V.

CONTRIBUTION TOWARDS A MONOGRAPH

OF THE

LABOULBENIACEÆ.

BY

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INTRODUCTORY NOTE.

Since the publication in these Memoirs (Vol. XIII, No. 6, 1908) of the second Part of the writer's "Contribution toward a Monograph of the Laboulbeniales," nine preliminary communications have appeared in the Academy's Proceedings (Vol. 48, Nos. 7 and 10; Vol. 50, No. 2; Vol. 51, No. 1; Vol. 52, Nos. 1 and 10; Vol. 53, No. 9; and Vol. 55, No. 6) which include diagnoses of more than four hundred species and fourteen genera which were previously unrecorded. It has not hitherto been possible to publish figures illustrating these additional species; but it is hoped that this may now be accomplished without undue delay. The new forms have, however, become so numerous that it is impracticable to prepare and publish plates illustrating all of them at once, since, in addition to the number above mentioned, there are still many which have not yet been described.

It has also seemed best to defer any summary or discussion of general matters relating to the Laboulbeniales, except in so far as individual genera are concerned, and to devote a final part to an index of species and hosts, a review of the literature and such other matters as the more recent contributions to our knowledge of these forms may render desirable. Five of the six known genera of unisexual Peyritsiellaceae, three of them monotypic, will therefore be considered in the present connection, an account of the remaining genus, *Trenomycetes*, being deferred to a later Part; and for reasons of mechanical convenience, a synopsis of the genera *Hydraeomyces* and *Chitonomyces* is included, although thus taken from their proper sequence.

The accompanying figures are of the usual somewhat unsatisfactory ink-stipple type, and it should be said that, in many cases, no attempt has been made to reproduce different shades of coloration, or suffusion, in individual species. For these characters, therefore, reference should always be made to the descriptions. The latter have been carefully revised, corrected and amended, after renewed examination of the old and often of fresh material.

MONOGRAPH OF THE LABOULBENIACEÆ

PART III.

DIMORPHOMYCETEAE.

This family includes the six genera *Trenomycetes*, *Polyandromycetes*, *Nycteromycetes*, *Dimorphomycetes*, *Dimeromycetes* and *Eudimeromycetes*, the members of which are all unisexual, the males bearing one or more compound antheridia, in which two or more antheridial cells discharge their sperm-cells into a common cavity, from which they escape through a single opening. As in the corresponding hermaphrodite genera, there is great variation in the complexity of these antheridia, the most complicated being illustrated by the type found in *Polyandromycetes*: while in *Eudimeromycetes* and the less typical forms of *Dimeromycetes*, like *D. Thaxteri*, or *D. aberrans*, the type is much simpler, and approaches that of the simple single antheridium. The functional, or spermogenous, region of these compound forms is intercalary, the cross-septa of one or more terminal cells being absorbed to form a continuous cavity which includes both the sperm-chamber and the efferent canal, the differentiation of which is variably marked in different cases. The family bears the same relation to the hermaphrodite Peyritschielleae that the Herpomyceteae, Amorphomyceteae, and certain other as yet undescribed unisexual types with simple antheridia, bear to the hermaphrodite Laboulbeniaceae. As in these instances, the sex of each individual is predetermined in the ascus, and of the two members of each spore-pair, which are normally discharged simultaneously, one is male and the other female; so that juxtaposition of the sexes is ordinarily assured, when development takes place.

Although, as I have previously pointed out, in hermaphrodite forms where male and female branches are clearly distinguished, as for example in the genus *Laboulbenia*, the sexual character in either case is by no means fixed; and male organs, especially, frequently develop from the female branch, the differentiation of sex in each individual of the unisexual types seems absolute. No instances have been seen of an anomalous production of antheridia from females, or of perithecia from males, even in such an unusual type as *Dimeromycetes adventitosus*, in which antheridia and perithecia are developed, not only in the normal position from the receptacle, but arise adventitiously from ordinarily sterile portions of the male or female individual, as the case may be.

Among the male individuals of the Dimorphomyceteae, two categories may be distinguished; depending on the relation of the antheridia to the receptacle: for while in *Trenomycetes*, *Streblomyces*, *Dimeromycetes* and *Dimorphomycetes* they are always secondary, terminating lateral branches, in *Polyandromycetes* and *Eudimeromycetes*, they may normally terminate the primary axis. Assuming that my interpretation of the conditions in the type-species of *Eudimeromycetes* is correct, this difference in position is not necessarily significant of near relationship; since the last mentioned genus seems far removed from *Polyandromycetes*, and evidently related to the simpler types of *Dimeromycetes*, like *D. Tomari* or *D. aberrans*, if not actually congeneric with them.

In the female individuals, on the other hand, the perithecia in all the genera are always secondary; terminating lateral branches, and never terminal on the primary axis. Their origin

and relation to the receptacle is essentially the same in all cases; although the production of secondary appendages, or even axes, sometimes results in considerable complication. Further details relating to these matters will be briefly considered under the different genera.

POLYANDROMYCES.

Proc. Am. Acad. Arts & Sci. 55, 215.

Type Species *Polyandromyces coptosomalis*.

The most striking characteristics of this genus are seen in the male. The spores of both sexes are once-septate, and in the male the basal segment divides but once to form the two-celled receptacle; while the distal segment divides in three cells (fig. 1), corresponding to the three primary regions of the antheridium proper: namely; the stalk-cell, which divides no further and is seen as the third cell from the foot in figures 1-6; a terminal cell, figure 1, which becomes pointed, figure 2, dividing in two, figures 4-5, and forming the efferent region; a middle cell which separates a single cell above and below, figures 3-5, the middle of which divides and proliferates to form the very numerous antheridial cells, figures 3-6, the necks of which push up through the upper cell, which is destroyed, and discharge their sperm-cells into the common cavity which is formed by the absorption of the walls separating the two cells of the efferent region, the limits of which are indicated by a corresponding constriction and enlargement, figures 6 and 10. The figures given of the more mature stages are necessarily somewhat diagrammatic; since the antheridial cells are so numerous that it is almost impossible to trace with exactness, in optical section, their origins and relations (figures 6 and 10). The number of sperm-cells discharged is very great, and their formation appears to continue during the entire life of the individual, so that literally millions must be formed during its existence.

In the development of the female individual the upper segment of the spore becomes a short, blunt, two-celled appendage; while the basal cell divides obliquely, immediately below it; separating normally four cells which are successively cut off from the distal end of the basal cell. The uppermost of these forms the base on which the two-celled appendage rests. The next below is sterile, while the third grows out laterally to form the single perithecium. The lowest, or fourth, which is obliquely separated from the basal cell of the receptacle, also grows out somewhat, the outgrowth becoming separated by a septum and closely united to the base of the perithecial stalk. It does not, however, develop further, except in instances where the first perithecium is injured or destroyed, when it may produce a new perithecium. The numbers and relations of the cells as above indicated, seem to be very constant, although variations sometimes occur which are usually the result of injury.

The structure and development of the perithecium appears to present no peculiarities and conforms to that of its near allies. There seems to be but a single ascogenic cell, and the septa separating the stalk-cell, and the basal and lower wall-cells, disappear; so that the lumen of the stalk is continuous with that of the general ascigerous region.

POLYANDROMYCES COPTOSOMALIS Thaxter. Plate I, figs. 1-9.

Proc. Am. Ac. Arts & Sci. 55, 216.

Male individual yellow to yellowish brown, the basal cell and efferent chamber and tube paler, or even hyaline; the subbasal cell small and obliquely separated, so that the basal cell is in contact with the squarish stalk-cell of the antheridium on one side, or nearly so. Venter of antheridium, with its supporting cell, deeper brown, subsymmetrical, sometimes inflated, often

abruptly broader than its stalk-cell: the almost dome-shaped efferent chamber separated from the efferent neck by an abrupt constriction and enlargement; the whole straight, or somewhat curved, about $135\ \mu$ long. Antheridium $64 \times 25\ \mu$; its stalk-cell $16 \times 16\text{--}21\ \mu$; venter $30 \times 26\ \mu$; efferent chamber $125 \times 16\ \mu$; neck $22\ \mu$.

Female individual yellowish, becoming more or less deeply tinged with brown; the appendage darker, erect or but slightly divergent; its distal cell slightly longer, somewhat tapering, bluntly rounded. Perithecium erect, nearly symmetrical above the very short curved stalk, the margins slightly convex, the tip and apex clearly distinguished by successive elevations and depressions, which are variably prominent; the apex short, broad, flattened or slightly rounded. Perithecia $240\text{--}280 \times 50\text{--}55\ \mu$. Appendage $30 \times 20\ \mu$. Receptacle $105 \times 34\ \mu$. Total length to tip of perithecium $300\text{--}345\ \mu$.

On legs of *Coptosoma maculatum* Westw. No. 2800 (Type). Madagascar (M. C. Z., Wulsin). On inferior abdomen of *Coptosoma* spp. No. 2960, Suene, Fiji, No. 2960, Wai Ai, Solomon Is., (M. C. Z., Mann).

The material from Fiji and the Solomons is somewhat smaller than that from Madagascar, and grows usually on the margin of the abdomen. The differentiation at the tip is apt to be more pronounced, and the distal cell of the appendage somewhat longer, narrower and more reddish. A rather well defined variety, I have distinguished as

var. MINOR, Plate I, figs. 10-12.

L. c. 55, 217.

This variety is much smaller, relatively stouter, with a more asymmetrical perithecium, the tip much less clearly differentiated, the apex broader. The perithecia are $135 \times 38\text{--}150 \times 42\ \mu$. Receptacle $40 \times 34\ \mu$. Appendage $20 \times 12\ \mu$. Total length $160\text{--}190\ \mu$. The male $100\text{--}105\ \mu$ in length, but otherwise entirely similar. Both sexes are distinguishable at a glance from the type, by their small size, but the differences seem insufficient for specific separation. It is found on a small species of *Coptosoma* from Kamerun, No. 3103, and from its habit of growing partly concealed by the projecting segment at the tip of the abdomen, it is detected with difficulty.

NYCTEROMYCES.

Thaxter, l. c. 52, 653.

Type Species *Nycteromyces streblidinus*.

This genus has been based on a single species, which represents a very distinct type, most nearly related to *Polyandromyces*, from which it is very clearly distinguished by both the characters of the male and female. The antheridia, of which there are several, are more simple in structure, consisting of not more than six cells, possibly only four, and originating as lateral outgrowths, like those of *Dimeromyces*. The receptacle in both sexes is terminated by a peculiarly modified cell, which probably corresponds to the distal segment of the spore, and is seated on a smaller cell, which, though similarly colored, is probably to be regarded as the terminal cell of the receptacle; although, in the original description, they are interpreted as together constituting the appendage. As in *Dimeromyces*, the basal cell of the receptacle, in the male, cuts off successive cells, sometimes as many as five, from which the antheridia arise in a unilateral series; but in the female a single cell, only, is distinguished above the basal cell, and bears the solitary perithecium; unless one regards the lower of the two cells forming the so-called appendage, as also belonging to the receptacle. In neither sex are secondary appendages pro-

duced. The structure of the solitary perithecium conforms to that of other related genera; the walls which separate the basal and stalk-cells being soon absorbed, so that the cavity of the latter is continuous with that of the ascigerous region. The ascogenic cell is single in the type.

NYCTEROMYCES STREBLIDINUS Thaxter. Plate I, figs. 13-15.

L. c. 52, 654.

Male individual hyaline, except the two blackish brown distal cells; the basal relatively long and slender, its base tapering to a point reaching slightly beyond the small black lateral foot: the fertile cells above it, two to five, half as broad as its distal end: antheridia two to five, the relatively short broad stalk-cells and venters superposed in a continuous lateral series, and closely united; the short, stout, blunt, conical efferent chambers and necks diverging slightly upward: the distal appendage-cell pointed, bullet-shaped, blackish brown; the subterminal cell flattened and concolorous. Basal cell of receptacle $40-50 \times 10 \mu$. Antheridia $18 \times 12 \mu$. Terminal cell $18 \times 10-14 \mu$, the subterminal $4 \times 15 \mu$ broad. Total length $86-110 \mu$.

Female individual of rather slender habit, the basal cell hyaline, its upper fourth broader, comparatively long and slender, its base as in the male; subbasal cell small, nearly isodiametric, displaced by the base of the perithecial stalk-cell, which occupies one-half, or more, of the distal margin of the basal cell; the two terminal cells modified as in the male. Perithecium long, the sporogenous portion tinged with dull purplish brown, broader distally, and tapering to the rather broad, flat apex; asymmetrical, the tip bent slightly inward, the successive regions indicated by marginal prominences more prominent on the inner side. Spores $42-45 \times 4 \mu$. Perithecia, including stalk, $210-280 \times 36-45 \mu$; apex and tip $35-40 \mu$. Basal cell $70-90 \times 21 \mu$; subbasal $10 \times 18 \mu$. Terminal appendage-cell $18 \times 14 \mu$, the subterminal $4 \times 16 \mu$ broad. Total length $290-360 \mu$.

On the superior abdomen and legs of *Strebla vespertilionis* Fabr. No. 2073a, M. C. Z., taken on bats in Venezuela (Carriker).

DIMORPHOMYCES.

Thaxter, l. c. 28, 157.

Type Species *Dimorphomyces denticulatus*.

As I have pointed out in a recent paper on "New Dimorphomyceteae" (Proc. Am. Acad., Vol. 55, p. 212), the additions to this genus and to Dimeromyces, which have accumulated since the publication of the second part of the present Monograph, serve to break down, in some respects, the clearly defined distinctions which formerly seemed to separate these genera. But although, in the light of this added knowledge, their separation now seems somewhat artificial, it is still a convenient one. However closely the two types may approach one another in certain species, the ultimate relation between the subbasal cell, and its primary appendage, to the basal cell of the receptacle in the female, may still be used clearly to separate the one genus from the other. As a matter of convenience it may be desirable again to summarize the differences between the two, since they may be made more clear by reference to the accompanying figures.

In all species of *Dimorphomyces*, the primary subbasal cell, which bears the primary appendage, is always directly related to the basal cell from which it is separated by a common wall, only; and whatever secondary developments may occur, this relation remains unaltered. In *Dimeromyces*, on the other hand, these secondary developments always result in interposing variable numbers of cells between the basal and the primary subbasal cells, so that they do

not remain in contact. The typical conditions characteristic of the two genera may be seen by reference, for example, to figures 27, 54 or 55, in the case of *Dimorphomyces*, and figures 105 or 111, in *Dimeromyces*.

The conditions seen in *Dimorphomyces* result from the secondary activity of the distal end of the basal cell, which pushes up beside the subbasal. From this protrusion of the basal cell, a cell is then cut off which lies beside the subbasal cell, and, from its position, has the appearance of having been derived by separation from this cell, rather than from the basal. The same process is then continued, a further protrusion of the basal cell pushing up beside the cell first separated, and from this second protrusion a second cell is then cut off, which lies beside the first, and like it is in contact with the lumen of the basal cell. As a result of the repetition of this process, more cells are cut off in a similar fashion, their number varying according to the individual or species, and the laterally developed "secondary receptacle," which, in figure 27 for example, consists of seven cells, is thus developed; its cells giving rise to perithecia, or secondary appendages, as the case may be. The seventh cell, which terminates this series, is thus the last or youngest, and, although it is farthest away from the original position of the basal cell, remains, nevertheless, in contact with it. In the figure referred to, the extension of the basal cell has pushed up beyond the seventh cell, although this last protrusion has not been cut off to form an eighth.

Turning to the usual type of development found in species of *Dimeromyces*, one finds that there is no such lateral displacement of the products of division cut off from the distal end of the basal cell; although the process by which they are formed is fundamentally similar. The basal cell, instead of pushing up beside the subbasal before it divides, cuts off at once, immediately below the latter, a first secondary cell, which completely separates the two; and as additional secondary cells continue to be separated distally from the basal cell, the two become more and more remote from one another, the number of cells thus interposed varying in different individuals and species. In figure 411, for example, fourteen such products of the division of the basal cell separate it from the subbasal, which bears the primary appendage represented as diverging at the left. These fourteen cells thus constitute a "secondary" receptacle which, although its axis is coincident with that of the primary receptacle, is entirely similar in character and origin to the laterally divergent secondary receptacle of *Dimorphomyces*. The presence or absence of displacement, through protrusion, in connection with the development of the secondary receptacle, from which the perithecia and secondary appendages are ordinarily developed, is thus the only essential difference between the two genera. Even this distinction tends to disappear in one or two instances among certain somewhat aberrant species. In *Dimeromyces necrotalis*, for example, reference to figure 178 will show that, although the first four cells at the right have been cut off as in other forms of *Dimeromyces*, and completely separate the subbasal cell and its appendage, at the extreme right, from the basal cell; the four secondary cells at the left, which were separated later than those at the right, have arisen through successive protrusion, and are bordered by a marginal extension of the basal cell as in *Dimorphomyces*. Since, however, the subbasal cell, even in this instance, is remote from the basal cell, being separated completely by the four cells intervening at the left, it must be regarded as belonging to *Dimeromyces* rather than to *Dimorphomyces*, although it combines characteristics of both genera. Among other transitional forms *Dimorphomyces Pachytelis*, *D. ramosa* and *D. oblique-septatus* may be mentioned as approaching *Dimeromyces* in the sequence of cell-divisions and cell-arrangement.

In typical species of *Dimorphomyces*, certain variations occur which may be mentioned. While in a majority of cases the female individual develops a single secondary receptacle, or axis, in the manner above described, several are characterized by the production of two such structures, one on either side of the median axis. The second, however, instead of originating from the

basal cell, is derived from the subbasal. The successive steps in its formation and its general structure are, nevertheless, the same, and it is bordered by an extension of the subbasal cell, just as the first is bordered by one of the basal cell. The two species originally described, *D. muticus* and *D. denticulatus*, are both illustrations of this type, and it is very clearly developed in Spegazzini's *D. vulgatissimus*. It also occurs in *D. furcatus*, figures 22-23; *D. Bledii*, figure 35 and *D. Trogophloeii* Speg. In all other known instances, however, only one is formed, as in *D. verticalis*, figure 27.

The male individuals of the two genera show no essential differences. It may be mentioned, however, that in *Dimorphomyces* no forms have been seen in which secondary appendages occur; and, as a rule, only one antheridium is normally produced; while forms with numerous antheridia and secondary appendages are not infrequently met with in *Dimeromyces*.

In describing the characters of the male, there has been some confusion in distinguishing the cells of the receptacle proper from the basal cell of the primary appendage; which, as is usually also the case in *Dimeromyces*, is more often undifferentiated by any special form or color. Owing to the fact, however, that the secondary development of the receptacle is set apart in a lateral position in *Dimorphomyces*, there is likely to be less confusion in determining this point, and it has seemed more convenient to assume that the appendage consist of a basal and ordinarily two distal cells, which, as a rule, are much less clearly distinguished than is usually the case in *Dimeromyces*. Twenty species of the genus have thus far been described, of which the six species having two secondary receptacles may be first considered.

In the following citations under species described by myself "l. c." refers in all instances to the Proceedings of this Academy.

DIMORPHOMYCES FURCATUS Thaxter. Plate I, figs. 22-24.

L. c. 55, 218.

Basal cell of the male individual relatively large, long and uniform, abruptly prominent below the base of the antheridium, obliquely separated from the subbasal; the two deeply suffused with blackish brown, externally. The appendage of three cells, subequal in length; the two distal abruptly more slender. Antheridium straight, erect, subsymmetrical, nearly sessile; efferent chamber distinctly inflated, about as long as the straight neck. Appendage 29 μ . Receptacle, without foot, 32 μ . Antheridium $28.5 \times 11.5 \mu$. Total length to tip of appendage 56 μ .

Female individual furcate, the two secondary receptacles dirty yellow, diverging at different angles and planes; the lower somewhat larger: the eight to sixteen cells bearing perithecia, of which there may be several, and secondary appendages of two kinds; one longer, of four to six cells, having the distal cell distinguished by a slightly constricted broad blackish brown area; the other much shorter, of two cells, blackened. Perithecia relatively large, much longer than the larger secondary appendages; the stalk stout and well developed, but not distinguished from the ascigerous portion; which is somewhat inflated, progressively darker smoky brown to its junction with the well distinguished, abruptly paler, dirty yellowish tip and variably prominent apex, which are subtended by a distinct shallow depression on both sides, the latter slightly distinguished, subsymmetrical, blunt. Primary appendage short, of two cells, finally blackened about the septa. Perithecia $140-180 \times 22-27 \mu$. Longer secondary appendages $45-95 \times 8.5 \mu$. Secondary receptacles $60-95 \times 20 \mu$.

On *Apocellus* sp. Nos. 1581 and 1582; Agua Caliente, Guatemala, (Kellerman).

Since this species was described, several males have been examined. They are distinguished by the deep suffusion on the posterior margin of the receptacle, the abruptly slender two-celled

termination of the appendage, and the straight, nearly symmetrical antheridium. The females vary considerably, but are well distinguished by the various points referred to in the description. The species is most nearly related to *D. vulgatissimus*, which I have not seen, but which appears to differ in the form of its longer appendages, and of its perithecia, as well as in the different relations, in position, of its primary and secondary receptacles to one another. The male of Spegazzini's species is very similar, but lacks the characteristic blackish suffusion of the present form.

DIMORPHOMYCES VULGATISSIMUS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, **23**, 520, fig 63, June, 1912.

This species appears to be closely allied to *D. furcatus*, but is not known to me except through the figures and description of Spegazzini. Although the appendages are represented as dimorphic, they appear to be unlike those of *D. furcatus*, and the secondary receptacles are developed more or less symmetrically on either side, as in *D. Trogophloeï* Speg. It is said to be frequent on species of *Apocellus* in the Argentine and at Montevideo, and is a large species; the secondary receptacles reaching a length of 150 μ , the perithecia 200 μ and the secondary appendages 180 μ .

DIMORPHOMYCES BLEDI Thaxter. Plate II, figs. 35-37.

L. c. **55**, 217.

Male individual relatively large, the two cells of the receptacle subequal, obliquely separated. The two cells of the primary appendage subequal, distally thick-walled, narrower. Antheridium single, erect; the neck bent inward; the venter inflated, especially on inner side; stalk-cell small and flattened. Antheridium $23 \times 9 \mu$. Appendage $9.5 \times 5 \mu$. Receptacle $13 \times 8 \mu$. Total length to tip of antheridium 42 μ .

Female nearly hyaline or pale yellowish. Receptacle developing fertile axes of six cells, more or less, from both the basal and subbasal cells; the latter smaller and diverging at a slight angle to the former: secondary appendages of two kinds: short, two celled, geniculate, with a dark septum; and very long, seven- to fourteen-celled, flexed, more slender at the base and apex. Perithecia suffused with brown, rather long and slender; the tip blunt, slightly tapering, subtended by two more or less distinct elevations on the inner side. Primary appendage subcylindrical, the two cells subequal, distally rounded. Perithecia $180-135 \times 21-22 \mu$. Primary appendage $25 \times 8 \mu$. Longer secondary appendages $250 \times 8 \mu$, short appendages 20 μ .

On *Bledius emarginatus* Say. Lawrence, Kansas.

The material available of this species is very scanty. In the specimen from which figure 35 was drawn, the distal portion of the perithecium is bent backward, so that the tip is not visible. Figure 37 shows the perithecium from a second individual, in which the general form is more clearly shown, and the slight subterminal elevations at the left are indicated. The species seems most nearly allied to *D. vulgatissimus* Speg.

DIMORPHOMYCES TROGOPHLOEI Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, **29**, 519, fig. 61.

This species is said to occur on the abdomen of *Trogophloeus tenuipunctus* on the island of Santiago, La Plata. The male is not known. The female resembles *D. furcatus*, having two secondary receptacles, and two forms of secondary appendages, as well as perithecia with a subterminal constriction. The latter are, however, differently shaped, with characteristic blunt

tips, and the appendages are not the same; while the two secondary receptacles are symmetrically opposite, and do not diverge at different angles.

DIMORPHOMYCES MUTICUS Thaxter.

L. c. 29, 104. Monograph, Part I, Mem. Am. Ac. 12, 267, Plate V, figs. 1-10.

This species has been met with frequently on *Falagria dissecta* in New England, but like *D. denticulatus*, which may be associated with it, it has not been received from other localities.

DIMORPHOMYCES DENTICULATUS Thaxter.

L. c. 28, 157. Monograph, Part I, 266, Plate V, figs. 1-15.

This species, which is the type of the genus, seems rather rare, and has not yet been recorded outside New England; although it is probably as widely distributed as its common host, *Falagria dissecta*. It grows somewhat concealed at the tip of the abdomen, and is easily recognized by the tooth-like outgrowth which subtends the apex of the perithecium.

DIMORPHOMYCES GRENADINUS Thaxter. Plate I, figs. 16-18.

L. c. 55, 221.

Male nearly hyaline, rather slender, the basal cell about half as long as the subbasal, which approximately equals the basal cell of the appendage and the stalk cell of the antheridium in length. Distal portion of the appendage straight, erect, of two nearly equal cells, abruptly slightly narrower, above a thin dark septum, the distal somewhat flask-shaped and pointed. Venter of antheridium straight externally, the neck long, slender, with subconical base, its pointed extremity greatly exceeding the tip of the appendage. Antheridia $35 \times 9 \mu$. Receptacle 22μ . Total length to tip of antheridium 75μ .

Female pale yellowish, becoming faintly brownish, the basal cell of the primary appendage nearly twice as long as broad, similar to the subbasal cell of the receptacle; the distal portion consisting of two cells, the lower short and flattened, the terminal with a neck-like termination. Secondary appendages stout, mostly curved away from the perithecium, somewhat irregular in outline, six- to nine-celled. Perithecium single, next the primary appendage, lateral, the stalk not defined, the distal half or third tapering slightly to the broad termination which is slightly sulcate, angular on the outer and subtended by a variably developed, short, nearly cylindrical projection on the inner side. Perithecia $65-74 \times 17 \mu$. Primary appendage $25-35 \times 8 \mu$. Secondary appendage, longer, $105 \times 10 \mu$ at base. Total length to tip of perithecia $95-105 \mu$.

At the tip of the abdomen of a small aleocharid captured by sweeping in the forest at the Grand Etang, Grenada, B. W. I.

The host of this peculiar species has been unfortunately lost, so that its determination has not been possible. The characters are so clearly marked, however, that it is not likely to be confused with any other. The unusually long and slender efferent neck of the male, and the termination of its appendage; as well as the appendiculate apex and peculiar form of the perithecium in the female, serve to distinguish it at once. The female is so twisted, that one usually cannot see the succession of cells in the secondary receptacle; which is usually viewed edgewise, or concealed. Its character is indicated with sufficient clearness, however, in figure 17.

DIMORPHOMYCES THLEOPORÆ Thaxter.

L. c. 35, 410. Monograph, Part II, 241, Plate XXVIII, figs. 12-13.

Only the scanty original material of this species has been seen. It occurs on *Thleopora corticalis* Götz, from Madeira, and appears to be readily separable from other forms by the blackened, bluntly conical terminations of its short, stout primary appendages in both sexes. In general habit it is not unlike *D. platensis* Speg.; its perithecia are, however, different, and it has but one type of secondary appendage.

DIMORPHOMYCES ARGENTINENSIS Spegazzini. Plate I, figs. 25-26.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 23, 187, fig. 14, June, 1912. L. c. 29, 517, fig. 59, Sept., 1917.
Dimorphomyces Meronerae Thaxter, l. c. 48, 158, Sept., 1912.

The male individual is distinguished by its clearly differentiated antheridium, of which there may be one or several: the relatively long and slender stalk-cell; abruptly inflated, slightly asymmetrical venter, and rather long, tapering and slender neck and efferent chamber giving it a somewhat characteristic habit. The two-celled primary appendage consists of a large rounded basal, and an abruptly smaller dark terminal cell, with a small apical prominence. The receptacle consists of two subequal cells, the basal subtriangular, the subbasal rounded. Receptacle, including foot, $40 \times 23 \mu$. Appendage 17μ . Antheridia $32-35 \mu$, the stalk 9μ , venter 10μ , neck 15μ .

In the female the secondary axis is straight or curved, projecting at right angles to the axis of the primary receptacle. It bears several perithecia, which are relatively slender, nearly straight, slightly asymmetrical and subfusiform, the two lower thirds separated from the upper by a shallow depression, which is associated with a distinct reddish brown suffusion. The secondary appendages are straight, erect, two-celled; the basal cell shorter and rather abruptly broader than the distal. The primary appendage is two-celled, somewhat tinged with reddish brown, especially the distal one, which projects sidewise, and is terminated by a minute rounded apical prominence. Perithecia $65-70 \times 12-15 \mu$. Spores $14 \times 1.5 \mu$. Receptacle, including foot, 18μ . Secondary receptacle $18-35 \mu$. Primary appendage $18 \times 9 \mu$; secondary about $30-32 \mu$.

On *Meronea Sharpi* L. A. No. 1593, vicinity of Buenos Aires.

In revising the proof of my paper on Argentine Laboulbeniales above cited, which was in press at the time Professor Spegazzini's first paper was received, I had no hesitation in retaining my own name *Meronevae*, (a misspelling for *Meronevae*), since the figures he gave appeared to represent a form having quite different perithecial characters, and occurring on a different host, *Myrmedonia*. In his second paper, however, he states that the figures first given represented a variety, occurring in moist situations, in which the perithecia were attenuated. The difference is so great, however, that I have felt some uncertainty whether the two were really the same. In the figures given in his second paper, Spegazzini represents a form having the characteristic suffused distal constriction of the perithecium, which, although more abrupt and circumscribed, is similar to the material examined by myself. The secondary appendages, as represented, are quite unlike those which I have seen, being multicellular above the basal cell, and slender; differing in this respect from those represented in his first paper, which correspond with my own material. It seems, therefore, not impossible that more than one species may occur on this host, and that the name *Meronevae* may have to be retained for a type having slender, constricted perithecia, and two-celled secondary appendages. Spegazzini, in his first paper, represents a

female with eight perithecia, and a male with four antheridia, and speaks of the form as common at various seasons of the year.

DIMORPHOMYCES MYRMEDONIAE Thaxter.

L. c. 35, 409. Monograph, Part 2, Plate XXVIII, figs. 14-16.

This species has not been again observed, since its original description, and the preparations have unfortunately deteriorated for some reason. It is more nearly allied to *D. brevirostris*, from which it appears to differ in its larger appendages, and much more divergent secondary receptacle. The type was found on *Myrmedonia flavicornis*, from Guatemala, in the Biologia Collection.

DIMORPHOMYCES PLATENSIS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 517, fig. 63.

This species, of which I have seen no specimens, was found by Spegazzini at La Plata, on *Apocellus parvipennis*. It is said to be nearly allied to *D. vulgatissimus*. The figure represents a form with but one secondary receptacle, having short and long secondary appendages, and a single relatively large perithecium with a pale and rather pointed extremity. The antheridium is represented as stalked and bent outward, at right angles.

DIMORPHOMYCES BREVIROSTRIS Thaxter. Plate I, figs. 31-34.

L. c. 55, 219.

Male individual yellowish, becoming brownish, and deeply suffused with blackish in the posterior region of the receptacle; which is two- to three-celled, according as one or two antheridia are developed; the basal cell rather long, extending to the base of the lowest antheridium: the latter suberect, broad, short, subsessile; the efferent apparatus short and stout, truncate. The primary appendage consisting of two cells which, in very young individuals, are surmounted by a slender termination, of one or two cells, which soon disappears. Antheridia $23-26 \times 9.5-11 \mu$. Appendage 13μ . Receptacle $25-27 \times 10 \mu$. Total length to tip of antheridia $45-50 \mu$.

Female becoming tinged with brownish yellow, a black patch in the region of the basal cell, which forms a short rather well defined stalk. Primary appendage two-celled through the disappearance of a more slender termination present in very young individuals. Secondary receptacle diverging at an angle of 45° , straight or slightly curved, of six to twelve cells, bearing one to four perithecia and alternating two-celled appendages; which are stout, distally rounded, the cells subequal. Perithecia becoming rather deeply suffused and subfusiform, the tip and apex indicated; when younger and viewed sidewise, the tip somewhat snout-like, with a subtending concavity on the inner side, associated with a brown suffusion. Perithecia $75-106 \times 16-20 \mu$. Primary appendage $23-28 \times 10-11.5 \mu$; secondary $33-42 \times 11.5 \mu$. Secondary receptacle $30-55 \times 12-13 \mu$. Primary basal cell 9μ .

On the abdomen of *Erchomus (Coproporus)* sp., No. 1662, Mandeville, Jamaica, No. 1652, Los Amates, Guatemala: No. 2228, Amazon River.

This species, which is most nearly related to *D. verticalis*, is distinguished by the blackish suffusion about the basal cell in both sexes, and the very short stout antheridium in the male, the efferent neck being exceptionally short and stout. It is similar to *D. Myrmedoniae*. The individuals from the three rather widely separated localities above indicated, show no important variations.

DIMORPHOMYCES VERTICALIS Thaxter. Plate I, figs. 27-30.

L. c. 48, 159. Spegazzini, Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 519, fig. 62.

Male individual becoming rather dark uniform smoky brown, rather narrow, straight erect, the foot relatively large. Receptacle of two cells, the subbasal somewhat larger than the basal, and extending nearly to its base. Antheridium usually single, erect or but slightly divergent, the neck rather stout. Basal cell of the appendage narrower distally, usually separated from the squarish subbasal cell by a dark septum, the much longer slightly tapering, terminal cell also sometimes thus distinguished. Total length, including foot, $16\ \mu$, about $50-60 \times 9\ \mu$. Appendage $14-20\ \mu$. Antheridia about $30-38\ \mu$, including stalk-cell.

Female individual pale, becoming dark smoky brown, or almost black with age. Basal cell of the primary appendage large, somewhat longer than broad; the subbasal cell mostly broader than long, distinguished by dark septa, and becoming deeply suffused; the terminal cell at first hyaline, distally narrower or rounded, thick-walled, becoming more or less disorganized. Secondary receptacle divergent at an angle of about 45° or less, consisting of seven cells, more or less, and bearing one to three or four perithecia, and several secondary appendages, alternating with them and hardly a third as long, stout and bluntly rounded, as a rule, two- to three-celled, becoming often subterminally blackened. Perithecia sometimes elongate, straight or curved, pale, becoming blackish brown, very slightly inflated; the tip bluntly rounded or asymmetrical, and snout-like when viewed sidewise; the hyaline apex subtended on the inner side by a variably distinct darker shade. Perithecia $75-100 \times 15-20\ \mu$. Secondary appendages $25-30\ \mu$. Total length to tip of longer perithecia $100-200\ \mu$; to tip of secondary receptacle $75-120\ \mu$.

On the abdomen, less frequently in other situations, on *Atheta* sp., No. 1690 (Type), Palermo, Buenos Aires, and Nos. 1681, 1965 and 1966; also No. 1606, from Isobal, and Nos. 1613, 1624 and 1655 from Los Amates, Guatemala. On *Oxyopoda* sp., No. 1501, Lavallol, Argentine. On *Atheta lurida* at St. Catalina, Lavallol (Spegazzini).

This species is subject to considerable variations. Even the male does not always conform to the rather narrow rigid habit of the type form, and may be somewhat stouter. The appendage, which I have regarded as consisting of three cells, while the receptacle is assumed to have but two, varies in length, and in the definition of its dark septa, which may be obsolete. The younger females sometimes resemble *D. brevirostris*, but, apart from other differences, the two are at once distinguished by the character of the male in either case.

Dimorphomyces decipiens nov. comb. Plate VIII, figs. 214-216.

Dimoromyces decipiens Thaxter, l. c. 55, 263.

Male individual (seen edgewise) rather slender; receptacle of two cells deeply tinged with reddish brown, except the anterior margin and the base of the much larger basal cell. Appendage three-celled, the basal evenly brown, contrasting abruptly with the other two which are hyaline, tapering slightly to the blunt tip, and are separated by a slightly oblique blackish septum. Antheridium somewhat longer than the receptacle and appendage combined, the neck very long and slender, slightly curved. Antheridium $57 \times 7.6\ \mu$. Appendage $19 \times 5.5\ \mu$ at base. Receptacle, without foot, $28\ \mu$. Total length to tip of antheridium $84\ \mu$.

Female individual Y-shaped, the perithecium and the receptacle, above its origin, diverging at somewhat less than a right angle. Basal cell of the receptacle hyaline, or translucent just above the large-foot, then dark red brown or opaque up to and beyond the origin of the single perithecium. Secondary receptacle of about twenty cells, more or less, those of the lower half bearing simple appendages of three or four cells, which are brownish, deeper below; the lowest

heterogeneous, becoming blackened, curved outward towards or past the perithecium; the stalk bent abruptly outwards and causing the perithecium to diverge, not distinguished from the ascigerous region, which is strongly convex externally, and somewhat concave on the inner side, broader distally below the well defined tip; which is distinguished by indentations, deeper on the inner side, its margins somewhat convex; the apex somewhat oblique, distally and externally somewhat rounded and prominent. Perithecia $118-140 \times 22-27 \mu$. Basal (heterogeneous) appendage $50-66 \times 5-5.7 \mu$; the rest about $35 \times 6 \mu$. Total length to tip of axis $140-190 \mu$.

On the inferior surface at the tip of the abdomen of ? *Eleusis* (*Isomalus*) sp., No. 2359, Kamerun, West Africa.

This species, which was originally placed in *Dimeromyces*, was based on two adult females and one very young individual with a single male. Since these were mounted they have become somewhat cleared, and it is possible to make out their structure, which is obscured by deep suffusions and by the fact that they are viewed edgewise, and to reach a more definite conclusion as to their cell relations. It has seemed desirable for this reason to transfer this form to the present genus; since, in one specimen, it seems possible to determine, figure 215, that the distal cells of the axis are bordered, as in other species of this genus, by an extension of the basal cell. The primary appendage is not visible in the adults, although it is present in the very young specimen; the free part consisting of two small hyaline cells, separated by a somewhat oblique blackened septum. This individual is so turned that its cell relations are also obscured. The heterogeneous appendage appears to arise next the base of the perithecium, from the secondary receptacle. Although the latter is so well developed, and bears a number of appendages, there is no indication that more than one perithecium is formed. In general appearance it suggests an aberrant form of *Rhachomyces*. The single male is also turned edgewise, so that its cell-relations are also underterminable. It is chiefly remarkable for the very long neck of its antheridium, and the somewhat peculiar appendage, which is probably very like that of the female.

DIMORPHOMYCES SIMPLEX Thaxter. Plate II, fig. 60.

L. c. 55, 222.

Male receptacle of normally three cells, the basal pushed outward and upward beside the stalk-cell of the antheridium; the subbasal cell broader than long, the distal smaller. Primary appendage of two to three cells, the distal sometimes brownish. Antheridia arising from the subbasal, sometimes also from the distal, cell of the receptacle; the stalk-cell clearly defined; the neck bent abruptly sidewise at right angles. Receptacle, without foot, 19μ . Antheridia to curvature $20-23 \times 8 \mu$. Appendage 12μ . Total length to curvature of neck 38μ .

Female uniform pale yellowish brown, like the male; the body of the perithecium and distal cell of the appendages darker. Receptacle compact, short and broad. Basal cell short, its lateral prolongation clearly defined and bent upward abruptly beside the outer margin of the secondary appendage, which arises from the outer of the two cells composing the secondary receptacle. Perithecium single and arising from the inner cell of the secondary receptacle, sometimes also from the subbasal cell of the primary receptacle: the stalk long and well distinguished, hyaline, the ascigerous region bent rather abruptly outward, the inner margin abruptly convex near the middle, thence tapering somewhat to the rather pointed apex. Primary appendage of two subequal cells, the slightly narrowed hyaline apex of the distal usually protruding above a brownish disorganized collar. The secondary appendage two-celled above its enclosed basal cell, and similar to the primary. Perithecium $65-80 \times 12-15 \mu$. Receptacle, exclusive of foot (which is relatively very large), $16-20 \times 20 \mu$. Primary appendage $21 \times 6 \mu$. Total length to tip of perithecium $95-105 \mu$.

On the prothorax and elytra of *Leptoscapa* sp., No. 2388, Mindanao, P. I. (Weber).

The male and female of this species are so firmly united, owing to the unusually large foot, that it has not been possible to examine them separately. The antheridial neck seems well developed, but is turned so abruptly sidewise at right angles that it can only be viewed end-on. The perithecium and its stalk resemble the head and neck of a goose when mature, and are thus very characteristic. Two may occasionally be developed, a second arising, in an unusual position, from the subbasal cell of the receptacle on the inner side. The genus of the host, which was not given in the original description, has been very kindly furnished me by Mr. Arrow.

DIMORPHOMYCES TRIANGULARIS Thaxter. Plate II, figs. 52-59.

L. c. 55, p. 224.

Basal cell of the male rather long and narrow, its distal end immediately below the stalk-cell of the antheridium; subbasal cell somewhat shorter, very obliquely separated; the third, distal, cell slightly longer than broad, continuous with the three-celled appendage; the cells of the latter small and short, the distal rounded, the middle squarish, faintly purplish brown, and distinguished above and below by dark septa. Antheridium single, abruptly erect, the outer margin sigmoid, the well developed purplish brown neck curved outward, the individual otherwise hyaline. Antheridia $17 \times 5.7 \mu$. Appendage $6.5 \times 3 \mu$. Receptacle, including foot, 18μ . Total length to tip of antheridium 32μ .

Female becoming slightly and unevenly tinged with purplish brown, bent sidewise so that it lies flat on the host. Receptacle small, compact, usually twisted; the basal cell extending below the four or five cells of the horizontal secondary receptacle; the subbasal cell distally broad. The primary appendage of three cells, the basal usually more or less suffused, small, dome-shaped; the terminal becoming brown, and seated on a dark septum. Secondary appendages usually three; erect, consisting of four cells, including the basal cell; the distal greatly but variably elongated, becoming more or less deeply suffused with purplish brown below, the extremities variable and rather abruptly swollen; the subbasal cell distinguished above by a dark septum, slightly broadened. Perithecium triangular, or subtriangular, wholly ascigerous, except the very short narrow stalk which attaches it by its greater angle to the inner cell of the secondary receptacle; hyaline, becoming purplish brown, the short apex only slightly distinguished, and symmetrically rounded. Perithecia $28-30 \times 15-17 \mu$. Primary appendage $10-12 \times 7.5 \mu$, at base; secondary $40-125 \mu$. Receptacle $22-28 \times 11.5 \mu$.

On the legs of *Celaenopsis* sp., No. 2069 (Type), Wainoni Bay, and No. 2970, Fulakora, Solomon Islands.

This very peculiar species is most nearly related to *D. clavuliferus* and is distinguished by its triangular perithecium and peculiar appendages. The swelling at the tips of the latter vary in abruptness and recall those represented by Spegazzini in *Rickia formicicola*, which may possibly prove to be also a species of *Dimorphomyces*. The swelling is less well marked or even absent from the specimens examined from Fulakora. The form of the perithecium and its relation to the very short stalk recalls the conditions seen in *Dioicomyces malleolaris*. Owing to the irregular twist, which usually occurs during its development, it is very difficult to determine the exact cell relations in mature specimens. They are sufficiently clear, however, in younger forms, and occasionally in adults (figs. 54-55).

DIMORPHOMYCES CLAVULIFERUS Thaxter. Plate II, figs. 49-51.

L. c. 55, 223.

Receptacle of the male rather long and narrow, curved, extending to the base of the single antheridium, which seems to be seated on it. The primary appendage consisting of four cells, sometimes subequal, the terminal broadly rounded, the subterminal becoming suffused and distinguished above and below by dark septa. Antheridium subsessile, subsigmoid, asymmetrical, the neck bent outward, or sidewise and outward. Antheridia $16 \times 6 \mu$. Appendage $8-10 \times 3.5 \mu$. Receptacle $15 \times 9 \mu$. Total length to tip of appendage 32μ .

Female subflabelliform, the basal cell forming a short stalk and extending sidewise at right angles below the four to nine cells of the secondary receptacle. Primary appendage of two or three cells; the distal brown and rounded; the middle, if present, distinguished by dark septa. The first cell of the secondary receptacle producing a single perithecium; the rest secondary appendages, consisting of a terminal, long-clavate cell, which becomes tinged with brown, and two very short basal cells, the upper distinguished above by a dark septum. Perithecium nearly sessile on a very short, abruptly narrow stalk; long ovoid, bent to one side, the tip brownish. Perithecia about $30 \times 15 \mu$. Primary appendage $9-12 \times 5.5 \mu$; secondary $26-28 \times 7.5 \mu$.

On the inferior surface of a species of *Uroscius*. Baguio Mt., Luzon, P. I.

This very minute and peculiar species is most nearly related to *D. triangularis* from which it is distinguished by its short, broadly clavate secondary appendages, and long ovoid perithecium. It was found on a mite contained in the sediment of a miscellaneous lot of beetles very kindly collected for me by Mr. T. V. Reed, at Baguio.

DIMORPHOMYCES OBLIQUESEPTATUS Thaxter. Plate II, figs. 45-48.

L. c. 55, 225.

Male pale yellowish. Receptacle of three cells, the basal and subbasal subsimilar, or the latter larger; both distally prominent externally, about twice as long as broad. Appendage usually of four cells, the three basal short and rounded; distinguished from one another, and from the long cylindrical distal cell, by well marked black septa. Antheridia one or two, nearly sessile and erect, the regions clearly defined, the neck strongly curved or recurved outward. Receptacle $38-42 \mu$. Appendage $30 \times 5 \mu$. Antheridia $30 \times 8.5 \mu$. Total length to tip of antheridia 68μ , of appendage 70μ .

Female individual pale yellowish, or faintly brownish. Receptacle rather stout and compact, the basal and subbasal cells nearly equal; or the latter larger, reaching nearly to the foot: the three to four cells of the secondary receptacle subtriangular, their axes diverging from the angle between the two, and giving rise to a perithecium and two to three secondary appendages. The former arises either from the first secondary cell, or from the second, figure 46, in which case it is associated with the first secondary appendage springing from the same cell: the second and third cells of the secondary receptacle becoming usually sufficiently displaced to lose contact with the basal cell of the primary receptacle. Primary appendage consisting of a large basal cell bearing the distal part of the appendage terminally, and an often longer branch externally, the base of which occupies its whole outer surface: the free appendage of five cells, the four lower hardly longer than broad; the second and third distinguished by well defined black, transverse septa; the terminal cell variably elongate and tapering: the external branch variably developed, its four subterminal cells short, the second and third, at least, distinguished by dark oblique septa: the secondary appendages similar to this branch, variable, of ten cells or less; the subterminal cells similarly modified. Perithecia erect, the regions hardly indicated, rather short, the

termination blunt and unmodified. Perithecia $55-75 \times 13-14 \mu$. Receptacle $30 \times 16 \mu$. Primary appendage $38-50 \times 4.5 \mu$; its branch and the secondary appendages, longer, 120μ . Total length to tip of perithecium $105-120 \mu$.

On the legs of *Pachyteles* sp., Verdant Vale, Arima, Trinidad, B. W. I., No. 2821.

This species, together with *D. Pachytelis* and *D. ramosus*, constitute a somewhat aberrant group to which a fourth species, on a similar host, known to me from Jamaica, W. I., should be added; although the material of this form is insufficient for description. Owing to the compact structure of the secondary receptacle, and the slight displacement of some of its cells, it might not be recognized, at first, as belonging to the type of *Dimorphomyces*. The basal cell remains in contact, however, with the subbasal, as do the first and last cells formed. Like *D. necrotalis* and certain others, the conditions presented serve to break down, to some extent, the distinction supposed clearly to separate the two genera. The material of the present species is scanty, and in part mixed with that of *D. Pachytelis*, to which it is very closely allied. A reexamination of the specimens leads me to feel that, when more abundant material is available, the two may have to be united. Nevertheless *D. Pachytelis* appears to lack the oblique blackened septa, so characteristic of the present form; and the secondary receptacle is made up of but two cells. It is, moreover, a larger species, and the male lacks the well defined differentiation of the antheridial regions, as well as the very characteristically curved, or recurved, efferent neck, figure 48.

DIMORPHOMYCES RAMOSUS Thaxter. Plate II, figs. 38-40.

L. c. 55, 228.

Male individual similar to that of *D. obliqueseptatus*, more slender, the necks of the two to three antheridia less strongly curved or recurved, and somewhat geniculate. Receptacle, including foot, $55-62 \times 17-20 \mu$. Appendage $38-5.5 \mu$. Antheridia $30 \times 8 \mu$. Total length to tip of antheridia $85-90 \mu$, of appendage 100μ .

Female individual dirty yellowish, with slight brownish tinges. Basal cells rather short, distally pointed, and obliquely separated from three successively smaller cells: namely, the subbasal cell, which is slightly longer, uniformly narrow, and bears the primary appendage distally, and the two much smaller cells of the secondary receptacle, from the inner of which the single perithecium usually arises; while the outer is obliquely associated with the basal cell of the single secondary appendage, to which it gives rise. Basal cell of the primary appendage somewhat shorter than the cell which bears it, producing on either side and subsymmetrically very large, lateral, indeterminate branches, from the angle between which rises the small, nearly uniform, free, determinate primary appendage of about six cells, two of the lower distinguished by dark septa; the lateral branches proliferous, and more or less copiously subdichotomously branched; their primary terminations determinate and persisting, with several successive short cells, several with dark septa; the ultimate proliferating branches strongly flexed, or reflexed. Secondary appendage simple, the terminal portion differentiated like the primary, with dark septa; or variably branched like the branches of the primary appendage. Perithecium large, slightly curved, directed away from the appendages through an abrupt bend at the base of its long undifferentiated stalk-portion; the ascigerous portion slightly shorter, and distally somewhat broader; the tip clearly and abruptly distinguished by subtending elevations, subconical and subsymmetrical. Perithecia $350-425 \times 20-22 \mu$. Receptacle, including the rather large foot, $75-80 \times 22-25 \mu$. Primary appendage $64 \times 5 \mu$; the lateral branches 500 to over 1000 μ .

On the inferior tip of the abdomen of *Pachyteles* sp., Verdant Vale, Arima, Trinidad, B. W. I., No. 2821.

This species, which is represented without great enlargement in figure 38, forms a hairy mass at the tip of the abdomen of the host, owing to the extraordinary development of the proliferous branches of the appendages. It is very closely allied to the two preceding species, from which it differs in its much greater size, differently shaped perithecium and the very characteristic and highly developed system of secondary branches formed by the appendages, the primary terminations of which are left behind by their development. The structure of its receptacle is entirely similar to that of *D. Pachytelis*, which occurred on the same host.

DIMORPHOMYCES PACHYTELIS Thaxter. Plate II, figs. 41-44.

L. c. 55, 227.

Male individual tinged with brownish yellow. Basal cell long and narrow distally, extending to the base of the antheridium, and prominent below it; the subbasal separated from its upper half by an almost vertical septum; the third cell usually narrower, much shorter, often bearing one or even two accessory antheridia. Primary appendage of usually five cells, tapering distally and curved inward; the four lower cells subequal, but slightly longer than broad; the second and third distinguished by dark septa, sometimes the fourth; the fifth as long as the rest combined. Antheridia one to three, sessile, the venter stout, the efferent neck bent outward, nearly straight, or but slightly curved. Receptacle $65-85 \times 18-28 \mu$, including foot. Appendage, longest, $68 \times 6 \mu$. Antheridia $35-42 \times 9.5-11 \mu$.

Female individuals yellow, with brownish shades. Basal and subbasal cells subequal in length, the latter reaching nearly to the base of the former. Secondary axis usually two-celled, margined by the basal cell; the usually single perithecium arising from the inner, or in conjunction with the single secondary appendage, from the outer; the latter stout rigid, slightly tapering, consisting of about a dozen cells; two to four of its subterminal cells squarish, some with dark transverse septa. Primary appendage consisting of a rather long and narrow basal cell, the rather slender free appendage tapering, of four or five cells, the three or four lower short, the second and third distinguished by dark horizontal septa: the outer face of the basal cell bearing one, usually two, erect branches, which are similar to the secondary appendage. Perithecium straight or curved, becoming yellow, distally broader; the short blunt tip and apex rather clearly distinguished; $100-185 \times 18-34 \mu$. Longer appendages $100-210 \mu$; primary appendage $100-140 \times 6.5 \mu$; its basal cell $25 \times 13 \mu$. Receptacle $75-125 \times 25-40 \mu$.

On the legs of *Pachyteles* sp., Verdant Vale, Arima, Trinidad, B. W. I., No. 2821.

As has been already mentioned, this form seems to be distinguished from the smaller *D. obliqueseptatus* which accompanied it on the same host, by the straight, or slightly bent neck of the antheridium, and by the invariably transverse blackish septa of the shorter cells in the appendages, as well as in its two-celled secondary receptacle. The relations of the cells and appendages may be clearly seen by reference to figures 42-43, and are of the type of *Dimorphomyces*. The material is not in very good condition, most of the perithecia having been injured.

DIMEROMYCES.

Thaxter, Monograph, Part I, p. 267.

Type Species *Dimeromyces africanus*.

A comparison between this and the genus preceding has already been made under the latter, from which it appears that while in *Dimorphomyces* the basal and subbasal cells remain in contact throughout the development of the individual, they become separated in *Dimeromyces*.

by the interposition of a variable number of cells cut off distally from the basal cell. Although the various cell-relations may become disturbed, through accessory branching of the axis, by unusual cell divisions or by secondary displacements, this distinction seems to hold good in all species.

Among the numerous new forms which have been described, and of which seventy-six are enumerated below, many depart so considerably from the original type, that it may be desirable to refer briefly in this connection to some of the more important differences. With reference to the male, the development of the receptacle and appendages shows varying degrees of difference. In the simplest type the receptacle may be regarded as consisting of two cells, the subbasal producing a single antheridium laterally, and surmounted by the usually undifferentiated basal cell of the terminal, primary appendage; the subbasal cell of which is not infrequently distinguished by a blackened basal septum. Such a simple type is represented in figure 138. The distinction between receptacle and appendage is not always clear, and in certain forms, in the male as in the female, there is nothing to indicate where the one ends and the other begins. This is true for example in *D. Thaxteri*, figure 219, but from analogy with the secondary appendages in both sexes, figures 151 and 147, it has seemed best, when a dark septum is present, to regard it as subtending the subbasal cell; although even this characteristic is not always a safe guide, as may be seen in figure 78, the otherwise somewhat aberrant form, *D. subuliferus*, having the simplest male thus far observed, its two-celled receptacle being separated by a dark septum from the two-celled appendage. Except in the even more aberrant *D. adventitosus*, the number of cells in the primary appendage is seldom more than five or six, more often three, although it may be variably elongated.

With reference to the receptacle, although the simple type consisting of but two cells is more common, it may become much more highly developed through the activity of the distal end of the basal cell, which, as in the female, may divide actively; thus interposing a greater or less number of new cells between itself and the subbasal cell, as for example in figure 112. In a majority of instances, the receptacle produces no secondary appendages, and only one or two antheridia, but in not a few species secondary appendages are formed usually on one side of the axis and associated with antheridia; but sometimes, as in *D. pinnatus*, figured in Part II, Plate XXIX, figure 16, of my Monograph, appendages may be formed in opposite series from both sides of the axis. In general, however, such appendages are few in number and are formed on one side, only; as in figures 152 and 157.

The number of antheridia formed by a given individual may be very constantly only one, or exceptionally two; but in many instances a greater number may be normally formed; as in figures 110, 194 or 197; but the most extraordinary illustration in this connection is seen in *D. adventitosus*, previously referred to, which not only produces its antheridia in the normal position on the receptacle, but also from any cells of the elongated primary and secondary appendages; so that, as in figure 67, very large numbers may be produced, in this instance thirty-seven.

The structure and development of the antheridium varies in different species, and the exact number of cells and antheridial cells cannot be regarded as generically significant. It is fundamentally the same, however, in all cases, the differences depending on how far development has progressed in a given instance, before it ceases. In *D. Thaxteri*, for example, division ceases at a comparatively early period of development: while in *D. adventitosus* it progresses beyond this point, so that the resultant antheridium is correspondingly more complicated.

The ordinary development may be illustrated by the accompanying text-figures of *D. adventitosus*. In this instance a cell of the receptacle, or of one of the appendages, as the case may be, protrudes, the protrusion being cut off as in *a*. The cell thus formed then divides to an upper and a lower, *b*. The upper of these then divides again for the last time, to form a terminal cell

subtended by a smaller flattened cell, *c*. Both these cells later disorganize, except their outer walls, forming a continuous cavity, the terminal one becoming narrower distally, and forming the efferent chamber and neck; while the position of the basal one is occupied by the upward growing necks of the individual antheridial cells. Meantime the lower cell, shown in *b*, separates distally and obliquely a smaller cell, *d*, and its extension, which lies beside the latter, is in turn cut off, thus forming three cells, of which the lower forms the antheridial stalk-cell; while the two above it are either transformed directly to antheridial cells, as in *D. Thaxteri*, figure 219, or undergo further division, *e*, which may result in the production of as many as five, or, in some cases, possibly six antheridial cells, from some or all of which smaller basal cells may or may not be separated, *f*.

In my original description of *D. africanus*, the type of the genus, I stated that the number of antheridial cells was six; but a reëxamination of fresh material has led me to question whether

Figure 1. *Dimeromyces adventitosus*. Development of antheridium. *a*, antheridial mother-cell obliquely separated at left; *b*, further development of the same showing division to an upper and lower cell; *c*, the upper of these cells has divided to a distal and a flattened middle cell, both of which are later destroyed; *d*, the lower cell shown in *b*, has divided, separating a smaller cell above at the right, and in *e*, both these cells have divided, forming the stalk-cell, below, and three antheridial cells above; *f*, the three antheridial cells, which are all that are visible in optical section, have each separated a basal cell and have grown upward distally to form efferent processes, which have traversed and destroyed the flattened cell of fig. *e*; while the distal cell of this figure has become transformed to an efferent chamber and narrower efferent neck, into which all the antheridial cells discharge their sperm-cells. All Leitz water im. oc. 5.

Figure 2. *Dimeromyces africanus* var. showing young perithecium, with basal cells, later destroyed, and terminal trychogyne of the usual type. Zeiss D, oc. 2. All figures without reduction.

there are as many as this, and in some instances there seem to be but four. In *D. adventitosus*, and some other species, however, there seem surely to be as many as five, while in *D. eximius*, six may even be present. Variations no doubt occur in different antheridia, even of the same species; but it is very difficult to arrive at a satisfactory conclusion as to actual numbers by focussing, even when very high powers are used.

The mature antheridium as a whole consists of a basal "stalk-cell"; a venter, comprising the antheridial cells and their necks and basal cells when the latter are present, and the terminal efferent apparatus, or neck. The Stalk-cell shows considerable variation in its development, and is sometimes very small; so that it may be more or less surrounded by other cells, in which case the antheridium may be sessile, or nearly so, figure 94: while in other instances it may be

variably elongate, bearing the rest of the antheridium free on a well developed stalk, as in figures 219 and 135. The Venter may be relatively large, stout and abruptly distinguished from the stalk, or neck, or from both, as in figure 200, or may be relatively slender, without such clearly marked differentiation. The antheridial cells may or may not cut off small basal cells, as in text-figures 1, *f*; and some, or all, may remain undivided. The Neck also varies greatly from short, stout forms, like that represented in figure 261, to long and slender types, like those shown in figures 83 and 125. A slight enlargement at the base of the neck, forming a chamber into which the sperm-cells are discharged directly from the antheridial necks, is sometimes rather clearly defined, as in *f* of the accompanying text-figure. Often, however, there is little indication of any special enlargement at this point, the whole efferent neck tapering gradually from the distal end of the venter to its terminal pore, through which the sperm-cells finally make their exit. The slender portion of this neck may be straight, or characteristically bent, as in figures 87 or 124, and is sometimes distinguished by special coloration, as in figures 187 and 191.

In a few exceptional cases, the antheridia do not arise directly from cells of the receptacle, but are borne on short unicellular branches arising from them. This seems the normal condition in *D. eximius*, figures 186–187 and may also occur in *D. Thaxteri*, figure 220.

The Foot in the male is variably prominent, and in only one instance is it replaced by a well defined rhizoid. This condition has been figured in the second Part of my Monograph, Plate XXVII, figure 8: but does not seem to occur elsewhere, even in species inhabiting similar hosts, with relatively soft and thin integuments. This is true even in *D. oscinosomalis*, the female of which possesses a penetrating rhizoid.

The variations which may occur in the females of different species parallel, to a certain extent, those above enumerated in the case of the male. The simpler types possess a receptacle consisting of only three or four cells, as in figures 79 and 265; while in others a much greater number may be present, as in figure 111. The Axis of the Receptacle, though usually simple, may, as in the case of the male, develop more or less clearly marked secondary axes. The nature of these axes is not always clear; since, in some cases, they appear to be merely modified secondary appendages, while in others they are of a different nature. In *D. Peltoidis*, for example, figure 68, they are very evidently merely secondary appendages, the basal cells of which are fertile; and this is probably the condition also in *D. crispatus*, figured in my second Monograph. In *D. brachiatus*, on the other hand, figures 72–73, the secondary axis, although sterile, seems to be of the same nature as the primary, bearing similar secondary appendages, although the latter occur on both sides of the axis. The conditions in this very peculiar form recall those which are present in various species of *Rickia* with branching axes, none of which have as yet been figured. In *D. aberrans* the homologies are more obscure, figures 283–284; but, as stated under this species, it seems probable that its characteristic bilateral symmetry results from the modification of a lower secondary appendage. Very few instances of this nature, however, are as yet known, and the primary axis, or receptacle, is typically a simple series of horizontally or obliquely superposed cells: but through displacement in development, or the abnormal or irregular development of individual cells, the fundamental arrangement of the cells may be very much obscured. Such irregularities are well illustrated by figures 79, 80, 85, 185 and 224–227. A striking instance is also seen in *D. subuliferus*, figures 75–77, in which the last two or three cells which are separated from the basal cell, remain small and superposed; while those formed earlier in its development lie side by side, and are disproportionately larger, and separated by nearly vertical septa. These cells give rise to the primary appendage, a heteromorphous secondary appendage, and the perithecium. The latter assumes a median position and might be supposed to be terminal. As a result, the general habit and misplaced cell-relations mimic the conditions seen in the more compact species of *Rickia*, which occur on similar hosts, and for one of which it might well be mistaken at first glance.

The terminal or Primary Appendage is usually well distinguished from the axis of the female, as in figure 79 at left, its basal not infrequently separated from its subbasal cell by a dark septum, as in the instance cited. In many cases, on the other hand, the axes of the receptacle and of the primary appendage merge into one another, without visible distinction, as in figures 212, 217 and 64. It is very variably developed in different cases; sometimes even consisting of but one cell, figure 196; or only two, figure 147; more frequently of several as in figure 237, or 221; but is apt to be conspicuously shorter and less well developed than the secondary appendage, as in figure 201. It is normally simple; but in some cases, as shown in figures 262 and 266, one or more branches may arise from its basal cell.

The Secondary Appendages may be wholly absent, as in figure 236; or copiously developed, as in figures 185 or 232. They are usually simple, although in some instances two or more branches may arise from their basal cells, as in figure 140. They may be relatively short and rudimentary, as in figure 212, or long and of many cells, as in figure 198. They are sometimes of two types, the lower being less differentiated than the upper, as in figure 105; or the reverse may be true, as in figure 271, which illustrates a frequent tendency in the last formed secondary appendage to show a certain individuality which distinguishes it from those above. One of the most striking instances of dimorphism, however, is seen in *D. subuliferus*, figures 76-77, in which the uppermost subulate secondary appendage, which is otherwise anomalous in developing later than the rest, is entirely unlike them, both in form and color. *D. Dhanyae*, figure 85, is another remarkable case of dimorphism, in which the lower appendage is quite anomalous in form.

The Perithecia are normally single in a majority of the species, as in figure 196; or in a few instances there may be as many as five or six, as in figure 181. Apart from variable elongation of the stalk and a certain amount of differentiation at the tip, they present few peculiarities, and are similar to those of *Dimorphomyces*. In a few cases appendages, or outgrowths, are developed, which are distinctive, as in *Dimeromyces mucronatus* and *D. falcatus* of Paoli, in *D. Hyperacanthae*, and *D. appendiculatus*, which has a well developed "trigger-organ," such as I have described in *Ilytheomyces*, and in other instances.

The Foot in all known species, except *D. oscinosomalis* and *D. coarctatus*, is of the usual type, the two species last mentioned being the only ones which penetrate the host by means of a rhizoid.

In the following enumeration, which includes all described forms, I have found so unsatisfactory any attempt to arrange the species serially, according to their apparent relationships, that I have chosen to distribute them according to the host-families; since, in general, though not in all cases, this arrangement serves to bring together related groups. A half dozen additional species known to me, are here omitted, owing to the fact that the material is too scanty, or not in sufficiently good condition for description: the hosts of which add three more families to the coleopterous hosts. In all, the species are seventy-seven in number, fifty-two occurring on Coleoptera, six on Diptera, thirteen on Orthoptera and six on Acarina.

Of the species found on Coleoptera, twenty inhabit Tenebrionidae, eleven Chrysomelidae, eight Carabidae, four Staphylinidae, two Cryptophagidae and one each Corylophidae, Phalacridae, Cucujidae, Cleridae, Anthicidae and Endomychidae.

The dipterous hosts are mostly undetermined, but at least two belong to the Oscinidae.

Among the Orthoptera one form occurs on Gryllidae, while twelve others are found on Forficulidae; and in the Acarina six species are found in several families.

It is of interest to note, in this connection, that the largest number of species are parasitic on Tenebrionidae, a family on which as far as I am aware, no other genus has been found, and also that only 5% occur on Staphylinidae, while in *Dimorphomyces* 80% are parasitic on members of this family.

SPECIES PARASITIC ON COLEOPTERA.

1. ON CARABIDÆ.

DIMEROMYCES NANOMASCULUS Thaxter.

L. c. 35, 411, 1900. Monograph, Part 2, 245, Plate XXIX, figs. 10-13.

This species, occurring on *Ardistomis viridis* Say in Florida, and on *Ardistomis* sp. from Central America, has not been seen since its original description.

DIMEROMYCES PINNATUS Thaxter.

L. c. 25, 410, 1900. Monograph, Part 2, 246; Plate XXIX, figs. 16-18.

It is very desirable that this remarkable form should be reexamined, in the light of fresh material. It has not, however, been again seen, since its original description, and it still remains uncertain whether the figures above cited represent a single species, or whether the form on the legs, represented in figure 17, may not need to be separated as a distinct species. It is quite possible, however, that the different conformation of its perithecium and the variation of its appendages may have resulted from its different position of growth. What I have regarded as the Type is represented by figure 16. The species occurs on a carabid, at least closely allied to *Ardistomis*, probably from Central America.

DIMEROMYCES PETCHI Thaxter. Plate VII, figs. 188-191.

L. c. 51, 7.

Male individual hyaline, subtriangular, or sometimes more elongate, of seven to ten cells: the basal more often short and triangular, the rest flattened and obliquely superposed: basal cell of primary appendage short, subtriangular, or externally prominent; subbasal cell small, slightly suffused, abruptly distinguished by a blackened septum; the rest of the appendage of two or three cells, often slightly tapering, rather short, becoming distally disorganized. Antheridia three to often six, sometimes eight, more or less displaced by crowding: short, stout, the stalk-cell well defined, forming an angle between the two antheridial cells, from which no basal cells are separated; the venter rather short and stout, not abruptly distinguished; base of the neck contrasting black, its distal portion quite hyaline, bent abruptly above its base at an angle of 45°-90°. Receptacle, including small foot, 45-80 $\times$ 15-20 μ . Primary appendage 45 $\times$ 5.5 μ near base. Antheridia about 28 $\times$ 9 μ .

Female individual hyaline, the receptacle of three or four cells; the basal longer, the rest somewhat obliquely superposed and slightly broader than long: the primary appendage similar to that of the male, of four or five cells. A single secondary appendage arising from the subbasal cell, similar to the primary, but usually somewhat longer, and similarly distinguished by a black septum. Perithecium usually arising from the third cell of the receptacle; erect, or usually bent abruptly sidewise at the base, almost sessile, asymmetrical, translucent, pale smoky brown, distally somewhat prominent externally below the rather abruptly distinguished tip, the base of which is more deeply suffused with blackish brown, and forms a more or less distinct blackish band, above which it is hyaline, except for a deep blackish suffusion just below the hyaline apex; which is slightly broadened, irregularly rounded and slightly bent. Spores 30 $\times$ 4 μ . Perithecia 75 $\times$ 20-24 μ . Receptacle 55-65 $\times$ 25 μ . Appendages about 40-45 $\times$ 7-8 μ . Total length to tip of perithecium 120-135 μ .

On the right inferior posterior surface of the prothorax of species of *Perigona*?, No. 2116a (Type), Kuching, Borneo; No. 2093b, Peradenyia, Ceylon, No. 2081c, Samarang, Java; Nos. 2398, 2400 and 3029, Philippines, Manila and Los Baños.

This species was first found on hosts kindly sent me by Mr. T. Petch from Peradenyia, Ceylon, to whom the form is dedicated. It is especially interesting for the reason that the only other nearly allied form, *D. caribbeus*, which occurs in the same position on a similar host in the West Indies, is distinguished from it almost wholly by the characters of the male; which, in the present species, is quite remarkable in appearance, from the characters of its antheridia shown in figures 190–191, and which appear to be invariable in all the material examined from widely separated localities. The specimens of both sexes from Java differ in their more elongate habit, and may be worthy of varietal rank; but more abundant material is needed to determine this point. The differences which separated the two species are referred to under *D. caribbeus*. Short stout individuals sometimes occur, in both forms, on the legs of the host adjacent to the normal position.

DIMEROMYCES CARIBBEUS Thaxter. Plate VII, figs. 192–195.

L. c. 55, 260.

Male individual hyaline, erect, rather slender. Receptacle consisting of from four to seven cells obliquely superposed, straight or slightly curved backward, of nearly uniform diameter, the basal cell much longer, narrower below. Basal cell of the primary appendage hardly longer than broad; the subbasal abruptly slightly broader, rounded, faintly suffused, separated by a black constricted septum from the two remaining cells; the distal longer, its end rounded, and becoming disorganized. Antheridia two to six, hyaline throughout, slender, the stalk relatively long, the neck rather strongly curved outward distally. Antheridia $28 \times 5.5 \mu$. Receptacle $38\text{--}45 \times 8 \mu$. Appendage $26\text{--}32 \mu$.

Female individual faintly tinged with yellowish or brownish, the appendages and perithecium darker. Receptacle of four superposed cells, the basal larger: the primary appendage of usually four cells; the distal longer and becoming disorganized at the tip; the subbasal rounded, brownish, with blackened constricted basal septum. The subbasal cell of the receptacle giving rise to the single brownish secondary appendage, which is usually five-celled, the terminal cell, as a rule, swollen and gelatinized; the subbasal with a blackish basal septum; the whole bent nearly parallel to the primary appendage, and sometimes reaching its tip. Perithecium single, arising from the third cell, and diverging sidewise at an angle of about 45° , sessile, broader distally; the tip delimited by a narrow, clearly defined blackish collar and constriction; the apex rounded, or the lips more or less distinct, clearly defined, and subtended by blackish suffusions. Perithecium $65\text{--}76 \times 20\text{--}22 \mu$. Receptacle $48 \times 18 \mu$. Primary appendage $25\text{--}30 \mu$; secondary up to 55μ . Total length $100\text{--}120 \mu$.

On the legs and inferior anterior prothorax of *Perigona* sp., Grand Etang, Grenada, B. W. I.

Specimens growing on the legs vary from the type, as shown in fig. 193, the appendages and perithecium being erect and parallel, and the general habit stouter. The species is very remarkable for the close resemblance of the female to that of *D. Petchi*, which differs in its larger receptacle, and more divergent perithecium, the tip of which lacks the basal constriction and clearly defined black collar of the present species. The males, however, are quite unlike, as may be seen by reference to figures 190 and 194. Neither form seems nearly allied to any other species.

DIMEROMYCES LAVAGNEI Picard.

Bull. Sci. France et Belgique. 50, 440, 1917. Maire 3-me Contr. a l'Étude des Laboulbéniales de l'Afrique du Nord. Publication de l'Université d'Alger, 1920, p. 8, fig. 1.

This form, which is not known to me except through the descriptions and figure above cited, appears to be rather a species of *Dimorphomyces* than of the present genus, since the three-celled "raquette-shaped" primary appendage is said to arise from the subbasal cell. If the peculiarly differentiated appendage thus designated is really primary, the form certainly cannot be included in *Dimeromyces*. It has been found in France by Picard on the elytra of the carabid, *Blechnus minutulus*, and by Maire in Algeria on *B. laevipennis* Lucas. In neither case were male individuals observed, and Picard states that the assignment of the species to *Dimeromyces* is merely provisional.

DIMEROMYCES EXIMIUS Thaxter. Plate VII, figs. 185-187.

L. c. 55, 259.

Male individual relatively large: receptacle nearly opaque, except the basal and the lower portion of the subbasal cell: consisting of about five superposed cells; the two or three above the basal, much flattened and oblique (45°), terminated by an undifferentiated appendage of two cells, the lower much larger; the upper shorter and narrower, slightly translucent, especially its broad flattened distal margin: the successive cells above the basal cell of the receptacle producing an anterior series of unicellular branches or protrusions, from each of which may arise one or more antheridia, or appendages, or both combined: the appendages stiff, simple, faintly brownish, rather closely septate; the septa darker and slightly constricted, slightly divergent: the antheridia sessile, rather short and stout, the three regions very clearly distinguished; the venter but faintly suffused, its margins nearly straight, or convex on the inner side; the efferent base of the neck abruptly distinguished, deeply suffused on one side at least, relatively very broad, slightly longer than the short-clavate, distal portion which is bent slightly inward: the insertion of the individual antheridia, as well as of the appendages, rather conspicuously blackened. Receptacle, including large foot, $58 \times 15 \mu$. Primary appendage $22 \times 12 \mu$; secondary 130μ or more $\times 8 \mu$. Antheridia $38-44 \times 13 \mu$. Total length to tip of appendage 82μ .

Female individual similar in general structure and appearance to the male, the secondary appendages more numerous and elongate, curved upward and inward, distinctly brownish; the septa darker, with a slight constriction. Primary appendage quite opaque above the basal cell. Perithecia one or two lying at the left, as do the antheridia in the male, while the secondary appendages, except the two or three lowest, lie at the right: the perithecial stalk very short, nearly hyaline, abruptly bent; the rest deeply suffused with reddish brown, large, broader distally, almost opaque: the tip-region translucent, more or less clearly defined above and below by a fine dark line: the apex larger and longer than the tip-region, asymmetrical, tapering rather abruptly, the inner two thirds much darker, especially the prominent overarched upper lips; the outer third concolorous with the tip-region. Perithecia $135-160 \times 32-38 \mu$. Secondary appendages, longest, $275 \times 9 \mu$. Axis, including foot and primary appendage, $100-110 \times 23-25 \mu$.

On the anterior legs of *Pachyteles* sp., Verdant Vale, Arima, Trinidad, No. 2821.

This form is one of the most striking and peculiar members of the genus. Apart from the general structure and deep suffusions of both sexes, the male is distinguished by the very unusual shape and coloration of its antheridia, which appear to have at least six antheridial cells, and the presence of secondary appendages, which may arise with one or more antheridia on short branches, or protrusions, from the receptacle. The receptacle of the female becomes quite opaque above

the basal cell, but in somewhat younger individuals it may be seen to consist of about eight flattened, obliquely superposed cells; the fourth producing the first perithecium, the third apparently producing a second, figure 185, while the rest, above the basal, bear secondary appendages, which seem also to be associated with the perithecia somewhat as they are with the antheridia, figure 187. The appendages approach the type seen in *D. Aulacophorae* and its allies, consisting of a basal cell, or protrusion, which may bear two, possibly more, stiff, simple, slender branches of rather uniform diameter; the numerous cells of which, especially in those higher up, are separated by dark septa and slight constrictions. The primary appendage in the female is not distinguished from the receptacle, being involved in the general opacity of the latter, and its limits are thus not determinable. In young individuals there may perhaps exist some definite termination, which is soon disorganized or destroyed. Although so unusual in its characters, I should be inclined to place this form nearer *D. Aulacophorae* and its allies than to other known types.

DIMEROMYCES AFRICANUS Thaxter.

Monograph, Part I, p. 268. Plate IV, figs. 12-18.

This species, which is the type of the genus, occurs on *Pachyteles* in West Africa; and, since its original description, has been again found on hosts received from Kamerun, which were kindly sent me by Mr. Schwab. It is not confined to any special position on the insect, but in one instance a dense group was found at the tip of the abdomen, the individuals of which are somewhat specialized and vary from the type in being darker and more strict. The number of cells in the receptacle may vary from seven to fifteen, and the depth of the suffusion differs greatly, especially in the appendages; the deep blackish brown coloration of the subbasal cell sometimes involving several of the cells above. The species is most nearly allied in *D. maculatus*.

DIMEROMYCES MACULATUS Thaxter. Plate IX, figs. 232-235.

L. c. 55, 262.

Male individual pale yellowish, becoming tinged with brownish. Receptacle rather stout, asymmetrically clavate, consisting of from five to ten cells, greatly flattened and very oblique; the basal larger and usually abruptly bent. Primary appendage erect, rather elongate, tapering; the basal cell larger, obscurely finely granular or punctate; the second, and to a less degree the third, suffused with dark red-brown, especially at the septa, which show slight constrictions; the rest of the appendage tapering, pale, its lower cells sometimes darker and slightly inflated, tinged with purplish. Antheridia one or two to seven, sometimes associated with one, or less often two, secondary appendages similar to the primary, or with the cell unmodified; but longer and stouter, with longer basal cells: the antheridia tinged with purplish, the regions clearly distinguished, the stalk-cell short and free, or partly so; the neck straight or slightly bent; the base and apex nearly hyaline; the rest purplish brown, as is the clearly distinguished efferent region at its base. Receptacle $50-65 \times 20-25 \mu$. Appendage, primary, $115-150 \mu$: secondary, longer, 190μ . Antheridia, average, $48 \times 9 \mu$.

Female individual extremely variable in its size and the development of its appendages. Receptacle faintly yellowish, becoming tinged with brown, the cell-walls forming the posterior margin brown to deep blackish brown; tending to become very short and stout, sometimes nearly as broad as long, with the anterior margin subhorizontal; consisting of eight to thirteen cells, very greatly flattened and very obliquely superposed, or the transverse diameters nearly vertical. Primary appendage similar to that of the male, usually more conspicuously granular-punctate; secondary appendages two or three to six or seven, stouter; a basal and distal portion more or

less clearly distinguished; the former paler, stouter, of one to rarely six cells, punctate with scattered brown spots, which are slight thickenings of the wall; the distal portion resembling the primary appendage in a general way, more slender, one or more of its cells from below up abruptly darker, the depth and extent of the suffusion variable; the lowest cell sometimes almost opaque with straight, or slightly concave, margins. Perithecia variably elongated, one to several irregularly associated with the appendages, the stalk-portion often much longer than the ascigerous part, and variably distinguished from it; the whole straight and symmetrical, or less often variably curved; the tip deeply and rather abruptly suffused with clear reddish brown, the short, broad, flat or broadly rounded apex hyaline, or partly involved by the suffusion of the tip. Perithecia $100-360 \times 20-30 \mu$. Receptacle $80-110 \times 25-45 \mu$. Primary appendage $125-200 \mu$; secondary $150-550 \mu$.

On the elytra and inferior thorax of *Sphaerotylus Wyliei* Murr., No. 3089, Kamerun, West Africa.

This very striking species is most nearly related to *D. gonocnemalis* and *D. africanus*, especially to the former, which, however, differs in various important points, notably in the male, the appendage and antheridia of which are quite different. Although the appendages of the female in *D. gonocnemalis* show faint indications of maculation, their character is very dissimilar, and the receptacle is also quite different. Figure 232 is drawn from a group of unusually well developed individuals growing at the base of the anterior legs. Individuals on the elytra are mostly much smaller, with but a single basal maculate cell in the secondary appendages, the distal portion of which is usually more abruptly and deeply suffused.

DIMEROMYCES DHANYAE Thaxter. Plate IV, figs. 84-87.

L. c. 55, 239.

Male individual dull olivaceous brown. Receptacle consisting of three very unequal and oblique, or nearly vertical, cells; the basal extending upward anteriorly almost as high as its extremity, beside the narrow subbasal cell, from which a smaller cell is separated distally; in contact also with the base of the distal cell, which is somewhat shorter and bears distally the three-celled appendage, of which the basal and much shorter subbasal cells are paler and together about as long as the abruptly much more deeply suffused terminal cell, which is slightly irregular and tapering, ending in a bluntly pointed knob-like extremity. Antheridium turned against the appendage, the basally swollen or geniculate, somewhat irregular, dark brownish, slightly tapering and irregular neck bent abruptly away from its tip, the venter relatively short, the stalk-cell small and enclosed. Length to tip of appendage, including foot, $65-70 \mu$. Terminal cell of appendage $11-13 \times 5.7 \mu$. Antheridium about $44 \times 13 \mu$.

Female individual compact, partly suffused with blackish brown. Receptacle subtriangular consisting of usually four cells, very oblique or nearly vertical, unequal and somewhat irregular, the very large basal cell extending upward along the anterior face, prominent distally above an external, deep blackish brown suffusion near the middle of its outer margin; the subbasal cell small and narrow, bearing a two-celled, deeply suffused, short, broad, rounded, aberrant secondary appendage, the narrowed extremity of which is bent abruptly inward, ending in a flat rounded hyaline termination. Primary appendage very much as in the male, the basal cell relatively shorter and broader. Perithecium arising partly laterally from the subterminal, apparently sometimes also from the terminal cell; erect, the stalk opaque, except above its base, rather abruptly and clearly distinguished from the ascigerous portion, which is strongly inflated, somewhat more convex on the inner side, opaque, or deeply suffused below, above transversely mottled and translucent; the distal half subconical; the termination somewhat oblique; subtended by deeper

suffusions. Stalk of perithecium $48-58 \times 20-22 \mu$; ascigerous portion $75 \times 38-42 \mu$. Receptacle $48 \times 38 \mu$. Terminal cell of primary appendage $15 \times 7.5 \mu$; aberrant appendage $28 \times 19 \mu$. Total length to tip of perithecium 190μ .

On the inferior tip of abdomen of *Dhanya* sp., Mindanao, P. I., No. 2389.

I am indebted to Professor Oakes Ames for the host of this species, which was collected in the Philippines by Mr. Webber. It is very unusual and striking in appearance, and could not be mistaken for any of the other species thus far described. The neck of the antheridium remotely resembles that of *D. Australasiae*, but the two forms are not related. The aberrant appendage is unlike that of any species known, and the general appearance of the female individuals, of which but two fully developed specimens have been examined, recalls that of *Cucujomyces Diplocoeli* and *C. curtipes*, the perithecium having a similar series of transverse mottled lines. The structure, which, in two specimens, is developed from the terminal cell of the receptacle, and was thought to be a second appendage, seems rather to be an undeveloped perithecium, figure 84.

2. ON STAPHYLINIDÆ.

DIMEROMYCES GRACILIS Thaxter. Plate VIII, fig. 211.

L. c. 55, 267.

Male individual very minute, the receptacle apparently consisting of but two cells, the two-celled appendage undifferentiated, its basal cell small and rounded; the distal two or three times as long, distally rounded, the wall undergoing gelatinous disorganization. The single minute antheridium arising from the subbasal cell, apparently sessile, with a short neck. Total length to tip of appendage (including foot) 34μ .

Female individual almost hyaline. The receptacle consisting of four or five cells terminated by an undifferentiated two-celled appendage, like that of the male, and distally similarly disorganized. The third cell of the receptacle producing the single perithecium, which is long and slender, the stalk-portion not distinguished, of nearly uniform diameter, or slightly narrower at the base, the relatively long tapering tip-region not well distinguished, the apex small and rounded. Perithecia $150-190 \times 20 \mu$. Receptacle, including foot, $48-56 \times 12 \mu$. Appendage $22 \times 18 \mu$.

On the leg and tip of abdomen of a myrmecophilous aleocharid, No. 2612, Kamerun, West Africa.

One immature and two mature female individuals of this simple and curious form have been examined, neither of which, though well developed, bear any secondary appendage. A small cell is, however, separated distally from the subbasal cell, just below the insertion of the single perithecium. The only male examined is still adherent to the foot of the female, and is so placed that the minute antheridium lies above the receptacle and is hardly distinguishable, so that its structure is barely indicated. The host was taken by Mr. Schwab among various other Staphylinidæ which were following in the rear of a procession of soldier ants.

DIMEROMYCES RORERI Thaxter. Plate VII, figs. 174-177.

L. c. 55, 266.

Male individual hyaline, becoming very faintly tinged with yellowish brown. Receptacle of two, rarely three, cells, erect; the appendage of three cells, the middle roundish, distinguished by thin dark septa, the basal abruptly somewhat broader than the distal cell of the receptacle, and faintly suffused. Antheridia one or two, slightly asymmetrical, the inner margin more convex; the stalk well developed, as long as the venter, the neck distally rather slender. Receptacle,

without foot, $12-13 \times 8 \mu$, foot small. Appendage 12μ . Antheridia $38 \times 8.5 \mu$. Total length $48-54 \mu$.

Female individual nearly hyaline, with faint yellowish brown suffusions. Receptacle of six or seven flattened, oblique, or somewhat irregular-cells. Primary appendage similar to that of the male. Secondary appendage from the fourth cell, of five or six cells, the second and third somewhat longer than broad, distinguished by thin dark septa. Perithecia one or two, from the fifth, or third and fifth cells, erect and bent slightly sidewise; the short stalk not distinguished, the ascigerous part somewhat broadened distally, the curvature of the margins even, sub-symmetrical; the tip slightly inflated, abruptly distinguished by a slight constriction associated with a deep contrasting blackish brown suffusion, which forms a collar, above which it is rather abruptly somewhat narrower and bent inward; the apex rather clearly distinguished, narrower, and of nearly uniform width, with rounded termination. Perithecium $80-100 \times 17-19 \mu$. Receptacle $20-25 \times 12-13 \mu$. Primary appendage $16-20 \mu$; secondary $42 \times 5 \mu$. Total length to tip of perithecium $105-125 \mu$.

On the inferior surface at the tip of the abdomen of *Gyrophæna* sp., Port of Spain, Trinidad, No. 2306.

The host bearing this very pretty and distinct species was sent to me by Mr. J. B. Rorer to whom it is dedicated. It bears a certain resemblance to *D. caribbeus*, especially owing to the suffused collar which subtends the tip, and it is perhaps more nearly allied to this species than to any other. Owing to the basal curvature of the perithecium, individuals lie more often with the receptacle seen edgewise, so that it is difficult to represent the normal sequence of the cells.

DIMEROMYCES GYROPHAENÆ Thaxter. Plate VII, figs. 180-182.

L. c. 55, 268.

Male individual hyaline, faintly tinged with yellowish. Receptacle consisting of four or five slightly flattened and oblique cells, the basal as long as the rest combined. Appendage short, stout, of two cells; the distal slightly longer, broadly rounded, thick-walled. Antheridia three or four, diverging at about 45° ; the stalk but slightly shorter than the neck and venter; the former short, stout, conical. Receptacle $34 \times 12-13 \mu$. Appendage $17 \times 8 \mu$. Antheridia $30 \times 8.5 \mu$. Total length to tips of antheridia 64μ .

Female individual pale yellowish. Receptacle, above the basal cell, bent sometimes at right angles to the axis of the latter: consisting of usually eighteen to twenty cells, those above the basal very greatly flattened, especially the lower: giving rise alternately to perithecia and appendages, which diverge slightly, left and right respectively, projecting upward from the nearly horizontal receptacle. Primary appendage like that of the male: secondary appendages usually of four cells, the three lower subequal, hardly longer than broad, the distal one somewhat broader, rounded and thick-walled. Perithecia subclavate, curved, tapering to the slightly bent, short tip, and rather small asymmetrical apex. Perithecia $75-80 \times 21 \mu$. Receptacle above basal cell, $55-70 \times 20-25 \mu$. Primary appendage $17-19 \mu$; secondary 46μ .

On the elytra of *Gyrophæna* sp., No. 2610, Kamerun, West Africa.

The perithecia of this species are apt to be so abruptly bent at the tips that it is difficult to determine their outlines. It is distinguished by its short stout form, abrupt curvature and numerous alternating short blunt appendages and perithecia. It is perhaps as closely allied to *D. Copropori* as to any other species, but is very abundantly distinct, and quite unrelated to *D. Roreri* which occurs on another species of the same genus.

DIMEROMYCES COPROPORI Thaxter. Plate VIII, figs. 212-213.

L. c. 55, 266.

Male individual becoming more or less tinged with brown, rather short and stout. Receptacle of three cells obliquely superposed, the basal pale and longer; bent outward rather abruptly above cell 2, cell 3 and the basal cell of the short, blunt, two-celled appendage more deeply suffused, even opaque. Antheridia normally two, arising from the second and third cells, rather short and stout; the upper but slightly higher than the lower, their axes parallel to the distal part of the receptacle and appendage; the stalk-cell short, but well defined, and free externally; the neck short, tapering rapidly from its broad base. Receptacle, without foot, $20 \times 12 \mu$. Appendage 13μ . Antheridia $30 \times 9 \mu$. Total length to tips of antheridia 58-62 μ .

Female individual large and stout, more or less suffused with yellowish brown. Receptacle erect, slightly curved backward distally; consisting of about sixteen to twenty-five flattened cells, oblique only above the point of curvature; all except the lowest producing short, rounded, two-celled, abortive appendages, or unicellular protrusions, or sometimes both; and from four to seven perithecia, the two usually alternating. Primary appendage not distinguished from the receptacle, consisting of two or three cells ending bluntly. Perithecia nearly sessile, stout, of more or less uniform diameter; the tip distinguished by its darker color, below the broad, flat, nearly hyaline apex, $100-125 \times 20-25 \mu$. Receptacle, including foot and primary appendage, $125-180 \times 25-28 \mu$. Secondary appendages $18 \times 10 \mu$. Total length to tips of perithecia 225-260 μ .

On the legs of an undescribed species of *Coproporus*, No. 2620, Kamerun, West Africa.

This very distinct form is not clearly related to any of the described species, and is the only one which occurs on this host-genus. It is perhaps more nearly comparable to *D. Thaxteri*, in which the receptacle and primary appendage are also continuous and undistinguished; a condition also found in *D. gracilis*, and, to a less marked degree, in various other forms. The secondary appendages are usually associated with conspicuous protrusions from their basal cells, which may replace them above, and may protrude from either side in different cases. These appendages themselves vary somewhat, and are sometimes less stout and taper slightly. The material is sufficient and in good condition.

3. ON CORYLOPHIDAE.

DIMEROMYCES APHANOCEPHALI Thaxter. Plate X, figs. 259-261.

L. c. 55, 269.

Male individual colorless, or pale yellowish; the receptacle three-celled, the cells subequal, the upper long-oval tilted and externally prominent. Antheridium erect, the stalk-cell free externally, the short neck hardly divergent, hardly exceeding the tip of the appendage, which consists of two subequal cells, $15 \times 3.5 \mu$. Antheridium 20μ . Total length 35 μ .

Female individual colorless or yellowish. Receptacle and appendages sprawling on the substratum, the former four- or five-celled, the first four subequal, much broader than long. The subbasal cell giving rise to a short tapering secondary appendage on either side, one longer than the other, of seven or eight cells, the primary appendage undifferentiated and similar to the secondary: the short broad basal cell united to the basal cells of the two adjacent appendages, the shorter of which acts as a buffer. Perithecium with an elongate stalk, arising perpendicularly from the substratum, erect or strongly curved; the ascigerous portion moderately well distinguished, not quite symmetrical, slightly inflated, rather long and slender, terminating in a short, finger-like, erect projection, the lumen of the lower part of the stalk more or less obliterated.

Perithecium; stalk $90-170 \times 10-11.5 \mu$; ascigerous portion $60-75 \times 15-18 \mu$; total length $150-240 \mu$. Appendages $50-70 \mu$.

At the tips of the elytra of *Aphanocephalus pubescens* Gronv., No. 1834, Sarawak, Borneo.

In its sprawling habit this species resembles *D. appressus*, for which, in some positions, it might readily be mistaken. The form and characters of the receptacle and appendages are, however, quite different; as are the characters of the male. The latter is very simple in structure and its receptacle is perhaps better regarded as only two-celled, with a three-celled appendage not clearly distinguished from it. The antheridium appears to have but two antheridial cells, only one of which seems to be functional, and the species is perhaps better associated with *D. Tomari* and the other forms allied to *Eudimeromyces*. The production of opposite branches or secondary appendages from the subbasal cell of the female is unusual, the shorter branch acting as a buffer or support turned toward the substratum, and may approximate the condition seen in *End. anomalus*.

4. ON PHALACRIDÆ.

DIMEROMYCES UNGUIPES Thaxter. Plate VII, figs. 183-184.

L. c. 55, 258.

Male individual rather evenly tinged with pale brown, slender, erect; the foot long, slender and claw-like. Receptacle consisting of three cells; the basal much longer, but slightly broader distally, obliquely separated from the oblique, flattened subbasal cell, which separates a small cell below the base of the antheridium, which is erect, with relatively long narrow stalk; the venter abruptly broader distally; the neck short, gradually tapering from its broad base, and reaching somewhat above the tip of the appendage, toward which it is very slightly bent. Antheridium $38 \times 9 \mu$. Receptacle, without foot, $34 \times 8 \mu$. Appendage 27μ . Total length to tip of antheridium $80-90 \mu$.

Female individual rather slender, suberect, its color like the male; the foot similar; the receptacle consisting of five cells; the basal much longer, nearly uniform below, distally obliquely separated from the three middle cells, which are flattened and very oblique; the fifth subtriangular. Primary appendage of three successively smaller cells, the distal more deeply suffused; secondary appendage arising from the third cell, below and beside the perithecium, of four cells, the basal longer than the three distal ones combined, of which the subterminal is the shortest, the distal paler. Perithecium straight, erect, slender, nearly symmetrical, broadest just below the tip, which, with the apex, is relatively short, subconical, tapering to the blunt, symmetrically rounded, or subtruncate, extremity; the sporiferous region finely transversely verruculose, or roughened, this modification extending downward less conspicuously nearly to the base of the paler undifferentiated stalk-region. Perithecium $135 \times 16 \mu$. Secondary appendage $66 \times 8.5 \mu$; primary $34 \times 6 \mu$. Receptacle, without foot, $42 \times 16 \mu$. Total length to tip of perithecium 180μ .

On the elytra of *Eustilbus apicalis* Sharp, Agua Caliente, Guatemala, No. 1603.

The host on which this peculiar form was found was received from the late Professor Kellerman, who very kindly collected for me a number of miscellaneous insects, during his last trip to Guatemala. The material is very scanty, and only one female and two males in perfect condition are available. Its variation may therefore be greater than is indicated by the above description and more than one perithecium or secondary appendage may sometimes be produced. The subbasal cell cuts off a small cell below the single secondary appendage of the type, which may well, in some individuals, give rise to another appendage. Its claw-like foot, transversely roughened perithecium, the form of which is itself peculiar, the characters of its secondary appendage,

with its greatly elongated basal cell; as well as the structure of its slender male, with its peculiarly shaped antheridium, serve clearly to distinguish it from other described forms, to none of which does it appear to be nearly related.

5. ON CUCUJIDAE.

DIMEROMYCES AMETROTHECALIS Thaxter. Plate VIII, figs. 208-210.

L. c. 55, 265.

Male individual hyaline, or faintly yellowish. Receptacle three-celled; including the foot, roughly triangular, and bearing a two-celled, short, subulate appendage from its upper angle; and normally two antheridia from its upper side, arising from the smaller, nearly equal, subtriangular subbasal and terminal cells. Antheridia usually straight and symmetrical, the upper inclined against the appendage, the lower often slightly divergent; the stalk-cell short, but well distinguished; the venter stout, nearly symmetrical, extending above the tip of the appendage; the neck slender, straight, or less often slightly curved, subulate, relatively long. Receptacle, without foot, $21-22 \times 9-10 \mu$. Appendage $13-17 \mu$. Antheridia $30-38 \times 10 \mu$. Total length to tips of necks $63-66 \mu$.

Female individual pale yellowish, becoming tinged with brown. Receptacle relatively minute, consisting of four cells; the basal much larger; the rest successively smaller, subtriangular. Primary appendage short, three-celled, subulate; the secondary single, simple, arising from the subbasal cell, of nine or ten short cells, mostly broader than long, with slightly oblique septa; the whole tapering gradually to a point, and lying against the base of the perithecial stalk. Perithecium single, arising from the third cell, monstrously developed, becoming more or less deeply tinged with reddish brown; the stalk abruptly very broad above its origin, passing into the ascigerous portion without differentiation; the tip more clearly distinguished on the inner side, short and broad, the apex clearly distinguished, slightly bent outward, rounded. Perithecia $170-400 \times 25-27 \mu$. Receptacle and foot $38-42 \times 12-15 \mu$. Primary appendage $16-20 \mu$; secondary $40-60 \mu$. Total length to tip of perithecium $200-430 \mu$.

On the upper surface of the abdomen of *Cucujinus micromma* Arrow, No. 2339, Kamerun, West Africa.

This species, which is distinguished by its monstrously developed perithecium and minute receptacle, with its subulate primary appendage, does not appear to be nearly allied to any of the known forms. No other member of the genus is known to occur on Cucujidae.

6. ON CRYPTOPHAGIDAE.

DIMEROMYCES TOMARI Thaxter. Plate X, figs. 274-278.

L. c. 55, 272.

Male individual hyaline, the basal cell about as broad as long; the subbasal much smaller, bearing terminally a relatively stout undifferentiated appendage of three or four cells, and laterally a rather stout, short antheridium, its stalk-cell clearly defined, the antheridial cells apparently two, without basal cells; the neck short, stout and blunt; foot sometimes larger than the receptacle, which is $8.4 \times 4.2 \mu$. Appendage $20 \times 4 \mu$. Antheridium about $12 \times 5 \mu$.

Female individual becoming faintly tinged with brownish yellow. Receptacle consisting of three or four cells; those above the larger basal cell more or less horizontally disposed, often somewhat irregularly displaced; the subbasal bearing a stout undifferentiated secondary appendage, sometimes as long as the perithecium, tapering slightly, the lower cells shorter; the third

or fourth cell followed by the primary appendage, which is similar to the secondary, though often shorter, usually of eight or nine cells. Perithecium arising from the third cell, long and relatively stout, the stalk sometimes as long as the ascigerous part, and even broader; erect, straight, or slightly curved below, somewhat asymmetrical; the tip and bluntly rounded apex slightly distinguished, rather short and slightly tapering. Perithecia $80-100 \times 12 \mu$, longest 140μ . Appendages $50-90 \mu$. Basal and subbasal cells $10.5 \times 12.5 \mu$. Total length to tip of perithecium $90-150 \mu$.

On the elytra of *Tomarus bellus* Gronv., No. 2776, Grand Etang, Grenada, B. W. I.

The female of this species closely resembles that of *Eudimeromyces Chilotis*, except for the presence of a secondary appendage, and it is not improbable that the apparent differences in the males of the latter are less fundamental than was at first supposed. In the present form the antheridia are in several instances clearly compound, and borne from the subbasal cell below the appendage, as in figures 227 and 228. In several, however, that are in place next the female, the antheridium might be terminal: but as it is almost impossible to isolate them, from the fact that they are hyaline and very minute, it has not been possible to be certain of their exact structure. Although I have chosen to retain the genus *Eudimeromyces ad interim*, it is evident that the three species on minute Cryptophagidae herewith enumerated, namely *D. aberrans*, *D. Tomari* and *E. Chilotis*, are very closely allied, and very probably congeneric: but a definite decision as to this point must await the examination of more abundant material. The present species is much less complicated than the nearly allied *D. aberrans*, since it does not appear to produce the accessory perithecia, which make the homologies of the receptacle, in the latter, so difficult to interpret.

DIMEROMYCES ABERRANS Thaxter. Plate X, figs. 282-285.

L. c. 55, 270.

Male individual consisting of a small basal and subbasal cell, the latter bearing distally a bluntly pointed terminal cell, and subterminally a short-stalked antheridium; the neck of which is very short and blunt, or nearly obsolete; the antheridial cells apparently two; the subbasal cell sometimes producing one or more branches; which consist of a basal cell, bearing distally a bluntly pointed cell, and subterminally a short-stalked antheridium. Total length about 30μ . Antheridium and stalk $11 \times 3.5 \mu$.

Female individual pale yellowish, more or less bilaterally symmetrical in general habit; the broad short basal cell for the most part blackened, and indistinguishable from the foot; overlapping the small subbasal cell, which produces, right and left, what have the appearance of similar branches; rather closely septate, often thicker distally, curved upward outside the perithecia, which subtend them on the inner side: one of these branches, the secondary appendage, usually somewhat longer and stouter than the other, which corresponds to the primary appendage: the first perithecium arising from the third cell of the receptacle, at the base of the latter; the basal cell of which is not distinguished from it: the basal cell of the secondary appendage, also, usually giving rise to one, or even two, perithecia. Perithecia seldom more than four, sometimes only one: asymmetrical, straighter on the inner margin, usually nearly twice as long as the appendages, irregularly fusiform; the stalk-portion relatively short, and tapering to its narrow insertion, not distinguished from the gradually much broader ascigerous portion; which is slightly bent inward distally, strongly convex externally and distally, the inner margin distally even slightly concave: the apex sometimes very slightly and abruptly bent upward, distally broad and flat, or blunt. Perithecia $55-75 \times 13 \mu$. Appendages $30-48 \times 6-7 \mu$. Total length to tip of perithecium $70-92 \mu$.

On the elytra of *Tomarus atomarius* Sharp, or closely allied species. No. 1527, Columbus, Ohio; No. 1609, Los Amates, Guatemala; No. 1599, El Rancho, Guatemala.

The hosts bearing this curious parasite were collected for me by the late Professor Kellerman, to whom I am indebted for numerous other new and interesting forms. The species is most nearly allied to *D. Tomari*, from which it differs in the form and number of its perithecia and appendages. Although its pseudobilateral habit gives it a very different appearance, it does not appear to differ fundamentally from other somewhat aberrant types of the genus. A corresponding development of accessory perithecia is found in *D. Peltoidis* and *D. adventitosus*, and the production of secondary branches bearing antheridia, which, however, does not always occur in the present species, finds a parallel in *D. Thaxteri*, *D. adventitosus* or *D. eximius*. The males are so small, and adhere so closely to the base of the female, that they can only be separated with the greatest difficulty. Nevertheless, a few have been clearly seen, as in figures 284–285. The antheridium, though not unlike that of *D. Tomari*, is not typical; the neck being but slightly developed, and the antheridial cells apparently only two in number. The individual necks of the antheridial cells seem hardly to discharge their sperm cells into a common cavity and tube, but almost directly to the outside. They are so small, however, and their definition is so vague that it has not been possible to determine this point with certainty.

DIMEROMYCES NECROTALIS Thaxter. Plate VII, figs. 178–179.

L. c. 55, 257.

Male individual (type specimen) pale yellowish, the receptacle of four obliquely superposed cells, the two middle much flattened. Basal cell short, triangular, protruding beyond the base of the lower antheridium. Appendage straight, rigid, tapering, distally attenuated, concolorous, the basal cell about as long as the subbasal, which is rather abruptly somewhat narrower. Antheridia stout, the stalk short and well defined; the short stout venter rather abruptly distinguished from the broad base of the rather short, slightly tapering, straight neck. Appendage 35 μ . Antheridium 20 $\times$ 6 μ . Total length to tip of appendage 55 μ . Receptacle 20 $\times$ 10 μ .

Female individual pale yellowish throughout; the receptacle of ten cells, the basal extending horizontally to the base of the lowest secondary appendage; the rest of the receptacle a horizontal series of cells, all, except the eighth and ninth, wedge-shaped with points downward; the terminal cell larger, subtriangular, externally abruptly prominent below the base of the primary appendage, which is similar to, but slightly stouter and somewhat shorter than, the secondary appendages; which tend to alternate with the perithecia, diverging slightly from one another, straight, ridged, tapering throughout to a slender extremity, of seven or eight cells, the whole forming, with the receptacle and considerably longer alternating perithecia, a fan-like structure. Perithecia straight, the stalk well developed and rather clearly distinguished from the somewhat shorter sporiferous portion, which is nearly symmetrically subfusiform, the distal half with two or three slight marginal depressions and elevations, the upper distinguishing the tip rather clearly; the apex well defined, about as long as broad, distally rounded. Perithecia 106 $\times$ (stalk) 8 $\times$ (sporiferous part) 15 μ . Longer appendages 75 $\times$ 7.5 μ , at base. Horizontal receptacle 35 $\times$ 10 μ .

On the antennae of *Necrota africana* Gr., Kamerun, West Africa, No. 2577.

A mature female and one in which the trichogynes are still adherent, together with a single male, all in perfect condition, have been examined. In the latter, figure 179, the third antheridium is still unicellular, and in the female, but one perithecium is fully mature, figure 178. The species is of great interest, since the structure and development of its receptacle partake of the characters of both the genus *Dimorphomyces* and *Dimeromyces*. Although the basal cell re-

mains in contact with four or five of the cells last separated from it, the interposition of an equal number of cells between it and the base of the primary appendage clearly distinguishes it from any type found in *Dimorphomyces*. For further reference to the characters of this species vid. sub DIMORPHOMYCES, p. 11.

7. ON CLERIDAE.

DIMEROMYCES CORYNETIS Thaxter. Plate VII, figs. 196-197.

L. c. 48, 157. Spegazzini, Ann. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 514, fig. 55.

Male individual pale yellow, the axis straight, erect. Receptacle of three to eight cells; the basal larger, subtriangular; the rest successively slightly larger from below up, small, flattened, horizontal, each producing an antheridium diverging at right angles from the axis. Primary appendage a single very large mitriform cell, its base broader than the receptacle, somewhat inflated, nearly symmetrical. Antheridia two to seven, relatively very large, the stalk-cell sometimes half the total length, narrow below, broader distally, but clearly distinguished from the broader stout venter, which is considerably inflated, subsymmetrical or slightly more prominent, distally, below; the straight neck abruptly distinguished, as long as, or slightly longer than, the venter, tapering evenly from its broad base to its rather truncate apex. Total length about $50-60 \times 9 \mu$. Appendage $14-20 \times 10-12 \mu$. Antheridia about 35μ ; the stalk-cell $9-18 \times 6 \mu$; the venter $10 \times 12 \mu$.

Female individual pale yellow, or faintly tinged with brownish. Receptacle similar to that of the male, of four or five cells, and terminated by a similar appendage: the distal cell bearing a secondary appendage, erect or somewhat divergent, of five or six successively smaller slightly inflated cells; the first peritheciium arising from the cell immediately below it, and one or even two more very rarely developed from the cells immediately below the first. Peritheciium usually single, relatively very large, usually curved slightly throughout, or more abruptly at the base, variably divergent, the stalk well developed, but not clearly distinguished, shorter than the rest, which is broader below the tip; the latter short and broad, fairly distinguished, as is the short broad apex, the broad blunt extremity of which is often slightly sulcate. Spores $60 \times 9 \mu$. Perithecia $150-215 \times 30-40 \mu$, $100-135 \mu$ above the stalk-portion. Appendage $60-100 \times 8 \mu$. Receptacle, to tip of primary appendage, $80-100 \mu$.

On the elytra of *Corynetes ruficollis* Fabr. La Plata, Argentina, No. 1459; No. 2798, Honolulu, Hawaii.

The host of this species being more or less cosmopolitan, it is probable, from its occurrence in the Hawaiian Islands, whence it has been sent to me by Dr. A. T. Speare, that the parasite is also widely distributed. It is one of the most clearly defined of the known members of the genus, and is most readily distinguished by its unicellular mitrate appendage. The axis appears to lie flat on the surface of the host, and the antheridia and perithecia project upward from it nearly at right angles. The species has been again found by Spegazzini in the Argentine. It does not appear to be nearly related to other forms.

8. ON ENDOMYCHIDAE.

DIMEROMYCES TRYCHERI Thaxter. Plate IV, figs. 105-108.

L. c. 55, 238.

Male individual pale yellowish. Receptacle rather stout, consisting of six to eight cells, somewhat oblique and flattened, except the basal and distal: appendage straight, characteristically divergent, its three cells nearly equal in length, the basal slightly broader. Antheridia two to six,

radiately divergent; the stalk short, broad and well defined; the venter rather broad distally; the base of the neck abruptly distinguished, but relatively large and broad; the distal part about equal to it in length, straight, uniform, truncate. Receptacle about $30 \times 12 \mu$. Appendage and antheridia $25-30 \mu$, the latter $\times 8 \mu$.

Female individual pale yellowish. Receptacle consisting of more often sixteen cells, the basal subtriangular, the rest usually much flattened, especially the lower; those of the upper half somewhat oblique, all, except one or two of the lowest, bearing perithecia or secondary appendages more or less alternating. Primary appendage of three or four cells, short, divergent; the subbasal abruptly narrower than the basal and suffused with pale brownish; secondary appendages four to eight or nine, much longer, of four to eight or nine cells; the two basal short and broad, the third abruptly slightly narrower and conspicuously tinged with brown; the upper radiately divergent, slightly tapering; the lower three or four not thus modified at the base, and often characteristically curved downward and even across the foot, not associated with perithecia, more evenly tapering. Perithecia alternating with the upper three to seven appendages, mostly straight, subsymmetrical and subfusiform, the stalk not distinguished, and shorter than the sporiferous portion; the tip large and well distinguished, slightly and subsymmetrically inflated; the apex well distinguished, very slightly inflated, nearly symmetrical, distally rounded, with a slight median apiculus. Perithecia $100-125 \times 25 \mu$. Receptacle $80-100 \times 25-30 \mu$. Primary appendage $30-40 \mu$; secondary, longer, $85-100 \times 9 \mu$.

On the elytra and legs of *Trycherus bimaculatus* Guer., No. 2445, (Type) and 3087: of *Trycherus* sp., No. 3088. Metet, Kamerun, West Africa.

This species is most nearly allied to *D. Strongylii* and *D. Amarygmi*; but although somewhat variable, is easily distinguished by the conspicuous brown suffusion of the third cell of its secondary appendages. In the type, the receptacle is distally curved, as in figure 105. The individuals from No. 3088, which grew on the legs, are much stouter, as is usually the case in this position, and may be straight and very broad, even more so than is shown in figure 106. The appendages are also shorter, for the most part, and the lower ones show less tendency to bend downward.

DIMEROMYCES PLATYCILLIBIS Thaxter. Plate VIII, figs. 201-204.

L. c. 55, 269.

Male individual pale yellowish, tinged with brown. Receptacle straight, erect, of five or six cells; the basal longer, subtriangular; the rest somewhat flattened, the middle ones broader. Appendage of three cells, the basal and subbasal subequal, the latter roundish and distinguished above, and less broadly below, by darker brown or blackish shades, the distal cell somewhat tapering and longer. Antheridia one to three, strongly divergent; the stalk-cells small and almost included; the venters short and stout, rather abruptly distinguished from the outcurved, tapering necks. Length to tip of appendage $38-48 \mu$. Antheridia $15-18 \times 7.5 \mu$.

Female individual yellowish, rather strongly tinged with brownish at maturity. Receptacle nearly straight and erect, of five to eight cells; the basal short, subtriangular, much larger; the rest flattened, the upper somewhat oblique; primary appendage relatively very small, similar to that of the male; the secondary appendage usually single and subterminal, a second sometimes arising below the perithecium; consisting of a basal portion of six to nine cells, but slightly if at all longer than broad, distinguished by a constriction, associated with a deeper brown suffusion, from a terminal portion of one to several cells, variably elongated and slightly tapering, the walls often disorganized. Perithecia somewhat more distinctly brown, rather short and stout, broader below the tip, which is not distinguished, except that it tapers rather abruptly to the broad, blunt, undifferentiated apex: nearly sessile, or the stalk sometimes distinguished. Spores

20–24 $\times$ 2.5 μ . Perithecia 58–68 $\times$ 20 μ . Receptacle, without foot, 25–28 μ . Primary appendage 15–28 μ ; secondary 45–85 $\times$ 10–12 μ ; terminal part 45–130 μ .

On the upper surface of *Platycillibe* sp., No. 2986, Wainoni Bay, Solomon Islands, M. C. Z. (Mann Coll.).

This species is perhaps more nearly allied to *D. Trycheri* than to other known species, and is easily distinguished by its very small primary appendage, and the character of the secondary appendages, with their very clearly distinguished basal and terminal portions. The latter vary considerably, both in length and in the number of cells composing them, of which there may be but one, and usually taper above a slightly swollen base.

9. ON TENEBRIONIDÆ.

DIMEROMYCES BRACHIATUS Thaxter. Plate III, figs. 72–74.

L. c. 51, 6.

Male individual hyaline, subtriangular above the stalk-like base of the basal cell, the lumen of which is obliterated above the large foot. Receptacle of from five to seven cells, the distal larger; the basal much larger than the cells between them, which are irregularly flattened and very oblique; the lumen of the basal small and subtriangular; the distal cell somewhat prominent externally, bearing the single antheridium and the terminal primary appendage: the latter rather short, suberect, its abruptly smaller hyaline, squarish, or somewhat flattened, basal cell followed by two slightly broader, brownish, somewhat flattened; the terminal cell hyaline, long, hardly tapering, with rounded extremity. Secondary appendages three or four, arising from the cells below the antheridium, parallel and closely associated, with a divergence of about 45°, similar to the primary, with sometimes three short brown cells, the basal cell being sometimes twice as long as broad. Antheridium with a well defined stalk-cell, distally bent strongly sidewise, the distal portion of the neck at right angles. Receptacle 46 $\times$ 12 μ . Foot 18 μ . Appendages 28 $\times$ 4 μ . Antheridium 27 or more $\times$ 9 μ .

Female individual, hyaline or faintly yellowish. Receptacle similar to that of the male, consisting of eight or nine cells flattened or wedge-shaped, somewhat radiately disposed; the distal cell subtriangular, and bearing the small strongly divergent primary appendage, which is similar to that of the male, though less well developed. The cells of the receptacle also giving rise to three different structures, one or two perithecia, always from the subterminal cell, and often from the third cell below it; a secondary appendage similar to the primary, but better developed, always from the cell below the first perithecium; and normally three secondary sterile axes from the terminal cell and the fourth and sixth cells below it: or the cells immediately below the secondary appendage producing secondary axes, or perithecia, without regularity. Secondary axes very greatly elongated, flattened, of nearly equal width throughout, the walls very thick, the lumina of the small cells disposed more or less regularly in vertical pairs, right and left, each pair associated with straight, appressed appendages, which alternate on either side, and are similar to those of the male. Perithecia arising from a short basal cell, similar to that which subtends the secondary axes, mostly erect, distally somewhat broader, thence tapering slightly to the short, slightly broadened, somewhat symmetrically rounded apex; the lips slightly prominent. Perithecia 90–120 $\times$ 15–20 μ ; the basal cell 12 $\times$ 8 μ . Receptacle 50–60 $\times$ 20 μ ; the foot 20 μ . Primary and secondary appendages 18–22 $\times$ 4 μ . Secondary axes up to 580 $\times$ 12 μ , their appendages 20–28 $\times$ 4 μ .

On the elytra of *Heterophaga* sp. nov., No. 2107, Peradeniya, Ceylon.

This, the most remarkable form in the whole genus, is very clearly distinguished by its peculiar sterile secondary axes, no other species having structures which seem closely com-

parable, unless it be the fertile-secondary axes of *D. crispatus*. The perithecium, in the present instance, may be regarded as borne on a unicellular fertile axis; since the basal cell subtending it may produce one, or even two, secondary perithecia, if the first is injured or fails to develop. Owing to the abrupt distal curvature of the antheridium, it is not possible to determine its characters very satisfactorily. There appear to be four or more antheridial cells, but a reexamination of individuals which have become more transparent by over ten years' immersion in glycerine makes it seem doubtful whether there are eight as originally described. The host which has been determined by Mr. Champion as a new species of Heterophaga, allied to *H. nitidula* Motsch., was found among a miscellaneous collection of insects for which I am very greatly indebted to Mr. T. Petch.

DIMEROMYCES DERISPIAE Thaxter. Plate IV, figs. 103-104.

L. c. 55, 243.

Male individual pale yellowish. Receptacle consisting of from five to seven cells; the basal longer narrow below; the rest somewhat oblique, and flattened, except the distal. Primary appendage consisting of a stouter basal cell, twice as long as broad, and a somewhat more slender, three-celled, bluntly tipped distal portion, which converges parallel to the slightly divergent antheridia, the tips of which it slightly exceeds; its middle cell usually shorter than the other two. Antheridia two to four, superposed, somewhat divergent, the stalk-cell small, enclosed; venter strongly convex externally; base of neck broad, tapering, longer than the distal part, slightly curved outward. Receptacle $55-57 \times 12.5 \mu$. Appendage $34-42 \mu$. Antheridia $25-29 \times 9-12.5 \mu$. Total length to tip of appendage, including small pointed foot, $80-92 \mu$. Appendage $34-42 \mu$.

Female individual yellow, becoming slightly tinged with brown, straight, erect. Receptacle with small pointed foot, consisting of about twelve to sixteen cells; the basal subtriangular, somewhat longer than broad; those immediately above short, and much flattened, non oblique; the rest becoming oval or elliptical in outline, their posterior margins rather strongly convex, all but the lowest separating a small cell distally and externally: the subterminal (and rarely the second cell below it) giving rise to a slightly tapering, outcurved, seven- to ten-celled appendage; slightly shorter than the similar, erect, six- or nine-celled terminal primary appendage: the two forming a fork between which the slightly shorter perithecium is inserted. The latter erect, nearly symmetrical, subfusiform, sessile, relatively short; the tip relatively long, well distinguished, more convex anteriorly; the apex short, rounded. Perithecia $105 \times 22 \mu$. Receptacle $125-170 \times 25 \mu$. Primary appendage $90-125 \times 12 \mu$; secondary $80-95 \mu$. Total length to tip of perithecium $210-275 \mu$.

On the left elytron of *Derispia Moquersyi* Pic., No. 2568, Kamerun, West Africa.

A clearly defined and peculiar species, which, in general appearance, bears a remote resemblance to *D. nanomasculus*; although the perithecia and secondary appendages are unilateral. Rarely a second perithecium and appendage may arise below that first formed, but this appears to be rather the result of injury. The convergence of the male appendage, above its basal cell, appears to be quite characteristic.

DIMEROMYCES GONOCNEMALIS Thaxter. Plate VIII, figs. 198-200.

L. c. 55, 261.

Male individual erect, more or less slender; receptacle of from two to five cells, those above the longer larger basal cell subequal, slightly oblique, somewhat broader than long. Primary

appendage consisting of four to five successively somewhat smaller cells, distally more or less conspicuously enlarged, and tinged with brown, except the terminal one. Antheridia one to three, slightly divergent, straight, the stalk long, slender and hyaline, the neck and venter more or less tinged with purplish brown; the latter somewhat asymmetrical, more abruptly convex externally, the neck straight, tapering considerably, almost subulate. Receptacle $34-50 \times 9 \mu$, the stalk $20-22 \mu$; the antheridia and appendage usually slightly divergent.

Female individual very variable in size. Receptacle usually curved strongly backward; hyaline to pale yellowish, the upper half or more becoming rather deeply tinged with reddish brown; consisting of eight to sixteen cells, more or less, the lower much flattened, oblique, owing only, to the general curvature. Primary appendage not abruptly distinguished, soon broken, consisting of six or seven cells, the two or three lower becoming brownish, deeper and contrasting distally. Secondary appendages two or three to ten, longer, tending to alternate with the perithecia, erect and rather rigid, or somewhat flexuous; two to four or more of the terminal cells often abruptly somewhat smaller; the lower cells, in older appendages, sometimes marked by faint, scattered darker patches; the cells eighteen, more or less, many of them somewhat abruptly broader distally, with slightly concave margins. Perithecia one or two to eight, more or less; the stalk well developed, elongate; but not usually clearly distinguished from the ascigerous portion; which becomes rather deep red-brown, the stalk yellowish, or becoming tinged with pale brown; the whole straight and rigid, or slightly sigmoid, tapering distally to the undifferentiated tip and blunt apex. Largest perithecia $300 \times 25 \mu$; ascigerous portion about 140μ , but varying to much smaller dimensions. Receptacle about $60-80 \times 15-20 \mu$. Primary appendage $125-170 \times 12 \mu$; longer secondary appendages $300-425 \mu$, more or less.

On the elytra of *Gonocnemis* sp., Nos. 2356 and 2633, Kamerun, West Africa.

This species is very nearly allied to *D. maculatus* and may show a much fainter though similar maculation of the secondary appendages; which are stouter, the cells tending to be distally enlarged, with slightly concave margins. The receptacle is very different from the subtriangular compact habit seen in *D. maculatus*. The male also is dissimilar, having a primary appendage of different form, and antheridia of peculiar outline, unassociated with secondary appendages.

DIMEROMYCES PELTOIDIS Thaxter. Plate III, figs. 68-71.

L. c. 55, 235.

Male individual hyaline, becoming slightly tinged with brown, four- or five-celled, the basal larger and much longer, sometimes partly involved by the blackening of the foot. Appendage undifferentiated, of two or three cells, slightly tapering, rarely once-branched. Antheridia slightly divergent, usually two or more, rather short and stout, especially the neck, which is bluntly subconical, or but slightly curved. Total length $40-46 \mu$. Antheridia $15-20 \times 4.5-5.5 \mu$.

Female individual pale yellowish, or becoming tinged with brown, variable. Receptacle short and somewhat stout, straight and erect, or curved; the basal cell larger and longer than the rest, which are more or less oblique and wedge-shaped; each producing one, or rarely two, perithecia or appendages, or one of each. Primary appendage simple, or furcate above the smaller undifferentiated basal cell; somewhat moniliform, or the rather numerous cells squarish or subrectangular; secondary appendages similar, often furcate above the basal cell, which is not distinguished and may also produce an accessory perithecium between the branches. Perithecia large, long, subsymmetrical; the stalk often slender and well developed, not always clearly distinguished from the sporiferous portion; the tip large, well distinguished, rather character-

istically swollen, tapering distally to the short, bluntly rounded, undifferentiated apex. Spores $26 \times 2.5 \mu$. Perithecia $85-180 \times 14-22 \mu$. Longest appendages $100-190 \times 6-9 \mu$. Receptacle $38-46 \times 4.5-5.5 \mu$.

On *Peltoides pustulatus* Fairm., No. 3080, Kamerun, West Africa.

This species, which appears to be somewhat allied to *D. adventitosus* and *D. anomalus*, varies very considerably according to its position and luxuriance of growth. Individuals from the legs, and the tip of the abdomen, are darker and more fasciculate, with shorter perithecia. Those on the elytra and prothorax are simple and smaller, the appendages usually simple and single. A specimen growing near the base of the posterior legs, figure 68, is much larger, with several supernumerary perithecia, and branched appendages, a perithecium and an appendage also arising independently from the distal cell of the receptacle. The occurrence of furcate appendages bearing perithecia has been referred to above, p. 333, and might suggest that secondary peritheciigerous branches from the receptacle, such as occur in *D. crispatus*, may be merely modified secondary appendages. In the more compact and fasciculate individuals the cells of the receptacle may be so crowded that it is not possible to distinguish them clearly, or the origins of the tuft of appendages which arise from them, as from a common base.

DIMEROMYCES AMARYGMI Thaxter. Plate IV, figs. 111-112.

L. c. 55, 237.

Male individual hyaline, or faintly yellowish, rather slender, erect; the receptacle consisting of about ten cells, more or less; the basal much larger; the rest flattened, small, the upper somewhat oblique; the distal and one to six of the cells below it, giving rise to antheridia, which are suberect, or not strongly divergent; the stalk-cell free, and clearly defined; the neck as long as the venter, strongly bent outward. Primary appendage simple, stouter below, distally tapering, usually longer than the receptacle. Antheridia $25-30 \times 7-8 \mu$; receptacle $45-55 \times 7-12 \mu$. Primary appendage $55-85 \mu$.

Female individual pale yellowish. Receptacle erect or slightly bent outward distally; consisting of from ten to eighteen cells; the basal larger subtriangular; the rest flattened, increasingly oblique distally, giving rise to perithecia, or rather rigid, simple, secondary appendages which alternate with them, at least above, where the latter may be greatly elongated and attenuated; while below they may be successively shorter, and less tapering, like the primary appendage, and bent abruptly toward the substratum. Perithecia one to several, usually subtending secondary appendages, suberect, straight, nearly symmetrical, increasing in diameter slightly and continuously from the insertion of the stalk to the region of the tip; which is clearly distinguished by slight elevations on either side, whence it tapers rather abruptly to the slightly inflated apex. Perithecia $125-235 \times 20-24 \mu$, the subconical extremity about 20μ . Longest appendages $150-275 \mu$. Receptacle $65-100 \times 20-25 \mu$.

On the elytra of *Paramarygmus* sp., Nos. 2333 and 2567, Kamerun, West Africa.

This fine species is allied to *D. Strongylis*, and even more closely to *D. Trycheri*, from which it is distinguished by the form of its perithecium, and the unmodified bases of its much longer upper secondary appendages.

DIMEROMYCES STRONGYLII Thaxter. Plate IV, figs. 109-110.

L. c. 55, 236.

Male individual pale yellowish, with a faint tinge of brownish. Receptacle compact, erect, slightly curved; of five to twelve cells, slightly tapering above the subbasal; the basal short,

angular, or similar to the rest; which are subsimilar, flattened wedge-shaped, oblique; the distal usually separated by a more or less abrupt indentation from the basal cell of the erect appendage; which consists of usually four cells, tapering to a point, the basal cell somewhat inflated, longer than broad; the terminal ones projecting from a collar formed by the ruptured outer wall-layers above the subbasal cell. Antheridia from three to ten, often six, subradiate, short and stout; the stalk-cell distinct; the venter rather abruptly distinguished from the base of the neck, which is stout and abruptly distinguished from the short, straight, uniform and truncate distal part: the successive antheridia diverging slightly right and left, and often associated with one or two secondary appendages; which are similar to the primary, but often longer, their basal cells not inflated. Receptacle $25-42 \times 16 \mu$. Antheridia $25-30 \times 9 \mu$. Appendages $40-80 \mu$.

Female individual similar to the male. Receptacle of eight to ten cells, producing one or two to four perithecia, usually alternating with secondary appendages; which are usually longer than the primary, projecting beyond the perithecia, tapering; the five or six basal cells below the collar stouter, twice as long as broad, or less, sometimes slightly inflated: the whole rather stiff and straight, or but slightly curved or bent; the axis of each appendage, as well as of the perithecia, more or less coincident with the transverse axis of the cell of the receptacle which bears it. Perithecia subfusiform, straight, subsymmetrical, the stalk not abruptly distinguished, and about as long as the ascigerous portion; the termination blunt, rather broad, unmodified. Perithecia $75-120 \times 20-25 \mu$. Receptacle $40-60 \times 16-25 \mu$. Longer appendages $100-150 \mu$.

On the elytra and inferior surface of species of an unknown genus near *Menepphilus* (fide Arrow), No. 2353, (Type), No. 2569, Kamerun, West Africa. On *Platydemus detersum* Walk., No. 2122, Sarawak, Borneo.

The host on which the type of this species was originally found was determined for me as *Strongylium* sp.; but Mr. Arrow has since informed me that it belongs to an unknown genus near *Menepphilus*. Individuals from Borneo have appendages with somewhat more numerous and shorter cells, separated below by more distinct constrictions; but the differences are unimportant. The few individuals from host No. 2569, however, differ in having more erect, elongate and straighter receptacles, and suberect perithecia and appendages. This form possibly may not belong here, but the material is not sufficient to determine this definitely. The species is most nearly allied to *D. Trycheri*, *D. Amarygmi*, *D. Peltoidis* and *D. adventitiosus*, from all of which it is, however, abundantly distinct.

DIMEROMYCES ADVENTITIOSUS Thaxter. Plate III, figs. 64-67.

L. c. 55, 233.

Male individual pale yellowish, the receptacle consisting of five or more cells; the basal larger, subtriangular, the rest somewhat flattened and oblique; producing single, slightly divergent antheridia, or occasionally simple sterile branches. The primary appendage an undifferentiated continuation of the axis; often bearing numerous antheridia on one or both sides; a large secondary appendage sometimes developed from the subbasal cell, of indefinite growth, and producing numerous antheridia from the upper margin. Antheridia straight, or the necks slightly curved; the stalk-cell well distinguished. Length of receptacle proper about 25μ . Primary appendage 40μ or more, sometimes over 200μ ; the large secondary appendage somewhat shorter. Antheridia about $22 \times 5 \mu$.

Female individual pale yellowish; the receptacle consisting of six to eight somewhat flattened and oblique cells, the basal triangular; the primary appendage often greatly elongated, undifferentiated. Three or four of the cells of the receptacle usually producing simple, undifferentiated secondary appendages; while from one or more of the remainder, perithecia may develop;

adventitious perithecia often arising also from the lower secondary, as well as the primary, appendage. Perithecia straight, somewhat asymmetrical, the stalk-portion short and not clearly defined, one margin more strongly convex; tapering distally to the short, nearly symmetrical, rather clearly distinguished, small, blunt apex. Perithecia $80-110 \times 20-18 \mu$. Receptacle and foot 40μ or less. Appendages variably elongated, up to $425 \times 9 \mu$.

On the elytra and prothorax of *Tenebrio quadrihamatus* Fairm., No. 2801B, M. C. Z., Madagascar (Wulsin).

Reference has several times been made above to the very unusual conditions presented by this species, owing to the development of adventitious antheridia and perithecia, of which figure 67 illustrates an extreme case. The material is not very abundant, and it is not unlikely that female individuals may occur in which the adventitious perithecia are more numerous than in any of those examined. Not more than three have been seen on a single appendage, though they may develop not far from the extremity, as in figure 65. Many individuals of both sexes are quite normal. The pairs are scattered on the upper surface of the host, and are seen with considerable difficulty. The species is most nearly allied to *D. anomalus*, which also occurs on a tenebrionid, and shows a somewhat similar tendency to produce adventitious antheridia, and probably, also, perithecia; although the material, in this instance, is also too scanty to show the range of variation in this respect.

DIMEROMYCES ANOMALUS Thaxter. Plate III, figs. 61-63.

L. c. 55, 234.

Male individual pale yellowish, the axis rather slender and consisting of an indeterminate number of cells, of which there may be ten or more; slightly tapering; the primary appendage not distinguished; the subbasal cell giving rise to a secondary appendage, which is very similar to the main axis, the two diverging, so that the individual has a furcate habit; any cell of these axes bearing antheridia from the upper side, so that there may be six or more produced. Antheridia rather stout, with short well defined stalk-cells; the necks well distinguished, short and stout, somewhat curved; including stalk $20 \times 6 \mu$. Longest axis 66μ .

Female individual pale yellowish; Y- or T-shaped owing to the production of a secondary appendage from the subbasal cell, which curves away from and is more or less symmetrical with, the main axis; which is hardly larger, furcate above its basal cell; the basal cell of one of its branches sometimes producing a perithecium; the cell-relations sometimes confused by secondary divisions of the subbasal cell; the main axis giving rise to one or more perithecia and appendages, usually but one, the latter furcate above the basal cell: the cells of the axis and branches slightly longer than broad, the latter tapering but slightly. Perithecia usually not more than one to three, the stalk rather slender and well developed, rather clearly distinguished from the ascigerous portion; which is asymmetrical, more convex on one side, the apex flaring or asymmetrical. Perithecia $95 \times 15-16 \mu$, ascigerous part $47-52 \times 16 \mu$. The divergent axes $85-95 \times 6 \mu$.

On the left elytron of *Platydemus* sp., No. 3995, Florida, Solomon Is. (Mann).

Although the material of this species is scanty and in poor condition, the only individuals with mature perithecia being those represented in figures 61 and 62, it is so well marked and peculiar that it should be readily recognizable. Like *D. adventitosus*, which is its nearest ally, and to a less degree *D. Peltoideis*, it is remarkable for the production of adventitious perithecia, as well as antheridia. Of the four males which have been examined, all show the same furcate habit, and production of antheridia from both the primary and secondary axes, while in *D. adventitosus* individuals producing a secondary appendage, or axis, bearing antheridia, as in figure 67, are less frequent than the normal type shown in figure 66.

DIMEROMYCES AMAZONICUS Thaxter. Plate IV, figs. 88-90.

L. c. 55, 240.

Male individual hyaline, erect, slender, the receptacle consisting of three cells obliquely superposed, the basal longer; but slightly narrower below. Primary appendage three-celled, tapering to a point, the cells of about equal length. Antheridium relatively large and slender, nearly erect, the free stalk-cell bent abruptly upward; the neck nearly as long as the venter, slightly divergent, considerably exceeding the tip of the appendage. Total length to tip of antheridium $42 \times 8 \mu$. Antheridia $24 \times 9 \mu$. Appendage $14 \times 3 \mu$.

Female individual hyaline, slightly curved. Receptacle consisting of four cells very obliquely superposed, so that the distal (outer) margins of the first three nearly coincide horizontally; the subbasal bearing the single secondary appendage, close to the base of which the third cuts off a small cell; the fourth less flattened, narrower and longer, bearing the single perithecium: the foot blackened only along its marginal contact. Primary appendage consisting of two rather abruptly broader basal cells, the upper longer, and an abruptly slender distal portion, brownish below, slightly tapering and variably elongated. The secondary appendage usually longer, consisting of a relatively large nearly free basal cell; above which a brownish, isodiametric, closely septate lower portion, of six to ten flattish cells, is rather abruptly distinguished; the distal portion above, variably elongated, the walls tending to disorganize distally. Perithecium sessile, or very short stalked, slightly curved, the inner margin rather strongly convex; the apex somewhat sulcate, distinguished from the undifferentiated tip by an abrupt constriction. Perithecia $60-75 \times 14 \mu$. Longer appendage, secondary, $114-130 \times 4 \mu$ below; primary appendage $75-100 \times 3.5 \mu$ above basal cells which together are $24 \times 6 \mu$. Receptacle $28 \times 15 \mu$. Total length to tip of perithecium $75-100 \mu$.

On the elytra of *Platydemia* sp.?, No. 2243, Independencia, Amazon (Mann Coll.).

This species, the host of which is not certainly determined, is clearly distinguished by the peculiarities of its appendages and the apex of its perithecium. One or two aberrant males have been seen with more than one antheridium. The large somewhat inflated lip-cells, which form the apex, and are abruptly distinguished, may be separate and somewhat divergent. The species appears to be more nearly allied to *D. sulcatus* and the other species which occur in the East on *Leiochrodes*.

DIMEROMYCES CRYPTICI Thaxter. Plate IV, figs. 100-102.

L. c. 55, 239.

Male individual uniformly pale yellowish, becoming faintly tinged with brown. Receptacle and appendage forming an undifferentiated axis, tapering and somewhat divergent distally; the walls thick, the transverse septa nearly horizontal, the lower cells slightly flattened. Antheridia one to four, slightly divergent; the well developed stalk-cell bent abruptly upward; the venter short and stout; the hyaline neck straight, rather short, abruptly distinguished. Total length to tip of appendage $70 \times 9 \mu$. Antheridia $25 \times 8 \mu$.

Female individual similar to the male in structure and color, slightly darker. Subbasal cell of the receptacle giving rise to a stout, slightly tapering secondary appendage, curved upward against the lower perithecium, and reaching about to its middle. Perithecia one to several, subsymmetrically fusiform, erect, the short stalk bent abruptly upward; the tip hardly distinguished; the apex small, short, hyaline, abruptly distinguished by a slight constriction on both sides, accentuated by a protrusion on the inner side, slightly pointed and bent inward, with flat

rounded lips on either side. Perithecia $75-84 \times 18-22 \mu$. Secondary appendage $75-90 \times 9 \mu$. Total length to tip of primary appendage $75-100 \times 9 \mu$, of perithecia $100-120 \mu$.

On the elytra of *Crypticus scriptipennis* Fairm., No. 3078, Kamerun, W. Africa.

Although this form is without striking individual peculiarities, it is well distinguished by its undifferentiated primary appendage, and its single secondary appendage, which curves up against the lower perithecium, and is very similar to the primary axis. The tips of the nearly symmetrical perithecia are rather characteristic from the slight constriction which distinguishes the apex, and the conformation of the latter.

DIMEROMYCES HETEROPHYLLI Thaxter. Plate IV, figs. 91-94.

L. c. 55, 241.

Male individual hyaline, becoming tinged with pale brownish yellow. Receptacle consisting of four cells, the basal much longer; the rest somewhat flattened and obliquely superposed. Appendage of usually four cells, the basal much larger, and usually abruptly prominent, distally and externally, below the usually three-celled, abruptly narrower distal portion; which usually converges inward, its basal cell slightly brownish. Antheridia short and stout, sessile, with short necks, curved strongly outward. Receptacle and foot $30-35 \mu$. Appendage 20μ . Antheridia $18 \times 7.5 \mu$.

Female individual tinged with pale brownish yellow. Receptacle consisting of usually six or seven cells, flattened and oblique, except the basal, and the distal, the latter not distinguished from the basal cell of the primary appendage, which is bent against the perithecium, and similar to that of the male, but consists of from five to seven cells. Secondary appendage usually single, arising from the cell next below the insertion of the perithecium, the cells immediately below it separating small cells distally and externally on the same side. Perithecium normally single, short-stalked, subsigmoid, its apex rather broad, slightly bent upward, blunt, unmodified, sometimes slightly oblique. Perithecia $45-48 \times 14-15 \mu$. Receptacle $38-44 \times 12 \mu$. Secondary appendage, longest, 65μ ; primary $28-35 \mu$. Total length to tip of perithecium $75-80 \mu$.

On the elytra of a bluish black *Heterophyllus*. Hayti, No. 2760 (Mann Coll.).

This small and rather insignificant species is very closely related to *D. proximus*, which occurs on a similar host in Hayti, but differs in certain characters, which are referred to under that species, and seem to separate it with sufficient definiteness.

DIMEROMYCES PROXIMUS Thaxter. Plate IV, figs. 95-99.

L. c. 55, 242.

Male individual hyaline, or very faintly tinged with brownish yellow; the cells very clearly defined. Receptacle erect, of four or five cells; the basal narrower and somewhat longer; the rest considerably flattened and oblique. Appendage erect, slight tapering, of usually four cells; the basal larger, and not differentiated from the receptacle; the subbasal very faintly brownish; the distal longer, hardly reaching the tip of the antheridia of which there are one to three, relatively rather slender; the stalk-cell short and well defined; the venter slightly inflated; the neck curved outward. Receptacle 28μ . Antheridia $28 \times 6 \mu$. Appendage $20-25 \mu$. Total length to tip of antheridium 58μ .

Female individual faintly tinged with pale brownish yellow, or nearly hyaline, erect, rather compact. Receptacle of six, less often seven, cells, flattened and obliquely superposed above the somewhat longer basal cell. Primary appendage similar to that of the male, four- or five-celled; secondary appendage appressed, bent upward against the perithecium and arising from two

or three of the cells immediately below it, hardly reaching to its tip, rather stout and but slightly tapering, of six or seven cells. Perithecium usually single, erect, straight or nearly so, rather stout, sessile; the tip tapering rather abruptly to the small bent apex, from which two auricle-like lips project somewhat sidewise: becoming faintly brownish with age. Perithecia $38-50 \times 12-14 \mu$. Receptacle $30-38 \mu$. Primary appendage $28-38 \mu$; secondary $45-60 \mu$. Total length to tip of perithecium $75-100 \mu$.

On the elytra of *Heterophyllus* sp., No. 2759, Hayti; M. C. Z. (Mann Coll.).

This small species is very closely allied to *D. Heterophylli*, which occurs on another species of *Heterophyllus* without maculation, the host of the present form having an orange spot on the elytra. It was separated with some hesitation, but the differences seem distinct and constant. The most striking character which distinguishes the two is found in the form of the perithecium and the modification of its apex, *D. Heterophylli* lacking entirely the small auricular projections formed by two of the lips in *D. proximus*.

DIMEROMYCES APPENDICULATUS Thaxter. Plate VI, figs. 161-164.

L. c. 55, 249.

Male individual faintly tinged with yellowish. Receptacle broader than long above the large foot; of three cells, the basal greatly flattened, and extending outward and upward, beside the subbasal, above the insertion of the lower of the two antheridia; which arise from the subbasal and distal cells, the former projecting above the latter owing to its much longer stalk-cell; the venters relatively narrow; the necks stout and curved, or bent inward or sidewise, sometimes almost at right angles. Appendage long, five- or six-celled, and abruptly slender above the large basal cell. Receptacle $19 \times 20 \mu$. Antheridia, upper, 35μ , lower 45μ . Appendages, longest seen, 45μ . Total length to tip of lower antheridium, including foot, 60μ .

Female individual pale yellowish. Receptacle as in the male, but of four cells, the lower becoming somewhat distorted or displaced; the basal also forming a narrow margin, which extends up to, and is united to, the end of the basal cell of the single secondary appendage; which arises from the subbasal cell, both primary and secondary similar, becoming slender above the latter, rather closely septate below; the subbasal cells darker. Perithecium relatively large, sessile, without stalk, broader at the base, tapering gradually upward, bent, curved or arcuate; the tip abruptly somewhat narrower; the apex subtended by a slight indentation, and bearing a small, tooth-like prominence on one side, and a long, slender, usually upcurved and distally clavate appendage on the other. Perithecia $115-150 \times 14-17 \mu$, the appendage $40-50 \times 7.5 \mu$ at tip. Receptacle $15 \times 22 \mu$, exclusive of large foot. Longest appendage 95μ . Total length to tip of perithecium $135-170 \mu$.

On the antennae of *Leiochrodes medianus* and *Leiochrodes* sp., Nos. 2996-2998, Auki and Fulakora, Solomon Is. (Mann Coll.).

Although so aberrant in the form of its receptacle, and the possession of a well developed perithecial appendage, or trigger organ, this very distinct species is perhaps as nearly related to *D. luteus*, which occurs on the same host, as to any other; the appendages, with their rigidity and modified subbasal cells, being similar. The cell relations of the receptacle, which, in figure 162, is shown in optical section, are often confused by the irregular development of certain cells. The narrow upward extension of the basal cell, which is united to the secondary appendage and extends to its subbasal cell, gives the short broad receptacle a very characteristic appearance.

DIMEROMYCES SULCATUS Thaxter. Plate V, figs. 123-125.

L. c. 55, 248.

Male individual hyaline, slender, erect; the receptacle consisting of three very obliquely superposed cells, more than half of the basal in contact with the subbasal. Appendage erect, subcylindrical, rather stout, of five or six cells, longer than the receptacle; the basal cell undifferentiated, free, the subbasal somewhat narrower and denser. Antheridium single, sometimes two, suberect; the stalk relatively long and slender; the venter rather long and narrow; the long neck bent somewhat abruptly above its base, and curved inward, or sidewise, often at right angles. Receptacle $25 \times 8 \mu$, without small pointed foot. Antheridia, to bend of neck, $34 \times 5-6 \mu$. Appendage $38-45 \times 4.5 \mu$.

Female individual almost perfectly hyaline, erect; the receptacle consisting of four cells, otherwise like that of the male; the primary appendage of four or five cells, erect, nearly uniform in width, the subbasal slightly narrower; secondary appendage arising from the subbasal cell, erect, straight, nearly uniform, of seven or eight cells, reaching slightly above the middle of the perithecium, which it subtends. Perithecium long and slender, straight or distally curved outward, broader at the point of curvature; the tip slightly inflated, and distinguished above and below by prominent constrictions; the apex nearly as long, deeply sulcate or bilobed, the margins convex. Perithecia $90-105 \times 12-15 \mu$. Primary appendage $40-45 \times 5 \mu$; secondary $65-75 \times 5 \mu$. Receptacle $30-34 \times 12 \mu$. Total length to tip of perithecium $120-148 \mu$.

On the elytra of *Leiochrodes* sp., Los Baños, Philippines, No. 3043.

The host, on which this well marked species occurred, was very kindly sent me by Dr. W. H. Weston. Although in fundamental characters it is similar to *D. luteus* and other forms which occur on species of *Leiochrodes*, it is very well distinguished by its slender habit and deeply sulcate apex. As in the other species, the two appendages form a socket, as it were, into which the perithecium is inserted. The latter shows no clear differentiation of a stalk.

DIMEROMYCES DECUMBENS Thaxter. Plate V, figs. 116-117.

L. c. 55, 247.

Male individual dull brown, straight, receptacle three-celled, the basal transversely maculate, except its oblique extremity. Appendage short, hardly reaching the end of the venter; the basal cell square, suffused; the subbasal similar, deeper or opaque; the terminal longer than both, suffused below and externally, its blunt hyaline apex protruding beyond the blackened margin of the ruptured sheath. Antheridium single, erect, touching the appendage; the stalk well developed; the neck clearly distinguished, about as long as the venter, slightly tapering, bent somewhat sidewise distally; the whole evenly pale brown. Receptacle $50-60 \mu$. Appendage 38μ . Antheridia $80-18 \mu$. Total length 125μ .

Female individual more or less uniformly dull brown. Receptacle of four cells, the basal maculate, like the male, the rest obliquely superposed, the subbasal producing the single very large secondary appendage, of six or seven cells; subsigmoid, the basal longer, curved, the rest successively shorter, separated by slight constrictions, and with somewhat convex margins; the distal again longer, distally slightly tapering, irregularly divided or disorganized. Primary appendage short, similar in structure and suffusion to that of the male. Perithecium very large, the somewhat paler stalk not distinguished from the rest, the lower half or more of the ascigerous part more deeply suffused; the tip well distinguished by prominences on both sides; the blunt somewhat asymmetrical apex slightly bent away from the secondary appendage; the whole projecting upward beside the appendage at an angle of 45° or more from the prostrate receptacle.

Perithecium $235-310 \times 38-342 \mu$, the stalk $60-80 \mu$. Receptacle $70 \times 34 \mu$. Primary appendage $45-60 \times 12-14 \mu$; secondary $250-290 \times 20-22 \mu$. Total length to tip of perithecium $365-380 \mu$.

At the base of the posterior legs of *Leiochrodes* sp., Auki, Solomon Is., No. 2950 (Mann Coll.), M. C. Z.

The male individual, as well as the receptacle and primary appendage of the female, appear to lie flat on the surface of the host, the secondary appendage and the perithecium diverging upward at a variable angle. It is a very large species, closely allied to *D. longicollis*, *D. rugosus* and the other species which occur on members of the genus *Leiochrodes*.

DIMEROMYCES LONGICOLLIS Thaxter. Plate V, fig. 118.

L. c. 55, 246.

Male individual rather uniformly tinged with yellowish brown. Receptacle of three cells, somewhat obliquely superposed; the basal longer; the subbasal flattened. Appendage erect, of four cells; the basal squarish; the subbasal slightly smaller, and deeply suffused with blackish brown, the portion above slightly broader, then tapering to a blunt apex. Antheridia one or two, relatively large and long; the stalk well developed, abruptly bent upward at its origin; the venter convex externally, and rather abruptly distinguished from the tapering base of the very elongate neck, which reaches considerably above the tip of the appendage. Receptacle $50 \times 17 \mu$. Appendage $50-60 \times 7 \mu$. Antheridia $85 \times 14 \mu$, the necks $42 \times 3 \mu$. Total length about $140 \times 18 \mu$.

Female individual tinged with yellowish brown, the perithecium becoming rich dark brown. Receptacle consisting of four cells, the two middle ones flattened and very obliquely superposed. Primary appendage consisting of five or six cells. Secondary appendage from the subbasal cell, erect, distally tapering to a blunt apex, of about seven cells, somewhat longer than the primary, and stouter in the middle, but otherwise similar, the basal cell relatively large, oblique below. Perithecium long and slender, erect, slightly flexed inward distally, blackish brown, the stalk-portion pale and rather clearly distinguished; the tip hardly distinguished, but finally indicated by a deeper subtending suffusion; the short, hyaline, slightly oblique apex turned slightly outward and usually subtended on the inner side by the persistent base of the trichogyne. Perithecia $250 \times 30 \mu$. Receptacle $64 \times 22 \mu$. Primary appendage $64-84 \times 12 \mu$; secondary $100-120 \times 12 \mu$. Total length $275-310 \mu$.

On the elytra of *Leiochrodes medianus* Westw., Nos. 2951 and 2997, Auki, and No. 2998, Fulakora, Solomon Islands (Mann Coll.).

This species is allied to the other species on *Leiochrodes*, especially to *D. decumbens*, but differs clearly in the form of the perithecium, and the length and character of the appendages in the females; but especially in the greatly elongated neck of the antheridium in the male; a character which has suggested the specific name. In both sexes of one pair there is a slight maculation of the basal cell, similar to that seen in *D. decumbens*, but no other individuals show this character.

DIMEROMYCES RUGOSUS Thaxter. Plate V, figs. 113-115.

L. c. 55, 245.

Male individual hyaline, becoming more or less deeply tinged with brown. Receptacle of three cells, the basal longer, the subbasal somewhat flattened and oblique, separating a small cell externally. Appendage of three or four cells, stout and somewhat tapering; the basal cell

symmetrical, somewhat longer than broad, about as large as the distal cell of the receptacle. Antheridia one, or rarely two, abruptly erect; the stalk-cell well developed; the venter slightly inflated; the neck relatively short, and curved abruptly sidewise at its tip, or even recurved. Total length $75-92 \times 17-21 \mu$. Antheridia $42-50 \times 11-12.5 \mu$. Appendage 40μ .

Female individual becoming rather dark brown, or partly opaque. Receptacle relatively small, of four cells; the two middle somewhat flattened and oblique; the basal longer. Primary appendage short and becoming rather irregular; the second and third cells broader than long, and usually darker. Secondary appendage single from the subbasal cell, subclavate, of usually five to nine cells; the basal cell long, curved upward, slender; the third and fourth darker, usually broader than long, hardly exceeding the middle of the perithecium, mostly longer than the primary. Perithecium relatively large, long, straight, subsymmetrical, becoming nearly opaque and transversely rugose above the hyaline base; the tip well distinguished, relatively short, tapering to the very short hyaline apex, which has the appearance of a shallow cup, but from some points of view may be blunt or irregularly oblique. Perithecia $125-200 \times 26-30 \mu$. Receptacle $42-64 \times 35-45 \mu$. Primary appendage $60-80 \mu$, secondary $100-160 \times 16 \mu$. Total length to tip of perithecium $125-200 \mu$.

On the elytra of *Leiochrodes medianus* Westw., Nos. 2998 and 2951 (Type), Auki, Solomon Islands, M. C. Z. (Mann Coll.). On *Leiochrodes minutus* Pic., No. 1836; Sarawak, Borneo.

This species is distinguished by its finely rugose perithecial wall, the rugosity forming transverse lines, hardly visible in the mature perithecium which may be nearly opaque. The apex usually appears flat and hyaline, with symmetrical marginal prominences on either side, giving the effect of a shallow cup. This form is not, however, always apparent; the conformation apparently varying according to the angle at which the perithecium is viewed. There is considerable variation in the depth of the suffusion in different individuals. The rugosity is also variably distinct. Some individuals, like that represented in figure 114, approach *D. longicollis*, which is closely allied, and differs more especially in its very long-necked antheridium.

DIMEROMYCES LUTEUS Thaxter. Plate V, figs. 119-122.

L. c. 55, 244.

Male individual relatively large, pale yellowish, slender: the receptacle consisting of three obliquely superposed cells, the basal long and slender, the others subequal, one or both producing antheridia. Appendage of three or four cells, the basal larger, rather clearly distinguished from the slightly brownish narrower cells above. Antheridia relatively long and slender, the stalk-cell well defined, bent inward; the upper one in more or less continuous contact with the appendage; the necks reaching nearly to the tip of the appendage, rather strongly curved inward. Receptacle $55-65 \times 12 \mu$. Appendage $40-45 \mu$. Antheridia $46-50 \times 9 \mu$. Total length $95-100 \times 14 \mu$.

Female individual clear pale yellow, often becoming slightly suffused with brownish; straight and erect. Receptacle consisting of four cells: the basal somewhat elongate, the second and third oblique and flattened: producing normally a single perithecium from the third, and a secondary appendage from the second. Primary appendage shorter than the perithecium, and erect beside it or rarely slightly divergent; its basal cell much larger, long, and broader than the subbasal; which is clearly distinguished by its brown color: secondary appendage seldom as long as the perithecium, and lying close against it; its basal cell longer, the following six or more squarish, the subdistal ones broader, the lowest tinged with brown. Perithecium often becoming tinged with brown, straight, erect, rather stout, sessile, subsymmetrical, with more or less straight margins; the tip- and apex-regions abruptly distinguished; tapering to a rather broad bluntly rounded

termination. Perithecia $90-100 \times 24-30 \mu$. Receptacle $60-65 \times 20 \mu$. Longest appendages $75-100 \mu$. Total length to tip of perithecium $140-160 \mu$.

On the elytra of *Leiochrodes medianus* Westw., and of *Leiochrodes* sp., Nos. 2950, 2951, 2966 and 2997, Auki, Solomon Islands (Mann. Coll.).

In the group of nearly allied forms occurring on *Leiochrodes* this species is easily distinguished by its pale yellow color, and by the form of its sessile perithecium, lying parallel to the two appendages, which usually lie close against it, and between which it is inserted. The male is relatively unusually large, and differs from that of other allied species in its long slender habit, distally incurved necks and yellowish color. It occurs scattered over the elytra in pairs, often in company with *D. rugosus*. A small form has been examined from Sumatra in which the perithecia are marked by rather faint transverse granular lines.

10. ON ANTHICIDAE.

DIMEROMYCES TOMODERI Thaxter. Plate VIII, figs. 205-207.

L. c. 55, 273.

Male individual hyaline, or very faintly tinged with brownish yellow. Receptacle very short and stout; the basal cell twice as broad as long, oblique, its posterior margin prominent and suffused with blackish brown; the subbasal somewhat narrower, externally convex, the base of the two-celled appendage half as broad, its cells subequal, hardly longer than broad, of uniform width, distally bluntly rounded. Antheridium from subbasal cell, relatively large and long; the stalk-cell well developed, twice as long as broad, nearly erect; the venter and neck well distinguished, straight, of nearly equal length. Receptacle $8 \times 7 \mu$. Foot $8 \times 10 \mu$. Appendage $8-9 \times 3.5 \mu$. Antheridium $28 \times 5 \mu$.

Female individual pale brownish yellow, becoming darker; the perithecium deeper brownish. Receptacle consisting of four somewhat obliquely superposed cells, somewhat flattened; the fourth distally prominent, and bearing the four-celled primary appendage subterminally, from the right side; the subbasal cell bearing the secondary appendage, which consists of four or five cells, hardly tapering, similar to the primary but slightly longer, reaching to about the middle of the perithecium, which arises from the third cell; stout, erect, its outer margin strongly convex, its inner more nearly straight; the stalk very short and abruptly narrow; the ascigerous portion very broad, and tapering distally to the stout moderately well distinguished, relatively large tip; the apex short, projecting to a blunt point, anteriorly, its distal margin flattish, oblique. Perithecia $50-55 \times 20-22 \mu$. Appendages $18-25 \times 25-4 \mu$. Receptacle $20 \times 14 \mu$, exclusive of large foot. Total length to tip of perithecium $80-90 \mu$.

On the femur of anterior legs of *Tomoderus Kraatzi* Pic., No. 2590, Kamerun, West Africa.

This small species appears to be quite unlike any other described form and is the only species found as yet on the Anthicidae, which harbor so many other unisexual forms with simple antheridia. The apex of its perithecium appears differently from different points of view, the prolongation of the apex sometimes resembling a blunt tooth. The male is distinguished by its very large foot, short receptacle, and relatively long antheridium.

11. ON CHRYSOMELIDAE.

DIMEROMYCES LONGITARSIS Thaxter. Plate V, figs. 129-131.

L. c. 50, 22.

Male individual hyaline, or faintly yellowish; receptacle consisting of three obliquely superposed cells; the subbasal smaller, the basal much larger. The appendage bent inward from the

distal cell, which is prominent below it externally; consisting of a much broader, distally somewhat rounded, basal cell, and a subulate distal cell of variable length. Antheridia normally two, somewhat divergent; the stalk small, and free only externally; the venter stout, and rather abruptly distinguished from the neck, which is stout, usually more or less strongly curved outward. Total length to tip of appendage 60–64 μ ; to tip of distal antheridium 70 μ , including foot. Appendage 14–18 μ . Antheridium 22–28 $\times$ 8.5 μ .

Female individual tinged with pale yellowish, the perithecium more distinctly pale brownish yellow at maturity. Receptacle consisting of four obliquely superposed cells; the basal slightly larger, the second and third subequal; the upper terminated by the primary appendage, which is very similar to that of the male; a single, whip-like, distally slender and flexuous secondary appendage arises from the subbasal cell, its basal cell not distinguished from the adjacent cells of the receptacle; the whole exceeding the perithecium in length. Perithecium stout, or rather slender, strongly convex on the inner side, more nearly straight next the secondary appendage; the stalk-portion almost obsolete; the tip becoming rather clearly distinguished by depressions and slight elevations, rather abruptly paler, separated at maturity by a variably distinct constriction from the short apex; which is somewhat asymmetrical, rather abruptly inflated on either side, distally compressed and tapering abruptly to a blunt point. Perithecium 80–120 $\times$ 20–25 μ . Secondary appendage 85–100 μ ; primary 25 μ .

On the elytra and prothorax of *Longitarsus testaceus* Mels., Fayetteville, Arkansas, No. 1801; of *L. subcinctus* Har., No. 2455, and of *Aphthona Deyrollei* Baly, No. 2454, Port of Spain, Trinidad, B. W. I.

In this species, as in several others, it is not altogether clear which cell should be regarded as the basal cell of the appendage, and which the distal cell of the receptacle. An examination of very young individuals leads me to conclude that the receptacle should be regarded as consisting of four cells, while the appendage is made up of a very small basal cell and a subulate distal portion which may represent a second cell, or merely the pointed termination of the original spore. I have been unable to satisfy myself that it possesses a definite wall, although in the male this seems to be the case. The distal cell of the receptacle, as shown in figs. 129 and 130a, is united to the stalk of the perithecium, which arises from the cell below it. Although individuals from Arkansas and from the West Indies differ in no essential respects, there is a certain amount of variation in both instances, certain specimens being more elongate than those figured. The constriction which subtends the apex of the perithecium also varies greatly, and is prominent only in fully matured individuals. The species is nearly related to *D. Homophoetae* and can hardly be separated from *D. Bordei* Maire to which reference is made below. It may be mentioned that in figure 131 the antheridia are so turned that the curvature of the neck is much less conspicuous than is ordinarily the case.

DIMEROMYCES BORDEI Maire.

Publ. d. l'Université d'Alger. 3me Contr. a l'Étude d. Laboulbéniales de l'Afrique du Nord. Alger, 1920. 4, Plate I, figs. 1–5.

This species is said to occur on the elytra of *Thyamis parvula* Payk, and to be intermediate between the two preceding species. From *D. Longitarsi* the female is described as differing in having a three-celled primary appendage, and a larger perithecium, in which the terminal constriction is slight or absent, the stalk free on both sides. The male is said to differ in having a two-celled primary appendage, which is not pointed, and reaches nearly to the apex of the antheridium. These discrepancies may be in part accounted for by the fact that as above mentioned, the constriction of the perithecial tip is prominent only in well matured specimens, and

by a difference of opinion as to which cells should be regarded as belonging to the receptacle and which to the appendage; and also whether the pointed apex of the latter should be regarded as a definite cell, which in the male it actually seems to be. In a dozen or more males of *D. Longitarsi*, which have been examined, none have an appendage reaching beyond the base of the neck of the antheridium; and, as shown in figure 130a, the fourth cell of the receptacle in the female seems definitely united to the stalk of the perithecium. The two forms, however, seem too closely related for satisfactory separation as distinct species.

DIMEROMYCES HOMOPHOETAE Thaxter. Plate V, figs. 132-135.

L. c. 50, 19.

Male individual pale brownish yellow; the receptacle of three or four cells, those above the slightly larger basal cell slightly flattened and obliquely superposed. Basal cell of the appendage usually unlike the adjoining cell of the receptacle, and separated by a constriction and thin dark septum from the one- to several-celled distal portion, which ends in a long sharp spine. Antheridia two to five, one to three often arising from the cells of the appendage on which they are frequently terminal and subtended by its spine; the stalk-cell well developed, rather slender; the venter broader distally, and rather abruptly distinguished from the stout, straight, slightly tapering, somewhat longer neck. Total length to tip of appendage $60\ \mu$, of antheridium $80\ \mu$, of proliferous antheridium $112\ \mu$; normal antheridium, including stalk, about $35-40 \times 6\ \mu$.

Female individual rather variable in size. Receptacle reddish brown below, or only the basal cell, distally yellowish: consisting of three or usually four cells obliquely superposed, the darker basal cell extending upward beside the subbasal to the insertion of the lower secondary appendage; the third cell bearing the single perithecium, and the fourth a second appendage. Primary appendages two, consisting of two cells about equal in length, separated by a rather distinct constriction; the distal slightly inflated at the base and narrower apex, which terminates in a sharp spine. Secondary appendages rather slender, tapering, often slightly swollen above the base, shorter than, or not greatly exceeding, the perithecium. Perithecium subfusiform, or externally more convex, straight, or sometimes slightly curved; stalk very short, hyaline, the rest reddish or yellowish brown; the tip and apex paler, distinguished by slight indentations; the latter somewhat spreading, and subsymmetrically three-lobed when viewed sidewise, the middle lobe more prominent; when turned, more compressed and bluntly pointed. Spores $32 \times 3.5\ \mu$. Perithecium $100-190 \times 20-35\ \mu$. Total length to tip of primary appendage $70\ \mu$; of perithecium $140-250\ \mu$. Appendages, longest, $90-110\ \mu$.

On *Homophoeta aequinoctialis* Linn., No. 1577, Guatemala, inferior prothorax; No. 2066, Grenada, B. W. I., on antennae, and No. 2475, Port of Spain, Trinidad, B. W. I.

The specimens from Guatemala, on hosts collected by Professor Kellerman, are somewhat larger than the West Indian forms, but are otherwise similar. The male is decidedly variable, owing to the production of adventitious antheridia, and is usually in not very good condition. The female is readily distinguished by the peculiar form of the pointed terminal cell of its short primary appendage. The species does not seem allied to *D. Forficulae*, as formerly suggested, but rather approaches *D. Hermaeophagae* and *D. Longitarsi*, as well as the exotic species which have been described from Chrysomelidae.

DIMEROMYCES HERMOEOPHAGAE Thaxter. Plate V, figs. 136-139.

L. c. 50, 21.

Male individual nearly hyaline. Receptacle of two somewhat obliquely superposed cells, the basal but slightly larger; the foot subterminal. Primary appendage erect, the basal but

slightly shorter than the cell below it, separated by a black septum from the two nearly equal cells of the distal portion. Antheridium erect, long and slender, exceeding the tip of the appendage; the stalk-cell long and slender; the neck rather stout and but slightly curved outward. Total length to tip of appendage 35 μ ; of antheridium 50 μ . Antheridium 30–34 μ . Appendage 17 μ .

Female individual nearly hyaline or faintly yellowish. Receptacle normally of four cells, the basal slightly larger, with subterminal foot; the second and fourth bearing single secondary appendages, the basal cells of which are separated from the more slender, several-celled, slightly tapering distal part by a black septum. Primary appendage slightly divergent, similar to that of the male. Perithecium erect or more often bent near the base at an angle to the receptacle, arising from the third cell, almost sessile, somewhat asymmetrical, the outer margin straight or slightly concave, the inner convex; the tip usually well distinguished, slightly swollen; the apex funnel-shaped, abruptly and subsymmetrically spreading. Perithecium 60–70 μ . Primary appendage 20–25 μ ; secondary 60–70 μ . Total length to tip of perithecium 75–90 μ .

On *Hermoeophaga insularis* Jac., No. 2066, Grenada, B. W. I. (Brues).

This species occurs on the antennae of the host to which the receptacle is appressed, while the perithecia are curved outward. It is a small form, evidently most nearly allied to the other members of the genus which, like *D. geminandrus*, occur on Chrysomelidae. It is at once distinguished by its spreading apex, the distal margin of which is flat, or hardly rounded.

DIMEROMYCES HYPERACANTHÆ Thaxter. Plate VII, figs. 171–173.

L. c. 55, 256.

Male individual hyaline to pale brownish yellow, relatively small, with large foot. Receptacle of three cells, the second and third strongly convex externally, the former lying beside the distal half of the much larger basal cell, both bearing antheridia, as a rule: the latter slender, erect, somewhat flaccid, the neck slightly curved and relatively long. Appendage erect, hardly reaching the tip of the antheridium, the broader basal cell separated from the two-celled distal part by a broad black septum and slight constriction. Receptacle $30 \times 12 \mu$, exclusive of foot, which is 16–18 μ . Appendage 42 μ . Antheridia $42 \times 5.5 \mu$.

Female individual rather uniform translucent reddish brown with a yellowish tinge, of erect habit. Receptacle consisting of normally five cells, the basal larger, the rest slightly flattened, strongly convex externally, very obliquely superposed, and forming a divergent series from above it: the second, third and fifth bearing secondary appendages; their basal cells distinguished above by broad, black, somewhat constricted septa; the lower giving rise, usually, to two branches, similar to those above, rigid, erect or suberect, tapering but slightly, their often disorganized tips hardly reaching to the extremity of the perithecium. Primary appendage short, of usually three cells, the basal not distinguished from the receptacle, its outer margin strongly bulging, so as to throw the insertion of the blackened septum, at the base of the distal portion, inward. Perithecium somewhat darker, normally arising from the fourth cell; straight, erect, nearly sessile, relatively short and stout, rarely more slender; the outer margin less convex than the inner; the short tapering tip but slightly distinguished; the lip-cells compressed, elongated, and forming a terminal pseudo-appendage, which is bent strongly and abruptly inward. Perithecia $100\text{--}135 \times 30\text{--}36 \mu$. Receptacle, excluding foot and basal cell of primary appendage, $50\text{--}85 \times 25 \mu$. Appendages $100 \times 6 \mu$, longest 150 μ . Total length to tip of perithecium 160–210 μ , the more slender form up to 335 μ , owing to the elongation of the perithecium.

Forming a dense group on the free upper surface of the tip of the abdomen of *Hyperacantha robusta* Ws., and *Hyperacantha* sp., Nos. 3070–3071, Metet, Kamerun, West Africa.

The more elongate form of this peculiar species, above referred to, was found protruding from beneath the tips of the elytra. The pseudo-appendage of this variety tends to be more erect, and the margins of the cells of the receptacle are but slightly convex; while the cells themselves are narrower. The elevations distinguishing the tip are also much more prominent. It is possible that this form may prove distinct, but its differences are probably due to its somewhat different position of growth. The species is evidently allied to the other forms parasitic on Chrysomelidae.

DIMEROMYCES GEMINANDRUS Thaxter. Plate VI, figs. 140-145.

L. c. 55, 253.

Male individual hyaline to yellowish, or faintly brownish. Receptacle slender, erect, consisting of from two to six cells; the basal longer; the rest somewhat flattened, and obliquely superposed. Basal cell of primary appendage straight, erect, nearly isodiametric, about three times longer than broad, separated from the usually three-celled distal portion by a broad black septum. Antheridia two to a dozen or more, often adventitious, even from the basal cell of the primary appendage; which is usually inserted between two symmetrically placed antheridia, which arise distally, on either side, from the terminal cell of the receptacle, their necks curved outward in opposite directions; the rest arising often irregularly from the cells below, on one side, rarely associated with a secondary appendage, from the basal cell of which one or more adventitious antheridia may arise. Antheridia long and slender, the long stalk-cell abruptly erect, or but slightly divergent; the neck slightly curved outward. Receptacle, without foot, $40-80 \times 8-12 \mu$. Distal part of primary appendage $40 \times 4 \mu$, more or less, the basal cell $18-20 \times 6 \mu$. Total length to tips of highest antheridia $80-159 \mu$.

Female individual very variable in size, and in the development of its appendages and perithecia. Receptacle rather short, consisting of from five to eight somewhat flattened, obliquely superposed cells, variably tinged with reddish brown; the subterminal giving rise to the usually single perithecium, below which two to four cells, as well as the terminal one, give rise to secondary appendages; the latter single and simple, or their basal cells proliferating to form two to four branches, separated by black constricted septa, usually slender and very elongate, flexuous and hyaline; basal cell of the primary appendage usually short, unmodified; producing one or more adventitious branches, similar to the secondary appendages, on the inner side. Perithecium normally single, rarely two or three; extremely variable in size and form, sometimes nearly sessile with a broad base, more often with a greatly elongated stalk; which is yellow, not distinguished from the reddish brown ascigerous region; the tip usually rather well distinguished by slight elevations, and tapering symmetrically to the clearly defined apex, which, in face view, is more or less broadly spreading, symmetrically rounded, with marginal indentations; the lateral view asymmetrical, compressed, blunt, usually with a slight subterminal enlargement. Perithecia $150-925 \times 20-30 \mu$. Receptacle $70-125 \times 20-40 \mu$. Longest appendage seen $715 \times 5 \mu$.

Near the apex of the elytra of *Hyperacantha Kolbei* Ws., Type, No. 3072; *Hyp. robusta* Ws., No. 3070 and of *Diacantha Deussenii* Karsch., No. 3073, Kamerun, West Africa.

A reexamination of copious material of this form and of *D. Aulacophorae* has led me to feel doubtful whether the two are best kept distinct. The male is ordinarily recognized by the paired antheridia which terminate the receptacle symmetrically, enclosing the basal cell of the appendage, figures 143-144. The basal cell of the primary appendage, in the female, is not distinctive, as is usually the case in *Aulacophorae*. The perithecia may be extraordinarily developed, sometimes reaching a millimeter in length in the type material; while the form on *Diacantha Deussenii*, figure 142, which is not otherwise clearly separable, has nearly sessile perithecia,

tapering from a broad base. The branches of the appendages may also be very greatly elongated and slender. The type comprises six other closely related forms, namely, *D. auriculatus*, *D. helicoideus*, *D. Aulacophorae*, *D. rigidus*, *D. nigricaulis* and *D. Hyperacanthae*, all of which parasitize Chrysomelidae.

DIMEROMYCES RIGIDUS Thaxter. Plate VI, figs. 155-157.

L. c. 55, 249.

Male individual straight, erect, hyaline, becoming more or less deeply tinged with brown. Receptacle of from five to seven cells; the basal short, subtriangular, hardly larger than those above it; which are flattened and oblique, with slightly convex margins. Basal cell of the primary appendage rather abruptly narrower than the cell below it, somewhat longer than broad, distinguished by a black septum and constriction from the distal portion; which consists of two or three cells, and becomes dark brown. Antheridia one to three or four, associated with one to three erect, brown secondary appendages, very similar to the primary; the stalk-cell relatively long and slender; the venter rather short; the very long slender neck as long as both combined, or longer, distally bent outward; the whole erect, or somewhat divergent. Receptacle, exclusive of large foot, $30-40 \times 10.5-14 \mu$. Primary appendage 30μ . Secondary, larger, $50 \times 5 \mu$, distinguished, above the basal cell, by a black septum. Antheridia $50 \times 6.5 \mu$.

Female individual becoming more or less deeply suffused with dark brown. Receptacle straight, or but slightly curved, consisting of usually six cells; the basal short and subtriangular; the rest more or less flattened and oblique. Primary appendage similar to that of the male. Secondary appendages arising from all the cells of the receptacle above the subbasal, except the subterminal; their broadened basal cells producing from two to more often four, erect, stout, rigid, deep reddish brown branches, distinguished by broad, black, constricted basal septa, and more or less transversely arranged. Perithecium single, rarely two, relatively very large, bent abruptly erect from its insertion; the stalk stout and paler, nearly or quite half the total length, often not clearly distinguished from the sporiferous portion; which is darker, somewhat asymmetrical, abruptly distinguished by a well defined elevation on both margins from the rather slender tapering tip; the apex abruptly distinguished, distally compressed, its abruptly broader base forming a conspicuous prominence on the inner, and a lesser somewhat higher on the outer, margin; the termination much compressed, the lips small, the inner somewhat prominent: the whole appearing in face view subsymmetrical, ligulate or spatulate, distally rather broadly rounded. Perithecia $275-355 \times 25-30 \mu$. Receptacle, without foot, $65-75 \times 25 \mu$. Appendages $150 \times 8 \mu$ or longer. Total length to tip of perithecium $390-425 \mu$.

On the inferior surface of the abdomen of *Aulacophora* sp., No. 2948, Auki, Solomon Islands, M. C. Z. (Mann Coll.).

This large species seems well distinguished by its dark color, brown, rigid appendages, and the form of its perithecia and antheridia. The secondary appendages seem, in most cases, to be proliferous after breakage, and may be longer than the measurements indicated. They do not seem, however, greatly to exceed one third the length of the perithecium. The species is most nearly related to *D. Aulacophorae*, of which it may possibly prove to be a regional variety.

DIMEROMYCES AULACOPHORAE Thaxter. Plate VI, figs. 146-154.

L. c. 50, 20 and 55, 252.

Male individual hyaline to yellowish or variously tinged with brownish. Receptacle erect, of three to six cells, bearing a variable number of antheridia, one to four or five, and one or

more secondary appendages, above the basal cell. Antheridia rather slender, the stalk-cell well developed, about a third of the total length, and free; the neck usually somewhat shorter than the venter, and more or less strongly curved outward. Secondary appendages somewhat uniform, of four to six cells, the basal distinguished from the subbasal by a dark septum and constriction. Basal cell of the terminal appendage usually brown, and sometimes as long, or even longer, than the usually three-celled, rather uniform distal part, from which it is separated by a blackened septum and constriction. Receptacle $20-42 \times 10 \mu$. Basal cell of appendage $16-34 \times 6 \mu$; distal part 42μ or less by 4μ . Antheridium, including stalk, (12μ), $30-34 \times 5-6 \mu$.

Female individual pale yellowish, becoming variously suffused with brownish, or more or less evenly brownish throughout. Receptacle of from four to rarely six cells, flattened and obliquely superposed between the basal and the distal. Basal cell of the primary appendage usually brown, of nearly uniform width, variably elongated, straight, curved or even recurved; separated by a black septum and constriction from the distal portion, which may consist of from one to five or six cells. Secondary appendages very variable; when shorter, usually diverging characteristically, sometimes nearly at right angles; one to sometimes four; simple, or sometimes giving rise to two branches, separated from their basal cells by black septa and constrictions; usually, but not always, shorter than the perithecium. Perithecia usually single, arising from the subterminal cell, rarely two or even three; very variable, straight, curved, or falcate; broadly fusiform, or tapering above the middle to a somewhat attenuated termination; usually suffused with reddish brown below the tip; which is usually hyaline, and may be rather clearly distinguished; the apex small, somewhat spreading, trilobed, or asymmetrically and bluntly pointed according to the point of view. Perithecia $100 \times 12-175-250 \times 24-28 \mu$. Receptacle $40-65 \times 16-20 \mu$. Total length to tip of perithecium $150-240-315 \mu$. Basal cell of primary appendage $16 \times 10-38 \times 8 \mu$.

On the elytra and sometimes other parts of various chrysomelid beetles, No. 2510, Type, on *Aulacophora postica*, Perak, Straits Settlements: No. 3052, genus undetermined, Mindanao, P. I. From the Solomon Is.: No. 2947, on *Aul. similis* Oliv., Tulagi; No. 2989, on genus indet., Wai Ai.; No. 2991, on *Platyxantha* sp., Pamna; No. 2993, genus undetermined, Rendova: No. 2994, on *Monolepta* sp., Rere: No. 2995, on *Monolepta* sp., Rere. From the Fiji Islands: No. 2988, on *Aul. nigoensis* Jac., Suva: No. 2990, on *Aulacophora* sp., Vanna Ava: No. 2992, on genus indet., Nausori: No. 3111, on *Hyperacantha sexaspilata* Fairm., Madagascar. From Kamerun, West Africa: No. 3070, on *Hyperacantha robusta* Ws. and No. 3071 on genus indet.

Since the type material of this species was first found on a specimen of *Aulacophora postica* in the M. C. Z. collection, a large additional representation has been obtained, as above indicated, which shows that the form is a very variable one, and makes its specific limitations very difficult to determine. Forms like that represented in figure 148 may be regarded as typical of the species; but variations occur, like that represented in figure 147 x, showing a reduction in the appendages, and a modification of the form of the perithecium which may be specific: while others, as in figures 148 and 142, tend to produce more elongate appendages, which approach those of *D. geminandrus*. The latter may not prove really distinct, but appears to differ in the more complicated and greatly elongated slender appendages, sometimes considerably longer than is represented in figure 141, and the primary appendage apparently always lacks the peculiar basal cell which is usually, though not invariably, characteristic of the present species. This modification is often more striking than it is shown in figures 146-147, since it is frequently relatively more slender, and often distally curved outward. The male does not appear to show bilateral pairing of antheridia from the basal cell of the primary appendage, and usually produces one or more secondary appendages, a rare condition in male individuals of the genus. Such ap-

pendages are rarely absent in this species, as in figure 154, but this absence, which seems invariable in *D. geminandrus*, is here exceptional.

The type is one about which several closely allied forms, all parasites of Chrysomelidae in the Eastern Hemisphere, are grouped: among which, in addition to *D. geminandrus*, are included *D. rigidus*, *D. nigricaulis*, *D. helicoideus*, *D. auriculatus* and *D. Hyperacanthæ*.

DIMEROMYCES AURICULATUS Thaxter. Plate VII, figs. 168-170.

L. c. 55, 254.

Male individual nearly hyaline. Receptacle erect, consisting of three cells, the two upper bearing superposed antheridia. Appendage consisting of a large basal cell and a slender, two-celled termination, subtended by a cup-shaped black septum and constriction. Antheridia slender, curved outward, with long stalk-cells; the necks slightly longer than the venter, and with purplish brown bases. Receptacle, above foot, $20 \times 8 \mu$. Basal cell of appendage $8.5 \times 4.5 \mu$. Antheridia $38 \times 6 \mu$.

Female individual rather short and stout. Receptacle tinged with purplish brown, erect, subtriangular; consisting of five cells; the three middle ones similar, flattened, oblique and somewhat curved; the subterminal bearing the single perithecium; the second, third and fifth, secondary appendages; the latter rarely double, seldom exceeding the middle of the perithecium, more slender and rather closely septate above the basal cell, above which they are distinguished by broad black septa and constrictions; that from the terminal cell strongly curved outward: basal cell of the primary appendage small, bell shaped, separated from the short, slightly tapering, three-celled terminal portion by a black septum and constriction. Perithecia stout, erect, straight, slightly asymmetrical, subfusiform; the inner margin slightly straighter; yellow, with a brownish tinge, pale at base and tip; the stalk and tip not clearly distinguished; the latter tapering rapidly to the abruptly distinguished apex, which is inflated, its distal margin dome-shaped, and subtended on either side by a prominent auricle, broadly rounded distally, and narrower at the base. Perithecia $135-170 \times 29-34 \mu$. Receptacle $42-55 \times 22-25 \mu$. Longer appendages $85 \times 8 \mu$. Total length to tip of perithecium 190-230 μ .

Growing in a rather compact group on the mid-distal surface of the right elytron of *Diacantha Deussenii* Karsch, No. 3073, Kamerun, West Africa.

Seven pairs of this form have been examined, all from the same individual, among which but slight variation is observable. The primary appendages are broken in all but one, in which the more slender short terminal portion has but three cells. The form and color of the perithecium is very characteristic, and the auriculate apex, which may be nearly symmetrical, is unlike that of allied forms on similar hosts. It is most nearly related to forms of *D. Aulacophoræ* and *D. geminandrus*, but seems hardly a variety of either.

DIMEROMYCES HELICOIDEUS Thaxter. Plate VI, figs. 158-160.

L. c. 55, 255.

Male individual erect, straighter, or but slightly curved. Receptacle hyaline, becoming slightly yellowish, its two cells of uniform diameter, the basal cell of the primary appendage narrower distally, separated from the free, two- or three-celled portion by a black constricted septum. Antheridia erect, appressed or but slightly divergent, normally solitary, pale purplish brown, except the hyaline abruptly outcurved distal half of the neck; stalk well developed. Receptacle, exclusive of foot, $34 \times 8 \mu$. Appendage, above black septum, $25 \times 5 \mu$. Antheridia $38 \times 6 \mu$.

Female individual abruptly helicoid. Receptacle hyaline, becoming suffused with brown, except at the base; consisting of normally five cells, the three middle ones somewhat flattened and oblique, the fourth producing the normally single perithecium; the second, third and fifth secondary appendages normally single, the lowest rarely double. Primary appendage shorter, but similar to the secondary; which are long, though mostly broken, rather slender, slightly tapering, rather closely septate below, distinguished above the basal cell by a black septum. Perithecium strongly curved, or recurved so that the tip may touch the foot; the stalk usually well developed, but not distinguished, pale yellowish, merging into the rich dark purplish brown of the ascigerous portion; tip usually not distinguished; the apex subhyaline, short, blunt, unmodified. Perithecia $85-100 \times 18 \mu$. Receptacle $42 \times 12.5 \mu$. Appendages $50-170 \mu$.

Near the margin of the right elytron of *Crepidodera* sp. near *C. zambiensis* Jac., Nos. 3061, 3074, Metet, Kamerun, West Africa.

Although this species is nearly allied to *D. Aulacophorae*, and the related forms on Chrysomelidae, it seems well defined, and is clearly recognizable, even *in situ*, from its habit and position of growth. It is not to be confused with subhelicoid individuals of the last mentioned species, figure 148.

DIMEROMYCES NIGRICAULIS Thaxter. Plate VII, figs. 165-167.

L. c. 55, 251.

Male individual relatively small, subhyaline; receptacle of two cells, the basal about twice as large as the subbasal, which is somewhat obliquely separated, the margins slightly convex in both: basal cell of the appendage somewhat smaller, erect, separated by a thick, black cup-shaped septum from the short, straight, two-celled distal portion. Antheridium erect, curved outward distally; the stalk-cell well developed, constricted, and deeply suffused with blackish brown below the venter; the neck about as long as the venter and curved outward: a second antheridium sometimes developed from the basal cell of the appendage. Receptacle, including basal cell of appendage, without foot, $25 \times 4.5 \mu$. Antheridia $25 \times 7.5 \mu$. Appendage, above black septum, $12 \times 4 \mu$.

Female individual uniform pale dirty yellowish brown, the receptacle somewhat darker; consisting of usually six cells, subequal, except the larger basal; the four middle somewhat flattened and obliquely superposed. Basal cell of the primary appendage somewhat longer than broad, distally narrower, the rest of the appendage short, uniform, unicellular, distinguished by a thick black septum and constriction; a secondary basal cell normally separated from the primary on the inner side, and similarly distinguished from a several-celled branch by a black septum: all the other cells of the receptacle, except the first and fourth, giving rise to the basal cells of secondary appendages, which usually bear two rather short, stout, few-celled branches, separated by thick black septa, transversely and somewhat irregularly paired. Perithecium arising normally from the fifth cell; relatively large, slightly and rather evenly arcuate throughout, abruptly bent outward at the base, even at right angles, or sometimes more nearly erect; narrower about the insertion and tip, but otherwise often nearly isodiametric; the tip slightly bent outward, well distinguished, paler, tapering asymmetrically to the short apex, which is distinguished only by the rather prominently rounded inner lip-cell. Perithecia $200-235 \times 20-22 \mu$. Receptacle $70-85 \times 22 \mu$. Appendages $40-60 \times 8-8.5 \mu$. Total length to tip of perithecium 300μ , more or less.

On the elytra of *Diacantha flavescens* Ws., No. 3069, Kamerun, West Africa.

Four males and about a dozen females of this species have been examined. More copious material would no doubt show greater variation than is above indicated. The species seems well

distinguished from *D. Aulacophorae* and its allies, to which it is nearly related, by the very characteristic blackish brown constriction which separates the stalk from the venter of the antheridium, as shown in figures 166-167.

SPECIES PARASITIC ON DIPTERA.

DIMEROMYCES RHIZOPHORUS Thaxter.

L. c. 36, 412. Monograph, Part 2, 243. Plate XXVIII, figs. 6-8.

This form, which is parasitic on a small fly from New Guinea, was the first species known to have a penetrating rhizoid. This rhizoid, unlike that of *D. oscinosomalis*, is furcate, and the other characters of the two species clearly separate them. It has not been again found.

DIMEROMYCES COARCTATUS Thaxter.

L. c. 36, 410. Monograph, Part 2, 244. Plate XXXVII, figs. 1-5 and 17.

Although destitute of any penetrating rhizoid, this species is very nearly allied to the preceding and to *D. oscinosomalis*. It has not been again seen since its original description. The host is a small fly from New Guinea.

DIMEROMYCES CRISPATUS Thaxter.

L. c. 36, 413. Monograph, Part 2, 245. Plate XXIX, figs. 14-15.

This remarkable form, which occurred rarely on the same host with *D. coarctatus*, is one of the rare instances in which what appear to be secondary axes bearing perithecia arise from the primary receptacle. It is one of the most clearly defined species of the genus. No further material has been examined since its original description.

DIMEROMYCES OSCINOSOMALIS Thaxter. Plate IX, figs. 242-247.

L. c. 53, 701.

Male individual hyaline and thin-walled; of two cells, the basal often swollen below, with a minute lateral foot, longer than the subtriangular or slightly irregular subbasal cell, which bears the antheridium, and is about as large as the basal cell of the three-celled appendage, the subbasal cell of which is twice as long as broad, brown, thicker-walled, slightly constricted at the thin dark septa; the distal cell rather long, thin-walled, and tapering. Antheridia erect, or slightly divergent; a second often arising, above the first, from the basal cell of the appendage; the neck rather stout, straight, or slightly bent. A secondary appendage sometimes arising from the subbasal cell of the receptacle, straight, stiff, divergent, of four or five short cells. Primary appendage, above dark septum, $20 \times 2.5-3 \mu$. Antheridia $18 \times 5 \mu$. Receptacle 25μ .

Female individual subsigmoid in general habit, when well developed. Axis of the receptacle of usually four or five cells, the basal broad and hardly longer, with a minute lateral foot beside a stout, short, simple, tapering penetrating rhizoid, which is sometimes abruptly vesicular beneath the host's integument: the two distal cells smaller, rounded and more prominent; the rest somewhat flattened and oblique. Basal cell of primary appendage small and rounded; the subbasal much smaller, suboval, brown, and distinguished by a dark septum and constriction; the rest of the appendage short, tapering, of one or two cells. Secondary appendages usually three, of about six cells, curved, usually inward, and often diverging from the perithecium, which they exceed considerably in length; the distal cell enlarged and curved inward, often uncinulate, becoming irregularly

split into an upper and lower more or less spoon-shaped halves, or variously and irregularly broken and lacerate; the whole variably suffused with dark brown, distally curved or recurved; the basal cell smaller, and separated by a dark septum from the long, sometimes slightly inflated basal cell. Perithecium usually single, arising from the fourth cell, rather stout, slightly curved inward; the stalk obsolete; the outer margin strongly convex; the relatively large tip rather clearly indicated; the apex about as broad as long, clearly distinguished above a slight constriction; the lip-cells projecting variously to form a corresponding number of unequal, asymmetrical protrusions, which appear differently from different points of view. Perithecia $50-65 \times 16-20 \mu$. Receptacle, exclusive of rhizoid, $35-50 \times 12-16 \mu$. Appendages, primary, 18μ ; secondary, longest, $125 \times 8 \mu$. Total length to tip of perithecium $75-95 \mu$.

On the inferior surface of the abdomen of *Oscinosoma inaequalis* T. Beck., No. 2139, Sarawak, Borneo.

This species is nearly related to *D. rhizophorus*, which is the only other species known to develop an entering rhizoid; but is more nearly related to *D. pedalis* on the same host, which may prove merely a variation dependent on its position of growth. It is also allied to *D. kamerunensis*. The male seems variable and its characters are determined with difficulty; since it seems very difficult to isolate single individuals. The only one thus isolated, figure 247, is somewhat abnormal in producing a secondary appendage from the subbasal cell, and a second antheridium from the basal cell of the appendage, the distal part of which is broken. As a rule it appears to be of the normal type, with one antheridium and a tapering appendage.

DIMEROMYCES PEDALIS Thaxter. Plate IX, figs. 248-450.

L. c. 53, 699.

Male individual hyaline, receptacle of two cells, the basal much larger, with well developed normal foot; subbasal cell long and narrower, somewhat shorter. Basal cell of the appendage similar, bent upward at base, the subbasal cell twice as long as broad, separated by a thin black septum, faintly brownish below; the rest of the appendage rather long and tapering. Antheridium erect, the venter and neck about equal, the latter abruptly distinguished externally. Total length to tip of antheridium $28 \times 8 \mu$. Antheridium $18 \times 5 \mu$. Appendage $24 \times 3 \mu$.

Female individual more or less tinged with brownish yellow, especially the appendages. The receptacle consisting of seven or eight cells, somewhat broader in the middle, the basal cell nearly twice as long as broad with normally developed foot, the cells just above small and flattened, slightly oblique; the basal cell of the primary appendage undifferentiated, narrower distally; the subbasal somewhat rounded, with thin dark septum; the distal part short and tapering. Secondary appendages three, or often four, separated from the narrow basal cell by a dark septum and suffusion, distally broader; the distal cell curved, inflated, becoming split in two or lacerate: suberect, of five or six cells, shorter than the perithecia: which are single, somewhat divergent, nearly straight and subsymmetrical; the short stalk rather abruptly bent, arising usually from the fifth cell of the receptacle; the tip hardly distinguished, the apex clearly so, slightly spreading, usually appearing subsymmetrically three-lobed, the middle lobe higher; or more irregular according to the point of view. Spores $18 \times 2.5 \mu$. Perithecia $42-52 \times 14 \mu$. Receptacle $35-40 \times 8 \mu$. Appendages, primary, 30μ ; secondary, $40-50 \mu$.

On the legs of *Oscinosoma inaequalis* T. Beck., No. 2139, Sarawak, Borneo.

This form is too closely allied to *D. oscinosomalis*, of which it may prove a mere variation due to its position of growth. The female differs in having perithecia, with more or less symmetrically three-lobed tips, which are longer than the appendages; and in having a receptacle with a normally blackened foot which replaces the rhizoid, and consisting of more numerous

cells. Fifteen females and several males have been examined, but more abundant material may make its identity with *D. oscinosomalis* clear.

DIMEROMYCES KAMERUNENSIS Thaxter. Plate IX, figs. 239–241.

L. c. 53, 700.

Male individual relatively very small, faintly tinged with brown. Receptacle of two cells, the subbasal narrower, but nearly as long as the basal. Basal cell of the hyaline appendage small, slightly prominent externally, separated from the relatively long and slender several-celled distal portion by a thick black septum. Antheridium normally single, its venter brownish and rather strongly convex externally; the neck rather stout, hyaline, and slightly divergent above the base. Length to tip of antheridium $30 \times 8 \mu$. Appendage $20\text{--}40 \mu$.

Female individual: axis tinged with brown above; the basal and subbasal cells subhyaline, the former several times as long as broad; the remaining eight to ten somewhat flattened, especially below, with rounded outlines. Primary appendage small, the basal cell rounded, slightly flattened; separated from the short, tapering distal portion by a black septum and constriction. Secondary appendages usually five to seven, slightly divergent, or suberect, slightly curved backward distally; alternating right and left, relatively stout, more or less deeply suffused with brown; mostly slightly longer than the perithecia; one or two of the upper shorter, consisting of usually seven cells, the basal tapering and deeply suffused distally about the septum, above which they are broader; the cells successively somewhat shorter, the subterminal very small and rounded into the cavity of the distal, which is at first rather abruptly inflated below, and tapers to a blunt extremity; but later is disorganized, the spreading or revolute remains of its wall persistent and adherent around the minute subterminal cell. Perithecia one or two, uniformly pale dirty brownish yellow, the apex hyaline; relatively small, slightly shorter than the appendages; the lower half slightly inflated, tapering thence rather evenly to the broad apex, the compressed inner lip-edges forming a short, slightly oblique, subconical projection, subtended by three well marked papillae. Perithecia $88\text{--}105 \times 14\text{--}21 \mu$. Appendages, longest, $105 \times 12 \mu$. Primary appendage about $25 \times 3 \mu$.

On the head and legs of a pale yellow oscinid fly with slightly smoky wings, No. 2367, Kamerun, West Africa.

This species is most nearly related to *D. coarctatus* and *D. oscinosomalis*, but differs widely in the structure and position of its perithecia and appendages. The large dark appendages tend to conceal the relatively small perithecia, or render them inconspicuous. The relatively small male individual, in one instance, appears to develop two antheridia; but it is not possible to determine whether the receptacle in this case consists of three, rather than two, cells, or whether the second antheridium arises from the basal cell of the appendage.

SPECIES PARASITIC ON ORTHOPTERA.

DIMEROMYCES THAXTERI Maire. Plate VIII, figs. 217–220.

Bull. d. l. Soc. d'Hist. Nat. d. l'Afrique d. Nord 7, 100 (1916).

D. falcatus Thaxter *nec* Paoli, l. c. 51, 4 (1915).

Male individual pale yellowish, or nearly hyaline; its axis curved or subsigmoid, tapering distally, and consisting of from five or six to a dozen cells; the distal longer and more slender; the basal cell narrower above the very large foot, its distal half usually, but not invariably, deep blackish; the three or more cells immediately above, subequal, or successively smaller, and bearing

antheridia: the cells of the axis sometimes more numerous, and bearing short branches on which one to several antheridia may be borne. Antheridia slender, the stalk-cell sometimes even longer than the venter, which contains but two antheridial cells from which no basal cells are separated; neck about as long as the venter, slender, straight or curved. Total length of axis 80–94 μ , including foot (25 μ). Antheridia, with stalk, $40 \times 5 \mu$.

Female individual similar to the male, becoming brown, falcate or subsigmoid, the axis of about twenty-five cells, the five to seven lower corresponding to the receptacle proper, thicker-walled and shorter, except the basal and subbasal, which are separated by a broad, deep, blackish, often oblique suffusion which involves their adjacent ends and the intervening septum; the subbasal about as long as broad, and bearing anteriorly the seven- or eight-celled secondary appendage, which bends abruptly upward, at its much broader base, beside the perithecia and receptacle. Perithecia two, or usually three, erect, arising from successive cells in a slightly oblique series; the very short or almost obsolete stalk bent abruptly upward; the main body asymmetrical, slightly broader, distally, the inner margin convex, the outer slightly concave, or straight, tapering rather abruptly to the tip, which is subtended by a slight elevation on the inner side, bent slightly inward, the compressed narrow blunt apex concave externally, and forming a pseudo-appendage. Perithecia $85\text{--}100 \times 20\text{--}24 \mu$. Spores, female, $18 \times 3 \mu$. Total length of axis 350–390 μ . Receptacle $80 \times 20 \mu$, face view $\times 30 \mu$. Secondary appendage 45–70 μ .

On the antennae of *Gryllus mitratus* Burm., No. 2378, (Type), Samarang, Java: *Gryllus* sp., No. 3029, Wainoni Bay, Solomon Islands: on a genus of Gryllidae, No. 3047, Zamboanga District, Mindanao, Philippine Is.

Owing to a regrettable piece of carelessness, the name "*falcatus*," already employed by Paoli for a species of this genus, was used in the original description. This error was later noted by Maire, who proposed the present name, as above cited. The species is a very striking one, apparently of wide distribution in the East, and is remarkable for its long falcate axis, in which the receptacle seems only to be distinguished by its shorter cells, with small rounded lumina and very thick walls. The secondary appendage is often completely hidden, and can only be seen from one side. Male individuals sometimes occur, like that represented in figure 220, in which some or all the antheridia are replaced by short branches bearing the latter, and may in some cases be even more highly developed than in the specimen figured. The antheridia, like those of *D. Petchi*, possess but two antheridial cells, from neither of which does a basal cell appear to be separated. The near relationships of this form to other known species is not apparent.

DIMEROMYCES I-FLAGELLATUS Thaxter. Plate IX, figs. 236–238.

L. c. 55, 281.

Male individual hyaline, the receptacle straight, of two cells; the basal relatively very large and long, of nearly equal diameter throughout; the subbasal angular or subtriangular, obliquely separated from the larger basal cell of the appendage, which is more or less prominent externally, the slender, usually shriveled distal portion of (?) two cells. Antheridium divergent, usually single, a second sometimes developed from the basal cell of the appendage; rather long and slender; the stalk-cell well defined; the neck long, slightly curved outward, and tapering gradually from a relatively large base to the slender extremity. Axis, including basal cell of appendage, $25\text{--}30 \times 5.5 \mu$. Antheridia $25 \times 4 \mu$. Basal cell $20 \times 5.5 \mu$.

Female individual erect, straight, nearly hyaline or faintly yellowish. Receptacle consisting of usually five cells, the basal relatively very large and relatively long, sometimes broader below; the distal cell hardly differing from the basal cell of the appendage, which may be somewhat

longer, even twice as long as broad, external margin more nearly straight, its distal margin more or less distinctly oblique, prominent on the inner side below the small, squarish, suffused, much narrower subbasal cell, which is followed by a variable number of slightly broader and more rounded cells; the series of four or five terminating in a longer cell, which tends to become disorganized: the whole more or less divergent, or slightly curved outward above the basal cell. Perithecium erect, usually quite sessile, rarely with a short stalk-portion, faintly yellowish distally; the outer margin converging from the middle, or somewhat above it when a stalk is present, toward the base and apex, forming an elevation which is almost an angle; the inner margin straighter, converging at the tip; which is somewhat asymmetrical, short, hardly distinguished; the apex slightly broadened, through the enlargement of the outer lip-cell, which is somewhat spoon-shaped, and lies partly over the inner. Spores, female, $28 \times 2.5 \mu$. Perithecia $50-60 \times 13 \mu$. Appendage $75-90 \mu$. Total length to tip of perithecium $95-105 \mu$. Basal cell, largest $42 \times 10 \mu$.

On the head and prothorax of *Spongovostox alter* Burr., Porto Vehlo, Amazon, M. C. Z., No. 2242 (Mann Coll.).

This species is quite unlike any of the other forms known to occur on earwigs, and is peculiar from the absence of any secondary appendage in the female, and its almost invariably sessile perithecium. The divergence of the appendage from the usually broad and oblique distal margin of its basal cell, and the abruptly very much narrower and squarish suffused subbasal cell, give it a characteristic appearance. The appendage of the male seems to be evanescent above the basal cell, and has only been seen in a shriveled condition.

DIMEROMYCES AUSTRALASIAE Thaxter. Plate X, figs. 262-264.

L. c. 55, 275.

Male individual hyaline, becoming faintly yellowish; straight, erect, rather slender: the receptacle consisting of three cells; the basal somewhat longer than the other two combined. Basal cell of the appendage hardly differentiated, bearing distally one, sometimes two, branches, two- to three-celled, short, somewhat tapering, and swollen above thick, black, subtending septa. Stalk-cell of the antheridium short, clearly defined; the venter relatively short, stout, inflated, much shorter than the necks, which are strongly bent outward, and characteristically indented on the inner side above the base. Axis, including basal cell of appendage, $38-44 \times 9 \mu$. Antheridia $24-28 \times 7 \mu$. Total length to tips of appendages, including foot, $60-75 \mu$.

Female individual faintly tinged with brownish. Receptacle consisting of four obliquely superposed cells, the basal as long as the rest combined; more or less strongly curved above the foot, convex on the posterior side: the subbasal cell bearing the lower secondary appendage, which is unlike the rest, its basal cell strongly convex externally, distally compressed, separated by a black constricted septum from the three remaining cells, which are of about equal length, the margins of the two lower nearly straight externally, and strongly convex near the base on the inner side; the distal cell slender, slightly tapering. Perithecium arising from the third cell; the stalk usually straight, erect, hyaline, sometimes longer than the ascigerous portion into which it passes gradually; the latter subfusiform, slightly asymmetrical; the tip sometimes clearly distinguished by an external indentation; the apex well defined, with a longer bluntly pointed outer lip, and a smaller shorter rounded inner lip. A secondary appendage arises from the terminal cell of the receptacle, the large basal cell of which gives rise to an oblique series of from two to five black septa, bearing rather short, simple, three- to four-celled branches; the whole overlapping the basal cell of the primary appendage, which is entirely similar in all respects. Perithecia, body $50-75 \times 20 \mu$, stalk-portion $30-100 \times 9-12 \mu$. Spores about $30 \times 3.5 \mu$.

Lower secondary appendage, including basal cell, $38 \times 42 \mu$. Branches of primary appendage $22-38 \times 3.5 \mu$.

On the inferior surface of the abdomen and forceps of *Chelisoches morio* (Fabr.), Nos. 2949 and 3012, Auki; No. 3026, Florida, Solomon Is.; Nos. 3014, 3013 and 3027 from Nausori, Viti Leon and Nadarivata, Fiji Is., Mann Coll., M. C. Z.

This species, which belongs to the group of which *D. Forficulae* is the type, is very clearly distinguished from this species, as well as from *D. Anisolabis* and *D. Prorei*, which are its nearest allies, by the peculiarities of the lower secondary appendage in the female, and the geniculate neck of the antheridium in the male, as well as by other characteristics. The host is a large black forficulid on which it seems to occur not uncommonly.

DIMEROMYCES ANISOLABIS Thaxter. Plate X, figs. 268-273.

L. c. 48, 156, 1912. L. c. 55, 274. Spegazzini Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires 29, 514, fig. 54.

Male individual hyaline, straight. Receptacle of three obliquely superposed cells; the basal larger, subtriangular; the others subequal. Antheridia arising from the distal cell, sometimes also from the subbasal, rather short and stout; the stout rather abruptly distinguished slightly tapering neck half of the total length, curved rather strongly outward distally. Basal cell of the appendage undifferentiated or rounded, separated by a black septum and constriction from the usually more slender, straight, erect, often uniform, three- to four-celled distal portion, which rarely exceeds the tip of the antheridium. Antheridia $31-38-42 \times 7-10-12.5 \mu$. Appendage above septum $18-30-50 \mu$. Total length to tip of appendage $58-70-92 \mu$.

Female individual hyaline, or becoming somewhat suffused with yellow or brownish yellow. Receptacle short, compact, subtriangular, of four very obliquely superposed cells; the distal (lateral) margin often nearly horizontal. A larger secondary appendage arising from the subbasal cell, its nearly hyaline basal cell swollen, or inwardly prominent beside the base of its long, narrow, deeply blackened, distally broader and obliquely hyaline or translucent subbasal cell; the rest of the appendage hyaline, or suffused below; of four to seven cells; the lower broader, and more often brownish. The subdistal cell of the receptacle bearing a perithecium; the distal producing the primary appendage terminally, and one, or sometimes two, secondary appendages from the inner side, one of which may very rarely be replaced by a second perithecium, and which are similar in general to the lower appendage; but shorter, and distinguished above the basal cell merely by a blackish horizontal septum. Primary appendage shorter than the secondary, of five to seven cells, the distal longer, the rest hardly longer than broad; the basal hyaline, small and roundish, or larger and undifferentiated, distinguished above by a black septum and constriction, and rarely bearing on its inner side a branch similar to, but shorter than, the adjacent secondary appendage. Perithecia variably elongated and slender, becoming somewhat broader distally; the tip asymmetrical, more clearly distinguished on the inner side; the apex short and often slightly inflated. Perithecium $75-270 \times 14-21 \mu$. Receptacle, above foot, $25-30-55 \times 20-42 \mu$. Lower appendage $60-150 \times 12-13 \mu$. Primary appendage $40-64 \mu$. Total length to tip of perithecium $100-230-350 \mu$.

On the inferior surface, near the tip, of the abdomen of *Anisolabis annulipes* Luc. (Type), No. 1682; of ? *Anisolabis* sp., No. 2924, Grand Etang, Grenada, B. W. I., and Arima, Trinidad, No. 2887. On *Euborellia janeirensis* (Dohrn) No. 2257, Independenzia, Amazon and No. 2263, Ceara Mirim, Amazon (Mann). On earwigs allied to *Anisolabis* from Fiji (Mann), Nos. 1016, Larema, No. 3017, Turuca: No. 3015, Wai Ai, Solomon Is. (Mann): No. 3145, Soochow, China (Gist Gee).

This widely distributed and common species is very closely allied to *D. Forficulae*, from which it may be most readily distinguished by the somewhat stouter receptacle, and the peculiar differentiation of the subbasal cell of its lower secondary appendage in the female: and in the male, by the presence of only one dark septum in the appendage. It is very variable in size, the larger dimensions above given having been taken from the specimens obtained at the Grand Etang, where it was common, some individuals bearing greatly elongated perithecia. The other variations which are found are associated, for the most part, with the appendages; the primary rarely giving rise to a branch from its basal cell on the inner side, as in figures 271–272. The single secondary appendage, which is normally borne by the distal cell of the receptacle, may be replaced by two, and may even be associated with a second perithecium, while in some instances, figure 268, this cell may give rise to neither. The peculiar lower secondary appendage may, as in figure 272, produce from its basal cell a branch which is similar to the upper appendages, and still another unusual variation is figured by Spegazzini (l. c.), in which the abnormal receptacle is five-celled, the second and third cells each bearing similar appendages. The asymmetrical tip of the perithecium also varies considerably, being sometimes clearly defined by an elevation on the inner side, or often hardly distinguished. It is seldom as narrow as in *D. Forficulae*, and in this species the lower appendage does not show the peculiar modification of its subbasal cell above described, and usually, though not always, is bent across the receptacle instead of diverging outward, often at right angles to the axis of the receptacle, as is usually the case in *D. Anisolabis*.

DIMEROMYCES FORFICULAE Thaxter.

L. c. 389, 1902. Monograph. Part 2, 242, Plate XXIX, figs. 9–11. Spegazzini Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 515, fig. 56.

This species, which occurs on *Doru lineare* (*Forficula taeniata*) in Central and South America, has been obtained from Mexico and Guatemala, and is reported from La Plata by Spegazzini. It is doubtless common wherever its host occurs, and may be taken as the type of the small group of forms on Forficulidae to several of which it is very closely allied. The most conspicuous difference which distinguishes it from its nearest ally, *D. Anisolabis*, is the character of the primary appendage in the male, and of the lower secondary appendage of the female; the basal cell of which, in the present species, is usually much longer and often curved, so as to turn the appendage across the receptacle; while the subbasal cell lacks the special modification which is so striking a character in *D. Anisolabis*.

DIMEROMYCES PROREI Thaxter. Plate X, figs. 265–267.

L. c. 55, 274.

Male individual slender, hyaline. Receptacle of two cells; the basal several times as long as the subbasal, straight. Appendage slightly tapering; the basal cell hyaline, free; the subbasal slightly suffused, and distinguished by dark septa; the distal hyaline and variably elongate. Antheridium usually single, divergent, hyaline, except the very faintly suffused outcurved neck. Total length to tip of appendage, including rather large foot, 50 μ .

Female individual hyaline with yellowish to brownish suffusion. Receptacle rather short and stout; of four cells, the basal larger, short and subtriangular; the subbasal flattened and irregularly subtriangular; the third flattened and curved; the distal slightly compressed distally, and bearing the free appendage which may be, like that of the male, divergent, sometimes at right angles, relatively somewhat longer, of four or five cells; the subbasal distinguished by dark septa or its basal cell may bear, from its broadened distal surface, two or more branches of similar

character, or smaller. Secondary appendage single, arising from the subbasal cell, its base sometimes slightly geniculate, the irregularly prominent basal cell hyaline, distinguished by a dark septum and constriction from the rest of the appendage; the lower three or four cells hardly inflated, separated by slight but abrupt constrictions, rather deeply suffused with smoky brown; the extremity including two or three cells, the whole tapering throughout and variably divergent, Perithecium rather slender, nearly straight and erect, nearly isodiametric, or slightly inflated; the stalk not distinguished; the tip barely so; the apex abruptly narrower, and bent strongly inward; the inner lip slightly more prominent. Spores about $30 \times 4 \mu$. Perithecium $65-80 \times 8-9 \mu$. Receptacle $30-35 \times 18 \mu$. Secondary appendage $80-105 \mu$. Total length to tip of perithecium $85-105 \mu$.

On the inferior surface of the abdomen and forceps of *Proreus simulans* Stal., No. 3134, Los Baños, Laguna, Philippines.

The hosts on which this species was found were kindly sent me by Dr. W. H. Weston, and were collected in the sheaths of sugar cane. It is well distinguished from its near allies, *D. Australasiae*, *D. Forficulae* and *D. Anisolabis*, by the character of its appendages and perithecium.

DIMEROMYCES MINUTISSIMUS Thaxter.

L. c. 41, 204, 1905. Monograph, Part 2, 242, Plate XXIX, figs. 6-9.

This species, which is common on *Labia minor* Burm. in the vicinity of Cambridge, has not been received from other localities. It is, however, undoubtedly abundant wherever its host occurs.

DIMEROMYCES LAPIAE Thaxter.

L. c. 41, 303, 1905. Monograph, Part 2, 242, Plate XXIX, figs. 1-5. Spegazzini, Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 516, fig. 58.

This species which, although closely allied to the preceding, seems to differ from it in important respects, has been found but once on the elytra of *Labia minor* near Cambridge: but is also reported by Spegazzini, on the same host, from La Plata.

DIMEROMYCES LOBATUS Thaxter. Plate IX, figs. 229-231.

L. c. 55, 280.

Male individual hyaline, with faint brown tinges. Receptacle of three cells; the basal abruptly more than twice as broad distally, its extension forming a shelf-like support for the flattened, subtriangular, slightly oblique subbasal cell, as well as the base of the lower antheridium, when two are present; the third cell smaller and narrower, oblique below, slightly larger than the undifferentiated basal cell of the erect appendage, which is separated from the distal, slightly tapering, three-celled portion, by a thick black septum and slight constriction; a second similar branch, from the basal cell separated by a black septum, may also arise slightly higher on the inner side. Antheridium arising from the third, sometimes also from the subbasal cell of the receptacle, its axis parallel to, and in close contact with, the appendage which it slightly exceeds; rather long and narrow, the stalk cell short and free, externally convex, the neck relatively long and rather abruptly distinguished, curved slightly outward. Total length, including foot, (18μ), 65μ . Basal cell $\times 8 \mu$ below; $\times 114-16 \mu$ distally.

Female individual similar to the male, the receptacle of four cells; the basal cell of the terminal primary appendage subspherical, undifferentiated, separated from the distal portion by a dark septum and slight constriction. Secondary appendages dimorphic; one from the distal cell

somewhat similar to the primary, but longer, of six or seven cells; the second from the subbasal cell much larger and stouter, externally and distally blackened. its basal cell short and irregularly rounded, separated from the stout straight four-celled distal portion by a blackened septum and deep constriction, its terminal cell giving rise to usually four short irregular, blackish brown branches or lobes, recurved outward. Perithecium arising from the third cell, its stalk well developed, the ascigerous portion immature. Primary appendage 25–50 μ ; lower, secondary, 40–50 μ . Receptacle, including foot, 40–50 μ .

On the forceps of *Echinosoma congolense* Borelli, No. 3104, Kamerun, W. Africa.

About twenty individuals of this very peculiar species, among which only the males are fully mature, have been examined. Although I have described it with reluctance, owing to the fact that the perithecia are not fully developed, the characters of both sexes are such that its confusion with any other form seems improbable. No other species, as far as is known, shows the slightest tendency to produce the very peculiar terminal lobes, or branches, from one of the secondary appendages, and it is thus quite unique in this respect.

DIMEROMYCES MONILIFORMIS Thaxter. Plate IX, figs. 221–223.

L. c. 55, 278.

Male individual nearly hyaline, straight; the receptacle of three small somewhat similar cells, continuous with the straight, erect, relatively stout, tapering appendage; the basal cell of which is undifferentiated, and separated by a thick black septum and constriction from the hardly smaller subbasal cell; which is itself separated from the similar cell above it by a thin black septum; the terminal cell longer and somewhat tapering, exceeding the tip of the antheridial neck. Antheridium abruptly erect, its axis parallel to that of the receptacle and appendage, the neck rather short and stout, slightly tapering, and curved outward, the stalk-cell slightly prominent externally, subtended by a prominently rounded somewhat flattened cell, slightly larger than the subbasal cell of the receptacle, opposite which it lies, and extending downward below the extremity of the basal cell. Antheridium about $22 \times 6 \mu$. Appendage and receptacle, including foot, 50 μ .

Female individual nearly hyaline, with faint tinges of purplish brown. Receptacle lying prostrate, as does that of the male; of four somewhat flattened cells, not dissimilar in size, the second and third wedge-shaped. Primary appendage similar to that of the male, its basal cell more nearly round. Subbasal cell of the receptacle bearing the single highly differentiated secondary appendage, the basal cell of which overlaps that of the receptacle, and is externally strongly prominent and rounded, its distal end bent abruptly upward and outward to join the rest of the appendage; which is erect, slightly curved outward, submoniliform, consisting of seven or eight cells; the four lower smaller, hyaline, or the upper slightly suffused, distinguished above and below by deep constrictions and thick black septa, oblique above; the remaining cells successively larger; the lower nearly round; the distal subdivided. Perithecium slightly curved inward, erect, its general axis at right angles to that of the receptacle and primary appendage, normally single, arising from the third cell of the receptacle; the stalk-portion hyaline, short, hardly distinguished; the sporiferous portion but slightly broader in the middle region, long, slender, pale translucent reddish brown, distally curved slightly inwards, the outlines broken by four successive, rather prominent, rounded enlargements, the upper less marked and involving the tip; which is slightly bent inward, rather broad and flat, and asymmetrically slightly sulcate. Spores about $30 \times 4 \mu$. Perithecia $125\text{--}145 \times 12\text{--}20 \mu$. Primary appendage 25–34 μ ; secondary 100–110 $\times 8 \mu$ at base, $\times 12 \mu$ distally. Total length to tip of primary appendage 58–66 μ .

On the forceps of *Labia mucronata* Stal., No. 2139a, Sarawak, Borneo.

A very beautiful species, clearly distinguished from others related to it on Forficulae, by the moniliform base of its secondary appendage, and the wavy margins of its perithecium, which result from the presence of four successive enlargements. The perithecium is solitary in all the individuals examined, but the fourth cell of the receptacle cuts off a small cell, which possibly may sometimes develop a second perithecium or appendage.

DIMEROMYCES CHAETOSPANIAE Thaxter. Plate IX, figs. 224-228.

L. c. 55, 276.

Male individual rather short and stout; the basal cell becoming almost wholly blackened; the subbasal minute, subtriangular, and separating externally a much larger cell, which is rounded distally and forms an abrupt prominence below the base of the single antheridium; the third, terminal cell twice as long as broad, extending down beside the basal and distal, giving rise to the antheridium and primary appendage. The small stalk-cell of the antheridium not free; the venter erect, relatively large, stout and nearly symmetrical; the neck shorter; the very broad base hardly distinguished from the strongly outcurved distal portion. The basal cell of the appendage bearing terminally a three-celled branch, erect beside the antheridium, its basal cell distinguished above and below by a blackened annular septum, and sometimes subtended externally by a second similar branch. Total length to tip of antheridium, including foot, 35-38 μ . Antheridium 15-17 $\times$ 7 μ .

Female individual somewhat blackened above the foot, the suffusion involving part of the basal and the third cell. Receptacle at first somewhat spatulate, becoming prostrate; compact, four-celled, the fourth and the subbasal cell nearly opposite, at first similar, separated by the small narrow third cell. The latter bearing the single perithecium, its lower half in contact with the basal cell; the subbasal cell bearing a secondary appendage, the basal cell of which is nearly as large, and externally prominent below a four-celled branch, the two lower cells of which are shorter and distinguished by black septa; the fourth cell giving rise to the primary appendage and beside it, or slightly below it, to a second secondary appendage; which may be simple, or bear two three-celled branches from its basal cell, the two lower cells distinguished by black septa; the primary appendage simple, or its basal cell bearing distally and externally two or three two-celled branches, their basal cells distinguished by dark septa, somewhat shorter. The receptacle with its branches lying, at maturity, in the same plane, and viewed edgewise; the perithecium, which projects upward from the prostrate receptacle, arising from the small third cell at an angle of about 45°, relatively stout; the stalk about as long as the body, and often not very clearly distinguished from it; the tip slightly and abruptly bent inward, broad, snout-like, inconspicuously sulcate. Spores about 20 $\times$ 3 μ . Perithecium, including stalk, 75-130 $\times$ 13-15 μ . Appendages, including basal cell, 20-30 μ . Receptacle seen edgewise, including foot, 28 $\times$ 20 μ .

On the inferior surface of the abdomen and forceps of *Chaetospania thoracica* Dohrn. No. 2126, Sarawak, Borneo.

It is quite impossible to determine the cell-relations in fully developed female individuals; since the face view is never seen, and the early misplacement becomes accentuated. The above description is therefore based to a considerable extent on an examination of very young individuals in which the perithecium has but just begun to form as in figures 226 and 227. In the male, a small triangular cell is present, which appears to represent the subbasal cell, and it has been assumed that from this has been separated the much larger cell which forms a prominent rounded protrusion below the base of the antheridium. It is most nearly related to *D. appressus*, which

it resembles in general appearance; but may be at once distinguished by the peculiarities of its appendages, with their black-septate branches, and by the stouter perithecium.

DIMEROMYCES APPRESSUS Thaxter. Plate X, figs. 255-258.

L. c. 51, 8.

Male individual more or less tinged with brownish, the basal cell larger and forming a rounded prominence below the base of the antheridium, from which it is separated by a deep indentation; subbasal cell subtriangular, rather deeply suffused externally, bearing the antheridium and suberect appendage; the latter consisting of four cells; the basal longer than broad; the subbasal squarish, the lower septum black, the distal paler; the third cell similar in size; the distal longer than the two combined, and tapering slightly. Antheridium erect, the venter externally convex, the base of the neck stout, purplish brown, abruptly distinguished, slightly tapering; the short hyaline extremity abruptly bent outward. Receptacle, without foot, $10 \times 9 \mu$. Antheridium $18 \times 6 \mu$. Appendage $20-24 \mu$. Total length to tip of appendage about 30μ .

Female individual with prostrate receptacle, its four cells becoming more or less deeply suffused, more or less conspicuously prominent above the base on the side away from the substratum; the subbasal bearing the single secondary appendage, which may lie parallel to the substratum and primary appendage, or may diverge in the opposite direction from the base of the perithecial stalk, its basal cell relatively long, separated by a distinctly blackish, sometimes oblique septum from the three shorter, distally somewhat tapering, terminal cells. Primary appendage like that of the male. Perithecia solitary, arising from the minute third cell, the long, rather slender stalk projecting upward vertically, or at an angle from the substratum, broader immediately above its origin, somewhat longer than the purplish brown body of the perithecium, which may be rather evenly fusiform, or somewhat asymmetrical; the tip not distinguished, except near the apex, which is subtended externally by a more or less well defined prominence; the lips variably and unevenly prominent, slightly oblique. Perithecium, ascigerous portion, $45 \times 12 \mu$; the stalk $70-80 \times 12 \mu$ at base. Spores about $28 \times 2.5 \mu$. Receptacle, including basal cell of appendage and foot, $20 \times 10 \mu$. Primary appendage, without basal cell, $12-16 \times 5 \mu$. Secondary appendage $35-45 \times 5.5 \mu$.

On the inferior surface of the abdomen and forceps of *Labia pilicornis* Motsch., No. 2112, Peradeniya, Ceylon, (Type). On *L. curvicauda* Motsch., No. 2414, Manila, P. I. On *Labia* sp., No. 2871, Emperor and St. Ann's Valleys, Port of Spain, Trinidad, B. W. I.

Owing to its small size, early suffusion and distortion, it has been almost impossible to determine the exact structure and cell-relations in the receptacle of the female of this species, which, lying prostrate on the substratum is almost invariably viewed edgewise, as is the case with its near ally *D. Chaetospaniae*. In the male, the receptacle appears to consist of not more than two cells, and there is no indication of the small triangular cell which I have assumed to be the subbasal cell in the last mentioned species. Female individuals, figure 255, growing on the forceps of the host, differ from those on the abdomen in the position of the appendages, which are parallel in the one case, and diverge in the other, the secondary being bent upward and away from the base of the perithecium, as in figures 256-7.

DIMEROMYCES ANNULATUS Thaxter. Plate X, figs. 251-254.

L. c. 55, 279.

Male individual faintly tinged with brownish. Receptacle of two cells; the subbasal subtriangular, bearing the solitary antheridium laterally and obliquely, and the undifferentiated

basal cell of the erect, simple, three-celled appendage, the middle cell of which is squarish, and distinguished by dark septa; the distal several times as long, with rounded extremity. Antheridium rather stout, erect; the stalk-cell oblique; the venter somewhat inflated; the neck rather short and stout, strongly curved outward. Length to tip of appendage $28 \times 7.5 \mu$. The antheridium $17 \times 5.5 \mu$.

Female individual pale brownish, the receptacle short-spathulate or subtriangular, of four superposed cells, which become more or less displaced by an outgrowth of the third cell on the posterior side, and the enlargement of the basal cells of the appendages. Primary appendage of four cells; the subbasal short, somewhat narrower, distinguished by dark septa. The three terminal cells of the receptacle flattened and broad, slightly oblique, the third bearing the perithecium and protruding posteriorly; the second producing the first secondary appendage; while the fourth produces the primary appendage distally, and another secondary appendage laterally, above the perithecium: both secondary appendages distinguished below by the presence of broad, short cells, with dark annular septa; of which there may be five or six in the upper, and somewhat fewer in the lower; the terminations of both appendages hyaline, slightly inflated; their total length not half that of the perithecium, which is set between them, and from which they may diverge slightly. Perithecia straight, or very slightly curved, narrow, erect, slightly asymmetrical, distally tapering slightly to the blunt, somewhat asymmetrical apex; the ascigerous base abruptly broad above the almost obsolete stalk-region. Spores about $32 \times 2.5 \mu$. Larger perithecia $56 \times 10 \mu$. Primary appendage $20 \times 5 \mu$; larger secondary $30 \times 3.5 \mu$. Receptacle $13-15 \times 13 \mu$. Total length to tip of perithecium about 70μ .

On the inferior abdomen of *Chaetospania paederina* Gerst., No. 2205, Kamerun.

This minute species is most nearly related to *D. appressus*, which occurs on a similar host, but differs widely in its appendages and perithecium. The compact, relatively small receptacle appears quite differently from different points of view, and owing to a rounded outgrowth of the third cell, shown in figure 251, the fundamental cell-arrangement is often difficult to recognize.

SPECIES PARASITIC ON ACARINI.

DIMEROMYCES GALUMNÆ Thaxter. Plate V, figs. 126-128.

L. c. 55, 230.

Male individual slightly curved throughout, faintly tinged with brown, consisting of a three-celled receptacle, terminating in a simple two- to three-celled appendage, which is slightly longer, not abruptly distinguished, its two distal cells tapering somewhat, narrower and paler than the basal. Antheridium small, short, arising from the small subbasal cell; its very short subconical neck lying against the third cell, or turned sidewise; its venter hardly distinguished from the subbasal cell. Total length to tip of appendage $50-58 \times 10 \mu$. Antheridium about 10μ .

Female individual reddish brown: receptacle consisting of seven to nine cells, flattened and obliquely superposed, except the paler basal and the terminal ones: the third, fourth and sixth producing secondary appendages, which are short, straight, rigid horizontal, or bent upward; that from the second and third usually rudimentary or obsolete; the fifth producing the single perithecium which is recurved when young, later divergent and straight, or slightly curved inward; the long slender stalk rather clearly distinguished from the subsymmetrically fusiform body; the inner lip slightly flattened and higher; the tip rather long, darker, moderately well distinguished. Basal cell of the primary appendage concolorous with the receptacle, straight, slightly tapering, distally rounded, and abruptly distinguished from the nearly hyaline, narrower

distal portion; which consists of usually two shorter basal cells, and a greatly elongated distal one; which is flexed and nearly uniform in diameter, the extremity much stouter and usually subuncinate. Perithecium, including stalk, 115–190 μ ; the body $\times$ 15–19 μ , the stalk $\times$ 7.5–11.5 μ . Primary appendage, longest, 325 μ , its smaller diameter 3.8 μ , its basal cell 29–24 $\times$ 10–12 μ at base.

On the upper surface of *Galumna* sp., No. 2976, Lasema, Fiji Is., Mann Coll., M. C. Z.

This curious species is the only form as yet observed on orobatid mites, and grows prostrate on its host, the long-stalked perithecium projecting abruptly upward, and the singularly elongated primary appendage lying on the substratum. Only one of the three adult females examined is in perfect condition, and abundant material may show characteristics not above referred to. The male is also unusual in its characters, the very small short-necked antheridium appearing as if it were incorporated in the receptacle.

DIMEROMYCES SUBULIFERUS Thaxter. Plate III, figs. 75–78.

L. c. 55, 232.

Male individual hyaline: receptacle of two very obliquely superposed cells, the upper slightly larger, and separated by a thick black septum and slight constriction from the two-celled appendage, the basal cell of which is slightly broader than long; the distal slightly longer and ending in a slender recurved extremity. Antheridium single; the stalk-cell small, and free externally; the venter short and stout, prominent externally; the neck uniform pale brown, its base rather broad and abruptly distinguished, bent inward obliquely across the appendage. Total length to tip of antheridium, including large foot, 50–55 $\times$ 10 μ .

Female individual becoming suffused with blackish brown above, the basal cell of the receptacle hyaline, variably elongate, forming a more or less well defined and abruptly distinguished stalk; the main body above it roughly suboval in outline: the subbasal, third and fourth cells subequal, somewhat flattened and obliquely superposed, forming a median series, and cutting off the large basal cells of the three lower secondary appendages, which are similar in general to the primary appendage of the male: the fifth cell giving rise to the perithecium and lying beside them, extending downward to the basal cell; the sixth cell parallel to it, distally united to the perithecium, as is also the large basal cell of a heterogeneous secondary appendage; the seventh, distal cell long-triangular, lying beside the sixth, not reaching to its base, and bearing the primary appendage distally, which is like the lower secondary, although no basal cell is separated. Heterogeneous appendage stiff, suberect, extending above the tip of the perithecium, tapering slightly, blackened, except the tip and the lower half of its abruptly swollen base. Perithecium stout, subsymmetrical, erect, or slightly tilted outward, broadly subovoid or subfusiform; becoming deeply suffused below, like the adjacent cells of the receptacle; the short truncate conical tip and apex rather well distinguished, the former suffused with brown, the latter hyaline. Perithecia 55–64 $\times$ 25–30 μ . Spores about 30 $\times$ 4 μ . Basal cell of the receptacle 25–42 μ . Heterogeneous appendage 38–42 μ . Total length to tip of perithecium 92–125 $\times$ 42–50 μ .

On a species of *Uropoda*, *sensu latiore*, No. 2692, Verdant Vale, Arima, Trinidad, B. W. I.

This species, which is more nearly allied to the others which grow on mites, is at once distinguished by its median, erect, blackened heterogeneous appendage, as well as by the very peculiar form of its other appendages, the slender terminations of which are characteristically recurved. The cell-structure is very compact, and less than half of the inner margin of the perithecium is free. The sequence and arrangement of the cells of the receptacle is quite unusual and misleading, and suggests that of some of the species of *Rickia* which inhabit similar hosts. A similar, but much less complicated arrangement, is also found in *D. Parasiti*.

In both the male and the female I have felt some uncertainty as to the number of cells which should be regarded as belonging to the receptacle, and it would perhaps have been better to consider the receptacle of the male as comprising only two cells, and that of the female only six, the third and seventh in either case representing the basal cells of the corresponding primary appendages.

DIMEROMYCES MUTICUS Paoli.

Redia 7, II, 293, Plate XII, fig. 10: Firenze, 1911. Malpighia, 24, 339, 1912, Plate V, fig. 10.

This species, which occurs on *Canestrinia neglecta* Berl., a mite parasitic on *Scarabaeus centaurus* in Africa, is distinguished from allied forms on similar hosts by its large, stout, sessile perithecium, which is unarmed, with suffused tip and hyaline broadly spreading apex. The receptacle is three-celled, the basal much longer and irregularly curved, the subbasal subtending the large basal cell of the single secondary appendage, which is abruptly narrower and blackened above it; its six distal cells much broader, successively shorter, the tip disorganized. The primary appendage is similar, but shorter, with fewer cells; the two diverging somewhat symmetrically from the perithecium, which is inserted between them, its axis bent slightly outward. The characters of the male are not determined.

DIMEROMYCES MUCRONATUS Paoli.

L. c. 290, figs. 6-7; L. c. 336, Plate V, figs. 6-7.

This species occurs on *Canestrinia spectanda* Berl., a mite parasitic on *Dorcus bucephalus* from Java. It is somewhat similar to *D. muticus*, but differs in its shorter perithecium, which lies close beside the secondary appendage, and is very broad distally, the apex minute, short, rounded, flattened, but abruptly distinguished, and subtended on the inner side by a short, bluntly conical, black, tooth-like appendage which projects inward nearly at right angles. The two appendages are similar in general to those of *D. muticus*, and similarly divergent; their basal cells much larger, that of the secondary three times as long as broad, the black suffusion above it extending almost to the tip. The basal cell of the primary appendage nearly twice as long as broad, distally symmetrically and broadly rounded, the blackened portion above it very abruptly narrower, median, the appendage distally considerably broader, the terminal cells small and nearly round. The characters of the male are undetermined.

DIMEROMYCES FALCATUS Paoli.

L. c. 292, Plate XII, figs. 8-9 bis. L. c. 338, Plate V, figs. 8-9 bis. Nec *Dim. falcatus* Thaxter, Proc. Am. Acad. Arts & Sci. 51, 4, 1915.

This species occurs on *Canestrinia dorcicola* Berl., var. *Pentodontis* Berl., in Italy. It is similar to the two preceding, but smaller and more slender; the basal cell long and slender, the two remaining cells of the receptacle, and the basal cells of the two appendages, relatively small, and more or less similar in size and form. The appendages, which diverge from the base of the perithecium at somewhat less than a right angle, are straight, stiff, blackened nearly to the tips, the two terminal cells abruptly much broader; the secondary appendage considerably longer. The perithecium is relatively short, somewhat inflated below, distally suffused, the suffusion extending upward into a relatively long black process, slightly broader at its base, and with a blunt hyaline tip, which is rather strongly curved inward above the small, rounded, hyaline, subtending apex. The characters of the male are undetermined. Neither of these three species have been seen by me.

DIMEROMYCES PARASITI Thaxter. Plate IV, figs. 79-83.

L. c. 55, 230.

Male individual hyaline, relatively long and slender, consisting of a relatively very large basal cell, with large foot; the subbasal cell much smaller, twice as long as broad, united to the stalk-cell and venter of the antheridium, which lies nearly parallel to it. Basal cell of the appendage squarish, undifferentiated, separated from the very short, pointed, two-celled distal portion by a broad black suffusion. Stalk-cell of the antheridium small, and free only externally; venter short, stout, externally convex; base of neck large, broad, faintly brownish, passing into the very long neck, which is concolorous, except the hyaline extremity, bent inward and slightly upward. Total length about $40\ \mu$. Appendage $5.5 \times 4.5\ \mu$. Antheridium, venter 12×6.5 , neck and base $24 \times 2.5\ \mu$.

Female individual hyaline, except the brown appendages. Receptacle of four or five cells, the one or two above the large basal cell very small, and displaced so that the next succeeding cell above lies beside it, or them, and is also in contact with the basal cell; the distal cell smaller than the cell below, oblique, with somewhat rounded outline, obliquely separated from the free basal cell of the primary appendage; which is more than twice as long as broad, nearly uniform in width, and separated by a thick black septum and constriction from the distal brown portion; the lower half of which is broader than the upper, the extremity abruptly vesicular, hyaline and contrasting. Secondary appendages one or two, similar to the primary, or slightly longer. Perithecium single, sessile between the two diverging appendages, about half of its margin, below the apex, united to the inner margin of the basal cell of the adjacent appendage; stout and relatively short, subsymmetrical; the lower half broader, somewhat inflated, tapering to the well distinguished tip and apex; the latter broad, of even diameter, the distal margin flattened, rounded, slightly sulcate, with a slight prominence on either side, the anterior somewhat lower. Spores $30 \times 3.8\ \mu$, the apical segment very short. Perithecia $58-68 \times 22\ \mu$. Primary appendage $75-80 \times 8\ \mu$, its basal cell $15-21\ \mu$; free portion of upper secondary appendage $54-56 \times 8.5\ \mu$. Total length to tip of perithecium $100-125\ \mu$.

On *Parasitus* sp. and *Machrocheles* sp., No. 2493, Orizaba, Mexico, M. C. Z. (Mann Coll.).

This species is closely allied to those described by Paoli and is most nearly related to *D. muticus* Paoli. It has a similar V-shaped habit, but differs in numerous details of structure, and is perhaps most readily distinguished by the union of the lower half of the perithecium with the basal cell of the subtending secondary appendage. The arrangement of the cells of the receptacle is quite misleading, since the last, or the last two which are separated from the basal cell, are very small and the wall which separates them from the basal cell does not reach the outer margin of the latter, figure 81, so that as the subterminal cell above them enlarges, they assume a position beside it and seem to be accessory. Figure 97 shows the more usual condition in which but one secondary appendage is present, subtended by the very small subbasal cell, which corresponds to the small triangular cell above the basal in figure 81. A similar and even more confusing displacement is seen in *D. subuliferus*, in which the three cells last separated from the basal are superposed beside the fifth, from which the perithecium arises, figure 76.

EUDIMEROMYCES Thaxter.

L. c. 54, 215, and 55, 272.

Type Species *Eudimeromyces Chiliotis*.

Male individual consisting of three superposed cells, terminated by a single antheridium, within which one or two antheridial cells may be distinguished.

Female individual similar to the simpler types of *Dimeromyces* in structure.

In a recent Contribution on New Dimorphomyceteae (l. c. 55, 272), I have mentioned that a reexamination, with high magnification, of stained specimens of the males of this form, has indicated that the contents of the supposed antheridium may appear longitudinally divided, as in figure 281; and is thus possibly to be regarded as a compound antheridium of a reduced type, somewhat similar to that present in *D. Tomari* and *D. aberrans*. If this is true, the only basis for the separation of the genus from *Dimeromyces* would rest on the strictly terminal position of the antheridium, which would have no parallel in the last mentioned genus. Although, in the two species referred to, the presence of two antheridial cells can be clearly made out, the same cannot be said to be true in the present instance, in which the apparent longitudinal division of the cell-contents may be a misleading artifact. The form of the cell is certainly suggestive, and it has the appearance of being distally perforate. It is possible, however, that it is merely a sterile cell, terminating the axis, like that of *D. aberrans*, which is also shaped much like an antheridium, figure 285, and that, in certain individuals, a compound antheridium may be produced in the usual lateral position. But although about a dozen of these supposed males have been examined, in no instance has any indication of a development of this nature been seen. That it is a unisexual form is placed beyond question by the structure of its mature perithecium, the cavity of which is continuous from base to apex, and it seems also certain that it is very closely allied to *Dimeromyces Tomari*.

EUDIMEROMYCES CHILIOTIS Thaxter. Plate X, figs. 279-281.

L. c. 54, 216.

Male individual hyaline slender, the cells nearly uniform, the neck and venter of the antheridium about equal in length, well distinguished. Total length $25 \times 4 \mu$. Antheridium 12μ .

Female individual hyaline, or slightly yellowish. Receptacle irregularly triangular; consisting of a subtriangular basal cell, and usually four others, disposed so as to lie above it in a more or less horizontal series; the subbasal cell enlarged and variably protruding; the fourth and fifth smaller, giving rise to the single perithecium and the primary appendage, respectively. The appendage undistinguished, somewhat irregularly tapering, usually exceeding the tip of the perithecium. Perithecium thick-walled, the stalk broad, about half the length of the ascigerous portion, which is undistinguished from it; tapering to the undifferentiated tip and rather broad, flat or rounded apex, which are nearly symmetrical. Spores about $20 \times 2.6 \mu$. Perithecia $65-70 \times 14-15 \mu$. Receptacle $14-17 \times 11-13 \mu$. Appendage, longer, $110-120 \times 8 \mu$. Total length to tip of perithecium $80-100 \mu$.

On *Chiliotes formosus* Reit., No. 1473, Baños de Apoquindo, and No. 1898, Corral, Chile.

EUDIMEROMYCES ANDICOLA (Spegazzini) Thaxter.

L. c. 55, 273.

Corethromyces andicola Speg. Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires 29, 487, fig. 29.

Male individual unknown.

Female individual hyaline. Receptacle compact, of four (or five ?) cells, the second and third larger and obliquely superposed. The appendage broader and more closely septate distally, tapering at the extremity, nearly twice as long as the perithecium. The stalk of the perithecium long and slender, straight and stiff; the ascigerous portion nearly symmetrically inflated, tapering downward from about the middle to the insertion of the stalk, the blunt sub-

conical tip and apex slightly bent outward. Peritheciium, sporiferous part, $55-62 \times 19-22 \mu$: stalk $60-65 \times 7-15 \mu$. Receptacle $45 \times 18-20 \mu$. Appendage $175-200 \times 10-15 \mu$.

On *Chilotes formosus*, Nahuel-Huapi region, Neuquen, Argentina.

This species, the male of which was not observed by Spegazzini, seems to correspond in all essentials to the type of this genus, although specifically quite unlike *E. Chilotis*. It is of course possible that, like this species, it may have eventually to be removed to *Dimeromyces*: but the structure of its peritheciium, as figured by Spegazzini, shows very clearly that it is unisexual and cannot belong to the genus in which it was originally placed. The above description is based on the figure and description given by Spegazzini. I have not myself seen specimens.

CHITONOMYCES Peyritsch.

Sitz. d. k. k. Acad. Wiss. Wien: 68, 250, 1873.

Heimatomyces Peyritsch. l. c. 251. Thaxter, Proc. Am. Acad. Arts & Sci., 26, 30.

Type Species *Chitonomyces melanurus*.

Although this genus is here considered apart from its natural sequence it has been found convenient, for mechanical reasons, to include it before taking up *Trenomycetes*, the only remaining member of the Dimorphomyceteae. The species are all confined to aquatic beetles belonging to the Haliplidae and Dytiscidae, the last mentioned family including hosts of all but four of the known forms.

The generic type seems to correspond to that of the two aquatic genera *Hydraemyces* and *Limnaioomyces*, while the latter is evidently very closely related to *Peyritschiella* and its near allies. This relationship is most strikingly suggested by the peculiar type of appendage present in all these instances, and consisting of two cells; the basal, which in the present genus is characteristically bell-shaped, bearing a more slender, unicellular, terminal portion; from which it is separated by a more or less evident constriction and blackened septum; and which is ordinarily slender, cylindrical and colorless. The character and arrangement of the cells of the receptacle is similar, in general, to that of the two last-mentioned genera; both of which differ, however, from the fact that additional appendiculate cells are distally separated in both cases. Although in *Limnaioomyces* a well defined compound antheridium is present, similar to that found in *Peyritschiella* and its near allies, nothing which can be regarded as clearly corresponding to such an organ has been seen in either *Chitonomyces* or *Hydraemyces*.

The species of the present genus seem to fall readily into two well defined sections, which are distinguished by the fact that all of those which occur on hosts other than the Laccophili among the Dytiscids, bear but a single primary appendage, the basal cell of which, cell *i*, terminates a six-celled receptacle, as in figure 330; while in all other species there seem always to be eight cells present in addition to cell *i*, the fifth cutting off the basal cell, *h*, of a secondary appendage, which arises in the angle between the peritheciium and the primary appendage, as in figure 387; the third, fourth and fifth associated more or less horizontally above the subbasal cell. I have formerly been mistaken, I think, in supposing that the simpler of these types, represented in figures 330 and 332, for example, was probably identical, except for the separation of a secondary appendage; since an examination of more abundant material of various species having a primary appendage, only, leads me to believe that its receptacle cannot be regarded as consisting of more than six cells; the three cells which I have formerly distinguished as cells *c*, *d*, and *e*, being replaced by two, cells *c* and *e*, as indicated in the figures last cited; the small cell subtending the base of the peritheciium externally, being merely one of the basal cells of the latter, and not belonging to the receptacle.

With reference to the possible sexual characters of the genus, I regret that I have been unable to reach a satisfactory conclusion. In a few young individuals, somewhat younger than the stage represented by figure 333, I have sometimes seen what appears to be a short, hyaline, evanescent structure, which may perhaps correspond to a trichogyne, the base of which is often distinctly suffused, and persists beside the dark septum of the secondary appendage, if this is present; or in a corresponding position, as shown in the figure last cited, where its connection with the carpogenic cell of the young perithecium, which has been seen in various other instances, seems evident. In mature individuals of certain species, this persistent base seems to be replaced by a definite, somewhat indurated outgrowth; as in *C. cerviculatus*, *C. rhyncostoma*, *C. Grenadae* and *C. uncinulatus*. The trichogyne, if it is present, is extremely evanescent, and though I have seen several instances in which a connection between this "persistent base" and the carpogenic cell could be as clearly seen as it is in figure 333, I do not feel, from such observations as I have been able to make, that it is possible to arrive at any definite conclusion as to the presence or absence of a receptive female organ.

With reference to a male organ, I am also obliged to confess that, although one is so clearly distinguished in *Limnaiomyces*, I have seen nothing which can be thus interpreted in the present genus; and think it not improbable that, as is probably the case in several other instances among the Laboulbeniales, functional sexuality has been lost, and with it all trace of a male organ. The whole question, however, needs a much more careful and extended examination of fresh and stained material than I have been able to give it, and further investigation may show that the structures in question have been overlooked or misinterpreted.

The specific differences, which separate the various species of the genus, are based upon size, which is unusually constant; general form and cell-arrangement and, in many species, on peculiar modifications of the cells of the perithecium and of the receptacle, or outgrowths from them, some of which are very striking, as in figure 309. More or less contrasting suffusions of special cells or regions, as in figures 324 and 327, and more rarely the presence of verrucosities or characteristic roughening of the surface, as in figures 299, 306 or 312, are also occasionally distinctive.

The forms growing on *Halipli* and *Laccophili* are very remarkable in another respect, to which references has been made several times in previous papers, in that the distribution on its host of a given species is extraordinarily limited; and the restricted area of attachment in each case corresponds very exactly, in different host-individuals, even when the latter are quite different species, inhabiting widely separated regions. Not only will the distance from the apex of the elytron, for example, of the restricted area occupied by a given species, always be the same; but its relation to either margin will be definitely fixed. Of species inhabiting the left elytron, none will be found even in a corresponding position on the right. Thus if one sees, we will say, five groups along the outer margin of the left elytron, at different distances from the apex and from the extreme edge, on a given *Laccophilus* from a locality in which its flora is known, he can be sure that he has before him five different species, the identities of which he can thus determine without microscopic examination.

It is also remarkable that, in certain specific types, like that which includes *C. melanurus*, *C. japonensis*, *C. helicophorus*, *C. javanicus*, and at least one other, as yet undescribed, or the closely related group which includes *C. seticolus*, *C. bicolor*, *C. prolongatus* and *C. marginatus*, the members inhabit definite and similar positions, in these instances at or near the margin of the distal fourth of the left elytron. Not only are individual species, therefore, definitely restricted to very limited areas, but the same is true of different species of the same general specific type.

This restriction as to position of growth does not appear to hold in all other instances among the parasites of Dytiscidae, since individuals of *C. Hydropori*, for example, which inhabits

a host having habits quite similar to those of *Laccophilus*, has been found on the margins and on the middle of the elytra, as well as on the inferior surface of the abdomen, and is certainly not restricted in its distribution. A further indication that the ordinary habits of the insect host are not responsible for this fixity in position is found in the case of species that occur on Haliphi; which, like *C. Bullardi*, are quite as definitely restricted: although these somewhat inactive insects, which tend to creep slowly on rather slender legs, are distinctly different, in this respect, from the active and swiftly swimming species of *Laccophili*. That the habits of the host are not responsible for the condition, is also shown by the fact that the closely allied *Hydraemyces*, which is also found on Haliphi, occurs indiscriminately on the legs, elytra, abdomen and thorax.

It may be mentioned that all the forms which do not seem to be thus restricted, belong to the section having no secondary appendage, and occur on Dytiscidae having habits much like those of *Laccophilus*, although several are very minute. It might be suggested that, in the case of the restricted forms, a slight difference in the character and amount of the nutriment obtained from different areas of the elytra, for example, might influence the successful growth of a given species. But the fact that, in one instance, I have found a few specimens of *C. marginatus* normally developed near the tip of the left leg, would indicate that this is not a tenable theory. I have previously suggested that automatically recurrent movements of the legs *in coitu* might serve to explain the mechanism of spore-transfer to and from definite points; but, if this were the true explanation, all the species thus transferred ought also to be found growing in various positions on the legs.

Many examples of a similar nature might be cited, which occur, in individual cases, among other genera of Laboulbeniales; for example *Laboulbenia umbonata*, *L. lepida* and *L. elegans* which, with various others, are always found in a certain position on the thorax; but in no other instance is this phenomenon so striking as in the present genus, and I feel quite unable to offer any plausible explanation of it.

Some of the outgrowths from the perithecium and even from the cells of the receptacle, figures 309, 313, 315, etc., are probably to be regarded as what I have formerly described as "trigger organs," remarkable instances of which occur in *Ilythea*, *Ceratomyces* and other genera; all of which are so arranged as to affect the tension within the perithecium, on contact with another host or any firm object, in such a manner as to induce a sudden discharge of spores, the advantages of which are obvious. Perhaps the most striking instance of this kind is seen in *C. longirostratus*, figure 324, in which the cells which form the tip are enormously elongated, forming a slender somewhat indurated tube. It seems evident that when this tube is struck, as at the moment of impact with another host, so that even a very slight lateral bending is produced, the body of the perithecium, at its base, will be correspondingly compressed, with a resultant spore discharge, at the psychological moment. A similar purpose is also served, in all probability, by the elongation of the upper tiers of cells in the perithecium of many species of *Stigmatomyces*.

It will be seen from the following enumeration that fifty-five species of *Chitonomyces* are thus far known from various parts of the world, in addition to two which are here removed to another genus, a great majority of them having been found on the dytiscid genus *Laccophilus*; four occurring on Halipleae, and the remainder on Dytiscidae of genera other than *Laccophilus*. I have endeavored to arrange the species serially, and to associate evidently related forms, as far as practicable; but, as in any serial arrangement in a rather large genus, this attempt has resulted, necessarily, in the juxtaposition, in certain instances, of unrelated forms.

The species have been divided primarily into two Sections: the first, which I have thought it worth while to designate as *Euchitonomyces*, including those forms in which the receptacle consists of but six cells: a basal, *a*, and subbasal, *b*, followed by two horizontally, associated, *c* and *e*;

and two lying beside the perithecium, cells *f* and *g*, and below the basal cell, *i*, of the primary appendage. In the second Section, containing those species which conform to the structure of the Type, all those forms are included in which a secondary appendage is present and in which the receptacle consists of eight cells, this number including, for convenience, the basal cell of the secondary appendage which is lettered *h*, the rest being lettered from *a* to *g*, beginning with the basal cell and ending with the distal which subtends the basal cell, *i*, of the primary appendage (see These Proceedings, 52, 3). Cells *d* and *h* are thus absent in Section A, otherwise the corresponding cells are similarly lettered in both cases.

Section A. EUCHICTONOMYCES.

Receptacle of six cells. Secondary appendage lacking.

CHITONOMYCES BIDESSARIUS Thaxter.

L. c. 28, 185. Monograph, Part 1, p. 292, Plate XXVI, figs. 4-5.

This small species has been found in the type locality, Kittery Point, Maine, on *Bidessus granarius* Aube, and forms which cannot be satisfactorily separated from it have been received from Labasa, Fiji Islands, No. 2962 (Mann Coll.), and from Okayama, Japan, No. 2941, Mr. Chung; in both instances on minute dytiscids.

CHITONOMYCES BOREALIS Thaxter.

L. c. 28, 195. Monograph, Part 1, p. 292, Plate XXVI, figs. 8-9.

Since its original collection on Cutts Island, Kittery Point, Maine, on *Desmopachria convexa* Aube, this species has not again been found.

Chitonomyces Australasiae nov. sp. Plate XI, figs. 300-301.

Pale straw yellow with a faint brownish tinge. Basal cell usually bent forward, nearly twice as long as broad; the subbasal very small, distinguished by slight constrictions, flattened, separated from the base of cell *f* and of the perithecium by two somewhat elongated, parallel, subsimilar cells, above the posterior of which cell *f* is obliquely separated and is externally overlapped by cell *g*, so that only a comparatively small portion of its outer margin is free; cell *h* not separated from cell *g*, from which cell *i* is distinguished by a curved oblique septum; this cell being turned inward, its outer margin oblique and convex, so that the insertion of the appendage lies against the perithecium. Perithecium straight, rather symmetrically inflated, the free portion, somewhat less than half, erect, tapering subsymmetrically to the blunt, rounded, subsymmetrical, clearly distinguished apex. Perithecium about $85 \times 23 \mu$, the free portion 35μ . Distal portion of the receptacle $60-66 \mu$; basal, including foot, about 70μ . Total length to tip of perithecium, average, $130 \times 23 \mu$.

On the margin of the right elytron, near the middle, of a small dytiscid. Viti Leon, Fiji Islands, No. 2961 (W. H. Mann Coll.).

CHITONOMYCES AURANTIACUS Thaxter.

L. c. 29, 106. Monograph, Part I, p. 202, Plate XXVI, figs. 6-7.

This slender species is distinguished by its slightly orange color and the roughened outer margin of the perithecium. It occurs with *C. borealis* on *Desmopachria convexa*, and has not been seen since its original collection on Cutt's Island, Kittery Point, Maine.

Chitonomyces rugosus nov. sp. Plate XI, fig. 299.

Similar to *C. Australasie* in general structure; cell *f* somewhat more overlapped by cell *g*; cell *i* less strongly bent inward. Perithecium about the same diameter from base to apex, the outer surface conspicuously rugose, or verrucose, the rugosities tending to run in transverse lines, the free portion very broad, bent strongly outward; its inner margin convex, the outer nearly straight; the apex distally nearly flat, subtended externally by a pale brown shade. Perithecium, average, $95 \times 20 \mu$, the free portion $28 \times 20 \mu$. Distal portion of the receptacle about 94μ , lower portion $75-85 \mu$. Total length to tip of perithecium, average, $148 \times 26 \mu$.

On the tip of the right elytron, near the middle, of a small dytiscid: No. 2961, Viti Leon, Fiji Islands (Mann).

This species was found in the position indicated on the same host which bore the preceding species. The two are very closely related, the present species being distinguished by the form of its perithecium, which is not only very broad and bent outward distally, but is conspicuously rugose externally.

CHITONOMYCES HYDROPORI Thaxter.

L. c. 38, 32. Monograph, Part II, Plate XXXIV, figs. 28-29.

This species, which was originally collected by Mr. Charles Bullard at Cape Neddock, Maine, on *Hydroporus modestus*, has since been found at Kittery Point, Maine, and at Eustis, Florida. A form which does not appear to differ in any essentials, has also been received from Manila, P. I., on a dytiscid, at least allied to *Hydroporus*, which was sent me by Mr. Banks.

CHITONOMYCES INFLATUS Thaxter. Plate XII, figs. 331-332.

L. c. 52, 15.

Form moderately stout; hyaline, becoming faintly yellowish; basal cell more or less conspicuously stained with blackish brown above the foot, hyaline and conspicuously inflated above; cell *b* small, somewhat or considerably broader than long, usually forming a distinct constriction of this region, which may be more or less geniculate; cells *c* and *e* much longer than broad, narrower below, distally distinguished by a slight indentation; cell *f* about half as long as the perithecium, and twice as long as cell *g*, from which it is obliquely separated; cell *i* normally longer than broad, its symmetrically rounded tip slightly narrowed. Perithecium relatively large and stout, curved outward, distally and somewhat pointed, its upper half free; the tip slightly distinguished and bent outward; the apex narrow, blunt, subsymmetrical, one of the lip-cells slightly prominent. Spores about $40 \times 25 \mu$. Perithecium $75 \times 25 \mu$. Total length to tip of perithecium $100-120 \times 26-30 \mu$.

On the mid left leg of a *Clypeodyctus pseudogeminus* Reg.. Manila, P. I., No. 2409.

This species is most easily distinguished by its inflated and more or less suffused basal cell, narrow subbasal cell and often geniculate habit in this region. The perithecium relatively large, its free inner margin strongly convex, its outer concave, or nearly straight; the termination bluntly pointed. It is more nearly allied to *C. Australasie* and *C. rugosus* from which, as well as from other allied forms, it seems well distinguished by the characters above noted.

Chitonomyces incisus nov. sp. Plate XII, fig. 330.

More or less strongly curved throughout, relatively large, the concave margin anterior; hyaline, faintly tinged with yellowish. Basal and subbasal cells as in *C. Halphi* and *C. rugosus*,

cells *c* and *e* very large and long; cell *f* overlapped about half its length by cell *g*; cell *i* obliquely separated, and bent inward by the general curvature of the whole convex posterior margin: anterior margin mostly concave from base to apex. Perithecium about one third free; the tip and apex abruptly distinguished, on the inner side, by an angular elevation, which forms a sub-rectangular notch, subtending the apex; the distal margin of which is somewhat oblique, externally rounded, but which is otherwise nearly straight, short, broad and subuniform. Perithecium $85-95 \times 25 \mu$. Distal portion of the receptacle 85μ : cells *c-e* $45-60 \mu$. Total length to tip of receptacle $160-175 \mu$; of perithecium $170-190 \times 38 \mu$.

On the inferior margin at the base of the left elytron of a small dytiscid. Viti Leon, Fiji Islands (Mann Coll.), No. 2961.

This relatively large species was found on a single host only, so that it is not possible to say whether its position of growth is characteristic or not. It is nearly allied to *C. Hydropori* and *C. rugosus*, but seems well distinguished by the inner prominence which subtends its apex, and the relatively large size of cells *c* and *e*.

CHITONOMYCES EXCAVATUS Thaxter. Plate XII, figs. 328-329.

L. c. 52, 15.

Quite hyaline. Basal cell rather short and stout, not twice as long as broad; cell *b* flattened, horizontal; cells *d* and *e* similar large and long, the latter somewhat the largest; cell *f* about one half overlapped by cell *g*, the outer margin of which bulges abruptly above, its outer margin convex nearly to the insertion of cell *i*; which is erect, subsymmetrical and longer than broad. Perithecium relatively short, about one fourth free; the tip and apex curved abruptly outward above a large, broad, blunt, tooth-like, suberect projection which subtends it; the small, somewhat compressed apex, subtended on the inner side by a flattened elevation formed by a thickening of the wall. Spores about $45 \times 2.5 \mu$. Perithecia $70 \times 20 \mu$, exclusive of the tooth-like process which is subtriangular, $11 \times 18 \times 22 \mu$. Total length to tip of perithecium $120-150 \times 30-35 \mu$.

On the margin of the right elytron of a *Clypeodictus pseudogeminus* Reg. Manila, P. I., No. 2409.

This species occurs on the same host with *C. inflatus*. It is perhaps most nearly allied to *C. incisus* which, however, lacks the tooth-like projection from the outer margin of the perithecium by which the present species is clearly distinguished from all others of this section.

Section B. (CHITONOMYCES proper.)

Receptacle of eight cells, secondary appendage present.

CHITONOMYCES SIMPLEX Thaxter.

Monograph, Part I, p. 292, Plate XXVI, figs. 1-3. *Heimatomyces simplex* Thaxter, l. c. 27, 30.

This small species is common in New England occurring on the middle of the distal half of the right elytron of *Laccophilus maculosus*. It was originally said to occur also on *Hydroporus spurius*, but at the present time I am inclined to question whether there was not some confusion in the determination of the host in the case of this and of several succeeding species hereafter enumerated, which were among the first to be collected in this country over thirty years ago. The species was found on undetermined *Laccophili* at the Grand Etang, Grenada, and at Sangre Grande, Trinidad, B. W. I. and has been received from Guatemala (Kellerman); the individuals from these localities corresponding very closely to the more northern type. It is distinguished

by its small size, strongly curved habit, and the subtruncate, almost cylindrical or slightly tapering termination of its perithecium.

CHITONOMYCES THAXTERI Spegazzini. Plate XII, 326-327.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, **29**, 480. *Chitonomyces elongatus* Thaxter, nec Spegazzini, l. c. **52**, 13.

Long, slender, curved, more strongly below; of almost uniform diameter throughout; evenly suffused with pale dirty yellowish brown, the basal cell more deeply tinged, and blackened along the anterior margin and above the foot; a deeply suffused region also, along the anterior margin of the tip, which merges into a more or less distinct transversely mottled area extending half way across the tip, on the right side. Basal cell rather long, slightly convex along its anterior suffused margin, obliquely separated from cell *b*, which it almost completely overlaps on the anterior face, and by which it is itself nearly one half overlapped on the opposite side; cells *d* and *e* relatively long, similar; cell *c* relatively small, overlapping the distal half of cell *d* and visible only on the left side; cell *f* very long and narrow, its base somewhat oblique, and but slightly overlapped by cell *g*; which is relatively long and narrow, slightly broader distally, and hardly longer than cell *h*; cell *i* more than twice as long as broad, bent against the margin of the perithecium some distance below the apex. Perithecium very long and narrow; the tip hardly distinguished, except by its suffusion; the apex well distinguished on the inner side, somewhat longer than broad, of uniform width, distally flattened, or bluntly rounded, with slightly projecting lips about the pore. Spores $40 \times 2.5 \mu$. Perithecia $86-100 \times 10-12 \mu$. Cell *i* $12 \times 5.5 \mu$. Total length to tip of perithecium $120-55 \times 12-16 \mu$.

On the tip of the right elytron of *Laccophilus* sp., Sangre Grande, Trinidad, B. W. I.

In general appearance this species nearly resembles types of *Euchitonomyces* like *E. Haliphi* or *E. rugosus*. Cell *c* is quite invisible from the right, overlapping cell *d* obliquely, so that it is made out with difficulty. The secondary appendage, or rather its dark base, is clearly defined, however; as well as its basal cell, *h*. The individuals are apt to have a slight twist, so that it is not always possible to see the normal sequence of the cells. The present name was given by Spegazzini, owing to my regrettable carelessness in overlooking the fact that the name "*elongata*" had already been used in the genus.

CHITONOMYCES FLORIDANUS Thaxter.

L. c. **25**, 430. Monograph, Part II, p. 264, Plate XXXIV, figs. 36-38.

This species is known only from the types, which were found on *Cnemidotus 12-punctatus* at Eustis, Florida, inhabiting the legs and elytra. It bears a superficial resemblance to *Hydraeomyces*, which grows on this host, but conforms strictly to the type of this section of the genus; cells *c*, *d* and *e* being clearly defined, and normally placed, when the right side is in view. It is an insignificant species, distinguished by the rather short, stout perithecium, with broadly rounded extremity, and more or less distinct papillate lips, recalling those of *Hydraeomyces*, and by the usual prominence of cells *g* and *i*.

CHITONOMYCES OCCULTUS Thaxter.

L. c. **37**, 30. Monograph, Part II, Plate XXXIV, figs. 30-31.

This species, which grows on a species of *Cnemidotus*, concealed in a depression along the margin of the left elytron, near the middle, has not again been found. It is a small form dis-

tinguished by its narrow, bent, laterally suffused tip and small size, as well as by its position of growth and host.

CHITONOMYCES HYALINUS Thaxter.

Monograph, Part I, p. 291, Plate XXVI, figs. 10-11. *Heimatomyces hyalinus* Thaxter, l. c. 26, 31.

The types of this species were found on *Laccophilus* in the vicinity of New Haven, Connecticut, near the tips of the posterior legs. A form, apparently identical, was obtained on *Laccophilus*, in the same position, at the Grand Etang, Grenada, and what appears to be a long slender variety was found at Sangre Grande, Trinidad. The character by which it seems most easily recognized is seen in the unusual thickening of the rather straight anterior margin of the perithecium, which ends abruptly, forming a more or less distinct notch below the outcurved apex.

CHITONOMYCES AFFINIS Thaxter.

Monograph, Part II, p. 291, Plate XXVI, figs. 12-14. *Heimatomyces affinis* Thaxter, l. c. 27, 31.

The types of this species were found on the margin of the right elytron of *Laccophilus maculosus*, near the tip, collected in the vicinity of New Haven, Connecticut. It has also been obtained on the same host, and in the same position, from the vicinity of Cambridge, and from Kittery Point, Maine; as well as on *L. proximus* from Eustis and from Daytona, Florida. It is distinguished by its variably blackened, large basal cell, and the straight, strongly convergent basal cell of its primary appendage.

CHITONOMYCES UNCINATUS Thaxter.

Monograph, Part I, p. 291, Plate XXVI, figs. 23-24. *Heimatomyces uncinatus* Thaxter, l. c. 27, 33.

This species is distinguished by its curved clavate habit, narrow apex, and especially by the upward prolongation of cell *g*, nearly as large as the tip and apex, and forming with them a socket in which the basal cell of the primary appendage is set. Specimens growing in the same position on *Laccophilus* sp., from the Grand Etang, Grenada, B. W. I., correspond very closely to the type, although somewhat more slender, No. 2687. Material from Sangre Grande, Trinidad, Nos. 280 and 281, although undoubtedly referable to this species, differ from the fact that the upgrowth above mentioned, and the tip of the perithecium, are more closely approximated, turning the basal cell of the primary appendage somewhat to one side, and from the conspicuous blackish brown suffusion of the basal cell.

CHITONOMYCES INTROVERSUS Thaxter. Plate XII, figs. 322-323.

L. c. 52, 6.

Short and stout, becoming roughly triangular, rather evenly suffused with dull brownish: basal cell relatively large, curved below and much broader distally; cell *b* very broad and flat, horizontal; cells *c* and *e* relatively small; cell *d* broad, flat-triangular; cell *f* long and narrow, with very thick outer wall, its extremity enlarged and, with cell *h*, bent abruptly inward at right angles; cell *g* lying horizontally above them, its base forming an external rounded prominence, its axis coincident with that of the basal cell of the primary appendage, which is somewhat round, and lies partly beside the tip of the perithecium, just above a shelf-like prominence, which subtends the tip on the left side. Perithecium broad and short; its short tip bent abruptly to the right, away from the subtending prominences; so that, when viewed from the right, it is seen end on;

the apex irregularly, rather coarsely lobed. Body of perithecium, exclusive of tip, $54-60 \times 27-32 \mu$. Total length $80-95 \mu$, the three lateral dimensions $40 \times 75 \times 82-50 \times 86 \times 90 \mu$.

On the posterior legs of *Laccophilus* sp., No. 2687, Grand Etang, Grenada, B. W. I.

An apparently rare species, well distinguished by its short stout triangular form, and the horizontal position of the distal cells of the receptacle.

CHITONOMYCES ITALICUS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 27, 46, fig. 12.

This species, which is otherwise very closely related to *C. manubriolatus*, appears to differ in the form of its appendage, developed from cell *g*, which bears a small subterminal branchlet or outgrowth. It appears to be nearly opaque, except the basal cell and the distal portion of the perithecium. It was found by Spegazzini on *Laccophilus obscurus*?, at Conegliano, Italy.

CHITONOMYCES SPINOSUS Thaxter.

L. c. 42, 307. Monograph, Part II, p. 265, Plate XLI, fig. 40.

This form, which was obtained from a species of *Laccophilus*, No. 1394, from Java, on the left posterior leg, is closely related to *C. manubriolatus*, from which it differs in its pale color, longer and more uniform appendage, and rather long, nearly erect perithecium, ending in a small, compressed, nearly symmetrical apex.

CHITONOMYCES MANUBRIOLATUS Thaxter. Plate XI, figs. 293-295.

L. c. 52, 9.

Rather short, stout and subsigmoid in habit; brownish yellow, becoming more deeply suffused. Basal cell short, bent, obliquely overlapping the lower half of cell *b* on the posterior side; which is similar, or somewhat smaller, and, with cells *c-e*, more deeply colored; cells *c* and *d* subequal and subtriangular; cell *f* not very long, somewhat broader distally; cell *g* externally prominent in relation to an asymmetrically adjusted, variably divergent, straight or distally curved, thick-walled outgrowth; usually somewhat swollen above its base, and distally slightly tapering, its lumen connecting by a narrow isthmus with that of cell *g*; the whole forming a relatively long, free, deeply suffused appendage; cell *i* quite hyaline, longer than broad, slightly tapering and subsymmetrical, suberect. Perithecium stout, strongly convex externally, the margin somewhat undulate; the tip irregular, somewhat distinguished, curved inward, short, stout; the outer lip-cell of the apex forming a variably developed prominence, or outgrowth. Spores about $40 \times 3.5 \mu$. Perithecium $75-25 \times 27 \mu$, its appendage about $45 \times 11 \mu$. Total length to tip of perithecium $125-145 \times 40-45 \mu$.

On the posterior legs of *Laccophilus* sp., Sangre Grande, Trinidad, No. 2684, and at the Grand Etang, Grenada, B. W. I., No. 2687.

This species is nearly allied to *C. italicus*, and also resembles *C. spinosus* in having a well developed appendage, formed by an outgrowth of cell *g*. The type of *C. italicus* appears to have been immature, so that its characters are not all clear. It seems to be at once distinguished, however, by the fact that the appendage is distally furcate. What appears to be a rather extreme variation is illustrated by figure 295, which represents a form found on a species of *Laccophilus* from China, received from Professor Gist Gee. The points of contact of the four successive wall-cells along the strongly convex outer margin of the perithecium, are indicated by slight depressions which give the margin an undulate outline, which is often quite pronounced.

Chitonomyces gracilipes nov. sp. Plate XI, fig. 296.

Straight, erect, rather slender; faintly tinged with brownish; cells *a* and *b* of nearly equal length, the latter slightly stouter, deeper brown; the two forming a rather slender stalk: the region of cells *c-e* abruptly broader, cell *d* irregularly triangular, wholly included by cells *c* and *e*, which extend some distance above its upper angle and are subequal; cell *f* large and broad, oblique below; cell *i* erect, subsymmetrical, closely included between the perithecium and an erect prolongation of cell *g*; the lower half of which is broader, distally swollen with very thick external brownish wall, passing abruptly to the slender distally slightly incurved upper half. Perithecium considerably less than one half free, rather narrow, distally broader, the outer margin somewhat irregular, distally more convex; the inner erect, slightly convex; the apex blunt, erect. Perithecium $95 \times 20 \mu$. Cells *a* and *b* $64 \times 9 \mu$ and 12μ respectively. Upgrowth of cell *g* $44 \times 8.5-4 \mu$ below and above. Cell *i* about $16 \times 8 \mu$.

On the subterminal joint of the right leg of *Laccophilus* sp., China, Professor Tsou comm.

A single specimen only of this species has been seen. It is allied to *C. manubriolatus*, but is readily distinguished by the character of the upgrowth of cell *g*, as well as by its general form, and the abruptly distinguished brown stalk formed by cells *a* and *b*.

CHITONOMYCES GRENADAE Thaxter. Plate XII, figs. 317-319.

L. c. 52, 7.

Tinged with dirty brownish, rather irregularly developed, with a slight twist. Basal cell not twice as long as broad; cell *b* somewhat flattened, rather clearly distinguished above and below by constrictions; cells *c*, *d*, *e* small and rounded, irregularly associated; cell *f* rather long and narrow, hardly overlapped by cell *g*, which projects free above the apex of cell *h* for a variable distance; forming, with cell *i*, from which it is not distinguished, an erect or but slightly curved, nearly uniform pseudo-appendage, its slightly asymmetrical somewhat pointed extremity bearing the basal septum of the filamentous appendage; the whole more deeply suffused, and reaching some distance above the apex of the perithecium. Perithecium rather misshapen, tapering more or less toward the base, where it is subtended by a variably distinct constriction; the second external wall-cell forming a thick, dark brown margin, broadening upward to a more or less pronounced double elevation, followed by an indentation, above which the tip is irregularly bent inward to one side: a variably developed curled appendage arises on the left side, opposite the apex of cell *h*, which may grow outward or sidewise, right or left, and is variably helicoid and pointed, otherwise of uniform diameter. Spores about $36 \times 2 \mu$. Perithecia $55-60 \times 14 \mu$. Cell *i* $28-30 \times 7 \mu$. Total length to tip of perithecium $70-75 \times 20-22 \mu$.

On *Laccophilus* sp., on the margin of the right elytron near the tip. Grand Etang, Grenada, B. W. I.

Allied to *C. rhynchostoma*, from which it differs in the irregular termination of its perithecium and the shorter free portion of cell *g*. It is slightly twisted, so that one has to examine it from different angles, as shown in the figures, to get a clear idea of its characters. Although the same host was obtained in great abundance in Trinidad, it was only observed on the Grenada material.

CHITONOMYCES RHYNCHOSTOMA Thaxter.

Monograph, Part I, p. 290, Plate XXVI, figs. 17-18. *Heimatomyces rhynchostoma* Thaxter, l. c. 27, 33.

This species was originally found on *Laccophilus maculosus* in the vicinity of New Haven, Connecticut, and has been also found on an undetermined *Laccophilus* captured in the Aripo

Savanna, Cumuto, Trinidad, W. I. It grows near the middle of the margin of the right elytron, and is distinguished from the closely allied *C. Grenadae* by the longer, divergent finger-like extension formed by cells *g* and *i*, which are about equal in length; the former almost wholly free, and by the even, almost galeate, conformation of the tip of the perithecium. The peculiar curled outgrowth beside the apex of cell *h* is almost identical with that found in a similar position in *C. Grenadae* and in *C. cerviculatus*; in which, however, it occurs on the right, not on the left, side.

CHITONOMYCES CERVICULATUS Thaxter. Plate XII, figs. 320-321.

L. c. 52, 5.

Rather short and stout, subsigmoid, uniformly tinged with dirty pale yellowish brown, with certain deeper brown suffusions. Basal cell short and stout, the posterior margin convex; cell *b* broader than long, convex anteriorly; cells *c*, *d*, *e*, small, clearly defined, subtriangular, normal in position; cell *f* rather long, broader distally, where it is hardly overlapped by cell *g*, which bulges in an umbonate fashion on the right side, throwing the insertion of cell *i* asymmetrically to the left; and is short, broad and almost wholly free; cell *i* hemispherical; cell *h* short triangular: a short, rather stout, helicoid outgrowth arises near the apex of cell *h*, on the right side. Perithecium relatively rather large, its whole left side bulging, especially prominent distally, the long, stout, nearly uniform, neck-like terminal portion, which is turned slightly sidewise and then strongly inward, extending half its length beyond cell *i*; its lower, inner margin broadly suffused; the broad apex turned abruptly upward; the hyaline lips rather coarse and prominent; the outer subterminal wall-cell growing out to form a variably developed and outcurved, deeply suffused appendage, sublateral on the right side. Spores about $36 \times 2.5 \mu$. Perithecia $45-50 \times 18 \mu$, the neck $35 \times 12 \mu$. Cell *i* $5.5 \times 9 \mu$. Total length to tip of perithecium $80-100 \times 23-27 \mu$.

On *Laccophilus* sp., near the middle of the outer margin of the right elytron. Grand Etang, Grenada, No. 2687: and Sangre Grande, Trinidad, No. 2684, B. W. I.

This species is more nearly allied to *C. Grenadae* and *C. rhynchostoma*, from which it is at once distinguished by the position of its helicoid appendage on the right side, by the neck-like, incurved tip of its perithecium, subtended externally by a dark out-curved appendage from the wall-cell.

CHITONOMYCES UNCINULATUS Thaxter. Plate XII, figs. 313-314.

L. c. 52, 8.

Uniform pale dirty yellowish brown, evenly curved throughout, or almost crescent-shaped. Basal cell sometimes twice as long as broad, rather stout and straight, tapering below; cell *b* somewhat flattened and distinguished by slight constrictions above and below; cells *c*, *d*, *e* subequal, well developed, normal; cell *f* very long and narrow, distally somewhat broader and very slightly intruded between cells *g* and *h*; cell *g* extending free some distance above the apex of cell *h*, and curved strongly inward, so that cell *i*, which is symmetrical, longer than broad and slightly tapering distally, is pushed partly across the base of the tip of the perithecium. Perithecium relatively large and long, distally narrow, and tapering rather evenly to the blunt apex; the outer margin of the venter slightly depressed: a rather long, slender, straight or curved, distally abruptly helicoid appendage diverges from a point close beside the apex of cell *h*, outward across the distal half of cell *g*. Spores about $35 \times 2 \mu$. Perithecia $72 \times 18 \mu$; its appendage $24-30 \times 3.5 \mu$. Total length to tip of perithecium $100-120 \times 27 \mu$.

On the margin of the right elytron of *Laccophilus* sp., near the middle. Sangre Grande, Trinidad, B. W. I.

A species allied to *C. Grenadae*, *C. cerviculatus* and *C. rhynchostoma*, all of which grow in very similar positions on the right elytron. It is easily distinguished by the form of its perithecium, and its rather slender, stiff perithecial outgrowth, which is helicoid only at the tip.

CHITONOMYCES UNCIGERUS Thaxter.

Monograph, Part I, p. 288, Plate XXVI, figs. 27-28. *Heimatomyces uncigerus* Thaxter, l. c. 30, 478.

This species has been found on *Laccophili* in the vicinity of New Haven, Connecticut, and at Eustis, Florida; and has also been obtained from specimens of *Laccophilus* received from Professors Tsou and Gist Gee, collected in China, the latter apparently quite typical. It is found on the posterior legs of its host, and is somewhat similar in general appearance to *C. uncinulatus*; from which it is at once distinguished by its short, compressed tip, bent abruptly outward, or a little to the right, and by the position of its perithecial spine or appendage which, although somewhat similar in form, arises almost from the middle of the right face of the perithecium, somewhat lower than the apex of cell *h*.

CHITONOMYCES OEDIPUS Thaxter. Plate XII, figs. 315-316.

L. c. 52, 6.

Short and stout, more or less uniformly and rather deeply tinged with dull brown. Basal cell greatly inflated below, its outline here somewhat like that of a human ear, convex below, its axis horizontal, bearing the foot on its flat upper margin, near one side of which the short distal portion of the cell, narrow below and abruptly broader above, arises; cell *b* small, somewhat irregular, flattened, protruding anteriorly to form a pointed, tooth-like projection, of a longer protrusion, which may extend outward or downward beside the distal end of the basal cell; cells *c*, *d*, *e* small, flattened, misplaced and confused; cell *f* narrowing below to its oblique base, the margin evenly convex, distally somewhat overlapped by cell *g*, which is obliquely separated from cell *i*; the latter longer than broad, subsymmetrical, turned abruptly inward beside the tip of the perithecium, horizontal or nearly so. Perithecium relatively large and stout; the outer margin nearly straight above a variably developed rounded projection near its base; the short, abruptly distinguished tip bent to the right, then outward; subtended and exceeded anteriorly by an erect, blunt, slightly tapering upgrowth from one of the wall-cells: a long, straight, curved or subsigmoid tapering outgrowth, which extends some distance above the tip of the perithecium, arising near the apex of cell *h*, projects outward across cells *g* and *i*, bending abruptly upward. Spores $40 \times 4 \mu$. Perithecia $72 \times 30 \mu$; the outer spine $21-26 \mu$; the inner $45-55 \mu$. Inflated part of basal cell $36 \times 23 \mu$. Total length to tip of perithecium $100-120 \times 35 \mu$.

On *Laccophilus* sp., growing singly between the terminal claws of the posterior legs: Grand Etang, Grenada, No. 2687, and Sangre Grande, Trinidad, No. 2684, B. W. I.

The inner appendage of this very distinct species arises in a position similar to that of the curled appendage of *C. rhynchostoma*, and its allies; but seems to be of a distinctly different nature. Its swollen basal cell no doubt acts as a buffer, and its restricted position of growth is quite remarkable. It is perhaps more nearly related to *C. orientalis*, and *C. uncigerus*.

CHITONOMYCES ACULEIFERUS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires 26, 44, fig. 9.

As represented by Spegazzini, who found it on the legs of *Laccophilus virescens* in the Lago de Tarzo, Venice, Italy, this species is distinguished by its short, stout, almost long-oval form, its

short, pointed, incurved tip, from the inner side of which a slender, flexed, slightly divergent appendage arises, which is half as long as the perithecium, and extends some distance beyond the tip. It is said to be allied to *C. italicus*.

CHITONOMYCES DISTORTUS Thaxter.

Monograph, Part I, p. 287, Plate XXVI, figs. 29-30. *Heimatomyces distortus* Thaxter, l. c. 30, 477.

The types of this species were found on *Laccophilus maculosus* in the vicinity of New Haven, Connecticut, and it has also been found at Cocoanut Grove and Eustis, Florida, as well as at the Grand Etang, Grenada, B. W. I. It occurs on the tips of the anterior legs of its hosts, and is distinguished by the pointed cylindrical prolongation of its tip, which projects sometimes even at right angles, backward away from the primary appendage, and is subtended on the left side by an erect spinous process.

CHITONOMYCES BRUCHI Spegazzini.

L. c. 29, 480, fig. 22.

This species was found on the margin of the elytra of *Haliphus Bruchi* at Rosario, Argentina, by Spegazzini, and I have seen no specimens. Its characters are not quite clear from his account, cells *a* and *b* being represented as confluent and the receptacle anomalous in other respects. It is clearly recognizable by its short, stout form, pointed almost flat-conical tip and the long tapering pointed appendage which projects inward and upward from the inner distal wall-cell.

Chitonomyces orientalis nov. sp. Plate XI, figs. 289-290.

Pale yellowish, rather stout, somewhat evenly curved throughout. Basal cell even, twice as long as broad; cell *b* well defined, broader than long; cells *c-e* clearly defined, cell *e* larger, triangular in outline; cell *f* about twice as long as cell *g*; cell *i* rather short and broad, subsymmetrical. Perithecium but slightly narrower distally, about one third free; the tip bent abruptly sidewise to the right, irregular, subtended by a small rounded elevation externally, and by one or two elevations on the inner side, the lower larger; one of the wall-cells on the left side, opposite to and close beside the insertion of cell *i*, growing upward to form an erect, subsigmoid, tapering, brownish appendage which, when mature, may be half as long as the perithecium, or even more; but is more often present as an erect, tooth-like projection, hardly exceeding the apex of the perithecium. Perithecium $80-85 \times 25 \mu$; fully developed appendage $50-58 \times 9 \mu$ at base; from point of origin $64-70 \mu$. Cells *a-e*, including foot, about 60μ . Total length to tip of perithecium $125-135 \times 35-38 \mu$; to tip of appendage $170-175 \mu$.

Near the tip of the posterior legs of *Laccophilus* sp., Nos. 3161 and 3162, China (Professor Tsou comm.).

Only two, among a dozen specimens examined, show the fully developed appendage as above described, which recalls that of *C. Bruchi* Speg., although relatively shorter. In these it extends free some distance above the tip of the perithecium, and the attenuated apex is more or less recurved. In the remaining individuals, two of which belong to the same spore-pair, figure 290, at right, the process may not reach the apex of the perithecium, and is short, straight and erect. Cell *i* may be nearly erect or rather strongly bent inward.

CHITONOMYCES SPINIGERUS Thaxter.

Monograph, Part I, p. 288, Plate VIII, figs. 15-16. *Heimatomyces spinigerus* Thaxter, l. c. 30, 478.

This species has been found but once, on the posterior leg of *Laccophilus maculosus* near New Haven, Connecticut. It is well distinguished by its perithecium, which is almost wholly united to the receptacle, below its very short, outcurved apex, and bears a somewhat variably developed, spine- or tooth-like outgrowth, which projects externally, near its base. It is most nearly allied to the following species.

CHITONOMYCES ENSIFERUS Spegazzini.

L. c. 27, 45.

Found by Spegazzini on *Laccophilus virescens* at Conegliano, Italy, on the abdomen and the margin of the elytra, and apparently well distinguished from *C. spinigerus*, to which it is most nearly allied, from the fact that the perithecium appears to be nearly one half free, and that its appendage arises somewhat higher on the anterior side, and is more erect.

CHITONOMYCES DENTIFERUS Thaxter.

Monograph, Part II, p. 264, Plate XXXIV, figs. 26-27. *Heimatomyces dentiferus* Thaxter, l. c. 41, 306.

This species, which was found at Eustis and Daytona, Florida, near the base of the left elytron of *Laccophilus proximus*, along the margin, is most nearly related to *C. appendiculatus*, from which it differs chiefly in the form and character of the erect, tooth-like appendage, or outgrowth, which arises externally below the longer, rather abruptly in- and up-curved tip.

CHITONOMYCES APPENDICULATUS Thaxter.

Monograph, Part I, p. 287, Plate XXVI, figs. 25-26. *Heimatomyces appendiculatus* Thaxter, l. c. 27, 31.

This well marked species occurs on the anterior legs of species of *Laccophilus*, and was first found in the vicinity of New Haven, Connecticut. It was also found at Sangre Grande, Trinidad, B. W. I. Though closely allied to *C. dentiferus*, it is clearly distinguished by the form and character of its perithecial appendage, which is straight, subclavate diverging at an angle of about 45°.

CHITONOMYCES STRIATUS Thaxter. Plate XII, figs. 311-312.

L. c. 52, 12.

Very small and rather slender. Foot relatively large; basal cell rather uniform, longer than broad, more or less suffused below with blackish brown; cell *b* hardly broader, broader than long, distinguished by slight indentations; cells *c*, *d*, *e* normal, subequal; cell *f* relatively short, its rounded extremity obliquely and subsymmetrically separated from cells *g* and *h*; which are nearly equal and as long, or longer, than cell *f*; the region included by cells *g*, *h* and the upper part of *f*, more or less deeply suffused with clear brown, and crossed, on the right side only, by seven or eight variably distinct blackish lines or ridges, parallel and horizontal, and extending more than half way across the adjacent venter of the perithecium, which is otherwise nearly hyaline: cell *i* erect or bent slightly inward, somewhat longer than broad, suffused below, hyaline above. Perithecium relatively long, narrow and subsigmoid, tapering distally; the strongly convex outer margins slightly undulate; the third external wall-cell producing, from its base, a rather slender, very slightly curved, blunt appendage, which diverges at an angle of 45°, or

somewhat more; the often abrupt distal curvature of the perithecium carrying the usually up-curved, rather slender tip and apex inward and sidewise; the latter ending in a prolongation which forms a rather slender, hook-like upgrowth of the hyaline inner lip-cell, which is more or less recurved above the pore; the whole somewhat hood-like. Spores about $20 \times 15 \mu$. Perithecia $46-50 \times 10 \mu$; the appendage $9-10 \times 2-2.5 \mu$. Total length to tip of perithecium $75-80 \times 16-17 \mu$.

On the upper surface of the prothorax of *Laccophilus* sp., No. 2687, Grand Etang, Grenada, B. W. I.

The position occupied by this species is an unusual one. It is very nearly related to *C. appendiculatus* and *C. dentiferus*, from which it is clearly distinguished by the conformation of its apex and the peculiar transverse lines and suffusion on the right side.

CHITONOMYCES LICHANOPHORUS Thaxter.

Monograph, Part I, p. 290, Plate XXVI, figs. 15-16. *Heimatomyces lichanophorus* Thaxter, l. c. 27, 32.

The types of this species were found on the median inferior anal appendages of *Laccophilus maculosus* in the vicinity of New Haven Connecticut, and it was again found on *Laccophilus* sp. at Eustis and Daytona, Florida. It is a very characteristic species, well distinguished by its abnormally large and blackened basal cell, and the modification of cells *g* and *i* to form an erect, cylindrical pseudo-appendage, which extends far above the tip of the perithecium.

CHITONOMYCES ELONGATUS Spegazzini (nec Thaxter).

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 27, 45, fig. 10.

This peculiar form, discovered by Spegazzini on a species of *Laccophilus* in the Lago de Tarzo, Venice, Italy, resembles the preceding species in the anomalous development of cells *g* and *i*, or rather of cell *g* in particular. It is further characterized by a very slender and long basal cell, which is curled upon itself and is unlike that of any other species. It grows between the anterior legs on the inferior surface of the thorax.

Chitonomyces corniculatus nov. sp. Plate XI, figs. 287-288.

Pale straw-yellow, straight or rather evenly and slightly curved. Cell *a* twice or more than twice as long as broad, somewhat broader distally; cell *b* broader than long; cells *d-e* obliquely related, large; cell *d* lying wholly below cell *c*, which is much smaller; cells *f, g, i* subequal in length; cell *i* erect, subsymmetrical, free. Perithecium relatively very long, almost wholly free, of nearly uniform diameter throughout, slightly twisted, so that the pore is lateral; the tip blackened, tapering rather abruptly from a broad base, its inner margin convex and including the pore; the outer margin convex, the whole terminated by an erect, subsigmoid, partly translucent, blunt-tipped, horn-like prolongation; the whole subtended, on the opposite side, by a short, broad, rounded, somewhat obliquely divergent prominence formed by a single wall-cell. Perithecium $150-175 \times 28-30 \mu$, the black termination and its prolongation $38-42 \mu$. Cell *a* about $42 \times 17 \mu$ distally; cells *f-i* $64 \times 13 \mu$. Total length to tip of perithecium $250-270 \times 28-30 \mu$; to tip of cell *i* $125-140 \mu$.

Near the tip of the right leg of *Laccophilus* sp., No. 3160. Soochow, China, Professor Gist Gee.

This large and striking species is most nearly related to *C. psittacopsis*, which grows in a similar position, but is clearly distinguished by the wholly different conformation of the tip of

the perithecium. Owing to a slight twist in the latter, the distal portion of the receptacle is not visible when the tip is seen sidewise, figure 288.

CHITONOMYCES BULLARDI Thaxter.

L. c. 37, 31. Monograph, Part II, p. 265, Plate XXXIV, figs. 32-35.

This is one of the most peculiar species of the genus and was discovered by Mr. Charles Bullard in the vicinity of Cambridge, on the inferior anterior right margin of the prothorax of *Cnemidotus 12-punctatus*. It is abundantly distinguished by its monstrously developed basal cell, and the relation of the latter to the perithecium, which terminates in a black apex, resembling a parrot's beak, not unlike that of the following species to which, however, it is not nearly related.

CHITONOMYCES PSITTACOPSIS Thaxter.

L. c. 37, 30. Monograph, Part II, p. 266, Plate XXXIV, figs. 23-25.

This large and slender species was first found at Eustis Florida on *Laccophilus proximus*, and has since been obtained on *Laccophilus* sp. at the Grand Etang, Grenada, and at Sangre Grande, Trinidad, on a species of the same genus. It grows in clusters on the posterior legs, and is well distinguished by its long slender habit, large size, and by its conspicuous black tip, shaped like a parrot's beak, and contrasting with the otherwise quite hyaline perithecium and receptacle. It is here associated with *C. Bullardi* on account of the similarity of the tip in either case, but the two are not related.

CHITONOMYCES LONGIROSTRATUS Thaxter. Plate XII, figs. 324-325.

L. c. 52, 14.

Pale straw-yellow. Foot small; basal cell more or less often greatly elongated, becoming opaque; cell *b* squarish, or slightly longer than broad; cells *c* and *e* small, and lying wholly above the much larger cell *d*, which is slightly intruded between them; cell *f* long and narrow, hardly overlapped by cell *g*; cell *i* hyaline, four times longer than broad, rather uniform, the apex slightly asymmetrical. Perithecium subclavate, or somewhat broadened distally, curved sidewise, united to the receptacle below the enormously elongated tip; which is abruptly distinguished, of nearly uniform diameter throughout; the lower, inner half opaque, the other translucent purplish brown, straight and rigid; the apex short, hyaline, slightly oblique, the upper lip prominent. Spores about $30 \times 2 \mu$. Perithecia: body $65-78 \times 18-20 \mu$, the tip $245-260 \times 8-11 \mu$. Total length to base of tip $140-156 \mu$.

On the outer margin near the tip of the right elytron of *Laccophilus* sp., Sangre Grande, Trinidad, B. W. I.

The extraordinarily elongated tip of this species, which probably acts as a "trigger organ" distinguishes it from all others except the following, which may be merely a variety. The receptacle and the body of the perithecium are so flexed, that the tip projects sidewise at an angle of 45° or more, and the former are turned edgewise in preparations of mature individuals. It is only in undeveloped specimens that, as in figure 325, the normal cell-relations can be made out.

CHITONOMYCES ARGENTINENSIS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 479, fig. 21.

This species is said to occur on the posterior margin of the elytra of *Canthydrus debilis*, in La Plata, Argentina. Although it is somewhat smaller, the total length being but 250μ , and

the tip is relatively shorter and more blunt, as represented in the figure, it seems too near the preceding species and may prove only a variety. I have seen no specimen of this or of others of Spegazzini's species.

***Chitonomyces prolongatus* nov. sp.** Plate XI, fig. 302.

Somewhat curved or subsigmoid, tapering above and below. Cell *a* tinged with brown, the posterior margin deeper, but slightly broader distally, slightly longer than broad; cell *b* somewhat flattened; cell *c* larger than cell *d*; cell *e* much smaller; cell *f* very narrow, its axis coincident with that of the shorter cell *h*; both somewhat suffused with brown and overlapped by cell *g*, which is blackened, and extends down beside them to cell *e*, its outer margin convex, more so distally; cell *i* somewhat convergent, nearly symmetrical, about twice as long as broad, forming with cell *g*, a continuous posterior blackish margin, the insertion of the appendage terminal. Perithecium about one half free, hyaline, its venter narrow and straight; the tip abruptly distinguished, slightly bent outward and curved, tapering to a rather sharp apex, and slightly more than one third as long as the body; its inner margin, especially below, variably suffused with brown. Body of perithecium $60-68 \times 12-16 \mu$; the tip about $25 \times 8 \mu$. Cells *a* to *e*, including foot, $42 \times 14 \mu$. Blackened area of margin $58-64 \mu$. Total length to tip of perithecium $125-140 \times 26 \mu$.

On the margin of the left elytron of a species of *Laccophilus* sp. received from Professor C. V. Piper, Puyallup, Washington.

This species is most nearly allied to *C. marginatus*, which accompanied it, and *C. seticolus*, from both of which it is readily separated by the pointed prolongation of its tip, and the fact that cell *i*, although suffused, is otherwise unmodified and nearly symmetrical.

CHITONOMYCES MARGINATUS Thaxter.

Monograph, Part I, p. 289, Plate VIII, figs. 25-28. *Heimatomyces marginatus* Thaxter, l. c. 27, 34.

This form is a straight and rather slender type, in which the body of the perithecium is hyaline and wholly united to the distal part of the receptacle, below the short, abruptly distinguished, distally somewhat inflated and incurved tip and apex. In the distal part of the receptacle, cell *g* overlaps cell *f* to its very base, so that they lie parallel, side by side; and, owing to a common almost opaque suffusion, are mostly indistinguishable. Cell *h* is narrow, quite half as long as cell *f*, and remains hyaline; although it is usually hidden by the adjacent suffusions. Cell *i* is similarly suffused, erect, producing distally an erect, slightly narrower, distally broader and truncate upgrowth, nearly as long, and separated from it by a hyaline line; the insertion of the filamentous part of the appendage pushed to a lateral position on the inner side, subtending the projection.

The types of this species were collected in the vicinity of New Haven, Connecticut, and it has been found at Kittery Point, Maine, and on *Laccophili* received from Professor Barber from Lawrence, Kansas, Professor Piper from Puyallup, Washington and also from Jamaica, W. I. It always grows slightly within the margin of the left elytron, near the tip; although, in one instance, it was found on the posterior legs. It is closely allied to the preceding and following species, especially to the latter.

CHITONOMYCES SETICOLUS Thaxter, Plate XII, figs. 305-307.

L. c. 52, 11.

Nearly hyaline, becoming pale yellowish: form slender, slightly sigmoid. Cell *a* rather uniform, somewhat longer than broad; cell *b* somewhat flattened, distinguished above and below

by slight constrictions; cells *c*, *d*, *e* subequal, well defined, subtriangular; cell *e* very obliquely separated from cell *f* and the base of cell *g*, which extends even below that of cell *f*; the two lying parallel, the former much thicker, suffused with blackish brown, more often concealing the latter, which remains hyaline, and is very narrow, like cell *h*, which may be more than half as long; cell *g* showing coarse transverse mottlings or ridges on the margin and right side, seven or eight in number, often obscured by the depth of the suffusion; cell *i* nearly twice as long as broad, similarly suffused, though slightly translucent; straight, somewhat overlapping the tip of the perithecium, and producing a terminal upgrowth; which is somewhat narrower, half as long or less, distally somewhat pointed or hooked, separated by a hyaline line, below which on the inner side, after a short interval, is placed the base of the filamentous appendage: the whole suffused portion forming an evenly convex black margin, opposite the perithecium. Perithecium rather narrow, slightly concave near the base, externally; the short tip abruptly narrower, the somewhat irregular and swollen apex turned outward.

Growing among the bristles, just within the margin of the left elytron of *Laccophilus* sp., Grand Etang, Grenada, B. W. I.

This species is very closely allied to *C. marginatus*, a few individuals of which were found in the same locality and on the same host, growing in its usual position on the margin of the elytron, slightly nearer the base. The original description of this form appears to have been erroneous in several respects, as has been shown by a reexamination of material which has lain for some years in glycerine, and has become more translucent and thoroughly turgescient. Cell *f* in some individuals can be seen to be hyaline, and cell *g* appears to overlap it lengthwise in such a way that it can be seen only in certain cases. The accompanying figures 306 and 307 also give an erroneous idea of the position of the transverse ridges, which occur only on the right side and are here represented on the left side, showing through from the right. The most evident character which separates it from *C. marginatus* is that of cell *i*, which is relatively twice as long, its upgrowth half as long, and very differently shaped; tapering characteristically, instead of ending in a broad, truncate expansion.

CHITONOMYCES BICOLOR Thaxter. Plate XII, figs. 303-304.

L. c. 52, 11.

Hyaline, or becoming faintly tinged with dirty yellowish brown. Basal cell two or three times longer than broad, tapering slightly below; cell *b* much flattened, horizontal; cells *c*, *d*, *e* subequal, relatively large, subtriangular, typical; cell *f* long and narrow obliquely separated from cell *e*; but slightly overlapped by cell *g* which is about as long as cell *h*; its outer margin slightly divergent, distally slightly prominent below the base of cell *i*, which extends to, or slightly above, the tip of the perithecium, erect, blackish brown, somewhat translucent, opaque externally and distally, abruptly and more or less strongly curved outward distally, where its convex margin is roughened or coarsely tuberculate. Perithecium erect, about one-third free, the outer margin often convex below, tapering, somewhat distally, to the broadly spreading asymmetrical termination, which is outwardly rounded and prominent, sometimes slightly suffused, a much more prominent free rounded projection directed inward, and often wholly or partly overlapping cell *i*; a slight, median, papillate projection also arises near the pore. Spores about $24 \times 2 \mu$. Perithecia $60-80 \times 12-14 \mu$. Cell *i* about $30 \times 7 \mu$. Total length to tip of perithecium 100-125 μ .

On the outer margin of the left elytron of *Laccophilus* sp., No. 2684, Sangre Grande, Trinidad, and on the same species, No. 2687, Grand Etang, Grenada, B. W. I.

This species is allied to *C. javanicus* on the one hand, and to *D. seticolus* on the other: cell *i* alone, however, being suffused and distally proliferous. The distal curvature of this cell, and the prominence of its tuberculate elevations, vary considerably; but the form is well marked, and easily distinguished from similar types.

CHITONOMYCES JAVANICUS Thaxter.

L. c. 41, 307. Monograph II, p. 266, Plate XLII, figs. 37-38.

This species was found on the margin of the left elytron of a Javan *Laccophilus*, and is another example which illustrates the abnormal development of cell *i*, similar to that in *C. marginatus* and *C. bicolor*; a development associated with deep suffusion which, in the present instance, involves also cell *g*, the two forming a continuous, blackened, slightly curved, subclavate and pointed pseudo-appendage extending considerably above the tip of the perithecium; which is broad and subtended externally by a short, somewhat suffused upgrowth, very similar to that of *C. melanurus*, to which it is more nearly allied.

CHITONOMYCES HELICOPHORUS Thaxter. Plate XI, figs. 297-298.

L. c. 52, 10.

Color clear pale straw-yellow; the axis nearly straight. Basal cell hardly twice as long as broad, slightly narrower below and broader at its junction with cell *b*, which is but slightly shorter; the region of cells *c-e* abruptly slightly broader than cell *b*; cell *d* relatively long, its base occupying the whole upper margin of cell *b*; cells *c* and *e* similar, but slightly smaller; cell *f* more than twice as long as cell *g*, which overlaps it slightly, and is narrower than the somewhat shorter cell *h*, and distally slightly suffused, the base of cell *i* bulging prominently just above this suffusion; and prolonged for twice its length above the insertion of the filamentous appendage, which is turned so as to occupy a lateral position on the inner side, the proliferation curved outward, and distally strongly helicoid, the convex margin distinguished by a broad purplish brown suffusion extending nearly to its curled pointed apex; the cell proper and the outer, concave, margin hyaline, or nearly so. Perithecium narrower below, its outer margin evenly convex, the flaring tip abruptly distinguished by an erect, reddish brown, finger-like projection, appressed and extending to the small, hyaline, blunt apex, which it partly conceals; the inner subterminal wall-cell broadly subtriangular, flat; projecting on the inner side to form a divergent, bluntly subconical process, the lower margin of which lies close beside the lower two-thirds of cell *i* and its proliferation. Spores about $25 \times 2 \mu$. Perithecia $54-60 \times 12.6 \mu$; the anterior projection $14 \times 5 \mu$; 18μ by 18μ at the base. Total length to tip of perithecium $100 \times 19 \mu$.

Near the middle of the outer margin of the left elytron of *Laccophilus* sp., No. 2680, Sangre Grande, Trinidad, B. W. I.

This species is very closely allied to *C. melanurus*, the tip of the perithecium being similar, except in details of conformation. Cells *g* and *i* are, however, hyaline; and the latter, with its prolongation, differently shaped. It is a very beautiful and well defined variation among the five species of this general type.

Chitonomyces japonensis nov. sp. Plate XII, figs 308-309.

Similar to *C. melanurus*, somewhat more slender, similar in color. Apex of the perithecium but slightly spreading, the outer lip-cell small, protruding slightly, overarching the pore; which is subtended below, on the inner side, by a short, blunt projection from the inner lip-cell; the external subtending appendage erect, long, slender; its distal half curved strongly outward,

tapering to a blunt apex; its base rather abruptly and evenly convex. Perithecium about one third free, $70-85 \times 12-16 \mu$, the external appendage $40-46 \times 5 \mu$. Cells *g* and *i*, and the extension of the latter, $45-55 \mu$. Total length to tip of perithecium $120-135 \mu$.

On the margin of the left elytron of *Laccophilus* sp., No. 2940, Okayama, Japan, Professor H. H. Chung.

A group of fourteen individuals of this form was found on a species of *Laccophilus* very kindly given me by Mr. Chung, and on the same individual, in a slightly different position, was also growing a group of *C. melanurus*, the characters of which were quite typical. It was at first thought that the present species might be merely a variety; but as the individuals of the two groups show no tendency to vary toward one another, and as this is the case with other examples of *C. melanurus* from the orient, it seems unlikely that they should prove the same. The long slender tapering outcurved external perithecial appendage is quite unlike that of *C. melanurus*, and the characteristic conformation at the apex is distinctly different.

***Chitonomyces chinensis* nov. sp.** Plate XI, fig. 286.

Relatively large, rather dirty yellow; the base, cells *a-b*, abruptly bent at an angle of about 45° to the axis of the portion above, which is more than twice as long. Cell *a* narrow below and often bent; its extremity abruptly much broader; its anterior margin concave, blackened, more broadly distally, the posterior convex below, and slightly concave above, somewhat obliquely separated from cell *b*; which is much flattened, the posterior side larger; cells *c-e* somewhat irregularly associated, subequal; cell *c* overlapping cell *d* on the right side, its extremity usually protruding to form a more or less distinct elevation on the right side; cells *d* and *e* subtriangular and subequal; cell *f* relatively long, broader distally, its outer margin somewhat concave, especially below; cell *g* relatively short, subtriangular, distally conspicuously prominent, the short and broad subsymmetrical cell *i* directed inward and overlapping the tip of the perithecium. Outer margin of the perithecium rather evenly convex, distally abruptly so, as it passes into a deep brown, incurved, stout, horn-like outgrowth of the outer subterminal wall-cell, the blunt free extremity of which extends at right angles over and beyond the pore, and beyond the line of the distal outer margin of the receptacle, the region around the pore forming a rounded vesicular prominence, lying at the base of the concavity formed by the terminal horn and the protrusion of cell *g*. Perithecium, below the tip, almost wholly united to the receptacle; not including horn, $100-130 \times 28-32 \mu$: terminal horn, measured transversely, $45-50 \mu$. Cells *f* and *g* $100-125 \mu$; cell *i* $15 \times 13 \mu$, cell *a* $65-75 \times 32 \mu$. Total length $190-230 \mu$.

Along the margin of the distal half of the right elytron of *Laccophilus* sp., No. 361, China, Professor Tsou: No. 3161, Soochow, China, Professor Gist Gee.

A fine species, not nearly allied to any of the known forms; distinguished by its large size, geniculate base and large overarching terminal perithecial horn-like outgrowth.

CHITONOMYCES MELANURUS Peyritsch. Plate XII, fig. 310.

Sitz. d. k. k. Acad. Wiss. Wien, **67**, 251, Plate III, figs. 30-34. Thaxter, Monograph, Part I, p. 289, Plate XXVI, fig. 19. Spegazzini, Ann. d. Mus. Nac. d. Hist. Nat. **27**, 47, fig. 13.

This species, which is the type of the genus, has been reported from various European states, and from northern Africa, inhabiting the margin of the left elytron of various species of *Laccophilus*. Specimens corresponding exactly to the European type have also been found on similar hosts received from Professor Tsou and collected in China; also from Professor Gist Gee, Soochow, and from Mr. Chung, Okayama, Japan. With *C. bicolor*, *C. javanicus*, *C. helicophorus* and *C. japonensis*, it forms a well defined group, closely related to that of *C. marginatus*,

all characterized by peculiar modification of the distal cells of the receptacle, variably associated with conspicuous suffusions.

CHITONOMYCES PARADOXUS (Peyritsch) Thaxter.

L. c. 27, 32. Monograph, Part I, p. 287, Plate VIII, figs. 17-21. *Heimatomyces paradoxus* Peyritsch, Sitz. d. k. k. Acad. Wiss. Wien, 67, 251. Plate III, figs. 35-39.

This very distinct and remarkable type includes various striking variations, which I have felt unwilling, for the most part, to segregate. These include differences in general form; whether short and stout, or long and rather slender; in the conformation of the peculiar outgrowths in the region of cell *h* on the left side, and the form, relative size and relation of the horn-like distally projecting wall-cell of the perithecium; in the relation of this horn and the apex of the perithecium to cell *i*, and the cells immediately below it, whether closely appressed or widely separated; in the subsigmoid or nearly straight outer margin from base to apex; in the variations in coloration, whether pale or dark, uniform or otherwise, and in other points of minor importance. The variety, for example, figured in Part II of my Monograph, Plate XLII, figure 39, which occurs in Java, growing in the usual position on the extreme edge of the margin of the left elytron, near the tip, is a comparatively slender type, nearly straight, pale; cells *g* and *i* slightly convergent and close to the adjacent margin of the perithecium, the horn-like outgrowth from which is terminal and erect, narrow, tapering and nearly as long as the perithecium as a whole; the subtending wall-cell comparatively small and not at all prominent. In a variation from China, on the other hand, the general anterior margin is strongly subsigmoid; the habit short and stout; the distal part of the perithecium strongly convex on the inner margin, and separated from the divergent projection formed by cells *g* and *i* by a wide depression: while the relatively short and stout outcurved perithecial horn is subtended by the relatively very large and conspicuously prominent subtending wall-cell, which may almost equal it in size; the rounded apex-region protruding inward abruptly; while, in the Javan form, it forms a small and relatively inconspicuous elevation on the otherwise straight margin. From the West Indies several variations have been obtained. One of these, for example, is characterized by a partly or wholly blackened basal cell, and a short, stout, blunt, erect terminal horn, the subtending wall-cell inconspicuous; while cells *g* and *i* are abruptly convergent, and partly overlap the adjacent upper half of the perithecium; in marked contrast to the condition just described in the material from China. Since more or less intermediate variations also occur, I have thought it inadvisable to segregate these variations, even as varieties. In one case, however, it has seemed best to give a new specific name to an extreme variant, collected several times at the Aripo Savanna in Trinidad, which, in addition to its unusual conformation in other respects, is unlike any other form in producing a conspicuous rounded outgrowth from one of the perithecial wall-cells, on the right side. A second form has also been separated by Spegazzini in which the horn is hardly at all developed. The species always occurs on *Laccophili* near the margin of the left elytron.

The typical condition is now known from several regions in this country; New England, Kansas, Florida, Jamaica, W. I., and various parts of Europe, as well as from Sumatra. In all the variations of this species, including the two forms distinguished below, the ascogenic cell occupies an unusual position, opposite the distal end of cell *f*, the asci growing downward, outward and upward in a very characteristic fashion, found, I believe, in no other species. The variant separated by Spegazzini, and that from the Aripo Savanna, are distinguished as follows.

CHITONOMYCES TRUNCATUS Spegazzini.

Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 27, 47, fig. 14.

The general form of this species is represented as very short and stout, the termination of the perithecium very broad, flat and more or less distinctly three-lobed; the outer lobe corresponding to the terminal horn of *C. paradoxus*, but short and distally flattened. Cells *g* and *i* are short, stout and divergent from the opposite concave inner margin of the perithecium, the outer margin of which is evenly concave. The characteristic outgrowth in the region of cell *h* is said to become black with age. The total length is given as 175–185 μ , which is not unlike that often found in *C. paradoxus*, of which this may prove to be a variety, only.

Chitonomyces aripensis nov. sp. Plate XI, figs. 291–292.

Rather dark yellowish brown. Basal cell large and broad, convex anteriorly, more deeply suffused above the large foot, and along the posterior margin; cell *b* greatly flattened; cells *c*, *d* and *e* small and sometimes hardly distinguishable; cell *f* narrow below, broader distally, where it is obliquely separated from cell *h*; cell *i* slightly more than twice as long as broad, and somewhat divergent. Perithecium about two-thirds free, stout and rather short, broad throughout, or the distal half, which is free and more strongly divergent, tapering but slightly; a vesicular, or umbonate rounded lateral prominence arising laterally on the right side, just below the middle, and opposite the insertion of cell *i*; the tip surmounted by a flat-conical cell, its apex rounded or papillate, symmetrical or irregular, according to the point of view. Perithecium $84 \times 50 \mu$. Cell *a* $25 \times 20\text{--}25 \mu$; cell *i* $22 \times 8 \mu$. Total length to tip of perithecium $120\text{--}138 \times 38\text{--}42 \mu$.

On the margin of the left elytron, near the tip, of a pale *Laccophilus*, Aripo Savanna, Cumuto, Trinidad, No. 2685.

This species is closely allied to *C. paradoxus* and grows in a similar position. It seems clearly distinguished by its small size, general form, its flat conical, or irregularly flattened, terminal cell; which replaces the horn of *C. paradoxus*, and by the presence of an umbonate projection on the right side of the perithecium; while there is no indication of the usual outgrowths from the left side. The material examined was taken from several individuals of the host, found swimming in shallow pools in the Aripo Savanna.

SPECIES EXCLUDENDÆ.

Two aberrant types, *Chitonomyces Orectogyri* and *C. aethiopicus*, on *Orectogyrus* (*Orectochirus*) *specularis*, were provisionally placed by me in this genus, and illustrated in my second Monograph. A careful reexamination of these forms has, however, convinced me that this disposition of them is erroneous, and that they represent an aberrant and simple type among the aquatic species of the genus *Laboulbenia*, to which they should be transferred. The characters of the appendages, of which there are but two in either case, are similar to those of the Peyritschelleae, and one of them is inserted at the apex of cell V, which corresponds in position and appearance to cell *h* of *Chitonomyces*. A comparison with other species on Gyrinidae shows that one or more appendages may appear in this position, and that they may closely resemble, through the presence of a blackened basal septum and a more or less vesicular short hyaline distal portion, the type so characteristic of the Peyritschelleae generally. I have evidently been misled by their character and position, and by the fact that I have regarded the small hyaline portion of the foot as representing a much reduced basal cell. As a matter of fact, the basal and subbasal cells are the two lower, large, obliquely superposed cells represented in the figures, and although no primary or secondary stalk-cell is visible below the perithecium, their presence

could no doubt be determined in younger or fresher material. A further indication that the two should be associated with other aquatic Laboulbeniæ, is seen in the black tooth-like appendage at the tip of the perithecium in *C. aethiopicus*, which has an individuality peculiar to similar structures in aquatic forms, and is almost identical with that found in *L. denticulata*. I have no hesitation, therefore, in changing the generic reference of the two forms as follows:

Laboulbenia aethiopica nov. comb.

Chitonomyces aethiopicus Thaxter, l. c. 35, 430. Monograph, Part II, p. 267. Plate XXXIV, figs. 21-22.

Laboulbenia Orectogyri nov. comb.

Chitonomyces Orectogyri Thaxter, l. c. 37, 32. Monograph, Part II, p. 266, Plate XXXIV, figs. 19-20.

HYDRAEOMYCES Thaxter.

Monograph, Part I, p. 293.

Type Species *Hydraeomyces Halipli*.

Although the type of this genus has been found at various times since its original publication, no further careful study has been given it, and no additional information is available as to its development and possible sexual characteristics; which remain, like those of *Chitonomyces*, to which, undoubtedly, it is most nearly allied, quite problematical. It differs from *Chitonomyces* in having three or four secondary appendages, instead of one, which are separated from a cell corresponding to cell *f*; and also from the fact that cells *a* and *b* are replaced by three superposed cells. The perithecium also differs in having at least six or seven wall-cells on its anterior side, below the abruptly papillate, variably prominent, very characteristic apex. An additional species has been described by Spegazzini, as indicated below, and two species of a closely allied type have also been published by this author. All the species are parasitic on Haliplidae.

HYDRAEOMYCES HALIPLI Thaxter.

Monograph, Part I, p. 294, Plate VIII, figs. 22-24, Plate XXVI, figs. 31-33. Spegazzini, Ann. d. Mus. Nac. d. Hist. Nat. d. Buenos Aires, 29, 552, fig. 96. *Heimatomyces Halipli* Thaxter, l. c. 27, 32.

This is a common species on *Haliphus* and *Cnemidotus*, occurring in no definite position on the host. It is subject to some variation in color and habit, as well as in size. Specimens have been obtained from several localities in New England, and typical material was also found at Eustis, Florida. It is also reported by Spegazzini on *Haliphus obconicus* from La Plata, Argentina and it has been found on *Haliphus* and *Cnemidotus* received from Professor Gist Gee from Soochow, China; the latter quite indistinguishable from the American material.

HYDRAEOMYCES VENETUS Spegazzini.

L. c. 28, 52, fig. 17.

I have been unable to determine from the figure and description of this species, why it should be regarded as specifically different from *H. Halipli*. An examination of the material, however, would no doubt make this clear. On *Haliphus* sp. Italy.

PARHYDRAEOMYCES Spegazzini.

L. c. 28, 70.

This type has been separated from *Hydraeomyces* on account of the presence of four superposed cells above the foot, instead of three. It remains uncertain from the figures and description, whether this is actually an additional cell, or one of the smaller cells above the third cell in *Hydraeomyces*, which has become enlarged and somewhat differently placed. In either case, I should not myself regard such a difference as significant, and should be inclined to refer the species to *Hydraeomyces*.

PARHYDRAEOMYCES ITALICUS Spegazzini.

L. c. 70, fig. 35.

This species was found by Spegazzini on *Haliphus striaticollis* at Rome. In general habit it resembles the stouter forms of *H. Halipli*, except for the presence of a fourth superposed cell. The species is also reported from Algeria by Maire (Bull. Soc. d'Hist. Nat. d. l'Afrique d. Nord, 7, 11, 1916) on *Peltodytes conifer*. A variety "*neapolitanus*" is also described by Spegazzini, which is said to be somewhat smaller, the receptacle obconical and the basal cell quite hyaline, and was also found on a species of *Haliphus* at Rome (Spegazzini, l. c., fig. 36).

ADDENDUM

Insert before *Dimorphomyces simplex*, p. 326:

DIMEROMYCES ELEUSINUS Thaxter. Plate I, figs. 19-21.

On the margin of the abdomen, near the tip, of a host first determined as *Eleusis* (*Iso-malus*) sp., but which Mr. Arrow tells me belongs to *Inopeplus*, found among a small lot of beetles kindly sent me by Professor Weston from Los Banos, P. I., No. 3128.

The loss of the MS. for this species was overlooked until after the page proof was corrected; but it is so clearly defined by its falcate perithecia, and characteristic appendages, with abruptly narrowed terminations, that it should be recognized without difficulty from the accompanying figures. It seems most nearly related to *D. decipiens*.

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DESCRIPTIONS OF THE PLATES.

NOTE—The original ink-drawings have been reduced in reproduction from $10\frac{1}{2}$ by $9\frac{1}{4}$ inches. Except where otherwise stated they were made in Plates I to X with Zeiss objective D, ocular 4: in Plates XI and XII with water immersion and ocular 2. The water immersion indicated is the Leitz No. 10.

DESCRIPTION OF PLATE I.

Polyandromyces coptosomalis Thaxter.

Figs. 1 to 6. Progressive stages in the development of the male. Figs. 1 to 3, water im., oc. 2; figs. 4 to 6 Leitz oil im. $\frac{1}{16}$, oc. 2.

Figs. 7 to 9. Mature female individuals. Figs. 7 and 8, Types from Madagascar; fig. 9, Fiji Islands. Zeiss D, oc. 2.

Figs. 10 to 12. Male and two females of the variety MINOR. Male, Leitz $\frac{1}{16}$ oil im., oc. 2; females, Zeiss D, oc. 2.

Nycteromyces streblidinus Thaxter.

Figs. 13 to 15. Mature female, Zeiss D, oc. 2.: young female; mature male; water im., oc. 2.

Dimorphomyces grenadinus Thaxter.

Figs. 16 and 17. Two mature females seen from opposite sides: water im., oc. 2.

Fig. 18. Male.

Dimorphomyces eleusinus Thaxter.

Figs. 19 and 20. Two mature females in different positions, the second associated with a male.

Fig. 20a. Male individual.

Fig. 21. Primary appendages of male and female: water im., oc. 2.

Dimorphomyces furcatus Thaxter.

Figs. 22 and 23. Two females seen from opposite sides.

Fig. 24. Male: water im., oc. 4.

Dimorphomyces argentinus Spegazzini.

Fig. 25. The type of "*D. Meronerae*" Thaxter.

Fig. 26. Male: water im., oc. 4.

Dimorphomyces verticalis Thaxter.

Figs. 27 to 29. Three mature females.

Fig. 30. Male: water im., oc. 4.

Dimorphomyces brevisrostris Thaxter.

Figs. 31 and 32. Two mature females. All the figures are from the Jamaican Types.

Figs. 33 and 34. Two males, one having two antheridia: water im., oc. 4.

DESCRIPTION OF PLATE II.

Dimorphomyces Bledii Thaxter.

- Fig. 35. Well developed female; the tip bent backward.
Fig. 36. Male: water im., oc. 4.
Fig. 37. Straight perithecium, detached.

Dimorphomyces ramosus Thaxter.

- Fig. 38. Mature female with but few appendages broken. Zeiss A, oc. 4.
Fig. 39. Receptacle of female more highly magnified, showing relations of basal cell, appendages and perithecial stalk.
Fig. 40. Male with three antheridia.

Dimorphomyces Pachytelis Thaxter.

- Fig. 41. Female individual, the receptacle viewed sidewise.
Fig. 42. Young female, showing earlier relations of basal cell.
Fig. 43. Receptacle of mature female seen sidewise, with origins of perithecium and appendages.
Fig. 44. Male bearing two antheridia: water im., oc. 2.

Dimorphomyces obliqueseptatus Thaxter.

- Figs. 45 to 47. Three females.
Fig. 48. Male: water im., oc. 2.

Dimorphomyces clavuliferus Thaxter.

- Fig. 49. Mature female: water im., oc. 4.
Figs. 50 and 51. Two males: water im., oc. 4.

Dimorphomyces triangularis Thaxter.

- Figs. 52 to 54. Three younger stages in development of female, showing relations of basal cell: water im., oc. 4.
Figs. 55 and 56. Two mature females: water im., oc. 4.
Figs. 57 and 58. Mature perithecia: water im., oc. 4.
Fig. 59. Male individual: water im., oc. 4.

Dimorphomyces simplex Thaxter.

- Fig. 60. Male and female from same spore-pair: the necks of the antheridia curved and viewed end-on: water im., oc. 2.

THAXTER.--LABOULBENIACEAE

DESCRIPTION OF PLATE III.

Dimeromyces anomalus Thaxter.

Figs. 61 and 62. Two females, the appendages partly broken.

Fig. 63. Furcate male, the appendage also producing antheridia: water im., oc. 4.

Dimeromyces adventitosus Thaxter.

Fig. 64. Female individual with two young perithecia developing at right from undifferentiated primary appendage.

Fig. 65. Female individual, showing development of a perithecium near the tip of the primary appendage at left, and from the base of the lower secondary appendage at right. Zeiss A, oc. 4

Fig. 66. Male individual of the more ordinary type, without accessory antheridia or appendages: water im., oc. 4.

Fig. 67. Highly developed male individual, with two secondary appendages; the lower, at left, like the primary, at right, bearing numerous antheridia.

Dimeromyces Peltoidis Thaxter.

Fig. 68. Luxuriantly developed female: the lower secondary appendage at right, developing a perithecium from its basal cell.

Figs. 69 and 70. Female individuals of a simpler type, the appendages in the latter crowded on the condensed receptacle.

Fig. 71. Male individual: water im., oc. 4.

Dimeromyces brachiatus Thaxter.

Fig. 72. Mature female with three secondary axes, a mature and a young perithecium, and a single secondary appendage; the short primary appendage at the right. Zeiss D, oc. 2.

Fig. 73. Portion of a secondary axis showing appendages and very small lumina: the heterogeneous subulate secondary appendage not yet developed: water im., oc. 4.

Fig. 74. Male individual, the bent neck of the antheridium seen end-on.

Dimeromyces subuliferus Thaxter.

Fig. 75. Young female individual, with trichogyne, showing early displacement of the two lower cells of the receptacle lying obliquely at the left: water im., oc. 4.

Fig. 76. Nearly mature female.

Fig. 77. Fully mature female, with male adherent at the right. Seen from side opposite to that shown in fig. 76.

Fig. 78. Male: water im., oc. 4.

DESCRIPTION OF PLATE IV.

Dimeromyces Parasiti Thaxter.

Figs. 79 and 80. Mature females, with and without a secondary appendage: the former on *Parasitus*, the latter on *Macrocheles*.

Fig. 81. Young female on *Macrocheles*.

Fig. 82. Spore with very short basal segment: water im., oc. 4.

Fig. 83. Male individual on *Parasitus*.

Dimeromyces Dhanyae Thaxter.

Figs. 84 and 85. Mature females, seen from opposite sides.

Figs. 86 and 87. Younger and older males: Zeiss D, oc. 4, and water im., oc. 2.

Dimeromyces amazonicus Thaxter.

Figs. 88 and 89. Two female individuals.

Fig. 90. Male individual: water im., oc. 4.

Dimeromyces Heterophylli Thaxter.

Fig. 91. Female individual.

Fig. 92. Male and female, the insertion of the primary appendage more characteristic than in fig. 91.

Fig. 93. Tip of perithecium. Leitz, water im., oc. 4.

Fig. 94. Typical male: water im., oc. 4.

Dimeromyces proximus Thaxter.

Figs. 95 and 96. Two mature females.

Figs. 97 and 98. Tips of perithecia from different angles: water im., oc. 4.

Fig. 99. Male: water im., oc. 4.

Dimeromyces Cryptici Thaxter.

Figs. 100 and 101. Two females with one and two perithecia respectively.

Fig. 102. Male.

Dimeromyces Derispiae Thaxter.

Fig. 103. Mature female.

Fig. 104. Male.

Dimeromyces Trycheri Thaxter.

Fig. 105. Female with characteristic, recurved, lower secondary appendages.

Fig. 106. Female with straight secondary appendage. Three of the young perithecia bear trichogynes.

Figs. 107 and 108. Larger and smaller males.

Dimeromyces Strongylii Thaxter.

Figs. 109 and 110. Female and male individuals.

Dimeromyces Amarygmi Thaxter.

Figs. 111 and 112. Well developed female and male individuals.

THAXTER.--LABOULBENIACEAE

DESCRIPTION OF PLATE V.

Dimeromyces rugosus Thaxter.

- Fig. 113. Female individual from Sarawak, Borneo. Young perithecium with trychogyne at left.
Fig. 114. Less typical form from Sarawak.
Fig. 115. Male and female Types from Auki, Solomon Islands.

Dimeromyces decumbens Thaxter.

- Fig. 116. Male and female individuals. Type.
Fig. 117. Male.

Dimeromyces longicollis Thaxter.

- Fig. 118. Male and female adherent. Types.

Dimeromyces luteus Thaxter.

- Figs. 119 and 120. Two typical females from Fulakora, Solomon Islands.
Figs. 121 and 122. Two males.

Dimeromyces sulcatus Thaxter.

- Fig. 123. Female Type.
Fig. 124. Male with two antheridia and abruptly curved antheridial necks.
Fig. 125. Male enlarged; water im., oc. 4.

Dimeromyces Galumnae Thaxter.

- Fig. 126. Young female with small trichogyne.
Fig. 127. Mature female.
Fig. 128. Male: water im., oc. 4.

Dimeromyces Longitarsi Thaxter.

- Figs. 129 and 130. Two mature females.
Fig. 130a. Young female showing cell-relations: water im., oc. 2.
Fig. 131. Mature male individual: water im., oc. 4.

Dimeromyces Homophoetae Thaxter.

- Figs. 132 and 133. Female Types from Guatemala.
Fig. 134. Lateral view of apex of perithecium: water im., oc. 4.
Fig. 135. Male individual with an adventitious antheridium from the distal cell of the appendage: water im., oc. 4.

Dimeromyces Hermoeophagae Thaxter.

- Figs. 136 and 137. Two mature females.
Fig. 138. Male: water im., oc. 4.
Fig. 139. Male and female spores.

DESCRIPTION OF PLATE VI.

Dimeromyces geminandrus Thaxter.

Fig. 140. Female from Madagascar, the appendages much broken, the perithecium elongated, its tip viewed at right angles to that of

Fig. 141. Female Type, on *Hyperacantha kolbei*, from Kamerun.

Fig. 142. Variation on *Diacantha Deussenii*, Kamerun, of which

Fig. 143, is the male: water im., oc. 4.

Fig. 144. Male, Type, with adventitious antheridia from primary appendage: water im., oc. 2.

Fig. 145. Tip of female seen at right angles to position in fig. 140.

Dimeromyces Aulacophorae Thaxter.

Fig. 146. Type on *Aulacophora postica* from Perak.

Fig. 147. Typical form on *A. nigoensis* from Suva, Fiji Islands.

Fig. 147x. Variety on host 3071, Kamerun.

Fig. 148. Flexed individual of type material from Perak.

Fig. 149. Normal individual. Type, from Perak.

Fig. 150. Tip of perithecium seen at right angles to position in fig. 149.

Figs. 151 to 154. Four males showing the usual presence of secondary appendages, lacking in 154, and the elongated basal cells of the primary appendage.

Dimeromyces rigidus Thaxter.

Fig. 155. Female, Type, the tips of the stiff dark appendages broken.

Fig. 156. Origins of branches of three lower secondary appendages.

Fig. 157. Male individual.

Dimeromyces helicoideus Thaxter.

Figs. 158 and 159. Two females illustrating range of curvature.

Fig. 160. Male.

Dimeromyces appendiculatus Thaxter.

Figs. 161 and 162. Two females showing variation in appendage.

Fig. 163. Tip of perithecium enlarged: water im., oc. 4.

Fig. 164. Male individual.

DESCRIPTION OF PLATE VIII.

Dimeromyces Gonocnemalis Thaxter.

- Fig. 198. Well developed female, two young perithecia with trichogynes.
Fig. 199 and 200. Males, with two and one antheridium.

Dimeromyces Platycillibis Thaxter.

- Figs. 201 and 202. Two females, with and without a lower secondary appendage.
Figs. 203 and 204. Two males, the second more highly magnified; water im., oc. 4.

Dimeromyces Tomoderi Thaxter.

- Figs. 205 and 206. Two females seen from opposite sides.
Fig. 207. Male: water im., oc. 4.

Dimeromyces ametrothecalis Thaxter.

- Figs. 208 and 209. A young and a mature female.
Fig. 210. Male.

Dimeromyces gracilis Thaxter.

- Fig. 211. Male and female adherent. Types.

Dimeromyces Copropori Thaxter.

- Figs. 212 and 213. The male and female Types.

Dimorphomyces decipiens Thaxter.

- Figs. 214 and 215. Two females seen from opposite sides.
Fig. 216. Male individual seen edgewise: water im., oc. 2.

Dimeromyces Thaxteri Maire.

- Figs. 217 and 218. Two females from opposite sides.
Fig. 219. Normal male: water im., oc. 4.
Fig. 220. Male producing branches on which the antheridia are borne.

COCKAYNE BOSTON

THAXTER. -- LABOULBENIACEAE

DESCRIPTION OF PLATE IX.

Dimeromyces moniliformis Thaxter.

Figs. 221 and 222. Two females seen from opposite sides, the first with male.

Fig. 223. Male.

Dimeromyces Chaetospaniae Thaxter.

Figs. 224 and 225. Two females seen from opposite sides.

Figs. 226 and 227. Young females showing cell-relations, with displacement: water im., oc. 4.

Fig. 228. Male individual: water im., oc. 4.

Dimeromyces lobatus Thaxter.

Figs. 229 and 230. Young females, the perithecia immature. Zeiss D, oc. 12 and D, oc. 4 respectively.

Fig. 231. Mature male. Zeiss D, oc. 12.

Dimeromyces maculatus Thaxter.

Fig. 232. Well developed female from base of legs. Zeiss D, oc. 2.

Fig. 233. Smaller female from elytra. Zeiss D, oc. 2.

Fig. 234. Base of secondary appendage showing maculation: water im., oc. 4.

Fig. 235. Well developed male from base of anterior legs.

Dimeromyces 1-flagellatus Thaxter.

Fig. 236. Female individual: water im., oc. 4.

Fig. 237. Male and female adherent; less magnified.

Fig. 238. Male: water im., oc. 4.

Dimeromyces kamerunensis Thaxter.

Figs. 239 and 240. Lateral and posterior views of two mature females.

Fig. 241. Male: water im., oc. 4.

Dimeromyces oscinosomalis Thaxter.

Figs. 242 and 243. Two females seen from opposite sides, and showing penetrating rhizoids.

Fig. 244. Extremity of secondary appendage, showing terminal cell before splitting: water im., oc. 4.

Figs. 245 and 246. Tips of two perithecia seen from different angles: water im., oc. 4.

Fig. 247. Male: water im., oc. 4.

Dimeromyces pedalis Thaxter.

Figs. 248 and 249. Posterior and lateral views of female, the latter with adherent male.

Fig. 250. Male individual: water im., oc. 4.

DESCRIPTION OF PLATE X.

Dimeromyces annulatus Thaxter.

- Fig. 251 and 252. Two mature females seen from opposite sides: water im., oc. 4.
Fig. 253. Young female with unbroken primary appendage at left: water im., oc. 4.
Fig. 254. Male: water im., oc. 4.

Dimeromyces appressus Thaxter.

- Figs. 255 and 256. Two females from different points of view, from Trinidad.
Fig. 257. Type of female from Ceylon, seen from a third angle.
Fig. 258. Male, from Trinidad: water im., oc. 4.

Dimeromyces Aphanocephali Thaxter.

- Figs. 259 and 260. Two females from opposite sides.
Fig. 261. Male: water im., oc. 4.

Dimeromyces Australasiae Thaxter.

- Figs. 262 and 263. Two females seen from opposite sides, the first with male.
Fig. 264. Male with two antheridia: water im., oc. 4.

Dimeromyces Prorei Thaxter.

- Figs. 265 and 266. Two females seen from opposite sides.
Fig. 267. Male: water im., oc. 4.

Dimeromyces Anisolabis Thaxter.

- Fig. 268. Female Type from Argentina.
Fig. 269. Female on *Euborellia* from the Amazon.
Fig. 270. Male Type from Argentina: water im., oc. 4.
Fig. 271. Female from Wai Ai, Solomon Islands.
Fig. 272. Female from Turuca, Fiji Islands. The lower secondary appendage showing two branches from the basal cell not often found.
Fig. 273. Male from Wai Ai, Solomon Islands: water im., oc. 4.

Dimeromyces Tomari Thaxter.

- Figs. 274 to 276. Three females, the first with male attached.
Figs. 277 and 278. Two males: Leitz 1/16 oil im., oc. 4.

Eudimeromyces Chilotis Thaxter.

- Figs. 279 and 280. Two females from opposite sides, the first with male attached.
Fig. 281. Male, showing indications of division in the terminal antheridium: Leitz 1/16 oil im., oc. 4.

Dimeromyces aberrans Thaxter.

- Figs. 282 and 283. Two females seen from opposite sides, having two and four perithecia respectively: water im., oc. 2.
Fig. 284. Female and adherent male (cf. fig. 247): water im., oc. 2.
Fig. 285. Male: water im., oc. 4.

DESCRIPTION OF PLATE XI.

Chitonomyces chinensis Thaxter.

Fig. 286. Mature individual from left side.

Chitonomyces corniculatus Thaxter.

Fig. 287 and 288. Two individuals seen from the left and edgewise respectively.

Chitonomyces orientalis Thaxter.

Figs. 289 and 290. Three individuals; one from left, two from right.

Chitonomyces aripensis Thaxter.

Figs. 291 and 292. Two mature individuals seen from left and right respectively.

Chitonomyces manubriolatus Thaxter.

Figs. 293 and 294. Two individuals from Trinidad, (Type), and Grenada, B. W. I.

Fig. 295. Variety from China.

Chitonomyces gracilipes Thaxter.

Fig. 296. Unique Type.

Chitonomyces helicoferus Thaxter.

Figs. 297 and 298. Two individuals; the latter enlarged: water im., oc. 4.

Chitonomyces rugosus Thaxter.

Fig. 299. Individual seen from left.

Chitonomyces Australasiae Thaxter.

Figs. 300 and 301. Two individuals seen from right and left.

Chitonomyces prolongatus Thaxter.

Fig. 302. Type from right.

DESCRIPTION OF PLATE XII.

Chitonomyces bicolor Thaxter.

Figs. 303 and 304. Individuals seen from left and right respectively.

Chitonomyces seticolus Thaxter.

Figs. 305 to 307. Three individuals; 306 younger and showing the roughness, obscured in fully matured specimens. In 306 and 307, the ridges on cell *f*, though represented, are actually on the other (right) side and on the margin. In 305, they are shown as they are actually present on the right side.

Chitonomyces japonensis Thaxter.

Figs. 308 and 309. Two individuals seen from right and left respectively.

Chitonomyces melanurus Peyritsch.

Fig. 310. Individual from Japan.

Chitonomyces striatus Thaxter.

Figs. 311 and 312. Two individuals seen from right; the latter enlarged: water im., oc. 4.

Chitonomyces uncinulatus Thaxter.

Figs. 313 and 314. Individuals seen from left and right respectively.

Chitonomyces oedipus Thaxter.

Figs. 315 and 316. Two individuals seen from right and left respectively.

Chitonomyces Grenadae Thaxter.

Figs. 317 to 319. Three individuals seen from right, edgewise, and left respectively.

Chitonomyces cerviculatus Thaxter.

Figs. 320 and 321. Two individuals seen from right and left respectively.

Chitonomyces introversus Thaxter.

Figs. 322 and 323. Two individuals seen from right and left respectively.

Chitonomyces longirostratus Thaxter.

Fig. 324. Mature individual seen partly edgewise.

Fig. 325. Young individual showing cell-arrangement.

Chitonomyces Thaxteri Spegazzini.

Figs. 326 and 327. Smaller and larger individual, from left and right.

Chitonomyces excavatus Thaxter.

Figs. 328 and 329. Two individuals seen from left and right respectively.

Chitonomyces incisus Thaxter.

Fig. 330. Type seen from left.

Chitonomyces inflatus Thaxter.

Figs. 331 and 332. Mature individuals seen from right and left respectively.

Fig. 333. Young individual, showing position of carpogenic cell.

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