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**SANDERSONIOMYCES, A NEW GENUS OF
LABOULBENIALES ALLIED TO DIPLOMYCES,
SYMPLECTROMYCES AND TERATOMYCES**

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Sandersoniomyces gen. nov.

Stipes receptaculi 3-cellularis cum 1 cellula postica et quoque 2 cellulis anticis terminatum; cellula postica appendicem primum terminalem gerens; cellulae anticae elongatae axes cellulosos simplices vel ramosos gignentes; cellulae axium appendices singulas antheridiiferas gerentes; cellulae 1 vel plures axium cellulosarum perithecia gignentes; appendix antheridiifera ex cellula basilari singula et quoque ramulo simplice sterile externo et quoque ramulis 1, vel pluribus fertilibus internis constans; cellulae ramulorum fertilium antheridia simplicia gerentes; perithecium cum cellula stipiti et cellulis basilaribus persistentibus; ascosporae 1-septatae.

Stalk of receptacle consisting of three superposed cells followed by a single posterior cell bearing a primary appendage and two anterior cells that give rise to simple or branched cellular axes composed of large superposed cells each bearing an antheridial appendage distally; one or more cells of the cellular axes giving rise to stalked perithecia; antheridial appendages consisting of a single basal cell subtending a sterile branchlet and one to several fertile branchlets the cells of which may be converted into simple antheridia; perithecia with well-developed and persistent basal- and stalk-cells and four rows of wall-cells of four cells each. Ascospores 1-septate.

Etym.—Named for Dr. Milton W. Sanderson, Illinois Natural History Survey, Urbana, entomologist, student of Coleoptera, especially Staphylinidae.

Type species.—*Sandersoniomyces divaricatus* Benjamin.

Sandersoniomyces divaricatus sp. nov.

(Fig. 1-2)

Fungus maturus plus minusve fuscoporphyreus vel fuscorufescens; stipes receptaculi $40-55\ \mu \times 22-35\ \mu$; cellula postica triangularis basi $23-35\ \mu$ lata appendicem primam singulam terminalem gerens; appendix prima ex cellula basilari singula $10-12\ \mu \times 10\ \mu$ et quoque 2-3 ramulis cellulosi $15-20\ \mu$ longis

constans; cellulae anticae subaequales prope isodiametrae $15-25\ \mu \times 15-25\ \mu$ axes simplices vel ramosos plus minusve divergentes 8-17 cellularum compositos gerentes; in quoque cellula axium appendix singula antheridiifera gesta; cellula basilaris appendicis aliquantum inflata $12-22\ \mu \times 8-13\ \mu$; ramus externus appendicis sterilis 3-cellularis $22-40\ \mu$ longus; rami interni 2-3 vel plures antheridia et quoque ramulos $10-20\ \mu \times 2-3\ \mu$ gerentes; 1 vel plures cellulae plerumque proximales axium perithecia interne gignentes; corpus perithecii elongatum, $130-195\ \mu$ longum $\times 35-50\ \mu$ latum; margines uniformiter convexae; stipes $25-65\ \mu$ longus $\times 15-25\ \mu$ latus; totus fungus a basi ad apicem perithecii $200-315\ \mu$; ascosporis hyalinis $40\ \mu \times 3-4\ \mu$.

Mature individuals more or less uniformly dark reddish-brown to dark rufous in color. Basal cell about two times as long as broad; foot black, small; the next two cells slightly darker in color, usually somewhat broader than long; the three cells forming a stalk $40-55\ \mu$ long $\times 22-35\ \mu$ wide distally. The posterior appendiculate cell broadest below, $23-35\ \mu$ wide, tapered upward and bearing a single terminal primary appendage consisting of a relatively large, somewhat inflated basal cell, $10-12\ \mu \times 10\ \mu$, that subtends 2-3 small cellular branchlets $15-20\ \mu$ long. The paired anterior cells subequal, nearly isodiametric, about $15-25\ \mu \times 15-25\ \mu$, each giving rise to more or less divergent simple or branched cellular axes consisting of 8-17 superposed cells; each cell bearing posteriorly and distally a single branched appendage. Appendage composed of a single slightly inflated basal cell, $12-22\ \mu \times 8-13\ \mu$, subtending a sharply tapered, 3-celled, sterile outer branch, $22-40\ \mu$ long, and a branched inner appendage of 2-3 or more branchlets the cells of which are delimited by usually darkened septa and may become transformed directly into simple antheridia that discharge spermatia through very short exit tubes formed laterally and distally; in age, the cells of the inner branchlets often forming elongate simple branchlets, $10-20\ \mu \times 2-3\ \mu$. Perithecia usually arising internally from one or more of the proximal cells of the cellular axes; body of the perithecium elongate, the margins uniformly convex, $130-195\ \mu$ long $\times 35-50\ \mu$ wide including the basal cells; the stalk short, $25-65\ \mu \times 15-25\ \mu$. Total length to tip of perithecium $200-315\ \mu$. Ascospores hyaline, $40\ \mu \times 3-4\ \mu$.

Holotype.—CALIFORNIA. Los Angeles County: Fern Canyon, San Gabriel Mts., 5 miles north of Claremont, 4,000 ft. el., 10 July, 1957, R. K. Benjamin; moist litter near small stream in canyon; on upper surface of the head of *Quedius* (*Raphirus*) sp. (Order: Coleoptera; Superfamily: Staphylinioidea; Family: Staphylinidae; Subfamily: Staphylininae); RKB 2051; slides in RSA.

Other specimens examined.—CALIFORNIA. San Bernardino County: Icehouse Canyon, San Gabriel Mts., 2 miles northeast of Camp Baldy, 5,000 ft. el., 4 June, 1954, 11 Aug., 1954, 14 July, 1956, R. K. Benjamin; moist debris near stream; on upper and lower surface of abdomen near tip of *Quedius* (*Raphirus*) sp.; RKB 1737, 1826, 2026; slides in RSA.—Shasta County: Burney Falls, 26 June, 1954, R. O. Shuster; on upper surface of abdomen near tip of *Quedius* (*Raphirus*) sp.; RKB 1883; slides in RSA.

A discussion of *Sandersoniomyces* logically should include also a comparison of the genus with several other genera of Laboulbeniales to which it apparently is most closely related, namely *Diplomyces* Thaxter, *Symplectromyces* Thaxter, and *Teratomyces* Thaxter. Thus, I am including drawings and brief accounts of the type species of the latter genera for comparison with the former. All known members of this complex of four genera, which represent a very distinct group

within the order, occur on beetles belonging to the family Staphylinidae. Furthermore, all species of these genera parasitize insects classified in but two of the three subtribes, Oecypina and Quediina, of the tribe Staphylinini of the subfamily

Fig. 1. *Sandersoniomyces divaricatus* Benjamin.—A. Ascospore.—B. Very young individual showing terminal primary appendage.—C. Anterior view of slightly later stage of development of individual in which the divergent secondary axes of the receptacle are beginning to develop.—D. Posterior view of young individual showing primary appendage terminating single upper cell of the receptacle.—E. Posterior view of young individual showing median primary appendage and more advanced stage of development of the cellular axes bearing antheridial appendages.—F. Similar individual in anterior view. Note immature perithecium (per) arising from basal cell of the right axis.—G. Sketch of immature perithecium showing well-developed trichogyne (tr), the trichophoric cell (e''), and the carpogenic cell (f). (All $\times 660$.)

Staphylininae as recognized by Arnett (1961). The host of *Sandersoniomyces bilateralis* belongs to the Quediina.

The genus *Diplomyces* was described by Thaxter in 1895 and the type species, *D. actobianus*, first was illustrated a year later (Thaxter, 1896, Pl. X, fig. 18–21). Thaxter subsequently described a second species, *D. atanygnathi*, on species of *Atanygnathus* (Quediina) from the Cameroons and from Borneo. I have specimens of what may be the same species from an *Atanygnathus* collected in the Philippines. *Diplomyces atanygnathi* (Thaxter, 1931, p. 173, Pl. XLIII, fig. 1) is very distinct from the type species which is relatively common in the United States on species of *Erichsonius* (= *Actobius*) of the Ocyrina. My illustrations of *D. actobianus* (Fig. 3) are based on collections from Illinois (RKB 2343, 2344, 2345, and 2358).

The receptacle of *D. actobianus* consists of three superposed cells which, like *Sandersoniomyces divaricatus*, are followed by a single posterior cell and two smaller anterior cells placed side-by-side (Fig. 3 A–C). The posterior cell is terminated by a small primary appendage—suspected by Thaxter (1931, p. 172) to exist but not observed by him—that is more or less completely obscured from view by the development of a pair of divergent, basally septate upgrowths from the posterior cell and the formation of appendages and perithecia by the two anterior cells (Fig. 3 A–C). In *D. actobianus* the entire individual, except for the blackened foot, is dark reddish-brown in color. The receptacle, posterior upgrowths, perithecia and appendages are more or less concolorous, whereas in *D. atanygnathi* the stalk of the receptacle and the furcate upgrowths are black and completely opaque.

Each of the two cells anterior to the divaricate upgrowths formed by the posterior cell of the receptacle of *D. actobianus* typically gives rise to three structures as shown in Fig. 3 A: (1) a single outer antheridial appendage (Fig. 3 A, D); (2) an elongate inner appendage (Fig. 3 A, E), the successive cells of which bear single antheridial appendages similar to the outer appendage; and (3) a single short-stalked perithecium (Fig. 3 A) anterior to the inner appendages. When the perithecia and appendages on both sides of the receptacle develop normally, the individual is nearly bilaterally symmetrical when viewed from front or rear (Fig. 3 C). Not infrequently, however, one or both of the primary perithecia abort or fail to develop in which event axial cells of the elongate inner appendages form perithecial initials. The appendage illustrated in Fig. 3 F shows three successive aborted perithecia and the initial of a fourth being formed by another cell above these. In the individual illustrated by Thaxter (1931, p. 172, Fig. A) both of the primary perithecia aborted; a secondary peri-

Fig. 2. *Sandersoniomyces divaricatus* Benjamin.—A. Anterior view of mature individual showing a single cellular axis on left and branched cellular axis on right; the outer branch of the latter has produced a perithecium from its basal cell.—B. Posterior view of mature individual bearing a single perithecium.—C. Apex of growing cellular axis showing immature antheridial appendage being displaced laterally by the continued growth of the axis.—D–F. Three antheridial appendages showing relationship of the sterile three-celled outer branchlet and the branched fertile inner branchlet some cells of which have been transformed into simple antheridia (anth) that are discharging spermatia. Note the minutely rounded apex of the acuminate terminal cell of the outer branchlet; this is characteristic of the appendage of this species.—G. Antheridial appendage in age showing elongate branchlets formed by proliferation of the axial cells of the inner branchlets. (A–B, $\times 400$; C–G, $\times 1080$.)

thecium formed by the basal cell of one of the inner appendages matured, whereas the perithecium initiated by the basal cell of the opposite inner appendage also aborted.

The genus *Teratomyces* was described by Thaxter in 1893; the type species, *T. mirificus*, was found on a species of *Acylophorus* (Quediina) from Massachusetts and Pennsylvania. A year later Thaxter (1894) characterized two more species, *T. actobii* and *T. brevicaulis*, found on species of *Erichsonius* (= *Actobius*) from Kittery Point, Maine. In his first monograph (Thaxter, 1896) he illustrated the above species together with a fourth, *T. quedianus*, found on *Quedius ferox* Lec. from the vicinity of Cambridge, Mass. Subsequently, Thaxter described five more species, one, *T. atanygnathi*, on an *Atanygnathus* from the Philippines and Borneo (Thaxter, 1931), three species, *T. insignis*, *T. petiolatus*, and *T. zelandicus* on *Quedius* spp. from New Zealand (Thaxter, 1901), and *T. philonthi* on a *Philonthus* sp. (Ocygina) from Hungary. He also described *Teratomyces vulgaris* in 1900 but later transferred this species to a new genus, *Symplectomyces* (Thaxter, 1908), about which more will be said later. *Teratomyces atropurpureus* Maire (1920) from an Algerian *Erichsonius* was regarded as a synonym of *T. actobii* by Thaxter in 1931.

In addition to several as yet undetermined *Teratomyces*, I have examined numerous collections of *T. mirificus* on species of *Acylophorus* as well as species referable to *T. actobii* and *T. brevicaulis* on *Erichsonius* spp. The latter often are found in company with *Diplomyces actobianus* on the same host insect. The accompanying figures illustrating *T. mirificus* (Fig. 4) were prepared from specimens collected near Mahomet, Illinois (RKB 2457).

The receptacle of *Teratomyces mirificus* consists of three cells followed by a fourth cell that initially is terminated by a small primary appendage which soon is obscured by the formation of fertile and sterile appendages. These appendages arise from numerous small, usually elongate cells formed by the repeated subdivision to the right and left of the terminal cell of the receptacle. Figures 4 A and B, respectively, illustrate young individuals in anterior and posterior view. The appendiculate cells, lying in the horizontal plane, form a nearly complete terminal ring of cells with a conspicuous median cleft as seen from the front (Fig. 4 A, C). Perithecial initials arise from inner cells of this complex of cells (Fig. 4 A).

Fig. 3. *Diplomyces actobianus* Thaxter.—A. Anterior view of immature individual showing paired cells terminating the stalk of the receptacle. The cell on the right has formed only an outer simple appendage and an inner appendage in early stages of development. The cell on the left has given rise not only to similar appendages but also to a perithecium; note the elongate trichogyne (tr) terminating the young perithecium. $\times 895$.—B. Mature individual viewed laterally. The prominent, basally septate, divergent, sterile upgrowths of the posterior upper cell of the receptacle are at the right. $\times 660$.—C. Anterior view of normally developed mature individual showing characteristic bilateral symmetry. The elongate inner appendages are somewhat broken and incomplete. Note rudiments of persistent trichogyne bases on apex of perithecia. $\times 610$.—D. Simple primary outer appendage (see A) showing sterile, three-celled outer branchlet and fertile inner branchlets. The axial cells of the two median branchlets have been converted into simple antheridia (anth). $\times 1360$.—E. An elongate inner appendage showing relationship of antheridial appendages to axial cells of the appendage. $\times 1080$.—F. An inner appendage and its supporting cell showing formation of perithecial initials by successive cells of the appendage as a result of the abortion of prior-formed perithecia (per). $\times 610$.—G. Ascospore. $\times 660$.

The perithecium of *T. mirificus* as well as other species of the genus has a well-defined stalk-cell, persistent basal cells and four longitudinal rows of wall-cells of four cells each (Fig. 4 C). I never have observed more than two ascogenous cells in the mature perithecium of this species.

The appendage of *T. mirificus*, as well as other species of *Teratomyces*, is very distinctive and varies greatly in degree of complexity (Fig. 4 D-F). It usually consists of an elongate basal cell, often bearing a sterile, beak-like basal branchlet of 2-3 cells, followed above by more or less numerous free flask-shaped antheridia and additional sterile apically-beaked branchlets. Secondary branches bearing both sterile branchlets and antheridia also may be formed by the elongate basal cell. In age, the appendages may become highly branched and produce numerous often elongate sterile branchlets distally. Also, the antheridia may be more or less deciduous or easily broken so that they disappear and their original position indicated only by the often darkened basal septum marking their former point of attachment to the supporting cell.

The final genus to be considered here is *Symplectomyces*. The type and only recognized species, *S. vulgaris* (Thaxter) Thaxter (1908), originally was placed in *Teratomyces* (Thaxter, 1900), and it has been reported on a variety of species of *Quedius* from various parts of the world (Thaxter, 1908). Thaxter also listed one doubtful record on a *Philonthus* from Hungary.

Symplectomyces vulgaris is extremely common in the United States on *Quedius* spp., and I recently have had an opportunity to examine much excellent material collected by Steward Peck in the central and southeastern United States. I also have four collections of a *Symplectomyces* infesting species of *Philonthus* from Colorado, New Mexico, and California; this form is perhaps different from *S. vulgaris* but it has not yet been studied in sufficient detail for description. My observations do, however, bear out Thaxter's report of the occurrence of a *Symplectomyces* on *Philonthus*. The illustrations of *S. vulgaris* shown in Fig. 5 were prepared from specimens collected in Illinois (RKB 2453, 2458).

The receptacle of *S. vulgaris* is very similar to that of the other genera discussed above, especially *Teratomyces*. Early stages of development, which have not previously been described, are shown in Fig. 5 A-F. The ascospore (Fig. 5 A) possesses a conspicuous terminal apiculus that persists as a spine-like projection on the primary appendage and is easily observed during early stages of development (Fig. 5 B-C, E-F). At the stage of early development shown in Fig. 5 B the basal cell with its relatively large foot is followed above by three cells surmounted by the young primary appendage derived from the terminal cell of the spore. Even at this early stage the septum delimiting the appendage from the receptacle is conspicuously darkened externally. In Fig. 5 C the upper cell of the receptacle has divided once and the upper of these two cells is beginning

Fig. 4. *Teratomyces mirificus* Thaxter.—A. Anterior view of immature individual showing numerous antheridial appendages arising from small cells formed by upper receptacle. Two perithecia (per) are arising from inner cells of this complex of cells. $\times 485$.—B. Similar individual in posterior view. Note short beak-like branchlets at base of appendages. $\times 485$.—C. A mature individual with two long-stalked perithecia. $\times 290$.—D-F. Three appendages showing variation in number and arrangement of antheridia (anth) and sterile branchlets. D, F $\times 1080$; E, $\times 895$.—G. Ascospore. $\times 660$.—H. Apex of immature perithecium showing elongate, branched, multicellular trichogyne. $\times 610$.

to grow outward as the earliest stage of development of a secondary appendage. A slightly later stage is shown in Fig. 5 D in which the terminal part of the primary appendage has been broken. Figures 5 E-F show even later stages of early development in which the spinose primary appendage is conspicuous and is beginning to branch. Antheridial appendages are arising from cells derived from the proliferation of the upper cells of the receptacle. Fig. 5 H illustrates a relatively advanced stage of early development and shows numerous antheridial appendages and two young perithecia. In mature specimens, the appendiculate cells of the receptacle of *S. vulgaris*, like those of *Teratomyces mirificus* (Fig. 4 A-B), tend to surround the bases of the perithecia (Fig. 5 I).

The young secondary appendage of *S. vulgaris* consists of a single series of superposed cells the upper cells of which very soon are mostly converted directly into simple antheridia having divergent, upwardly-directed exit tubes through which spermatia emerge (Fig. 5 E-F, H). The antheridial appendages may remain simple or become branched by the successive formation of new branches by the basal cell (Fig. 5 G) which as a result may become elongate in age. The length of the cells comprising the appendages, especially the lower cells, varies and often a cell is several times longer than wide. Secondary branchlets are formed mostly by proliferation of the antheridial cells, especially in age (Fig. 5 I).

The perithecium of *S. vulgaris* is structurally like that of the other genera treated here, and it has a more or less elongate stalk-cell and relatively large, often elongate basal-cells. Eight ascogenous cells appear to be characteristic of the mature perithecia of this species.

All of the parasitized insects available for study had been preserved originally only in a simple alcohol-water solution. However, utilizing specimens of *S. vulgaris* mounted in glycerine + acid fuchsin or aniline blue dyes, I have been able to record photographically many stages of the formation of the perithecium and female sexual organ of this species. Development of these structures in *S. vulgaris* as well as in *Diplomyces actobianus*, *Teratomyces mirificus*, and *Sandersoniomyces divaricatus* is essentially the same as was described many years ago by Thaxter (1896) for *Stigmatomyces baeri*, *Peyritschiella geminata*, and *Laboulbenia flagellata* (as *L. elongata*). Although the method of fixation precluded cytological observations, the sequence of cellular differentiation of the female organ of *S. vulgaris* also parallels that given by Faull (1912) for *Laboulbenia chaetophora* and *L. gyrinidarum*. Several stages of development of the species figured by Thaxter (1896, Pl. I) have their counterparts in the several optical sections of perithecia of *S. vulgaris* shown in Fig. 6.

In the brief discussion that follows, the terminology and symbols employed by Thaxter in his detailed description of perithecial development in the species listed above (Thaxter, 1896, pp. 218-228, Pl. I) are used.

Fig. 5. *Symplectromyces vulgaris* (Thaxter) Thaxter.—A. Ascospore. $\times 660$.—B-F. Early stages of development of the individual showing origin of primary and secondary appendages. Note spine-like apex of spore that persists near base of the first branch of the primary appendage. $\times 660$.—G. Antheridial appendage showing two branches in which all cells except the basal have been converted directly into antheridia (anth) having divergent, upwardly-directed exit tubes. $\times 1080$.—H. Late stage of development of young individual showing numerous antheridial appendages and two immature perithecia (per). $\times 610$.—I. Mature individual bearing two perithecia. $\times 290$.

Figure 6 A shows a very young perithecium in which the female organ consists of three cells, a terminal trichogyne (tr), a median trichophoric cell (e"), and a carpogenic cell (f). Primordial wall-cells (i) are just beginning to grow upward around the carpogenic cell. The stage of development shown in Fig. 6 B is approximately the same as Thaxter's illustrations of *Laboulbenia flagellata* and *Stigmatomyces baeri* (Thaxter, 1896, Pl. I, fig. 33 and 19 respectively). The stalk-cell (p), secondary stalk-cell (h), and basal cells (o) are shown as are three of the outer wall-cells (n, wx, wx'). Also present but not labelled in this figure (but see the next) are the parietal cells (pc) and the first canal-cells (nc) that lie between the outer wall-cells and the female organ. The trichogyne (tr) already has become disorganized except for the persistent base. The elongate trichophoric cell (e") still is conspicuous and lies between the first canal-cells. The carpogenic cell, (f) in the previous figure, now has been replaced by three cells presumably derived from it, an upper superior supporting cell (ss), a median ascogonium (am), and a lower inferior supporting cell (is).

The next figure (6 C) corresponds to the illustrations given by Thaxter in his Plate I as follows: *Stigmatomyces baeri*, fig. 20; *Peyritschella geminata*, fig. 29; and *Laboulbenia flagellata*, fig. 35-36. The basal- and wall-cells labelled in the previous figure are not designated, but their position may be noted by reference to Fig. 6 B. The position of the parietal cells (pc) and the canal-cells (nc', nc") is indicated. It must be kept in mind that the wall-cells, parietal cells, and canal-cells have their counterparts not only on opposite sides of the perithecia as illustrated, but also on the near and far sides in the three-dimensional objects. The trichophoric cell (e") is still prominent as are the superior supporting cell (ss) and the inferior supporting cell (is). However, the ascogonium shown in Fig. 6 B now has divided and formed a lower secondary inferior supporting cell (ist) and the first ascogenous cells (ac) to the right and left.

A slightly later stage of development is shown in Fig. 6 D. The wall-cells and canal-cells are prominent. The trichophoric cell (e") still is present between the canal-cells. The secondary inferior supporting cell (ist) and the inferior supporting cell (is) still are in position below the ascogenous cells (ac) which are giving rise to asci (as). The asci are enlarging and expanding into the region occupied by the parietal cells (pc). Figure 6 E is a more advanced stage in which the asci (as) are increasing in number and enlarging. The resulting lateral compression is disrupting the parietal cells which eventually are completely disorganized. Finally, Fig. 6 F shows a portion of a maturing perithecium with the ascogenous cells (ac) below, then asci (as) in various stages of development and nearly mature asci containing elongate ascospores above.

In *S. vulgaris* multiplication of ascogenous cells takes place so that eight commonly are present in fully mature perithecia. I have observed only two ascogenous cells in the mature perithecia of *Diplomyces actobianus*, *Teratomyces mirificus* and *Sandersoniomyces divaricatus*.

DISCUSSION

In addition to *Diplomyces*, *Sandersoniomyces*, *Symplectromyces*, and *Terato-*

Fig. 6. *Symplectromyces vulgaris* (Thaxter) Thaxter.—A-F. Several stages of development of the perithecium and female sexual organ. Explanation is in the text. (A-E, $\times 1400$; F, $\times 1000$.)

myces, all species of which have been found only on beetles classified in the Staphylininae of the Staphylinidae, representatives of several other genera of Laboulbeniales, none of which is closely related to the above, also occur on this subfamily of insects. These include *Laboulbenia* (Spegazzini, 1915; Thaxter, 1893, 1899, 1902, 1908), *Rhachomyces* (Thaxter, 1895, 1896, 1900, 1908), *Corethromyces* (Maire, 1920; Spegazzini, 1917; Thaxter, 1912, 1931), and *Peyritschiiella* (Spegazzini, 1917; Thaxter, 1893, 1896, 1901, 1931) species of which also infest other more or less unrelated groups of insects. Except for one species, *Dichomyces homalotae* Thaxter (1901), reported on a member of the subfamily Aleocharinae (Staphylinidae), all species of *Dichomyces* (Thaxter, 1896, 1908, 1931) have been found on members of the Staphylininae. *Mimeomyces* Thaxter (1912, 1931) is confined for the most part to this subfamily, especially to species of *Quedius*, but one species, *M. latonae* (Thax.) Thax. (1931), has been found on a beetle placed in another subfamily of Staphylinidae, the Paederinae. The exact disposition of a few species included in *Mimeomyces*, however, still must be regarded as uncertain, for the thallus of *Mimeomyces* resembles very closely some forms of *Corethromyces*. These two genera are separated very readily on the basis of the antheridia which are compound in *Mimeomyces* and simple in *Corethromyces*. Unfortunately, the antheridia of some species placed in *Mimeomyces* by Thaxter still are unknown, including those of *M. latonae*.

As stated earlier, *Sandersoniomyces divaricatus* and species of *Diplomyces*, *Symplectromyces*, and *Teratomyces* comprise a complex of seemingly related fungi that stands apart from other Laboulbeniales. All of these possess a similar receptacle consisting of three superposed cells terminated by a fourth that bears a primary appendage. In *Symplectromyces* and *Teratomyces* the upper cell very soon divides repeatedly and forms a closely associated group of small cells bearing secondary appendages and stalked perithecia. In *Diplomyces* and *Sandersoniomyces* the terminal cell gives rise to a pair of cells placed laterally to it that do not subdivide repeatedly but function directly in the formation of perithecia and/or elongate cellular axes that bear secondary appendages and perithecia. The perithecia of all of these forms are similar in structure and, when young, bear often elongate, branched, cellular trichogynes. The appendages of *Diplomyces*, *Sandersoniomyces*, and *Teratomyces* form distinctive beak-like sterile branchlets in addition to antheridial cells which are free and flask-shaped in *Teratomyces*, whereas in *Diplomyces* and *Sandersoniomyces* cells of the appendages may be converted into antheridial cells directly. In *Symplectromyces* the antheridial cells are like those of *Diplomyces* and *Sandersoniomyces*, but sterile beak-like cells apparently are absent. Thaxter (1908, p. 314) reported such cells in *Symplectromyces*, but I never have observed them in the abundant material I have examined. Thaxter (1931, p. 169, 174) postulated possible affinity between *Cucujomyces* Spegazzini (1917) and *Diplomyces*, *Symplectromyces*, and *Teratomyces* but my studies of these genera do not lead me to support this idea (Benjamin, 1968).

A perusal of the accompanying illustrations reveals several characteristics that point to a closer alliance of *Sandersoniomyces* to *Diplomyces* than to *Symplectromyces* and *Teratomyces*. The antheridial appendages of *Sandersoniomyces divaricatus* (Fig. 2 D-F) and *Diplomyces actobianus* (Fig. 3 D-E) are nearly identical in structure. The acropetal origin of these appendages and

their disposition on the cells of the cellular axes arising from the paired anterior cells of the three cells terminating the stalk of the receptacle are remarkably similar in both species (Fig. 1 E-F, 2 A-B, 3 E). Although the primary perithecia of *Diplomyces actobianus* normally arise from the paired anterior cells of the upper receptacle (Fig. 3 A, C) the abortion of these or their failure to develop results in their being formed secondarily by cells of the multicellular appendages (Fig. 3 F). The origin of perithecia from cells of these appendages is characteristic of *Sandersoniomyces divaricatus* (Fig. 1 F, 2 A-B). A unique feature distinguishing *Diplomyces* from *Sandersoniomyces* is the formation of pronounced, sterile, divergent upgrowths by the posterior cell of the upper receptacle in *Diplomyces* (Fig. 3 B).

Symplectromyces and *Teratomyces* resemble one another superficially but are distinguished readily by the structure of their antheridial appendages. In the former the axial cells of the appendage are converted directly into simple antheridia (Fig. 5 G), whereas in *Teratomyces* the antheridia are discrete flask-shaped cells subtended by axial cells of the appendage or its branchlets (Fig. 4 D-F). As mentioned above, sterile beak-like branchlets commonly are associated with the appendages of *Teratomyces* but are absent in *Symplectromyces*.

SUMMARY

A new genus and species of Laboulbeniales, *Sandersoniomyces divaricatus*, parasitic on an unidentified species of *Quedius* (subgenus *Raphirus*) of the subfamily Staphylininae (Coleoptera: Staphylinidae) from California is described and illustrated. *Sandersoniomyces* is thought to be closely allied to *Diplomyces*, *Symplectromyces*, and *Teratomyces* all species of which occur on related insect hosts. Illustrations and brief descriptions are provided of the type species of the latter genera, *Diplomyces actobianus* Thaxter, *Symplectromyces vulgaris* (Thaxter) Thaxter, and *Teratomyces mirificus* Thaxter. Several stages of development of the female sexual organ of *Symplectromyces vulgaris* are described and illustrated photographically.

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