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A Revision of the Gasteromycetes of Iowa

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The term Gasteromycetes was first used by Elias Fries in his *Systema Mycologicum* (1821-29) to designate the class in which were included only those fungi which produce their spores within a closed sporocarp. The use of the closed sporocarp as the chief characteristic for setting off the group from the other fungi led him to include some Myxomycetes and some Ascomycetes, both nongasteromycetous groupings. Today the term is used to denote the heterogeneous assemblage of higher Basidiomycetes in which the spores are formed within a closed basidiocarp. Dehiscence of the basidiocarp may or may not occur. In those instances in which dehiscence does occur, it takes place after the spores have become discharged from the basidia. The basidia, in most cases, are borne in a more or less distinct hymenium. The hymenium is indistinct at maturity in the Phallales and Nidulariales and lacking in the Sclerodermatales. In the Phallales the hymenium at maturity, deliquesces, becoming a pungent mass of spores, while in the Nidulariales the hymenium lines the walls of numerous cavities. Each cavity becomes surrounded by a firm, several-layered wall which at maturity forms the tough outer coat of the spore-bearing bodies or peridioles. The basidia, in the Sclerodermatales, are formed at the tips of hyphae which arise from hyphal knots which are formed in the gleba. When mature, the spores form a dry powdery mass. A hymenium is present, forming a waxy or fleshy, spore-bearing region in the Hymenogastrales and a powdery, dry, spore-bearing region at maturity in the Lycoperdales.

Many of the more common species of the Gasteromycetes have been given several names. This confusion has arisen, in part, due to a misunderstanding of the various authors as to what the type was. The starting point in the nomenclature of this group is Persoon's *Synopsis Methodica Fungorum* of 1801. Many of the specimens on which Persoon based his descriptions for the Gasteromycetes are in his herbarium, which is now in the Rijksherbarium at Leiden, Netherlands. Recently Perdeck (1950) has attempted to clear up some of the nomenclatorial confusion existing in the Lycoperdaceae by making a renewed study of these specimens. On the basis of the synonymy and nomenclatorial changes which Perdeck (1950) suggests, a revision of the genera *Calvatia and Lycoperdon* as found in Kambly and Lee (1936) has seemed advisable.

The changes in the genus *Calvatia* are as follows:
Calvatia saccata (Fries) Morgan = *Calvatia excipuliformis* (Pers.) Perdeck.

Regarding this species Perdeck (1950) states: "The name *Calvatia saccata* (Vahl) Morg., as the species mostly has been called up to this time is not valid. Vahl (Fl. Dan. fasc. 19. 1794, tab. 1139) gives no name, neither with his plate nor in the text; he only cites some phrase-names, one of which begins with 'Lycoperdon saccatum, cinereum polline obscure viridi .....'. Persoon was the first to use the name *Lycoperdon saccatum* (J. de Bot., vol. 2, 1809, p. 19) but in another sense, as appears from the type in his herbarium. This specimen is a form of *Lycoperdon pyriforme* Pers. so the name *L. saccatum,* used by Fries (1829) for the species in question is not valid being a later homonym."

Perdeck's study of the specimens in Persoon's herbarium shows that Persoon in 1801 called the species *Lycoperdon excipuliforme.* Therefore, the valid name for this species is *Calvatia excipuliformis* (Pers.) Perdeck.

Calvatia Bovista (Pers.) Kambly and Lee = *Calvatia caelata* (Pers.) Morgan.

Kambly and Lee (1936) called the species *Calvatia Bovista* (Pers.) and considered it to be a new combination. They were unaware that T. C. E. Fries had made this combination in 1921. This combination for *Calvatia caelata* (Pers.) Morgan is a homonym since it had previously been used by T. H. Macbride for *Calvatia gigantea* (Pers.) Lloyd. Macbride based his name on *Lycoperdon Bovista* Fries. This is not the same as *L. Bovista* Pers.

G. W. Martin (1938) has previously mentioned this correction for the combination used by Kambly and Lee.

The changes in nomenclature for the genus *Lycoperdon* are the following: *Lycoperdon atropurpureum* Vitt. and *Lycoperdon umbrinum* Pers. = *Lycoperdon molle* Pers.

This species has generally been known as *Lycoperdon umbrinum* Pers. Hollós (1904) based his naming of the species on Persoon's description and picture of the species. Perdeck (1950) states that this is not correct for the type specimen of *L. umbrinum* Pers., for this specimen shows only finely verrucose spores and does not have a purple gleba. Furthermore, Perdeck points out that what was called *Lycoperdon molle* Pers. by Trelease (1889), Morgan (1891), Hollós (1904) and Smith (1951) is not that species but *Lycoperdon spadiceum* Pers.

The first clear description of this species was made by Vittadini (1842) under the name *Lycoperdon atropurpureum.*

This particular fungus, as both Lloyd (1909) and Perdeck (1950) have pointed out, exhibits a wide range of variation in its characters. It is this diversity which has caused it to be described many times under many different names.

Lycoperdon molle Pers. sensu Hollós et aucct. = *Lycoperdon spadiceum* Pers.

This species has previously been called *Lycoperdon molle* Pers. by Trelease (1889), Morgan (1891), Hollós (1904), Kambly and Lee (1936) and Smith (1951). The change in name is made at the suggestion of Perdeck (1950) that the descriptions of *L. molle* Pers. given by the above authors indicate that the specimens they had were *L. spadiceum* Pers. and not *L. molle* Pers. A study of the specimens in our herbarium confirms Perdeck's suggestion. Perdeck arrived at his conclusion after a study of Persoon's herbarium.

Lloyd (1905) suggested that there were four species of *Lycoperdon* in the United States which closely resembled *L. spadiceum* Pers. None of these bore the specific epithet of *spadiceum*. They were *L. Turneri* E. & E., *L. compressum* Lloyd, *L. muscorum* Morg., and *L. polytrichum* Lloyd. *L. polytrichum* Lloyd is now considered to be a synonym of *L. muscorum* Morg.

Lycoperdon pusillum Pers. and *Lycoperdon polymorphum* Vitt. = *Lycoperdon ericetorum* Pers.

Persoon considered *Lycoperdon pusillum* to be a separate species from *L. ericetorum* solely on the basis of size. To this character Vittadini (1842) added the absence of a subgleba. Perdeck (1950) found all transitions between large and small specimens growing in the same spot. He also noted that Persoon's herbarium contains specimens of *L. ericetorum* with and without a subgleba. Therefore, Perdeck considers that the characteristics of small size and absence of a subgleba are not valid factors for differentiating *L. pusillum* from *L. ericetorum*. *L. pusillum* thus becomes a synonym of *L. ericetorum* Pers.

L. polymorphum Vitt. is, according to Perdeck, a synonym of *L. ericetorum* Pers. Lloyd (1905), who saw the type, had previously suggested this possibility. Lange (1953) concurs with Perdeck and Lloyd.

A study of the specimens in the Mycological Herbarium of the State University of Iowa bears out the above views.

Lycoperdon Wrightii Berk. and Curt. = *Lycoperdon Curtisii* Berk.

A study of the specimens in the Mycological Herbarium of the State University of Iowa leads me to believe that Coker and Couch (1928) and Smith (1951) are correct when they state that *Lycoperdon Wrightii* Berk. and Curt. is a synonym of *L. Curtisii* Berk. Coker and Couch base their conclusions on a study of the co-type in the Curtis Herbarium.

Two of the specimens in our herbarium labeled *L. Wrightii* Berk. and Curt. are *L. ericetorum* Pers., the other is *L. Curtisii* Berk.

Both Lloyd (1903) and Coker and Couch (1928) state that they do not know to what fungus Morgan (1891) referred when he treated *Lycoperdon Wrightii* Berk. and Curt.

Hollós (1904) considered *L. Curtisii* Berk. to be a synonym of *Lycoperdon hyemale* Vitt. This I do not believe is correct. *Lycoperdon hyemale* (*L. depressum* Bon., which Perdeck (1950) states is synonymous), has a distinct diaphragm and subgleba, while *L. Curtisii* Berk. does not. The spores of *L. depressum* Bon. are larger than those of *L. Curtisii* Berk. The two species may easily be confused if the presence of the distinct diaphragm and subgleba is not taken into consideration.

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