alger. t. 22, figs. 1 *a–b*) to *Didymium Trochus*.

DIDYMIUM DIFFORME var. REPANDUM, n. var. Plasmodiocarps curved closely on themselves to form a flat plate, or widely expanded. Capillitium of hyaline threads, stout and simple below, repeatedly branched above. Tubular or funnel-shaped ingrowths of the sporangium-wall connecting the roof with the floor of the sporangium are often present. Spores 14 to 15 μ diam.

This robust form has been obtained from Bedfordshire, Hertfordshire, Sussex, and South Devon, and seems worthy of varietal distinction.

LAMPRODERMA GULIELMÆ Meylan, in Bull. Soc. Vaud. Sc. Nat. lii. 449 (1919). The characters of this species are the following:— Sporangia globose on slender black stalks, 0·4 mm. diam., silvery or iridescent blue spotted with dark patches corresponding to thickened purplish areas of the otherwise hyaline sporangium-wall. Capillitium pale brown or colourless, repeatedly branching with acute angles. Spores brownish-purple, strongly spinulose, 12 to 15 μ diam. *Habitat* on dead leaves of beech and on needles of conifers. This species was first described and illustrated by Dr. Marcel Brandza (in Ann. Sc. de l'Univ. de Jassy, x. fasc. 2, p. 196, pl. ii. fig. 3: 1916) from luxuriant growths found by him on dead beech leaves in the mountain woods of Moldavia. He regarded it as a variety of *L. echinulatum* Rost., and described the plasmodium as translucent yellow and the spores as closely reticulated. In a further gathering made in November 1919, part of which he kindly sends me, the spores are strongly spinulose with no reticulation, and the sporangia agree in all respects with M. Meylan's type of *L. Gulielmæ* from the Jura Mts. This species has also been found in Colorado, U.S.A., by Dr. W. C. Sturgis, Aug. 1914; in Aberdeenshire by the Rev. W. Cran, Sept. 1913; in Norfolk by Mr. H. J. Howard, Nov. 1918; and near Mürren, Switzerland, by Miss A. Hibbert-Ware and myself, Aug. 1912. In all these gatherings the characters are remarkably constant; the sporangia may even be identified in the field by their dark-spotted walls.

LAMPRODERMA ATROSPORUM Meylan var. ANGLICUM G. Lister & Howard, in Journ. Bot. lvii. 25, pl. 552. This variety was found by Mr. H. J. Howard on dead beech leaves in woods near Norwich in April 1918, and proved to be the first British record for this species. The sporangia were shortly stalked or sessile, obovoid or subglobose, with a network of dark capillitium threads arising from a cylindrical columella, and dark, closely reticulated spores. Associated with these were numerous sessile hemispherical sporangia, usually without a trace of columella, the flaccid network of pale capillitium arising from the broad base of the sporangium; the pale purplish spores were faintly spinulose and measured 10 μ. We submitted the two sharply contrasted forms to M. Meylan: he agreed that the stronger was a variety of *L. atrosporum*, though less robust than the typical form which is frequent on the Swiss Alps—the weak form he thought might also prove to be that species; as we had at that time no proof of this, we named the more abundant weak growth *L. violaceum* Rost. var. *debile*. Last March, however, Mr. Howard was so fortunate as to find further developments in the Norfolk woods, in

which all intermediate stages connecting the extreme forms occurred, completely justifying M. Meylan's suggestion. Another case in which these strong and weak forms are closely associated was observed by Mr. E. Brazier in a gathering on dead oak leaves made in June, 1920, near Stourbridge, Worcestershire. Here the var. *debile* has a colourless network of widely expanded threads, and well-formed but very pale grey spores. Without the evidence gained from the Norfolk specimens, it would have seemed quite unreasonable to have regarded this as a form of the stalwart black-spored *L. atrosporum* of the Alps. Such experiences make us realise how far we are from having mastered what the possibilities of variety may be in species of *Lamproderma*. As the result of these observations, the var. *debile* must be transferred from *L. violaceum* to *L. atrosporum*.

Hemitrichia obrussea Meylan, in Bull. Soc. Vaud. Sc. Nat. lii. 196 (1919). This name M. Meylan applies to the form hitherto referred to *H. Karstenii* Rost., in which the sporangium-walls are translucent and free from all deposits of refuse matter; it appears to stand in the same relation of *Trichia lutescens* Lister as *H. Karstenii* does to *T. contorta*.

Arcyria carnea, n. sp. (Pl. 558, figs. 2, 2 *a*, *b*.) This is the form described as *A. cinerea* Pers. var. *carnea* Lister in *Mycetozoa*, ed. 2, p. 236; it is, however, so constant that it seems better to regard it as a distinct species. The distinguishing features are the clustered flesh-coloured sporangia, with papillose and often reticulated cups, giving attachment to the capillitium; the threads of the latter are marked with close-set prominences, arranged in a loose spiral and appearing square-ended or notched when seen in profile; the remainder of the thread is either spinulose or marked with a broken reticulation or occasionally with three or four faint and irregular spiral bands; the spores are 7 to 8 μ diam. In the field *A. carnea* may resemble robust forms of *A. insignis* Kalchbr. & Cke., but the capillitium is far less flaccid in texture than in that species and the prominences are much more strongly developed. I have found it on old stumps in Essex and Hertfordshire; it has been obtained by M. S. Buchet in the Forest of Fontainebleau, by Dr. H. Rönn in Holstein, by Dr. Celakovsky, jr., in Bohemia, and by Mr. K. Minakata in Japan.

Both Schumacher and Wallroth published species under the name *Arcyria carnea*, but with descriptions too brief to be of value; they have been considered by later writers to refer to either *A. incarnata* Pers., *A. denudata* Wettst., or *A. cinerea* Pers., flesh-coloured forms of which are not unfrequent. It is quite possible that the present species may have been described previously as *A. carnea*, but in the absence of types this must remain uncertain.

Minakatella, n. genus. Sporangia clustered, more or less united into an æthalium. Capillitium forming a coil of nearly simple smooth tubular threads. Spores spinulose.

M. longifila, sp. unica. (Pl. 558, figs. 3, 3 *a–d*.) Plasmodium? Sporangia sessile, subglobose, 0·3 to 0·5 mm. diam., more or less confluent in small clusters 1 to 2 mm. across, dull red with iridescent membranous walls; where the sporangia are in contact their walls may be imperfectly developed and reduced to irregular strands and

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