BRITISH COLUMBIA SLIME-MOULDS.

by

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I

INTRODUCTION.

General Introduction.

The province of British Columbia covers a large area in which there is a very wide range of climatic conditions and topographical features.

For this reason the systematic study of fungi of the province presents a field so comprehensive that only a few isolated groups of fungi have been dealt with.

The geographical nature of the southern coastal part of British Columbia being favourable to the growth of slime-moulds, it was suggested by Dr. F. Dickson that a study of these fungi be made by the writer to form the basis for a thesis.

Accordingly a collection of slime-moulds was begun, gatherings first being made in the district of Salt Spring Island, B. C., during the summer of 1931, this collection later being augmented by specimens from areas in the vicinity of Vancouver, B. C., obtained at intervals, mainly during the summer and fall months of the years 1931, 1932 and 1933.

No attempt was made to cover larger areas and it was therefore impossible to obtain a collection representative of more than a very small part of British Columbia.

Location and Description of Areas.

Much of the material in the collection was obtained in the locality of Salt Spring Island, which lies 123° 30' West long. and 40° 50' North lat., and is one of the Gulf Islands in the Strait of Georgia between the mainland and the eastern coast of the southern part of Vancouver Island.

The climate in this region is very mild, the influence of the surrounding waters being to modify both the heat in summer and the cold in winter. The winter is short with little snow as a rule; the summer almost rainless with cool nights and heavy dews. The averate rainfall is approximately 30" a year, and while this was not exceeded in 1931, in which year the larger part of the collection was made, there was nevertheless an abnormal amount of precipitation during the months of May and June.

A rather limited area of not more than forth acres at the north end of the Island was collected over continuously during the months of May, June and July. The land slopes back for a mile or so from the sea in terraced formation, a series of small wooded hills being separated from one another by narrow low-lying fields. The woods are composed mainly of Douglas fir, cedar and hemlock trees, with sprinklings of maple, alder and arbutus, and in most of the stands there is a thick undergrowth of salal. In some woods all the ground is covered with a thick carpet of moss, and there is an abundance of old rotting logs lying in the debris beneath the standing trees.

Besides the material gathered on Salt Spring Island, many specimens were collected in wooded areas only covering a few acres in the vicinity of Vancouver, which lies 123° West long. and 49° 20' North lat. Due to the nearness of high mountains the annual rainfall in Vancouver is quite large, averaging about 60". The woods in the areas collected over contain a large proportion of deciduous trees, such as alder and willow, and the land is comparatively high. In this locality collections were made during September, October and November, as well as in the summer months.

Prevalence of Slime-Moulds in Areas.

In the two localities described above a total of one hundred and three forms, in nineteen genera were collected, many of them occurring in both regions, some only in one or the other. Certain of these specimens were definitely identified, while others are listed as doubtful or varying forms. Colonies of slime-moulds were found on almost all the undisturbed rotting logs in the woods, this remarkable prevalence probably being due to the favourable weather conditions at the time of collecting.

In the order Physarales the genera Badhamia, Physarum, Craterium, Leocarpus, Didymium, Diderma and Lepidoderma are represented; Stemonitis, Comatricha, Diachaea, Enerthenema and Lamproderma in the Stemonitales; two genera Cribraria and Dictydium in the Cribrariales, and the single genus Lycogala in the Lycogalales; the genera Arcyria, Prototrichia, Trichia and

Oligonema in the Trichiales.

Methods of Collection and Preservation of Material.

Considerable care was taken in the collection and preservation of the slime-moulds, mature specimens gathered in the field being immediately transferred with a portion of the substratum to small boxes. Immature specimens were allowed to remain unmolested until the sporangia were fully developed. The boxes containing freshly collected slime-moulds were exposed for several hours to the direct sunlight before being closed. In the absence of sunlight the specimens in boxes were heated gently for an hour or two. This treatment assists in the drying out of specimens, and prevents contamination of the sporangia by destructive molds or insects.

Methods of Classification and Description of Material.

In the classification of the material Lister's "Mycetozoa" (13) and Macbride's "North American Slime-Moulds" (14) were the only works employed. In the absence of herbarium material the task of identification of the various specimens in the collection was more difficult than it would otherwise have been, since no comparisons with properly identified species co could be made.

Every specimen contained in the collection has been studied critically, and the present work consists of a list of the species represented. In cases where the specimens are absolutely typical of the species they represent, no description has been included, but in dealing with varying forms, attention

has been drawn to the characters which differ from those to be found in typical species, and where the identification is doubtful a discussion is given of the taxonomic difficulties. All spore measurements were made in a 2% solution of potassium hydroxide, while mounts of the material to be studied, were made in a mounting fluid composed mainly of glycerine.

In this work a number has been given to each distinct form, whether definitely identified or merely listed as varying or doubtful, the number being The University of B. C. Mycological Herbarium Number; in the labelling of the material corresponding numbers have been applied to the specimens contained in the collection.

BRITISH COLUMBIA SLIME-MOULDS.

GENERAL CLASSIFICATION OF MYXOMYCETES.

Macbride (14) classes myxomycetes as parasites or saprophytes; the saprophytic myxomycetes he places in two groups - the Exosporeae and the Myxogastres. The latter group only will be included in this work, for although species of Ceratiomyxa, belonging to the Exosporeae, were very common in the fall, they were not studied critically.

Slime-moulds belonging to the Myxogastres are divided into the following five orders, Physarales, Stemonitales, Cribrariales, Lycogalales, Trichiales. These will be dealt with in the subsequent pages, the sequence of families and genera within the orders being that of Macbride (14).

For each genus a key has been prepared for those species of the genus which are represented in the collection, the key being based on characters shown in the material studied.

ORDER I

PHYSARALES.

This order is divided by Macbride (14) into two families, the Physaraceae and the Didymiaceae.

The Physaraceae are, on the whole, well represented, species belonging to four out of seven genera having been collected. In the genus Badhamia two species are represented, in Physarum five definite, and four doubtful, species, while gatherings were made of one species belonging to each of the genera Craterium and Leocarpus. No specimens of Fuligo, Physarella or Cienkowskia were found in either of the localities in which the collection was made.

In the Didymiaceae three genera out of five are represented, collections being made of five species of Didymium, four of Diderma, and one of Lepidoderma. No gatherings were made of Mucilago or Colloderma.

PHYSARACEAE

1. Badhamia (Berkeley) Rost.

Two species of this genus were collected, the material being identified with ease. They may be separated as follows:-

I. Sporangia iridescent violet or bluish-grey; stipes membranous, branching to support the hanging sporangia; spores 9.5μ - 12μ in diameter.

(1) B. utricularis.

II. Sporangia silvery-brown; stipes distinct, erect; spores 11μ - 14 μ in diameter.

(2) B. rubiginosa.

(1) Badhamia utricularis (Bull.) Berk.

Sporangia in a cluster, hanging from the underside

of a small maple log. Plasmodium deep orange-yellow, taking over a week to mature. Collected once only, Vancouver vicinity, in the late fall.

This material is typical of B. utricularis.

U.B.C. Myc. Herb. No. 500

(2) Badhamia rubiginosa (Chev.) Rost.

Sporangia gregarious on decaying maple leaves. Large colony collected in the late fall, Vancouver vicinity.

Macbride (14) describes the spores of this species as being "minutely roughened or spinulose", while those of the material referred to above are marked with dark prominent warts or spinules, which are arranged unevenly to form broken reticulations over the surface of the spore. This feature of the spores characterizes B. rubiginosa var. dictyospora as given by Lister (13), in which he describes the otherwise typical sporangia as having spores "marked with prominent often confluent warts forming broken reticulations." Macbride (14), however makes no mention of any variety and so the material has been classified simply as B. rubiginosa.

U.B.C. Myc. Herb. No. 501

2. Physarum (Persoon) Rost.

This genus is fairly well represented, several species having been collected. These for the most part show variations from the typical forms, as described by Macbride (14) and Lister (13), and in some cases this variation is so considerable that the species could not be satisfactorily identified, and

consequently have been recorded as doubtful species.

I. Sporangia white, grey or yellow; stipitate or sessile; peridium containing deposits of lime.

A. Sporangium wall double; sporangia and lime-knots white.

(a) Sporangia scattered, forming short or elongated plasmodiocarps; lime-knots connected by numerous short threads.

(1) P. bitectum.

(b) Sporangia closely compressed; capillitium badhamioid, threads few.

(2) P. contextum.

B. Sporangium wall single; sporangia and lime-knots variously coloured, white, yellow or orange.

(a) Sporangia golden-orange; lime-knots orange, large and irregular, branching.

(3) P. auriscalpium.

(b) Sporangia white, grey or yellow; lime-knots white or yellow, variously shaped, or small fusiform and orange.

(i) Sporangia stalked, lenticular, usually nodding; sporangium wall when ruptured persisting at the base in petal-like lobes, fragmentary above.

x Sporangia yellow or greenish-yellow; lime-knots fusiform orange .

(4) P. viride.

xx Sporangia whitish or grey; lime-knots varying

in size, rounded, white.

(5) P. nutans.

(ii) Sporangia sessile, or stalked erect, globose or sub-globose; sporangium wall usually long persistent, or irregularly dehiscent.

x Sporangia sessile, crowded or forming plasmodiocarps, greyish-white or grey.

(6) P. (cinereum?).

xx Sporangia stipitate, greenish-yellow, or yellowish-white.

o Sporangia greenish-yellow; lime-knots bright or pale yellow.

(7) P. (oblatum?).

oo Sporangia pale yellowish-white; lime-knots white.

(8) P. (carneum?).

II. Sporangia dull black, plasmodiocarpous; peridium limeless.

(9) P. (vernum?).

(1) Physarum bitectum Lister.

Sporangia scattered or gregarious, fairly common on decaying wood. Collected once or twice, Vancouver vicinity, in the fall.

There is one discrepancy to be noted in the classification of this material as P. bitectum - the sporangium wall resembles that of P. sinuosum. Sporangia of P. sinuosum are characterized, according to Macbride (14) and Lister (13), by

having a reticulated outer wall and a wrinkled inner wall adhering to it. P. bitectum, on the other hand, is described by both authors as having a smooth inner wall, and hence also a smooth outer wall. According to Lister (13) these two allied forms are often associated in the south of England, P. bitectum differing constantly from P. sinuosum in having a smooth purplish inner sporangium wall, and rougher spores smoother and paler on one side. In the present species the purplish inner wall is reticulated, giving to the outer wall a reticulated appearance also, especially above. The outer wall is quite free and does not adhere to the inner wall. P. sinuosum gets its name from the nature of the plasmodiocarp, - creeping in long vein-like reticulations or curves" (Macbride (14)), and no such habit occurs in this species. The spores are also larger (9.5μ - 11μ diameter) than in a typical form of P. sinuosum, and are distinctly rough, with a paler, smoother area of dehiscence. Apart from the character of the wall this species fits perfectly the descriptions given of P. bitectum, and has been classified as such, in the belief that the slight variation from the typical form, in the nature of the sporangium wall, shows an approach to the closely allied species P. sinuosum.

U.B.C. Myc. Herb. No. 502

(2) Physarum contextum Persoon.

Sporangia gregarious on fiber-like plant roots on the surface of an old log. Collected once only in a wet wooded

area on Salt Spring Island, in the spring.

This gathering is typical in all respects but spore size, the large range in spore diameter (10μ - 22μ averaging 13μ) suggesting that this is an imperfect specimen of P. contextum. The spores, in addition, show irregularities of shape, only a few of them being perfectly globose. The large spores appear to be equally distributed throughout the sporangium, and are not confined to any particular region (inner or outer) as far as can be determined. Attempts to stain the spores to show the nuclei proved unsuccessful, and it was not possible to find out if the larger spores are, perhaps, binucleate or tri-nucleate. The large spores are in all other respects similar to the smaller ones, the walls being of equal thickness. The largest spores were estimated to be as much as eight times the volume of the smallest. Despite the irregularity in spore size this specimen was classified as P. contextum, which has spores larger (ranging from about 10μ - 14μ in diameter) than has P. conglomeratum, its closest ally.

The capillitium is distinctly badhamioid, being densely charged with lime.

U.B.C. Myc. Herb. No. 503

(3) Physarum auriscalpium Cooke.

Sporangia gregarious on fallen willow twigs, willow leaves and Douglas fir needles. Collected once in the summer on Salt Spring Island, in a dry wooded area.

Most of this material is quite typical, but some

specimens show a type of P. auriscalpium closely approaching Badhamia decipiens. The orange sporangia are sessile, often plasmodiocarpous, and the capillitium densely charged with lime, with few connecting threads. The spores however range, as in the typical form, from 10μ - 12μ in diameter.

Material typical of P. auriscalpium:-

U.B.C. Myc. Herb. No. 504

Material showing an approach to Badhamia decipiens:-

U.B.C. Myc. Herb. No. 505

(4) Physarum viride (Bull.) Pers.

Sporangia gregarious on Douglas fir twigs and charred fir wood. Gathered frequently in dry wooded regions on Salt Spring Island in the spring.

This material is absolutely typical of P. viride.

U.B.C. Myc. Herb. No. 506

A collection of P. viride was made also in the spring, on an old Douglas fir log, in which the sporangia differ from those referred to above in the nature of the stipe. In all the sporangia the stipe is swollen for about one-third of the way up, this portion being very dark; the sporangia also appear somewhat larger. All other characters are identical with those of the typical form, so this material was considered to be a form of P. viride varying only in the nature of the stipe.

U.B.C. Myc. Herb. No. 507

(5) Physarum nutans Persoon.

Sporangia gregarious on decaying alder wood and bark, Douglas fir bark, maple wood and even bracket fungi on decaying alder logs. Collected frequently in wet wooded areas on Salt Spring Island and in Vancouver vicinities in the summer and fall.

For the most part the material collected is typical of P. nutans, but one gathering was made in which the sporangia differ slightly from the typical form. The sporangia are large and erect, the capillitium containing numerous large lime-knots; this suggests an approach to P. nutans var. leucophaeum (Lister (13)), but Lister (13) notes that the species is extremely variable, and that between certain extreme forms, "all shades of difference may be found, making it difficult to define even distinct varieties".

Typical specimens of P. nutans:-

U.B.C. Myc. Herb. No. 508

Varying form of P. nutans:-

U.B.C. Myc. Herb. No. 509

(6) Physarum (cinereum?).

Sporangia gregarious on blades of grass. Collected once in the summer, Vancouver vicinity, the extensive heaped colony covering a considerable area of lawn turf.

This specimen in all but spore dimensions fits the descriptions given by Lister (13) and Macbride (14) of P. cinereum better than it does those of P. confertum or

P. vernum. The large sporangia (.3 mm. - .6 mm. in diameter) abundant capillitium, with large numerous lime-knots distinguish this species from P. confertum, while the often iridescent bluish-grey colour (due to the absence of lime in the walls) separates it from P. vernum.

In the classification of this material the large spinulose spores 8μ - 10.5μ in diameter, present a difficulty since Lister (13) describes P. cinereum as having spores 7μ - 10μ in diameter, while Macbride (14) gives the spore range as 6μ - 7μ. Lister (13) however, notes that P. cinereum is connected by intermediate forms with P. vernum - which has spores ranging in diameter from 9μ - 12μ - and also states that when the sporangia of P. cinereum are clustered and nearly destitute of lime, this species is only with difficulty distinguishable from P. confertum. It seems probable that this is a form of P. cinereum showing an approach to P. vernum in possessing larger and darker spores than is usual in the typical form. It would outwardly appear like P. confertum on account of the limeless peridium.

The turf of lawns appears to be a common substratum for the plasmodium of P. cinereum, as mention is made of this fact both by Lister (13) and Macbride (14); the specimen under discussion was found growing on lawn grass. Lister (13) also observes that specimens of P. cinereum have been found in which the clustered sporangia are iridescent blue from the absence of lime deposits in their walls. These two points, while of no

value in actual classification, yet help to confirm the identification of the specimen as P. cinereum.

U.B.C. Myc. Herb. No. 510

(7) Physarum (oblatum?).

Sporangia loosely gregarious on the bark of a willow twig lying among dead leaves and old logs. Gathered once only, these few sporangia being collected in early summer in a dry wooded area on Salt Spring Island.

In the absence of herbarium material it was found difficult to identify this specimen satisfactorily.

The capillitium is distinctly badhamioid in type, the lime-knots being numerous, large, and often extensively branched, with few connecting threads.

According to the key given by Lister (13) for the species of Badhamia this material would be classified as B. viridescens, and the description given of this species does show that there are similarities to be found in the size and colour of the sporangia, and the nature of the lime granules of the sporangium wall, as well as in the colour and nature of the capillitium. B. viridescens differs from the present form in having short stipes (.1 mm. - .3 mm. long) as opposed to the longer stipes (.5 mm. - .75 mm. long) of this specimen, and larger spores, 9μ - 13μ, instead of 10μ - 11μ diameter. None of the species of Badhamia listed by Macbride (14) in any way fit this species, but in the genus Physarum it would be classified, according to his key, as P. oblatum, and fits his

description of the species. Macbride (14) notes that the lime-knots are "dense and abundant", but does not mention the badhamioid nature of the capillitium. From the key to the species of Physarum given by Lister (13) this material would be identified as P. Maydis (P. oblatum according to Macbride's nomenclature), and fits this description fairly well also; in the illustration however the lime-knots appear smaller and the threads far more numerous than in this specimen.

It was concluded that the present species must be a form of P. oblatum with badhamioid capillitium.

U.B.C. Myc. Herb. No. 511

(8) Physarum (carneum?).

Sporangia loosely gregarious on twigs of willow and Douglas fir lying on the ground. Collected once or twice in a dry wooded area on Salt Spring Island, in the summer.

Two slightly differing collections were made of this species, which could not be satisfactorily identified.

In the first gathering the fairly numerous sporangia are on willow and fir bark, while the second gathering consists of a few sporangia on a cedar twig. These much weathered sporangia differ mainly from those of the first gathering in being smaller, (the head ranging in diameter from .25 mm. - .5 mm., as opposed to the range of .5 mm. - .6 mm. in the other sporangia), and also in possessing smaller violet-brown spores, ranging in diameter from 8μ - 9μ averaging 8.2μ. The sporangia in the first gathering have purple-brown spores, 8μ - 11μ,

averaging 9.1μ in diameter. The stipe in the smaller form is a pale yellowish-white; in the larger form the stipe is either pale yellowish-white or clear orange in colour.

This material cannot be definitely classified as P. carneum, on account of the colour of the sporangia, both head and stipe, and the spore measurements. The smaller spored sporangia of the second gathering come closer to P. carneum than to any other species of Physarum, although the sporangium head is nearer white than yellow, and the stipe is not noticeably flesh-tinted. The spore range comes within that given by Lister (13), although slightly larger than that given by Macbride (14). The sporangia of the first gathering present a difficulty in the colour of the stipe and the larger spore dimensions. The stipes in one group of sporangia are clear orange red, and the sporangia themselves are more of a dingy yellowish-white than a definite yellow. This suggests an approach to P. nodulosum in which the white sporangia are described as having bright brown or red brown stipes, and spores ranging in diameter from 8μ - 11μ (Lister (13)) or from 10μ - 12μ (Macbride (14)). Lister (13) also notes the occurrence of forms of P. pusillum (P. nodulosum according to Macbride's nomenclature) with badhamioid capillitium, such as is found in some of the sporangia in this material. There are still to be considered the sporangia of the second gathering with the pale yellowish stipes, and in this connection it may be mentioned that P. carneum is described by Lister (13) as

having either flesh-coloured or dull red stipes, so that while both these colours might be found in stipes of typical P. carneum, only the reddish ones could belong to P. nodulosum.

From the gatherings at hand, and in the absence of herbarium material nothing further can be done to decide the matter; it seems probable that the species is a form of P. carneum, but at the same time it is possible that all the material collected may not represent the same species - the larger spored form perhaps being a variation of P. nodulosum, the smaller spored form being more nearly typical of P. carneum.

First gathering, larger spored form:-

U.B.C. Myc. Herb. No. 512

Second gathering, smaller spored form:-

U.B.C. Myc. Herb. No. 513

(9) Physarum (vernum?).

Sporangia scattered on decaying wood. This scanty much weathered material was collected in the fall in the vicinity of Vancouver.

The sporangia form dull black plasmodiocarps, the single wall being without deposits of lime. The capillitium is abundant, containing numerous large, thick, white lime-knots, connected by many membranous threads. In some sporangia the lime has disappeared leaving an almost colourless membrane in place of the lime-knot. Attempts to mount the capillitium to show the threads and lime-knots proved unsuccessful, since the lime-knots seem to disintegrate when mounted in 2% potassium

hydroxide, and neither the threads nor the outlines of the lime-knots can be distinguished. The dark brown spinulose spores are usually globose, 10μ - 12μ averaging 11.1μ, but are sometimes oval, flattened on one side, averaging about 10μ x 12μ, usually with a paler area of dehiscence.

The absence of lime in the walls of this specimen makes identification difficult. According to the key given by Macbride (14) for the species of Physarum this would be one of the three species P. serpula; P. lateritium; P. vernum, the only three species listed which are plasmodiocarpous with a simple peridium. This species must then be P. vernum on account of the white calcareous deposits, as opposed to the yellow deposits of P. serpula, and the red deposits of P. lateritium. The occurrence of occasional oval-shaped spores would suggest an approach to P. ovisporum, a species not listed by Macbride (14), but mentioned by Lister (13) as being closely allied to both P. vernum and P. compressum. The oval spores however show no white line of dehiscence, such as characterizes spores of P. ovisporum, and it is possible that the irregularity in shape may be due to the fact that the sporangia were not quite mature when collected. Lister (13) gives a variety of P. vernum - P. vernum var. iridescens in which the sporangia are dark brown from absence of lime in the walls.

From the foregoing scanty description it seems reasonable to suggest that this specimen is an imperfect form of P. vernum.

U.B.C. Myc. Herb. No. 514

3. Craterium Trentepohl.

This genus is represented in the collection by a single species, which is typical in all respects and could therefore be easily identified.

Craterium leucocephalum (Pers.) Ditmar.

Sporangia gregarious on fallen horsechestnut leaves and Douglas fir twigs and needles. Collected twice in dry exposed areas on Salt Spring Island in the summer.

U.B.C. Myc. Herb. No. 515

4. Leocarpus (Link) Rost.

The single species belonging to this genus was collected several times from different localities, all the material being typical.

Leocarpus fragilis (Dickson) Rost.

Sporangia gregarious on fallen twigs and leaves, or hanging in bunches from living salal stems. Collected a number of times in the vicinity of Vancouver in the fall. A specimen growing on a windfall of fir needles and twigs was collected from a region in the coast mountains of British Columbia, but the sporangia are similar to those gathered at the lower altitude, being quite typical of the species.

U.B.C. Myc. Herb. No. 516

DIDYMIACEAE

1. Didymium (Schrad.) Fr.

In this genus five species have been recorded, but

only one of these could be identified with ease, a tendency for allied species to intergrade making it difficult to divide up the rest of the material into definite species.

I. Sporangia snow-white, flattened, sessile; outer wall a smooth brittle crust of closely combined almost indistinguishable tiny lime crystals; columella none.

(1) D. difforme.

II. Sporangia white or grey, rounded, usually stipitate; outer wall a crust of loosely combined, easily distinguishable stellate lime crystals; columella present.

A. Sporangia stipitate or sessile forming plasmodiocarps; stipe stout, black or very dark brown, opaque; columella light or dark brown.

(2) D. melanospermum.

B. Sporangia always distinctly stipitate; stipe white, yellowish, orange or clear red-brown; columella white, yellowish-white, yellow or rarely orange.

(a) Stipe and columella concolorous, white or pale yellowish-white, rarely orange.

(3) D. squamulosum.

(b) Stipe orange or reddish brown, translucent, or pale brown above, black opaque below; columella white or yellow.

(i) Columella yellow, roughened; capillitium of lax colourless threads.

(4) D. eximium.

(ii) Columella white smooth; capillitium of rigid purplish-brown threads.

(5) D. xanthopus.

(1) Didymium difforme Duby.

Sporangia scattered on the bark of an old branch, lying among decaying leaves. This scanty material was collected in the vicinity of Vancouver in the fall, and is absolutely typical of the species.

Macbride (14) notes that D. difforme is "evidently rare" in the United States.

U.B.C. Myc. Herb. No. 517

(2) Didymium melanospermum (Pers.) Macbr.

Sporangia gregarious, abundant on the crumbling inside wood of a very old Douglas fir stump. This material, which is typical, was collected in the summer in a dry wooded region on Salt Spring Island. A gathering of D. melanospermum was made in a very wet wooded area on Salt Spring Island in the spring, the grey sporangia, extremely numerous, growing all over a heap of branches and twigs of Douglas fir. This material differs from the typical form in having capillitium of very slender flexuose colourless threads, and spores ranging only from 8μ - 10μ, averaging 8.7μ in diameter; in these two respects the sporangia resemble D. minus.

Macbride (14) separates D. minus from D. melanospermum as a distinct and constant species, while Lister (13) describes it as a variety only of D. melanospermum, noting that

"intermediate form uniting the var. minus and the typical form are so frequent that the former cannot be regarded as a distinct species". Macbride (14) separates D. minus from D. melanospermum on the basis of sporangium size, and the present species would undoubtedly be classified as D. melanospermum on account of the large sporangia and short, stout stipes. However the capillitium of very slender colourless threads, and the spores, so much smaller than in the typical form, show an approach to D. minus.

Material typical of D. melanospermum:-

U.B.C. Myc. Herb. No. 518

Material showing an approach to D. minus:-

U.B.C. Myc. Herb. No. 519

(3) Didymium squamulosum (Alb. and Schw.) Fries.

Sporangia gregarious on fallen alder, willow and maple leaves and twigs and bracken stalks. Abundant in Vancouver vicinities in the fall. Plasmodium practically colourless, immature sporangia transparent white or yellowish.

In some of the gatherings made of this species the sporangia are large, about 1 mm. in diameter, flattened, often confluent, and so shortly stipitate (stipe .1 mm - .2 mm. long) as to appear sessile, the stipe being completely hidden in the concave base of the sporangium. In these sporangia the whitish columella is usually broad and flattened also. This is probably an imperfect development of D. squamulosum.

A slight variation from the typical form was found in

which the stipe and columella of the sporangia range in colour from pale greyish-brown to dark orange. Some of the sporangia have both stipe and columella orange in colour, while in others the stipe, orange at the base, shades to yellow above, in which case the columella is also yellowish; in these forms the dark brown hypothallus is not conspicuous.

Lister (13) remarks that numerous varieties occur in this species and that the stipe and columella may vary from white to orange. In all other respects these sporangia conform to the descriptions of D. squamulosum, and since they were found associated with normal sporangia there was no hesitation in identifying them as D. squamulosum also.

Typical material:-

U.B.C. Myc. Herb. No. 520

Varying form, sporangia flattened, nearly sessile:-

U.B.C. Myc. Herb. No. 521

Varying form, stipe and columella not typical in colour:-

U.B.C. Myc. Herb. No. 522

(4) Didymium eximium Peck.

Sporangia gregarious on fallen maple leaves. Material plentiful, collected once in the vicinity of Vancouver, late fall.

In these sporangia the columella is a conspicuous, depressed saddle-shaped structure, dull yellow with roughened surface. The spores are pale violet-brown, ranging from

7.5μ - 9.5μ, averaging 8.6μ in diameter.

Sporangia from the same gathering but growing on fern fronds show a few differences in structure. They are often depressed above as well as umbilicate beneath, and the roughened yellow columella is extremely large, circular in outline, and much flattened. The spores are very pale violaceous ranging from 8μ - 11μ, averaging 8.1μ in diameter.

Some difficulty was encountered in classifying the gathering as certain of the characters of D. nigripes, D. xanthopus and D. eximium seem to be blended in this one species. Lister (13) includes these three together and describes D. xanthopus and D. eximium as varieties of D. nigripes, since he finds that the forms blend into one another completely. Macbride (14) keeps the three forms separate, as distinct species, stating that they are quite distinguishable.

The large roughened yellow columella was considered to be the most important feature in the identification of this species; the other characteristics, with a few exceptions, also fit the description given by Macbride (14) of D. eximium. The exceptions are as follows:- the sporangia are not always depressed globose, nor are they minute, features characteristic of D. eximium according to Macbride (14), but not mentioned by Lister (13), while a definite hypothallus such as Macbride (14) describes for D. nigripes is present in this species in which the hypothallus is supposedly scant or none. The spore range

is larger than that given by Macbride (14), but comes within the range given by Lister (13) for D. nigripes and its varieties. The spore colour which is commonly darker in D. eximium than in D. nigripes or D. xanthopus is in this material quite pale; with reference to D. eximium and D. xanthopus spore colour appears to be an inconstant feature, since in specimens of D. xanthopus developed on soil the spores are dark, not pale, violaceous. Lister (13) makes use of the presence or absence of refuse matter in the stipe to help distinguish D. nigripes from D. melanospermum, D. nigripes possessing translucent orange brown stipes without refuse matter. In the specimens under discussion, however, refuse matter is found to be present either at the base or in the lower half of the stipe, making it opaque; the stipe of D. nigripes is black and opaque according to Macbride (14).

From the foregoing discussion it would appear that this is a form of D. eximium showing characters both of D. nigripes and of D. xanthopus.

Material on maple leaves, columella saddle-shaped:-

U.B.C. Myc. Herb. No. 523

Material on fern fronds, columella circular, flattened:-

U.B.C. Myc. Herb. No. 524

(5) Didymium xanthopus (Ditmar) Fr.

Sporangia scattered, developed on soil. The material was collected in the spring from bean flats in a greenhouse.

This is undoubtedly D. xanthopus and yet the spores instead of being small, 7.5μ - 8.5μ, pale violaceous and almost smooth, are dark and warted, ranging from 8μ - 10μ, averaging 9μ in diameter. On the other hand, in the material classified as D. eximium the spores are smaller and paler, instead of larger and darker, than those of D. xanthopus. Lister (13) makes no distinction in spore size between the three forms, but gives the spore range of D. nigripes as 8μ - 11μ and describes the spores as pale violet-brown, nearly smooth.

U.B.C. Myc. Herb. No. 525

2. Diderma Persoon.

This genus is quite well represented in the collection, four species having been recorded. Some difficulty was encountered in identifying the material due to the variability of certain of the species.

I. Sporangia usually stipitate, sporangium wall rupturing above, more or less persistent below; outer layer of wall calcareous, brittle, the inner membranous.

A. Two layers of sporangium wall closely adhering; columella very large, roughened, yellow; spores dark purple-brown, 9μ - 12μ diameter.

(1) D. radiatum.

B. Two layers of sporangium wall easily separable; columella usually small, reddish-brown; spores pale violet-brown, 7.5μ - 9.5μ diameter.

(2) D. montanum.

II. Sporangia usually sessile, sporangium wall rupturing into petal-like reflexing lobes; outer layer of wall membranous, the inner calcareous.

A. Sporangia small, about .75 mm. in diameter; peridium of two adhering layers; capillitium of slender colourless threads.

(3) D. asteroides.

B. Sporangia larger, about 1 mm. - 1.5 mm. in diameter; peridium of three closely adhering layers; capillitium of stouter rigid, mostly dark purplish-brown threads.

(4) D. Trevelyani.

(1) Diderma radiatum (Linn.) Morg.

Sporangia loosely gregarious on the bark of a twig lying on a heap of dead leaves. Collected once only, Vancouver vicinity, in the fall.

This specimen is apparently typical of D. radiatum, although the dehiscence of the sporangium wall is irregular, not stellate, and the lobes are seldom reflexed. This irregular dehiscence of the drab sporangia is suggestive of D. radiatum var. umbilicatum, which Lister (13) describes as being very closely allied to D. montanum. Superficially these sporangia closely resemble those of D. montanum, the collections having been made of both species at the same time of year and in the same locality.

Macbride (14) states that this species is rare.

U.B.C. Myc. Herb. No. 526

(2) Diderma montanum Meylan.

Sporangia gregarious on moss and bark of old logs, often occurring in lines along cracks in the wood of the substratum. This species is very abundant in the fall and was collected often in Vancouver vicinities. Plasmodium scarce, creamy-white, opaque; the sporangia when first formed are white, changing from white to fawn, and from fawn through brown and grey to black, the mature sporangia being whitish or pale buff-coloured.

Of the species of Diderma listed by Macbride (14), the one most nearly like this material is D. radiatum, but the present species differs from D. radiatum considerably in the nature of the sporangium wall, columella and spores, while it fits the description given by Lister (13) of D. montanum. Moreover Lister (13) notes that D. montanum is closely allied to D. radiatum var. umbilicatum, being distinguished from it by the two layers of the sporangium wall, which are easily separable, instead of closely adhering, and by the spores being paler, smaller and smoother. It is in these respects that this material differs from the material classified as D. radiatum (U.B.C. Myc. Herb. No. 526), and in addition the columella of the present species is small and dark red-brown, while that of D. radiatum, as shown by the specimens at hand, is extremely large and pale yellow. This species has therefore been classified as D. montanum despite the fact that Macbride (14)

has no record of it having been found before on this continent.

In all the gatherings of D. montanum the spores are remarkably constant in size and colour, being pale violet-brown, ranging in diameter from 7.5μ - 9.5μ, while the spores of D. radiatum are dark purple-brown ranging in diameter from 9μ - 12μ. In the shape size and colour of the columella, however, there is a considerable variation in the different sporangia, and one or two forms were collected which appear to be transitional between D. montanum and D. radiatum in the nature of the columella.

In the first of these forms the columella is large, about one-half the size of a columella typical of D. radiatum, and is pale or dark reddish-brown. These sporangia, apart from the very conspicuous columella, are similar to ones typical of D. montanum.

The columella of sporangia in the second gathering is also large, about one-third the size of a columella typical of D. radiatum and is pale reddish or yellow-brown, sometimes creamish.

A third gathering shows the columella the same size as in the preceding form, but concolorous with the stipe, white or creamish.

The increase in size and the variation in colour of the columella in these three forms, show an approach to D. radiatum, but the sporangium wall of two easily separating layers, and the small pale spores, distinguish them as forms

of D. montanum.

The typical gatherings of D. montanum, as well as the three varying forms were collected at the same time of year, in one region, and on similar substrata.

Typical material:-

U.B.C. Myc. Herb. No. 527

First varying form:-

U.B.C. Myc. Herb. No. 528

Second varying form:-

U.B.C. Myc. Herb. No. 529

Third varying form:-

U.B.C. Myc. Herb. No. 530

(3) Diderma asteroides List.

Sporangia gregarious on fallen arbutus leaves and willow twigs. Collected twice on Salt Spring Island, spring and summer, in dry wooded regions.

This material is typical of the species.

U.B.C. Myc. Herb. No. 531

(4) Diderma Trevelyani (Grev.) Fr.

Sporangia gregarious on the bark of a decaying alder log. This scanty, much weathered material was collected in the spring, in a wet wooded area on Salt Spring Island. In the fall some similar sporangia were gathered in the vicinity of Vancouver on decaying maple leaves, but they were apparently immature at the time of collection, and were of no use for identification

purposes.

The sporangia of the weathered material fit the descriptions given by Lister (13) and Macbride (14) of D. Trevelyani with the exception of the nature of the base of the sporangium. The lower quarter of the sporangium appears to be thickened, forming a broad circular yellowish roughened area, almost like a flattened or concave columella, from the edge of which the lobes of the ruptured sporangium wall are reflexed.

The three-layered wall, the method of dehiscence and the dark much branched network of capillitial threads distinguish this species as D. Trevelyani, while the basal thickened rough area may be due to abnormal development of the sporangia.

U.B.C. Myc. Herb. No. 532

3. Lepidoderma DeBary.

This genus is represented by one species which is very abundant in wet wooded regions on various substrata, in the fall. All the gatherings are quite typical and no difficulty was experienced in identifying the material.

Lepidoderma tigrinum (Schrad.) Rost.

Sporangia scattered on moss covered logs. Collected frequently in the fall, Vancouver vicinity. Plasmodium deep orange yellow.

According to Macbride (14) this species is rare.

U.B.C. Myc. Herb. No. 533

ORDER II

STEMONITALES.

The order Stemonitales is divided by Macbride (14) into three families, the Amaurochaetaceae, the Stemonitaceae and the Lamprodermaceae. No species belonging to the first family were found, but the two remaining families are well represented in the collection.

In the Stemonitaceae species belonging to three out of four genera were collected, the largest number of representatives being in the genus Stemonitis in which three definite and four doubtful species are recorded. Two definite and one doubtful species have been placed in the genus Comatricha, and a single species in the genus Diachaea. No gatherings were made of Brefeldia.

Species of genera belonging to the family Lamprodermaceae are not of such frequent occurrence as are members of the Stemonitaceae, only two out of four genera being represented. A single species of the genus Enerthenema, and three definite and one doubtful species of Lamproderma have been listed, no gatherings having been made of species of Clastoderma or Echinostelium.

STEMONITACEAE

1. Stemonitis (Gleditsch) Rost.

This genus, well represented in the collection, presented many taxonomic difficulties, since much of the

material was not typical of any of the species of Stemonitis listed by Macbride (14) or Lister (13). Only three species were definitely identified, while four others, showing marked variations from typical forms, have been recorded as doubtful species. Difficulty was experienced in finding constant characters on which to separate the various forms, since in most of the species the size and colour of the sporangia, density of the capillitium, and the nature of the capillitial surface net, seem to be subject to a great range of variation.

A number of forms were collected besides the ones recorded here; these appear for the most part to be varying phases of the species listed below, but time did not permit of their study in detail.

I. Spores marked with distinct or faint reticulations.

A. Sporangia dusky purplish-brown; spores 6.5μ - 8μ diameter, purple-brown or violet-grey, strongly reticulated with bands or rows of stout spines.

(a) Sporangia 6 mm. - 15 mm. in total height.

(1) S. fusca.

(b) Sporangia 2 mm. - 3.5 mm. in total height.

(i) Sporangia slender, cylindrical; capillitial threads slender, branched and anastomosing; surface net well developed; spores reticulated with rows of spines.

(2) S. (fusca?).

(ii) Sporangia broad, elongated-ovate; capillitial threads stout, little branched; surface net

irregular, disappearing near the summit of the sporangium; spores reticulated with continuous raised bands, or confluent spines.

(3) S. (nigrescens?).

B. Sporangia pale lilac-brown or pinkish-fawn; spores 5.5μ - 6.5μ diameter, pale violaceous or yellowish, very faintly and irregularly reticulated.

(4) S. (hyperopta?).

II. Spores nearly smooth, or minutely warted.

A. Spores 4μ - 6μ diameter, pale reddish or yellowish, nearly smooth.

(a) Sporangia bright rusty-brown, about 15 mm. high; meshes of surface net 8μ - 30μ wide; spores 5μ - 6μ diameter.

(5) S. axifera.

(b) Sporangia dull violet-brown, about 7 mm. high; meshes of surface net 20μ - 60μ wide; spores 4.5μ - 5.5μ diameter.

(6) S. (axifera?).

B. Spores 6μ - 8μ diameter, pale violet-grey, minutely warted.

(7) S. herbatica.

(1) Stemonitis fusca (Roth) Rost.

Sporangia clustered on decaying maple wood and leaves. Collected once or twice in the vicinity of Vancouver, in the fall.

A range of variation in the height of the sporangia

is shown in the three gatherings made of this species. In the first gathering the sporangia range in height from 9 mm. - 13 mm.; the second collection contains sporangia about 8 mm. high, while in the third cluster they average about 6 mm. in height. The density of the capillitium, and the nature of the usrface net vary considerably even in sporangia from the same gathering, but in all the material examined the spore characteristics are very constant.

Material containing sporangia 9 mm. - 13 mm. high:-

U.B.C. Myc. Herb. No. 534

Material containing sporangia 8 mm. high:-

U.B.C. Myc. Herb. No. 535

Material containing sporangia 6 mm. high:-

U.B.C. Myc. Herb. No. 536

(2) Stemonitis (fusca?).

Sporangia in a small cluster on a maple twig. Collected in the early summer in a wet wooded area on Salt Spring Island.

This species differs from typical gatherings of S. fusca principally in size, the slender cylindrical sporangia ranging in height from 3.25 mm. - 3.5 mm.; in this respect the material fits the description given by Macbride (14) of S. nigrescens, and by Lister (13) of S. fusca var. nigrescens. Macbride (14) distinguishes S. nigrescens from S. fusca by its small size, 3 mm. - 5 mm., intensely black colour, very short stipe, .5 mm. long, and incomplete surface net. The sporangia

of the present material, besides being small, are a very dark purple-brown, but the stipe is comparatively long 1.25 mm. - 1.5 mm., and the surface net is present just as in typical forms of S. fusca. Some of the gatherings of S. fusca are also very dark (U.B.C. Myc. Herb. No. 534), so that except for size this species is really identical with S. fusca.

It may be noted that there is only a few millimetres difference in height between the sporangia of this species and those of the shorter forms of S. fusca, (U.B.C. Myc. Herb. No. 536).

U.B.C. Myc. Herb. No. 537

(3) Stemonitis (nigrescens?).

Sporangia gregarious in scattered clusters on Douglas fir wood. Collected once, early summer, in a wet wooded region on Salt Spring Island.

This species does not appear to be quite typical of S. nigrescens as described by Macbride (14), and so has been recorded as doubtful. The sporangia instead of being cylindrical are elongated-ovate, broader at the base than above; the stipe is slightly longer than is typical, .75 mm. long; the surface net is only incomplete near the apex of the sporangium, the meshes varying greatly in size and shape - small in some sporangia, large in others -, while the pale violet-grey spores, 6.5μ - 7.5μ diameter, appear to be reticulated with continuous raised bands, although in some cases confluent spines can be distinguished.

U.B.C. Myc. Herb. No. 538

(4) Stemonitis (hyperopta?).

Sporangia gregarious, clusterd in little tufts or spreading along cracks in decaying Douglas fir wood. Collected once in an exposed swampy area on Salt Spring Island, in the spring.

This material is not absolutely typical of any of the species listed by Macbride (14) or Lister (13) for this genus, but according to the key given by Macbride (14) for the species of Stemonitis it would be classified as S. virginiensis, on account of the short sporangia, 2.5 mm. - 3.25 mm., and reticulated spores. Macbride (14), however, describes the spores of S. virginiensis as being conspicuously banded with ten or twelve meshes to the hemisphere, and notes that the spore markings are sufficient to identify the species. In the present species the spores are very faintly and irregularly reticulated; some show a few patches of small-meshed network connected by faint lines; in others a lax reticulation of more or less circular meshes seems to cover the spore surface, while in many the meshes are narrow, elongated and angular, so that the bands appear to run parallel around the hemisphere. These spore markings are characteristic of S. hyperopta which Lister (13) gives as a species nearly related to S. virginiensis, being distinguished from it by the less complete surface net and the fainter more uneven reticulation of the spores. It is in just these respects that this material differs from descriptions of S. virginiensis, and resembles S. hyperopta.

It differs from S. hyperopta however, and tends to approach S. virginiensis in possessing slightly larger spores, 5.5μ - 6.5μ, and longer stipes, (about 1 mm. in length).

Without the use of an oil immersion lens this species might be classified as Comatricha pulchella var. gracilis (Lister (13)), as the spore markings are too indistinct to be seen clearly with ordinary magnifications and the spores consequently appear almost smooth or warted.

U.B.C. Myc. Herb. No. 539

(5) Stemonitis axifera (Bull.) Macbr.

Sporangia gregarious in tufts on decaying maple wood. Collected once in the spring on Salt Spring Island, and once in Vancouver in the fall.

The greater development of branches near and at the apex of the columella, and the uneven surface net with free projecting ends, suggest an approach to the allied species S. flavogenita, but the large long-stiped sporangia (total height about 15 mm.) and the very small spores 5μ - 6μ, average 5.4μ, definitely identify this gathering as S. axifera.

U.B.C. Myc. Herb. No. 540

(6) Stemonitis (axifera?).

Sporangia gregarious on decaying leaves; gathered once in the fall, Vancouver vicinity.

The most conspicuous characteristic of this species is to be found in the small nearly colourless, absolutely smooth

spores, ranging from 4.5μ - 5.5μ in diameter. There are only two species of Stemonitis listed by Macbride (14) which possess spores similar to the ones just described, namely, S. Smithii and S. axifera. S. Smithii however is said by Macbride (14) to include forms varying in size from 2.5 mm. - 3 mm. only, and the sporangia of the present species range from 5.5 mm. - 7 mm. in height. The specimens differ from S. axifera also, in size, as well as in colour, the sporangia being a dull violet brown instead of bright rusty-brown; the surface net is composed of delicate, flexuose threads surrounding large irregular meshes 20μ - 60μ wide, and is incomplete toward the surface of the sporangium. In typical forms of S. axifera the surface net is fine-meshed, the meshes as a rule not larger than 30μ in width.

U.B.C. Myc. Herb. No. 541

(7) Stemonitis herbatica Pk.

Sporangia gregarious, growing in a tuft on maple wood. Collected once in the fall, vicinity of Vancouver.

These sporangia are not quite typical of S. herbatica, but show an approach to S. splendens in the longer stipes, 2.5 mm. - 3.5 mm., little branched capillitium and very firm surface net. Lister (13) remarks that S. herbatica holds an intermediate position between S. flavogenita and S. splendens, and adds that different gatherings may show a tendency toward one or other of these allies.

U.B.C. Myc. Herb. No. 542

2. Comatricha (Preuss) Rost.

Two of the three species recorded for this genus were easily identified, but the third, listed as doubtful, includes three varying forms, which, although quite distinct from one another, nevertheless appear to be phases of a single species. The external features of the sporangia, and the characteristics of the cpaillitium in these forms vary so much that no satisfactory identification could be made. One or two somewhat similar varying forms were collected, but owing to lack of time these could not be examined critically, and consequently are omitted from this list.

I. Sporangia small, 1 mm. - 1.5 mm. in total height, violaceous or pinkish brown; sporangium wall persistent at base of sporangium forming a distinct brownish membranous cup, which is attached to the capillitium.

(1) C. rubens.

II. Sporangia larger, usually 2 mm. - 7 mm. in total height, silvery-grey, violet- or dusky-brown; sporangium wall evanescent, or more or less persistent as a silvery-grey membranous sheath.

A. Sporangia cylindrical, sporangium wall silvery-grey, partially or wholly persistent enveloping the stipe and sporangium head; spores 6μ - 7μ diameter, marked with scattered prominent warts (or patches of tiny warts) three or four to the hemisphere.

(2) C. typhoides.

B. Sporangia ovate-cylindrical or ovoid, sporangium wall evanescent; spores 7.5μ - 9μ diameter, minutely warted.

(3) C. (nigra?).

(1) Comatricha rubens Lister.

Sporangia loosely gregarious or scattered, abundant on wet decaying alder leaves. Collected once, late fall, in the vicinity of Vancouver.

This material is not quite typical of the species as described by Lister (13) and Macbride (14), a slight variation occurring in the nature of the columella and the colour of the capillitial threads and spores. The columella is usually only one-third, rarely one-half, the height of the sporangium, while in typical forms it is "more than half the height" (Macbride (14)) or "about two-thirds" the height" (Lister (13)) of the sporangium; the capillitium is bright reddish-brown, not purplish-brown, and the spores very pale reddish or lilac, almost colourless, instead of lilac-brown.

In other respects the material is typical of C. rubens.

U.B.C. Myc. Herb. No. 543

(2) Comatricha typhoides (Bull.) Rost.

Sporangia gregarious forming large colonies on rotting Douglas fir wood. Collected once in the summer, in a wooded area on Salt Spring Island.

This gathering conforms in all respects but one to the

descriptions given by Lister (13) and Macbride (14) of C. typhoides. Both authors give the total height of the sporangia as ranging only from 2 mm. - 3 mm., while the sporangia of this material show a slightly larger range 1.75 mm. - 5 mm., but are otherwise typical of the species.

U.B.C. Myc. Herb. No. 544

(3) Comatricha (nigra?).

Under this heading are grouped three forms, which while distinguishable from one another yet appear to resemble C. nigra more than they resemble any other species of Comatricha listed by Macbride (14) or Lister (13); since these gatherings are so distinct from one another, they will be dealt with separately.

In the first form the sporangia, scattered in loose aggregations, were found on the bark of a Douglas fir log, in a dry wooded area on Salt Spring Island in the spring. These sporangia seem to show a very close approach to C. Suksdorfii in the dark sooty-brown, almost black colour of the oval or ovate-cylindrical sporangia; in the very dark purplish-brown colour of the threads, which arise from all parts of the columella, and in the dark violaceous, or purplish-brown colour of the spores. Lister (13) notes that C. nigra is connected by intermediate forms with C. Suksdorfii, a close ally; the spores of the latter species however, are large, 9μ - 13μ (Lister (13)), or 10μ - 12μ - (Macbride (14)), while in the present species the spores resemble those of C. nigra, being

much smaller, 7.5μ - 9μ, averaging 8.4μ in diameter.

It is possible that this material shows an abnormal development of the species, since the capillitial threads are very irregular, being conspicuously warted, especially near and at the surface of the sporangium.

U.B.C. Myc. Herb. No. 545

The sporangia of the second gathering are loosely gregarious on rotting moss-covered wood and Douglas fir needles. They were collected in the vicinity of Vancouver in the late fall. In immature specimens the head is opaque white, the stipe black. These sporangia differ considerably from those of the first and third gatherings (U.B.C. Myc. Herb. Nos. 545 and 547) being much taller, 3 mm. - 7 mm., while the others are less than 3.5 mm. in total height; the ovoid, violaceous sooty-brown heads are mounted on long slender flexuose stipes, and are usually nodding and slightly plumose at the tips.

In most respects the material fits the descriptions of C. nigra, but one or two peculiarities are to be noted. The total height of the sporangia is larger than that given by Lister (13); the branches of the columella, giving rise to the violaceous-brown capillitial threads, are more numerous and usually larger in the basal region of the sporangium, while the spores, 8μ - 9μ in diameter, are marked with distinct scattered, but evenly spaced warts. A large proportion of the spores from this material have added irregular markings like thickenings in the wall, or adhesions to it. These are seldom

extensive but form dark patches on the surface of the spore wall.

U.B.C. Myc. Herb. No. 546

The third gathering is composed of sporangia aggregated in small clusters or scattered on Douglas fir and maple wood. Collected twice, once in the summer in a dry wooded area on Salt Spring Island, and once in the fall, Vancouver vicinity. Of the three forms this is most nearly typical of C. nigra. The shortly ovoid, dark brown sporangia are quite short, 1.25 mm. - 3.25 mm., erect, and are slightly umbilicate beneath. They vary from typical forms in the nature of the capillitium and spores; the branches of the columella are more numerous near the base and at the apex, than elsewhere; the threads become paler and much more slender toward the periphery, forming an irregular surface net in the lower region of the sporangium. The majority of spores are typical but some of them show extra thickenings or adhesions such as are found in spores of the second gathering (U.B.C. Myc. Herb. No. 546).

U.B.C. Myc. Herb. No. 547

C. nigra is said by Macbride (14) to be allied to C. laxa and C. aequalis, while Lister (13) describes it as a very variable species, closely allied to, and connected by intermediate forms with the three species C. Suksdorfii, C. laxa, and C. elegans. This great range of variation within the species may account for the difficulty experienced in identifying the three forms listed above, (U.B.C. Myc. Herb.

Nos. 545, 546, 547).

3. Diachaea Fries.

This genus is represented in the collection by a single species, which is not listed by Macbride (14), but which Lister (13) describes as a limeless species.

Diachaea cerifera G. Lister.

Sporangia gregarious on very wet moss covered wood. Collected several times in the fall, in Vancouver vicinities. Plasmodium scarce, apparently nearly colourless, heaping into little transparent, almost colourless globules. As the sporangia take form the head becomes transparent yellowish, the stipe greenish-brown above and below, black in the middle. Gradually the stipe turns black, the head changing to white and then cream-colour, until finally both head and stipe are dull black. At maturity the sporangia are iridescent dark brownish or greenish purple.

According to Lister (13) the limeless forms of Diachaea closely resemble some species of Lamproderma, and the present species was first described as Lamproderma columbinum var. sessile. This material, while bearing a superficial resemblance to members of the genus Lamproderma, on account of the iridescent, limeless peridium, is nevertheless quite distinguishable from any of the lamprodermas by the very dark, rigid capillitial threads which fork and anastomose, but do not form a network, the pale irregularly shaped and marked spores, and by the absence of a columella, - the threads springing from

a basal disc formed by the broad tip of the stipe. This species can be separated in addition from Lamproderma columbinum in particular, by the nature of its sporangial development, in the manner described above, from a transparent, almost colourless plasmodium, while the observed development of sporangia of L. columbinum from transparent or opaque white plasmodia is quite different.

D. cerifera, a limeless species of Diachaea, is not listed by Macbride (14) as occurring in America; these specimens however seem to be very nearly typical of D. cerifera as represented by Lister's description and illustrations, while they do not conform to any of Macbride's descriptions of species of Lamproderma, Diachaea or allied genera. No yellow waxy collar is apparent in the sporangia, but Lister (13) mentions that this feature is peculiar to Japanese specimens; the spores, 9μ - 16μ diameter, do not show quite such a large range in diameter as is given by Lister (13), but are very similar since in his illustrations they are depicted as irregular in shape and marked with either close or scattered warts or spinules.

U.B.C. Myc. Herb. No. 548

LAMPRODERMACEAE

1. Enerthenema Bowman.

Of the two species listed in this genus by Macbride (14), one is included in the collection, and since the material is typical in all respects it was not difficult to identify.

Enerthenema papillatum (Pers.) Rost.

Sporangia gregarious on rotting alder and fir wood. Collected twice in the spring on Salt Spring Island, in a wet wooded area.

According to Macbride (14) this well marked species is rare on this continent.

U.B.C. Myc. Herb. No. 549

2. Lamproderma Rost.

This genus is well represented, four species having been collected. In three of these the material is fairly typical and so offered no particular taxonomic difficulties, but the fourth species could not be satisfactorily identified, and is therefore recorded as doubtful.

I. Sporangia usually brilliantly iridescent with blue, green, purple, bronze or gold reflections.

A. Sporangia large, 2.75 mm. - 3.75 mm. in total height; capillitium dark from the columella out to the periphery, becoming pale at the tips; spores dark, closely spinulose, 11μ - 13μ in diameter.

(1) L. columbinum.

B. Sporangia small, 1 mm. - 1.25 mm. in total height; capillitium pale for a short distance after leaving the columella, then abruptly dark; spores pale, marked with scattered warts, 6.5μ - 8.5μ in diameter.

(2) L. scintillans.

II. Sporangia usually dull, dark silvery black, or silvery

violet, sometimes with faint iridescence.

A. Sporangia subglobose, deeply umbilicate beneath, peridium dark, the same colour throughout; capillitial threads pale brown or almost colourless, arising usually from the upper half of the columella; spores 9μ - 12μ, averaging 10.7μ in diameter.

(3) L. violaceum.

B. Sporangia subglobose or obovoid, not umbilicate, peridium silvery-violaceous above, dark reddish-brown below forming a cup at the base of the sporangium; capillitial threads deep red- or purple-brown, arising chiefly from the large main divisions of the apex of the columella; spores 7.5μ - 9μ, averaging 8.6μ in diameter.

(4) L. (arcyrionema?).

(1) Lamproderma columbinum (Pers.) Rost.

Two very distinct forms of this species were collected; the first is more or less typical of the species as described by Lister (13) and Macbride (14), while the second corresponds in every way to the description given by Lister (13) of L. columbinum var. gracile.

In the typical form the sporangia are gregarious, forming large colonies on the mossy surfaces of very old Douglas fir logs. Abundant in the fall, collected in the vicinity of Vancouver. The plasmodium is usually opaque white, rarely grey, the immature sporangia on stout black stipes are opaque white

and clavate at first, soon changing in shape to globose in colour from white to pinkish fawn and finally to black. At maturity the perfectly globose heads are brilliantly iridescent, bright green being the predominating colour in all the collections made, purple and bronze tints occurring rarely. A peculiarity was noted in the fact that the sporangia are seldom solitary, but tend to occur in twos and threes, the stipes, often joined for a quarter of their length, diverging from a common base. In this material the columella is shorter than the approximate length Lister (13) gives as characteristic, while the spores have a slightly larger diameter range (11μ - 13μ) than is recorded by Macbride (14).

U.B.C. Myc. Herb. No. 550

The sporangia of the second form are gregarious on the mossy bark of rotting logs, and were collected frequently in Vancouver vicinities in the fall. At no time were they found associated with sporangia of the first type (U.B.C. Myc. Herb. No. 550), although the two forms are abundant on similar substrata at the same time of year, and in one locality. The plasmodium is watery white and the immature sporangia are completely white at first; the central part of the stipe, (in the longitudinal axis) then becomes black leaving a transparent whitish part on either side, and finally both head and stipe turn black. At maturity the solitary obovoid sporangia mounted on slender curved stipes, are iridescent bright blue or purplish, the peridium being much firmer and the columella

longer, than in the other form.

Macbride (14) does not describe any varieties under L. columbinum, but the sporangia of the two types recorded here agree fairly well with his description of the species.

U.B.C. Myc. Herb. No. 551

(3) Lamproderma scintillans (Berk. and Br.) Morgan.

Sporangia gregarious on maple and alder leaves, fir twigs and decaying herbaceous stems, forming extensive colonies. Collected in the vicinity of Vancouver in the late fall. Immature sporangia are yellowish-white on white stipes; as the stipe becomes dark the head changes to yellow, and from yellow to a dingy mauve, until eventually both head and stipe are black. At maturity some of the sporangia are iridescent blue and purplish-bronze, while others are golden or silvery-bronze. The dull gold and silvery sporangia are quite easily separable on a basis of colour from those with blue and purple iridescence, and as far as could be made out the sporangia of the two forms grow in separate, although often adjacent, patches. This suggests the possibility of a varietal difference, but the two forms could not be constantly separated on structural differences. While there is a strong tendency for the peridium to be wholly persistent and adherent to the capillitium in the blue and purple forms, this was also found to be the case in one or two of the duller silvery sporangia, in which as a rule the peridium is evanescent falling away in large flakes. Much branched, flexuose capillitial threads appear only to be

present in the blue and purple forms, but capillitium of straight, seldom uniting threads also occurs in these, as well as in the golden sporangia. On the whole no definite separation could be made, the species as represented in this collection being very variable as to the colour and nature of the sporangium wall. In all, the capillitium is characteristically pale at the base where it leaves the columella, and the spores are typical throughout.

Macbride (14) notes that this species is rare, and also adds that it is an early species, whereas this material was collected in the late fall.

Blue and purple iridescent sporangia:-

U.B.C. Myc. Herb. No. 552

Dull golden and silvery sporangia:-

U.B.C. Myc. Herb. No. 553

(3) Lamproderma violaceum (Fries) Rost.

Sporangia gregarious on moss and bark forming extensive colonies on rotting Douglas fir logs. Collected in Vancouver, late fall. Plasmodium bright canary-yellow, thick opaque and extensive. Immature sporangia bright yellow at first, the stipe later becoming dark, and the head changing through shades of yellow and orange-buff to greenish-brown; mature sporangia dull brownish or silvery black.

This collection does not seem to be quite typical of L. violaceum; the sporangia are darker and less colourful than would be expected from the description given by Macbride (14),

in which they are said to be metallic blue or purple. The stipe is distinctly tapering, not even, and the spores decidedly spinulose, with a slightly larger diameter range (9μ - 12μ) than is typical for the species. Macbride (14) notes that the plasmodium is transparent and then amber-tinted, but according to Lister (13) it is sometimes yellow. On the whole this may be taken as a slightly varying form of L. violaceum, and it is possible that the lack of metallic iridescence may be connected in some way, with the colour of the plasmodium, which apparently is unusual also.

U.B.C. Myc. Herb. No. 554

(4) Lamproderm (arcyrionema?).

Sporangia clustered in large colonies on decaying maple leaves and herbaceous stems. Collected once, in the fall, Vancouver vicinity. Plasmodium extensive creamish-buff, immature sporangia changing from cream-colour to black through shades of brown and violet-brown, the head at maturity being silvery-violet, the stipe black.

This gathering does not fit the descriptions of any of the species of Lamproderma listed by Macbride (14) or Lister (13), but it approaches L. arcyrionema in some respects, although it differs from it in others. The branching of the columella and the capillitium is very Comatricha-like, and in this way is characteristic of L. arcyrionema. The black columella, reaching half the height of the sporangium, divides at the tip into two (sometimes more) main divisions; smaller

lateral branches may be given off as well. The deep purple-brown capillitial threads, flexuose and much looped form an Arcyria-like network, especially in the outer part of the sporangium. In these respects the material is typical of L. arcyrionema, but it differs in the following features. The sporangia are subglobose or obovoid, not globose, while the presence of a definite reddish, ribbed basal cup is distinctive; the spore mass is brown, not black, the spores larger (7.5μ - 9μ diameter), and marked with prominent irregularly scattered warts, and short lines formed by confluent warts, covering the spore surface with broken, irregular reticulations.

With the exception of the persistent peridium this species bears a strong resemblance to Comatricha lurida as described by Lister (13), and would consequently appear to be on the borderline between the two genera Lamproderma and Comatricha.

U.B.C. Myc. Herb. No. 555

ORDER III

CRIBRARIALES.

In this order five families are listed by Macbride (14), but only species belonging to one of these - the Cribrariaceae - are included in the collection, no gatherings having been made of members of the remaining four families. In the genus Cribraria, the first of the two genera belonging to the Cribrariaceae, four definite and ten doubtful species have

been listed, this being the largest number of forms recorded for any one genus in the collection; the single species of the second genus, Dictydium, was also collected, so that while the order Cribrariales as a whole, may not be very well represented here, the family Cribrariaceae most certainly is.

CRIBRARIACEAE.

1. Cribraria (Pers.) Schrader.

This genus is better represented than any other genus in the collection, fourteen distinctly differing forms having been collected. The taxonomic difficulties encountered were such that only four of these species have been definitely identified. The remaining material shows a great range of variation, chiefly in the nature of the peridial cup and network, these features differing so widely from descriptions given by Lister (13) and Macbride (14) of typical forms, that no satisfactory identification could be made of the ten distinct types represented in the material. These are consequently listed as doubtful species of the genus.

I. Nodes of peridial network little enlarged.

A. Cup well defined; threads little branched; meshes of network large.

(1) C. rufa.

B. Cup small, indefinite; threads much branched; meshes of network numerous, small.

(a) Sporangia long-stipitate, usually rust-coloured;

spore mass brick red; threads reddish.

(2) C. ferruginea.

(b) Sporangia short-stipitate, clay-coloured; spore mass clay-coloured; threads yellowish-brown.

(3) C. argillacea.

II. Nodes of peridial network definitely enlarged.

A. Aggregation of granules in cup, horizontal; sporangia purple.

(4) C. purpurea.

B. Aggregation of granules in cup, longitudinal; sporangia brown.

(a) Nodes of peridial network expanded into small compact areas.

(i) Cup replaced by ribs.

(5) C. (dictydioides?).

(ii) Cup well defined.

x Margin of cup indefinite, often with distinct perforations.

(6) C. (macrocarpa?).

xx Margin of cup distinct, not perforated.

o Sporangia reddish-brown, less than .5 mm. in diameter.

(7) Cribraria sp. (563).

oo Sporangia yellowish-brown, .5 mm. or more in diameter.

Cup small, one-sixth to one-fifth the height of the sporangium.

(8) Cribraria sp. (564).

Cup larger, one-third the height of the sporangium.

ϕ Sporangia small, total height 1.5 mm.

(9) Cribraria sp. (565).

ϕϕ Sporangia larger, total height 2.75 mm.

(10) Cribraria sp. (566).

(b) Nodes of peridial network expanded into large spreading areas.

(i) Teeth of cup continued into network as ribs; expansions broad comparatively few in number.

(11) Cribraria sp. (567).

(ii) Teeth of cup small, not continued into the network as ribs; expansions elongated, branching numerous.

x Cup one-third the height of the sporangium; nodes varying, - broad or narrow, sometimes quite small and compact, - branched.

(12) Cribraria sp. (568).

xx Cup one-sixth to one-fifth the height of the sporangium; nodes narrow, much branched.

o Total height of sporangium, 1.5 mm.; cup minute, indefinite; nodes elongated, continuing into the threads; threads 3μ - 5μ in width.

(13) Cribraria sp. (569).

oo Total height of sporangium 3 mm.; cup larger (one-sixth height of sporangium); nodes conspicuous; threads slender, 2μ in width.

(14) Cribraria sp. (570)

(1) Cribraria rufa (Roth) Rost.

Sporangia scattered, on decaying wood. Collected once only, Vancouver vicinity, in the fall.

The nodes of the peridial network are little expanded as a rule, but are occasionally extended into rectangular or triangular areas; in other respects the material appears to be typical of the species.

U.B.C. Myc. Herb. No. 556

(2) Cribraria ferruginea Meylan.

Sporangia closely gregarious, forming extensive colonies on the bark and wood of rotting Douglas fir logs. Collected once in the fall, in the vicinity of Vancouver. The thick opaque plasmodium, black at first, soon turns blue-grey and the sporangia begin to form; these at first are completely blue-grey, later the stipe turns dark, while the shining head changes in colour from grey to brown and then to greyish-brown; the mature sporangia are bright reddish-brown. The extensive plasmodium is very conspecuous, its blue-grey mass being visible from a distance.

This material is typical in all respects of

C. ferruginea as described by Lister (13); it is of interest to note that the species is not recorded by Macbride (14), and apparently has not been collected on this continent before.

U.B.C. Myc. Herb. No. 557

A form of C. ferruginea was collected in which the colour of the mature sporangia differ from that of the typical form. Both specimens were collected at the same time of year, but were growing in different parts of the wooded area. The immature sporangia were a dull purplish-brown, the mature sporangia a deep buffy-brown as opposed to the bright rust colour of typical forms. The sporangia are also slightly larger, many of them 3 mm. in total height, and the threads of the peridial net are stouter and darker than in the typical sporangia.

U.B.C. Myc. Herb. No. 558

(3) Cribraria argillacea Pers.

Sporangia gregarious on the bark of fallen Douglas fir branches. Collected once in a wet wooded area on Salt Spring Island, in the summer. Immature sporangia:- stipe brown, head deep grey changing to light yellow and then becoming clay-coloured at maturity.

According to Macbride (14) and Lister (13) the peridial net of C. argillacea is without nodal thickenings, but a variation is present in these sporangia where the nodes of the net are sometimes slightly expanded. In other respects the material is typical of the species.

U.B.C. Myc. Herb. No. 559

(4) Cribraria purpurea Schrad.

Sporangia loosely gregarious on rotting logs. Collected once or twice in the fall, Vancouver vicinity.

This material is typical of the species, which Macbride (14) describes as rare.

U.B.C. Myc. Herb. No. 560

(5) Cribraria (dictydioides?).

Sporangia gregarious on decaying wood. Collected in the fall, Vancouver vicinity.

This species resembles C. dictydioides in external features, (the cup being replaced by ribs) and the nature of the spores, but differs in the structure of the peridial net. Lister (13) describes the nodes of the network as being joined by slender threads and having many free ends, while Macbride (14) says the "stellate nodules emit filamental rays in all directions". In the present species the small irregularly shaped swollen nodes give off several stout connecting threads and one or two short free ends but are not in the least "stellate". There is the possibility that the specimen may be a form of C. splendens, since in this species also, the cup is replaced by ribs. The present material differs however in having a small-meshed net with conspicuous and distinct nodes; Lister (13) notes that C. splendens is connected by intermediate forms with C. aurantiaca and other allied species.

U.B.C. Myc. Herb. No. 561

(6) Cribraria (macrocarpa?).

Sporangia loosely gregarious on rotting wood. Collected in the vicinity of Vancouver in the fall.

The material represented in the collection is not absolutely typical of C. macrocarpa, because while the margin of the cup is usually perforated, the amount of perforation varies greatly and is very small in some sporangia; the stipe is unusually long, 2.25 mm., and numerous long or short free ends are present in the network. Macbride (14) notes that this "rare" species is only rivalled in size by C. argillacea, but these sproangia are similar in size and general appearance to sporangia in some of the unidentified gatherings which possess unperforated cups and somewhat resemble C. aurantiaca. This suggests that the present species might be a phase of some such species as C. aurantiaca showing an approach to C. macrocarpa, since Lister (13) remarks that C. aurantiaca is connected by intermediate forms with a group of allied species, including C. macrocarpa.

U.B.C. Myc. Herb. No. 562

(7) Cribraria sp.

Sporangia scattered on charred Douglas fir wood. Collected once in a dry wooded area on Salt Spring Island, in the spring.

These sporangia are very minute, .25 mm. - .4 mm. rarely .5 mm. in diameter, and usually only about 1 mm., rarely 1.5 mm. in total height; in colour they are reddish or orange-

brown; the ribbed regularly toothed cup is one-third the height of the sporangium and the meshes of the network small, polygonal, the nodes expanded into compact triangular or quadrangular areas giving off several straight connecting threads; free ends none; spores almost smooth, yellowish, 6μ - 8μ in diameter.

According to the key given by Macbride (14) for the species of Cribraria, this would be classified as C. minutissima, C. tenella, or C. microcarpa, on account of its small size; however, the description given above doesn't fit any of these three species. The colour of the sporangia and characters of the peridial net and cup suggest an approach to C. aurantiaca, but Macbride (14) says this species is easily recognized by its large sporangia, .8 mm. - .9 mm. in diameter; the spores of the present species are also larger than in C. aurantiaca. In the classification given by Lister (13) this species comes close to C. vulgaris var. aurantiaca.

U.B.C. Myc. Herb. No. 563

(8) Cribraria sp.

Sporangia gregarious, forming extensive colonies on decaying barkless Douglas fir logs. Collected in the vicinity of Vancouver, in the fall.

The yellowish buff-coloured sporangia are large .75 mm. in diameter, and about 3.75 mm. in total height; the cup is only one-sixth or one-fifth the height of the sporangium and has numerous long slender teeth; the meshes of the net are

small, the nodes expanded into definite triangular or quadrangular areas often somewhat rounded; free ends few; spores yellowish 5μ - 7μ in diameter.

This species bears a considerable resemblance to C. aurantiaca, but the cup is very small and the stipe rather long. Macbride (14) notes that in the dusky forms of C. aurantiaca, set off by Schrader as C. vulgaris, the stipes are usually longer, but apparently the size and colour of sporangia of this species is very variable depending upon climatic conditions prevalent at the time of fruiting (Macbride (14)). The dark compact, often rounded, nodes of the network somewhat resemble those of C. tenella; Lister (13) notes that the forms of C. aurantiaca with a close regular net approach C. tenella or C. intricata.

U.B.C. Myc. Herb. No. 564

(9) Cribraria sp.

Sporangia loosely gregarious on rotting logs; collected in the fall, Vancouver vicinity.

This species is similar to the preceding one (U.B.C. Myc. Herb. No. 564), but differs in height and the size of the peridial cup. The sporangia are small, .5 mm. in diameter, or less, and the stipe short, about 1 mm. long; the cup one-third the height of the sporangium. The material probably represents a short form of C. aurantiaca, but is quite easily distinguishable from the preceding species (U.B.C. Myc. Herb. No. 564) which also appears to be a form of C. aurantiaca.

U.B.C. Myc. Herb. No. 565

(10) Cribraria sp.

Sporangia gregarious extending in large colonies over the decaying wood of Douglas fir logs. Collected in the vicinity of Vancouver in the fall.

The very dark buff-coloured sporangia of this gathering can be distinguished from those of the preceding species (U.B.C. Myc. Herb. No. 565) by their height (total height 2.75 mm., head .75 mm. diameter), by the presence of numerous free ends in the peridial net, and by the slightly larger spore range, 5μ - 8μ diameter. From species (8) - U.B.C. Myc. Herb. No. 564, it can be separated by the darker colour, larger cup (one-third the height of the sporangium), free ends of the net and larger spore range. This apparently is yet another form of C. aurantiaca, although the development of numerous free ends in the peridial network is unusual for that species.

U.B.C. Myc. Herb. No. 566

(11) Cribraria sp.

Sporangia gregarious on old logs; collected in the fall, Vancouver vicinity.

This gathering is not typical of any of the species of Cribraria listed by Macbride (14) or Lister (13). The sporangia - total height 1.25 mm., head .5 mm. diameter - are nut-brown; cup, one-third the height of the sporangium with jagged margin, passing over to the network by means of irregular,

node-like ribs which may have cross-connections between them giving a perforated appearance in places to the margin. Network irregular, nodes large and glattened, often stellate, or long narrow angular and extensive; short free ends many; spores 7μ - 8μ diameter.

The material somewhat resembles C. vulgaris as described by Lister (13), but has much larger spores; the conspicuous net with stellate nodes emitting free rays, and the irregular cup are suggestive of C. dictydioides, but the expanded, flat areas at the nodes, comparatively few in number, give to the peridial net a distinctive appearance unlike anything described by Macbride (14) or Lister (13). Superficially this gathering resembles species (5), C. (dictydioides?), U.B.C. Myc. Herb. No. 561, but the nature of the peridial cup and net is entirely different.

U.B.C. Myc. Herb. No. 567

(12) Cribraria sp.

Sporangia gregarious on decaying alder wood; collected in the early summer in a wet wooded region on Salt Spring Island.

This species comes closer to C. dictydioides than to any other species of Cribraria, but is by no means typical of that species. The total height of the orange-brown or buff-coloured sporangia is about 2 mm., the head being .5 mm. - .7 mm. in diameter; cup one-third the height of the sporangium, with shallow marginal teeth; network irregular; nodes numerous

large flat branching areas as a rule, sometimes smaller and compact, with numerous slender connecting threads and free ends; spores 6μ - 8μ in diameter. According to Macbride (14) the cup of C. dictydioides is variable, sometimes well developed, sometimes rudimentary or replaced by ribs. The spores of the present species are larger than is typical of C. dictydioides.

U.B.C. Myc. Herb. No. 568

(13) Cribraria sp.

Sporangia gregarious on decaying wood; collected in the fall, Vancouver vicinity.

In this material the sporangia are dull ochraceous-brown, about 1.25 mm. in total height, the head usually .5 mm. in diameter, but sometimes as small as .3 mm. and as large as .75 mm. in diameter; cup one-sixth the beight of the sporangium; meshes small; nodes flat broad and angular, occasionally narrow and angular, very irregular in shape, often much elongated; spores 5μ - 9μ in diameter. This description does not fit any of the descriptions given by Macbride (14) or Lister (13) for the species of Cribraria.

U.B.C. Myc. Herb. No. 569

(14) Cribraria sp.

Sporangia loosely gregarious on old Douglas fir wood; collected in the vicinity of Vancouver; fall.

Sporangia yellowish-brown; total height about 3 mm., head .9 mm. - 1 mm. diameter; cup one-fifth the height of the

sporangium, deeply toothed; nodes conspicuous, numerous, expanded and branching into angular areas giving off several connecting threads and many free ends; spores yellowish, 5μ - 6μ.

This species resembles C. aurantiaca in some respects, but differs in the presence of the numerous free ends of the peridial net, and the nature of the nodes; the much expanded nodal areas distinguish this species from the other forms recorded in this list as approaching C. aurantiaca.

U.B.C. Myc. Herb. No. 570

The three species (8), (9) and (10) of this series (U.B.C. Myc. Herb. Nos. 564, 565, 566) all resemble C. aurantiaca more closely than they resemble any other species of Cribraria described by Lister (13) or Macbride (14), but at the same time they can be separated from one another by characters which seem to be constant in the sporangia of a group. If these all represent a single species - C. aurantiaca - the range of variation in such a species must be very great; in addition it may be noted that species (5), (6) and (7) of this series (U.B.C. Myc. Herb. Nos. 561, 562, 563) are apparently widely separated from one another, and from species (8), (9) and (10), and yet the possibility of these, also, being varying form of C. aurantiaca has been suggested. Species (11) to (14) in the series (U.B.C. Myc. Herb. Nos. 567 - 570) are separated from the forms mentioned above by a difference in the nature of the nodes of the peridial network, but in one of

these forms also, species (14) (U.B.C. Myc. Herb. No. 570) certain characters of C. aurantiaca are found. Species (11) and (12) somewhat resemble C. dictydioides, but differ from one another, and are quite distinct from species (5) (U.B.C. Myc. Herb. No. 561) which also approaches C. dictydioides.

According to Lister (13) the following five species, - C. aurantiaca, C. macrocarpa, C. tenella, C. intricata and C. splendens - are closely allied and are connected by intergrading forms. This suggests the possibility that the majority of the forms recorded here are varying phases of one or two of these species, the taxonomic difficulties being accounted for by the presence of intermediate, as well as typical, characters, and the consequent great range of variation shown in the material.

2. Dictydium (Schrad.) Rost.

This genus is represented by a typical gathering of the single species belonging to it.

Dictydium cancellatum (Batsch) Macbr.

Sporangia gregarious on the crumbling inner wood of a very old Douglas fir log. Collected once only, in the late fall, Vancouver vicinity.

The sporangia, black when immature, are dark brown at maturity, the stipes dark brown or black; total height about 3 mm.; head 1 mm. in diameter.

U.B.C. Myc. Herb. No. 571

ORDER IV

LYCOGALALES.

The order Lycogalales contains the single genus Lycogala, and this is represented in the collection by one species.

Lycogala Micheli.

Macbride (14) lists four species under this genus, but only one of these has been collected here, the gatherings being quite typical.

Lycogala epidendrum (Buxb.) Fries.

Sporangia solitary or clustered on decaying maple and Douglas fir logs. This species is common in the summer and fall, and numerous collections were made both on Salt Spring Island and in the vicinity of Vancouver.

U.B.C. Myc. Herb. No. 572

ORDER V

TRICHIALES.

This order is divided by Macbride (14) into five families, of which three - Arcyriaceae, the Prototrichiaceae and the Trichiaceae - are represented in the collection. No specimens of the two smaller families, the Dianemaceae and the Perichaenaceae, were found.

The family Arcyriaceae comprises three genera, Lachnobolus, Arcyria and Heterotrichia. The arcyrias alone will be dealt with, since no members of the other two genera

were collected. Macbride (14) lists twelve species of Arcyria, and of that number four definite and three doubtful species are represented in this collection.

The family Prototrichiaceâe contains a single genus, Prototrichia, and a single species, which was collected several times.

Macbride (14) gives four genera in the Trichiaceâe - Hemitrichia, Calonema, Trichia and Oligonema. Of these only the last two are represented in the collection. In the genus Trichia numerous specimens were gathered; eight of the fourteen species listed by Macbride (14) have been definitely identified, some only with difficulty, while two others have been recorded as doubtful. Several varying forms are included under one or two of the species, so that on the whole this genus is very well represented. Two species of Oligonema are recorded here; Macbride (14) lists only four species for the genus.

ARCYRIACEÂE

Arcyria (Hill) Pers.

Four definite and three doubtful species are recorded in this genus. The material of the four definitely classified dpecies is typical for the most part, and since the colour of the sporangia and capillitium is diagnostic in these species it was not difficult to identify them. In the remaining material the sporangia show variations from typical forms, and consequently could not be satisfactorily identified.

I. Spores 6μ - 8μ in diameter.

A. Capillitium in typical forms loosely attached to the cup by few threads.

(a) Capillitium pink or rosy, expanded but not drooping; threads with numerous ring-like expansions.

(1) A. incarnata.

(b) Capillitium yellow or yellowish-buff, much expanded, drooping; threads without ring-like expansions.

(2) A. nutans.

B. Capillitium in typical forms more or less persistently attached to the cup by many threads.

(a) Capillitium bright, or brownish-red; threads marked with prominent cogs and half-rings.

(3) A. denudata.

(b) Capillitium whitish, cream-white, greyish or dull yellow; threads warted or banded, and spinulose.

(i) Capillitium grey, whitish or cream-white.

x Capillitium scarcely expanded, grey or whitish.

(4) A. cinerea.

xx Capillitium definitely expanded, cream-white.

(5) A. (cinerea?).

(ii) Capillitium dull yellow.

(6) A. (pomiformis?).

II. Spores 9μ - 11μ in diameter; sporangia and capillitium dull orange-red.

(7) A. (versicolor?).

(1) Arcyria incarnata Pers.

Sporangia gregarious on Douglas fir, maple and cedar wood. Collected a number of times on Salt Spring Island and in the vicinity of Vancouver, in the summer and early fall.

Gatherings of this species were typical for the most part, but one collection was made in which the sporangia are more or less oval in shape, while the capillitium is not as elastic as in typical forms, and varies in colour from a pale pinkish-red, to a darker rosy red. According to Lister (13) this specimen would be classified as A. incarnata var. fulgens on account of the colour of the sporangia; Macbride (14) however, describes the colour of A. incarnata as flesh-coloured or rosy, making no mention of any variety.

Typical material:-

U.B.C. Myc. Herb. No. 573

Varying material, A. incarnata var. fulgens:-

U.B.C. Myc. Herb. No. 574

(2) Arcyria nutans (Bull.) Grev.

Sporangia gregarious on decaying Douglas fir and cedar wood. Collected once or twice in dry wooded areas on Salt Spring Island in the spring, and in the vicinity of Vancouver in the summer.

This material is typical of the species as described by Lister (13) and Macbride (14).

U.B.C. Myc. Herb. No. 575

(3) Arcyria denudata (Linn.) Sheldon.

Sporangia gregarious on Douglas fir and maple logs, and twigs of either deciduous or evergreen trees. Collected frequently in dry and wet wooded areas on Salt Spring Island in the spring and summer, and in Vancouver vicinities in the summer and fall.

Some collections of the species show variations in the character of the capillitium, the threads being much roughened and spinulose; this is probably due to weather conditions at the time of development of the sporangia. The character of the capillitium in certain specimens suggests an approach to A. stipata not evident in typical forms of this species. The expanded capillitium in these gatherings is smoother-looking and of a paler colour than in the others; the attachment of the capillitium is by fewer threads; the cogs are not so prominent and are wider based, while free rounded ends and a suggestion of faint spiral bands are visible in some mounts. The occurrence of such forms of A. denudata is mentioned by Lister (13).

U.B.C. Myc. Herb. No. 576

(4) Arcyria cinerea (Bull.) Pers.

Sporangia gregarious on rotting maple wood and

Douglas fir logs. Collected twice in wet wooded regions on Salt Spring Island in the spring.

These sporangia, usually grey, sometimes dingy yellowish-white, are typical of the species, in their early stages of development both sporangium head and stipe are white, and of a sticky consistency; the white colour gradually changes to grey, and from grey to shining black. As the sporangium matures the black fades first to a dull yellow colour and finally back again to grey.

U.B.C. Myc. Herb. No. 577

(5) Arcyria (cinerea?).

Two collections were made on Salt Spring Island in the early summer, of what appears to be a varying form of A. cinerea.

In one gathering a group of three sporangia were found on the bark of a maple twig. The capillitium is creamish-white in colour, and is expanded forming curved or somewhat procumbent subcylindrical columns about 3 mm. long.

In the other collection a group of twenty sporangia are scattered over a small area of Douglas fir bark. In these the capillitium - white at first, becoming dingy with age - is expanded to form erect cylindrical or ovoid tufts about 2 mm. long and 1 mm. wide, more loosely expanded at the tip than the base.

The most conspicuous difference between this form and the typical form of A. cinerea lies in the nature of the

capillitium which is very definitely expanded in these sporangia but is almost inelastic and hardly expanded at all in sporangia typical of A. cinerea, so that outwardly, at least, the two specimens appear very different. As regards microscopical characters this form is very hard to separate from A. cinerea, but the following general differences may be noted. The spines on the threads are often more prominent, and the swellings of the basal threads very conspicuous and far more numerous than in the typical form, while the spores average only 6.2μ in diameter as opposed to 7.2μ - the average diameter of the spores of the typical material examined.

Only a few mounts of the varying form could be made, since the material is so scarce, and consequently it was difficult to determine whether or not these microscopical characters are constant.

U.B.C. Myc. Herb. No. 578

(6) Arcyria (pomiformis?).

Sporangia scattered on the inner wood and decaying bark of an old Douglas fir log lying in damp earth in a coniferous wood. Collected once on Salt Spring Island in the early summer.

This material fits the description of A. pomiformis given by Lister (13) but differs from that given by Macbride (14) in the size and colour of the sporangia; these are dull ochraceous-yellow, or buff coloured, not "bright yellow", and are about 1 mm., sometimes less, in total height. Sporangia

in which the buff-coloured capillitium is expanded, may measure 4 mm. in height.

Lister (13) notes that A. pomiformis can be distinguished from A. cinerea by the scattered buff sporangia with looser capillitium.

U.B.C. Myc. Herb. No. 579

(7) Arcyria (versicolor?).

Sporangia gregarious on maple wood. Collected once only, late fall, in the vicinity of Vancouver. Immature sporangia brownish-pink, mature sporangia orange-red.

This gathering differs from typical forms of A. versicolor in the following respects. According to Macbride (14) the capillitium is "bright golden yellow or orange", whereas in this material the capillitium is rather dull orange, or yellowish-red; the stipe is usually long, .5 mm. or .6 mm., and pale or dark red above, pinkish below, while Lister (13) describes it as ".2 mm. long, yellow-brown" in the typical species; the sporangium wall as a rule is only persistent in the lower half or quarter, forming a deep reddish cup; the spores are larger than usual, ranging from 9μ - 11μ, averaging 10.5μ, and are marked with scattered patches of warts.

The sporangium wall in the present species is very distinctly papillate on the inner side, a feature which is used by Lister (13) to separate A. versicolor from A. ferruginea, a closely allied species in which the inner side of the sporangium wall is marked with round-meshed reticulation.

U.B.C. Myc. Herb. No. 580

PROTOTRICHIACEÆ.

Prototrichia Rost.

This genus contains a single species which is represented in the collection by several typical gatherings.

Prototrichia metallica (Berk.) Mass.

Sporangia loosely gregarious on willow bark and Douglas fir wood. Collected infrequently, once on Salt Spring Island in the summer and once in the fall, in the vicinity of Vancouver.

Lister (13) notes that in perfect development the strands of the capillitium are deep red-brown, but also says that the species is very sensitive to changes of temperature and weather. This probably accounts for the fact that the spores and capillitium in the specimens examined were pale or nearly colourless. In other respects the material is typical.

U.B.C. Myc. Herb. No. 581

TRICHIACEÆ.

1. Trichia (Haller) Rost.

The trichias are better represented in the collection than any other genus, since ten distinct forms (eight definitely established species and two doubtful ones) were collected, and Macbride (14) lists only fourteen species for the whole genus; in addition one or two varying forms are mentioned under several

of the species. The diagnostic characters of the different species are on the whole well marked and constant, so that it was not so difficult to identify the varying forms in this genus as it was in some of the other genera (e.g. Cribraria), where characters of several species may be blended in a single specimen.

I. Spores marked with distinct reticulations.

A. Reticulations close, even, forming a small meshed net over the spore surface.

(1) T. scabra.

B. Reticulations large, sometimes irregular, forming a complete or incomplete, wide meshed net over the spore surface.

(a) Sporangia sessile, closely crowded.

(i) Elaters 7.2μ - 8μ in width; spores evenly reticulated.

(2) T. favoginea.

(ii) Elaters 5μ - 5.5μ in width; spores unevenly reticulated.

(3) T. (favoginea?).

(b) Sporangia usually stipitate; stipes weak, united in small clusters.

(4) T. verrucosa.

II. Spores minutely warted, or only partly covered with minute reticulations.

A. Sporangia yellow; spirals of elaters two.

(5) T. varia.

B. Sporangia brown; spirals of elaters three or more, usually four.

(a) Sporangia sessile, rarely shortly stipitate.

(6) T. contorta.

(b) Sporangia definitely stipitate.

(i) Sporangium wall marked with conspicuous pale lines of dehiscence.

x Stipe dark brown, opaque, filled with refuse matter.

(7) T. Botrytis.

xx Stipe deep reddish, translucent, without refuse matter.

(8) T. lateritia.

(ii) Sporangium wall even in colour, not showing lines of dehiscence; stipe filled with spore-like cells.

x Elaters smooth, 5μ - 6.3μ in width.

(9) T. decipiens.

xx Elaters spinose, 6.3μ - 7.2μ in width.

(10) T. (decipiens?).

(1) Trichia scabra Rost.

Sporangia closely gregarious forming extensive colonies on rotting Douglas fir logs. Collected in the fall, vicinity of Vancouver. The plasmodium, white at first, turns gradually to pale yellow as the sporangia begin to take form, and then from pale to a deeper yellow until as the sporangia near maturity they become ochraceous-orange in colour.

The elaters are somewhat wider (6μ - 7.2μ) than would be expected from the descriptions of the species given by Lister (13) and Macbride (14), but in other respects the material is typical.

U.B.C. Myc. Herb. No. 582

(2) Trichia favoginea (Batsch) Pers.

Sporangia gregarious crowded in small or large colonies on maple, alder and Douglas fir wood. Collected on Salt Spring Island in the spring and early summer, wet wooded area, and in the fall, Vancouver vicinity.

The material is typical of the species as described by Lister (13) and Macbride (14).

U.B.C. Myc. Herb. No. 583

(3) Trichia (favoginea?).

Sporangia gregarious on decaying alder leaves and Douglas fir bark. Collected once, in the fall, vicinity of Vancouver.

Lister (13) notes that intermediate forms frequently occur between T. favoginea and T. persimilis, and the present species appears to be one of these. The colour of the sporangia and capillitium favours T. favoginea while the shape of the sporangium is like that of T. persimilis. Broken reticulation of the spores suggests an approach to the spore marking of T. persimilis, but the size of the spores (14.4μ - 16μ in diameter) and the width of the spore border is suggestive

of T. favoginea. The width of the elaters (5μ - 5.5μ) approaches the width of elaters of T. persimilis; the spiral bands, in some cases, are produced into two or three diverging points at the tips of the elaters, as in T. persimilis, but the longitudinal striae are quite conspicuous.

U.B.C. Myc. Herb. No. 584

(4) Trichia verrucosa Berk.

Sporangia gregarious on rotten Douglas fir wood. Collected once only, in the late fall, Vancouver vicinity. Plasmodium white, thick and opaque; the immature sporangia turn from white to light yellow, becoming dull yellow or buff-coloured just before maturity.

The material appears to be typical of the species, which Macbride (14) says is to be expected in the southern United States since specimens in the herbarium of the State University of Iowa are from Mexico.

U.B.C. Myc. Herb. No. 585

(5) Trichia varia (Pers.) Rost.

In this species a number of forms varying in external and capillitial characters were found. In some collections the sporangia are all sessile, in others there are stipitate and sessile sporangia, while in two or three gatherings all the sporangia are distinctly stipitate.

In typical specimens the sporangia are closely gregarious, usually on willow and maple wood. Collected in the

summer on Salt Spring Island, and frequently in the fall, vicinity of Vancouver. Plasmodium white, immature sporangia white, turning pale yellow.

U.B.C. Myc. Herb. No. 586

A slight variation of the typical form of T. varia was collected in the spring on the rotting wood of an old maple log. The sporangia mostly sessile, a few shortly stipitate are far larger than those in a typical collection of T. varia, but this might be due to the abundance of the plasmodium and favourable weather conditions at the time of development of the sporangia. The capillitium differs from that of typical forms in having very irregular, twisted elaters which occasionally possess spine-like branches or spines. The outline of the elaters often appears roughened where the two irregular, indefinite, closely would spiral bands project on either side. The spines are of rather infrequent occurrence and none of the mounts show more than one spine on a single elater.

U.B.C. Myc. Herb. No. 587

Several sporangia were found, also in the spring, which were partially destroyed by some minute fungus. The specimen has been classified as T. varia since it comes closer to this species than to any other species of Trichia. The elaters are very long, or quite short, terminating sometimes in a large bulbous swelling, sometimes in a swelling and a long

point. Elaters rough looking, 4μ - 5.4μ wide, spirals probably two, perhaps three in places, very faint, irregular and difficult to count; spores 12.6μ - 13.5μ in diameter.

U.B.C. Myc. Herb. No. 588

In another gathering, made in the spring on willow wood, a more distinct variation of T. varia was found. The brownish-yellow sporangia differ from the typical form of T. varia in the colour and nature of the sporangium wall, and in the spiny character of the capillitium. The sporangium wall is not translucent when mounted; the elaters are sometimes typical, but often possess tips which are swollen and club shaped, with several lateral or terminal blunt spines. Occasional spines are also found along the length of the elaters, so that on the whole the capillitium can be termed definitely spiny.

U.B.C. Myc. Herb. No. 589

A collection of T. varia was made in the fall near Vancouver, in which the sporangia are brownish, and stipitate. The sporangium wall is hard and the capillitial mass closely compacted; elaters comparatively few, long frequently twined around each other in the middle, irregular and twisted in outline.

U.B.C. Myc. Herb. No. 590

Other stipitate sporangia of T. varia collected in the fall near Vancouver also have the capillitial mass closely

compacted. The capillitium itself differs from that found in typical forms, in that the ends of the elaters terminate abruptly in obtuse points, and that the elaters themselves are sometimes branched.

U.B.C. Myc. Herb. No. 591

From the foregoing list it can be seen that the species T. varia includes a number of diversified forms, all showing slight variations from the typical form, but nevertheless, all definitely belonging to this species.

(6) Trichia contorta (Ditmar) Rost. var inconspicua Lister.

Sporangia loosely gregarious on maple wood. Collected once in the fall, near Vancouver. These sporangia, dull orange in their early stages of development, took from one to two weeks to become fully mature.

The elaters are peculiar in that they are often swollen at intervals along their length, with a more or less swollen tip terminating in one or sometimes two, curved or straight points.

This specimen is undoubtedly a variety of T. contorta, and yet no mention is made, either by Lister (13) or Macbride (14), of the swellings in the elaters. However Lister (13) notes that the occurrence of bulbous swellings in the elaters is so frequent, and at the same time so inconstant, in many species of Trichia that it cannot be received as a specific character.

U.B.C. Myc. Herb. No. 592

(7) Trichia Botrytis Pers.

Sporangia gregarious on decaying Douglas fir and Maple wood. Collected once on Salt Spring Island in the early summer, and frequently in Vancouver vicinities in the fall. The immature sporangia mounted on dark purplish stipes, are opaque white in their early stages of development, and turn dark purple or black just before maturing.

This material is quite typical of T. Botrytis as described by Lister (13) and Macbride (14).

U.B.C. Myc. Herb. No. 593

A collection of this species was made in the vicinity of Vancouver in the fall, containing sporangia which are yellowish, not purple brown, and in which the elaters are perhaps a little paler in colour, the spirals closer, and the spores larger (11.7μ - 12.6μ in diameter) than in the typical form of T. Botrytis; the immature sporangia are quite a light orange colour.

It is probable that this is merely a form of T. Botrytis showing a little variation in colour and capillitial characters, since Macbride (14) describes the species as remarkable for its variation in colour.

U.B.C. Myc. Herb. No. 594

(8) Trichia lateritia Lév.

Sporangia gregarious on Douglas fir wood. Collected once in a wet wooded area, early summer, on Salt Spring Island.

This specimen, which is typical of the species, was found on a log that was lying in a stream, so that the sporangia were actually in running water when they were collected.

U.B.C. Myc. Herb. No. 595

(9) Trichia decipiens (Pers.) Macbr.

This species shows diversified forms, several variations from the typical T. decipiens being represented in the collection.

The sporangia of the typical form are gregarious on rotting logs, and were collected in the fall in Vancouver vicinities.

U.B.C. Myc. Herb. No. 596

Lister (13) notes that several varieties of this species have been described but that they appear to represent forms rather than important varieties, and in this connection he mentions the variety "olivacea", which differs from the typical form only in external characters. This form was collected frequently in the fall on decaying Douglas fir and maple wood. When immature the sporangia are pale pinkish-orange, the stipes being white. The material exactly fits the description given by Lister (13) of T. decipiens var olivacea, but also fits that given by Macbride (14), of the typical form.

U.B.C. Myc. Herb. No. 597

Several collections of sporangia were made on Salt Spring Island, which seem to show a gradation from a slightly

varying form of T. decipiens to the more natural form.

The first of these gatherings was made in the summer, on willow wood. Immature sporangia orange coloured with white stalks, mature sporangia shining dull brown, very minute, about 1 mm. in total height. This specimen differs from the typical form of T. decipiens in the size of the sporangia, the width of the elaters (3μ - 4.5μ) and the nature of the spores which are echinulate, 9μ - 11μ in diameter.

U.B.C. Myc. Herb. No. 598

A specimen resembling the typical form more closely was found on decaying maple wood. The sporangia are about 1.5 mm. in total height, the elaters range from 3.6μ - 5μ in width; the spores are echinulate.

U.B.C. Myc. Herb. No. 599

In another collection the sporangia are similar in appearance to those referred to above (U.B.C. Myc. Herb. No. 599), but are about 2.5 mm. in total height; the elaters are almost typical ranging from 4.5μ - 6μ in width, and the spores, while they are echinulate, are the same size as those found in typical forms of T. decipiens.

U.B.C. Myc. Herb. No. 600

(10) Trichia (decipiens?).

Sporangia gregarious on decaying wood; collected once only, in a wooded area near Vancouver, in the fall.

The smooth elaters, very gradually tapering at the

ends, the four evenly wound spirals, the spore-like cells filling the stipe, and the partially reticulated spores place this species as T. decipiens. However the width of the elaters, averaging 5.6μ in T. decipiens, but 7μ in this form, the regular occurrence in the capillitium of spines, spine-like branches and bifurcate tips definitely establish this as a distinct variation of T. decipiens, and one which is not mentioned either by Lister (13) or by Macbride (14).

U.B.C. Myc. Herb. No. 601

2. Oligonema Rost.

This small genus is represented in the collection by two closely allied species which are chiefly distinguished by the nature of their capillitium. The material was rather difficult to identify since the markings of the capillitial threads are so obscure.

I. Elaters marked with a series of faint close lines and minute warts; spores 11.7μ - 13μ in diameter, regularly reticulated with continuous bands, border 1μ wide.

(1) O. flavidum.

II. Elaters marked with indefinite spiral bands; spores 12μ - 16μ in diameter, irregularly reticulated with pitted bands, border 1.5μ wide.

(2) O. nitens.

(1) Oligonema flavidum (Peck) Mass.

Sporangia gregarious, heaped in a cluster on a piece

of Douglas fir bark which was embedded in boggy soil. Collected once on Salt Spring Island, in the spring.

The material fits the descriptions of the species given by Lister (13) and Macbride (14).

U.B.C. Myc. Herb. No. 602

(2) Oligonema nitens (Lib.) Rost.

In this gathering, which is typical of the species as described by Lister (13) and Macbride (14), the sporangia are gregarious, clustered on Douglas fir wood. The collection was made on Salt Spring Island in the summer.

U.B.C. Myc. Herb. No. 603.

SUMMARY.

This paper deals with a study of British Columbia slime-moulds as represented in a collection gathered over a period of three years in wooded areas on Salt Spring Island, B. C., and in the vicinity of Vancouver, B. C.

Both sub-classes of the Myxomycetes are represented; the Exosporeae by the single genus Ceratiomyxa, the Myxogastres by a number of genera in each of its five orders - a total of one hundred and three forms belonging to nineteen genera in eight families being recorded. Of these, fifty are species which have been definitely identified, twenty-eight are varying forms of certain known species, seventeen are listed as doubtful, while the remaining species, eight in number, could not be identified at all.

In the family Physaraceae a total of nine typical and four doubtful species is recorded:- two species of Badhamia; five definitely identified and four doubtful species of Physarum; a single species of Craterium, C. leucocephalum, which according to Macbride (14) is "not common"; and the single species of Leocarpus. The family Didymiaceae is represented by ten species, five belonging to the genus Didymium; four to Diderma and one to Lepidoderma. Three of the species recorded, Didymium difforme, Diderma radiatum and Lepidoderma tigrinum are said by Macbride (14) to be rare in the United States, while Diderma montanum is not listed by him

as occurring on this continent.

Six typical and five doubtful species are recorded in the family Stemonitaceaê:- three definite and four doubtful species in Stemonitis; two definite and one doubtful species in Comatricha and a single species of Diachaêa, the latter a limeless species D. cerifera not mentioned by Macbride (14) as occurring in the United States. The family Lamprodermaceaê is represented by four definite and one doubtful species. The single species in the genus Enerthenema, E. papillatum is said by Macbride (14) to be rare, while of the four forms listed under the genus Lamproderma, one L. scintillans, is apparently rare also.

Five typical species are recorded in the Cribrariaceaê:- one species of Dictydium and four of Cribraria. Of these four Cribraria purpurea is said by Macbride (14) to be rare, and another Cribraria ferruginea has not been previously recorded for this continent. Besides these typical species two doubtful and eight unidentifiable species have been recorded in the genus Cribraria.

A single common species of Lycogala is listed.

In the family Arcyriaceaê four definite and three doubtful species are recorded, all in the genus Arcyria; the single species belonging to the genus Prototrichia of the family Prototrichiaceaê was collected, while the family Trichiaceaê is represented by a total of ten typical and two doubtful species:- two species of Oligonema, and eight of

Trichia, the two varying forms belonging to the latter genus. Trichia contorta is rare according to Macbride (14), while the same author says that T. verrucosa is to be expected in the southern United States, since specimens in the herbarium of the State University of Iowa were collected in Mexico.

Many taxonomic difficulties were encountered in classifying certain species of Physarum, Stemonitis, Comatricha and Cribraria. The range of variation within a single species is often very great, and the need for a revision of the genus Cribraria, in particular, seems to be indicated. A more detailed study of the cribrarias, for instance, might lead to the separation into distinct and possibly new species, of some of the unidentifiable forms represented in the genus. Species of the genera Stemonitis and Comatricha were also, on the whole, difficult to identify, since the capillitial characters appear to be inconstant, and in some cases difficulty was experienced even in separating the two genera.

It is of interest to note that of the one hundred and three forms listed in this work, only fifty are absolutely typical of the species they represent.

The Myxomycetes, as represented by the specimens in this collection, appear to be subject to a great range of variation both in external features and capillitial characters, and while the cause of this tendency to vary is not definitely known, it is probably largely due to the effect of environmental conditions upon the developing sporangia.

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