The Typification of *Lycoperdon* described by PECK and MORGAN

By Vincent DEMOULIN

Department of Botany, University of Liège, Sart Tilman, B-4000 Liège, Belgium

Summary. The typification of *Lycoperdon* species described by Morgan and Peck is reviewed and several lectotypes or neotypes are designated. The new combinations *Lycoperdon molle* PERS. per PERS. var. *stellare* (PECK) DEMOULIN, *Bovista aestivalis* (BONORDEN) DEMOULIN, *Bovista dryina* (MORG.) DEMOULIN, *Lycoperdon ericaeum* BONORDEN var. *subareolatum* (KREISEL) DEMOULIN and *Lycoperdon foetidum* BONORDEN var. *peckii* (MORG.) DEMOULIN are introduced.

Résumé. La typification des Lycoperdon décrits par Morgan et Peck est examinée et plusieurs lectotypes ou néotypes sont désignés. Les nouvelles combinaisons *Lycoperdon molle* PERS. per PERS. var. *stellare* (PECK) DEMOULIN, *Bovista aestivalis* (BONORDEN) DEMOULIN, *Bovista dryina* (MORG.) DEMOULIN, *Lycoperdon ericaeum* BONORDEN var. *subareolatum* (KREISEL) DEMOULIN and *Lycoperdon foetidum* BONORDEN var. *peckii* (MORG.) DEMOULIN sont introduits.

In the study of North American Gasteromycetes, MORGAN and PECK play an important part with their pioneering work and the large number of new taxa they described. The typification of those taxa was much needed and given the cooperation in which they worked a joint study was advisable.

Observations are performed after a short boiling in lactophenol cotton blue for spores and capillitium and chloral hydrate for spherocysts. For each fruitbody 10 spores have been measured (without the ornamentation).

Herbarium abbreviations follow the Index Herbariorum (1974).

"Art." and "Rec." refer to the International Code of Botanical Nomenclature (STAFLEU et al., 1972).

I am much endebted to the curators of the various herbaria which have loaned material and specially to Drs. R. L. HULBARRY and R. W. EMBREE from the University of Iowa (IA) where MORGAN's herbarium is located and S. J. SMITH and J. H. HAINES from the New York State Museum in Albany (NYS), repository of PECK's collections, for their hospitality during my visit in their respective institutions.

Lycoperdon atropurpureum VITT. var. *hirtellum* PECK, Ann. Rep. New York State Mus. 32: 66 (1879).

Isonyms: — *L. molle* PERS. per PERS. var. h. (PECK) KREISEL, Feddes Repert. 64: 155 (1962).

— *L. umbrinum* PERS. per PERS. var. h. (PECK) HOLLOS, Die Gasteromyceten Ungarns: 98 (1904).

No specimens named so are retained in Peck's herbarium and he did not cite any in the description. The taxon seems to have been ignored by most botanists following LLOYD's (1905) opinion that it is identical with the type variety. In the very difficult group of *L. atropurpureum-molle* it is hard to interprete a taxon without specimens or a more complete description than that of Peck. The "slender bristle-like spinules which are often blackish, and give the plant a decidedly hairy aspect", are however an uncommon character in that group and I know a taxon presenting such characters which occurs in New York State. It is a good species that can be characterized beside its exoperidium by large spores (often more than 5 μm), warts like in *L. molle* (C) and a capillitium with pores absent or very rare. I prefer to delay neotypification and combination at specific rank until a detailed taxonomic treatment of the species is completed. (It is known until now through 12 collections from N and S Carolina, Maine, Michigan, New Hampshire, New York, Virginia). It must be emphasized that the interpretations by HOLLÓS and KREISEL are erroneous and refer to european forms of *L. molle*, while the present taxon is not known in Europe. It should also be noted that *L. mauryanum* PAT. ex DEMOULIN (1972) which is the other American species in that group with slender blackish spines is of southern distribution and does not reach New York State. One must also note that a collection named *atropurpureum* var. *hirtellum* by BURT, determination confirmed by PECK (Mathew's Lodge, Middlebury, Vermont, 14. 8. 1879, FH note n 465 does not answer the original description. It has clear mealy spines and should rather be referred to *L. floccosum* C. G. LLOYD. This collection may be the one from which a duplicate was sent to Hollós who figured it (badly) on pl. XXIX, 4 (1904) and made him apply the name to european forms without dark slender spines.

Lycoperdon atropurpureum VITT. var. *stellare* PECK, Ann. Rep. New York State Mus., 32: 66 (1879).

Isonyms: — *L. umbrinum* PERS. per PERS. var. s. (PECK) HOLLOS, Die Gasteromyceten Ungarns: 98 (1904).

— *L. stellare* (PECK) C. G. LLOYD, Mycol. Writ. II, Mycol. Notes 20: 225 (1905).

There is a single collection so named in PECK's herbarium. It seems however posterior to the description, the label in PECK's handwriting being "*Lycoperdon stellare* (PK.) LLOYD, North Greenbush, Chas H. PECK, (*L. atropurpureum stellare* PK.)" It is a large collection of mostly unripe specimens of the *molle* group with more or less developed stellately fasciculate spines which may not correspond to a single mycelium.

One and a half specimen are almost ripe and answer best the original description (my note 708 is based on the half specimen which can be considered ripe). Those would be suitable neotypes if in CURTIS' herbarium (FH) there was not a collection labelled Isotype "Nov. Ebor., C. H. PECK (68)" The isotype status might be correct for PECK states in the original description "This variety was mentioned in the Twenty-second State Cabinet Report, under the name *L. calvescens* B. & C. The specimens were thus referred by one of the authors of that species; but when the description of the species was published, the reference was found to be erroneous. The larger, purple-tinted, rough spores forbid such a reference" Unfortunately the specimens at FH if they also show the stellately cruciate spines are unripe and the spores might not be normal. I am so reluctant to use this as lectotype and prefer to let the question open as long as the taxonomy of the *molle* group in eastern U. S. A. is not perfectly understood. In the mean time I believe it might be useful to designate collections of *L. molle* which show a tendency toward *L. echinatum* by having groups of convergent spines easily falling off and leaving traces of a reticulation:

L. molle PERS. per PERS. var. *stellare* (PECK)DEMOULIN, comb. nov.

Basionym: *L. atropurpureum* VITT. var. *stellare* PECK, Ann. Rep. New York State Mus. 32: 66 (1879).

It should be noted that such forms do not occur in Europe where the variability of *L. molle* is more restricted than in America. I also consider that this varietal name if to be useful must be restricted to specimens as defined supra and not to any *L. molle* with convergent spines.

Lycoperdon bellii PECK, Bull. Torrey Bot. Club 22: 209 (1895).

What is certainly the holotype (there is however a divergence in the denomination of the locality: Digges Island, Hudson's Bay in the publication, between Gig Island and Amadjnak Fiord, Baffin Land, on the label) is preserved in NYS. It is a *Calvatia* of the complex group of arctic species (*C. arctica* FERD. et WINGE, *C. cretacea* (BERK.) C. G. LLOYD, *C. tatrensis* HOLLOS) characterized by large (more than 5 μ) verrucose spores and septate capillitium.

When the needed revision of that group will be performed these specimens should be carefully studied for this name antedates *C. arctica* and *C. tatrensis*. It should be also noted that another name in that group is usually forgotten: *Lycoperdon turneri* E. et. E. J. Mycol. I: 87 (1885), whose holotype at NY and isotype in K clearly show it is a *Calvatia* probably antedating *C. tatrensis* and not a *Lycoperdon* s. str. as often assumed.

Lycoperdon coloratum PECK, Annual Rep. New York State Mus. 29: 46 (1878).

It is important for the typification of this species to refer to the original description and not the modified one published in 1879; one can so note the type is from Sandlake and grew "in bushy places" This type collection is almost certainly the one from Sandlake labelled "type" in NYS which was studied by BOWERMAN (1961) (figs. 1, 2). In LLOYD's correspondence kept in BPI is a letter of PECK from 12. Nov. 1902 answering enquiries of LLOYD on that species to which is joined a sketch of the smallest and largest specimens of the original collection fitting exactly those in NYS. This collection is made up of 4 specimens, all of them unripe, a fact to be expected since the yellow colour on which the species was based is an occasional and very transient character present only just before maturity. It can be seen in most Lycoperdaceae but is not frequently observed because of its very transient nature and the fact it does not keep in herbarium. This explains it was considered a taxonomic character special to some rare species while it is almost devoid of taxonomic significance. The fact the specimens are unripe does not allow a complete description to be made, but one can at least ascertain that the spores are globose, the pores in capillitium small but abundant and the exoperidium is pale and furfuraceous made up of hyphal elements, seldom swollen until $10{,}4 \times 6$ µm (wall 0,9 µm). I had the good fortune to collect several fungi close to those specimens in Albany area and specially my collection 4074 (LG) can be considered a good representative of *L. coloratum* in its original sense. It includes all the colour stages: white young, brown at maturity and brillant golden yellow just before maturity. A slide shows this feature which is not preserved in herbarium. At the light of those additional collections, the interpretation of *Lycoperdon coloratum* is very clear: it belongs to the common, variable species of *Bovista* sg. *Globaria* for which in a former study (CALONGE & DEMOULIN, 1975) I did not select a name among the various synonyms, and represent an aspect with numerous small pores in capillitium and hyphal exoperidium, which KREISEL (1967) called *Bovista polymorpha*. KREISEL's concept of *Bovista colorata* (PECK) KREISEL is based on that of COKER and COUCH (1928) which refers to what can be considered a different species (*Lycoperdon dryinum*, cf. infra) with pores very rare on most hyphae of the capillitium and exoperidium with small blackish granules made up of large spherocysts with a brown content. The misinterpretation of Coker and Couch is due to the attention given to the false character of the yellow stage.

The time is now ripe to choice a name for the species to which *Lycoperdon coloratum* belongs. Nomenclaturally no new facts have been discovered since our analysis of 1975 and if in the genus *Lyco-*

perdon, the correct name is undoubtly *Lycoperdon cepiforme* ("*cepaeforme*") (BULL. per DC.) CHEV., if one wants to treat this as a *Bovista* the combination cannot be made because of the existence of a *Bovista cepiformis* ("*cepaeformis*") WALR. (a synonym of *Lycoperdon decipiens* DUR. et MONT.). For a similar homonymy reason *Lycoperdon furfuraceum* SCHAEFF. per STEUDEL cannot be combined because of *Bovista furfuracea* J. F. GMEL. trans PERS. (a species of uncertain identity, probably synonymous of *Bovista pusilla* ss. KREISEL).

I am so in the obligation to introduce the new combination: *Bovista aestivalis* (BONORDEN) DEMOULIN, comb. nov.

Basionym: *Lycoperdon aestivale* BONORDEN. Handb. allg. Mykol.: 251 (1851).

My 1970 paper can be consulted for the misinterpretation of *L. aestivale* by LLOYD. Further frequently used synonyms of this species are *Lycoperdon polymorphum* VITT., nom. rej. (art. 63) and *Lycoperdon pusilliforme* KREISEL. A problem still to settle on the basis of a large sample, from various geographical and ecological origins, is whether *Bovista dakotensis* (C. G. LLOYD ex BRENCKLE) KREISEL should be joined to this list, or be considered distinct. The material which has been widely distributed by BRENCKLE shows a rather distinctive fungus with large fruitbodies, very fragile capillitium (numerous large pores and septa) and exoperidium a purely hyphal almost continuous tomentum. I have however seen in MICH collections from Cisco, Texas which make some transition between those and more typical *Bovista aestivalis*.

Lycoperdon dryinum MORG., J. Cincinnati Soc. Nat. Hist. XVIII: 39, pl. II, fig. 10 (1895).

The type is cited as "Growing on the old leaves in oak woods, usually solitary. Preston, Ohio" In MORGAN herbarium (IA) lies a collection labelled in Morgan's handwriting "*Lycoperdon dryinum* MORG. solitary upon old leaves in woods A. P. M./Type", and I accept this as the type (figs. 3, 4). Another collection labelled "Preston, O. 1898" is of course posterior to the description but helps understand it. The specimen figured by LLOYD (1905) and labelled type (BPI, cat. 24669) is also posterior to the description.

The type collection is made up of 7 subglobose specimens 0,9—1,5 cm in diam. only 3 of which are ripe. The subgleba, compact, is extremely reduced. The exoperidium is made up of small blackish warts (already brown on unripe specimens) entirely made up of large spherocysts (up to 40×20 µm, wall 1,2 µm) with brown content.

The capillitium is elastic, brown, up to 5,2 µm (wall 1,0 µm) moderately septate in the zone beneath the pore, without pores except on some thin walled hyphae in a restricted zone beneath the pore and

in the periphery of the gleba. The pores are never abundant but may be rather large and of regular shape. Spores globose, smooth 3,6—3,9—4,3 μm. The collection from 1898 is very similar but counts 26 fruit-bodies which show a variation in diameter from 0,7 to 2,5 cm.

This is the *Lycoperdon coloratum* in the sense of COKER and COUCH (1928) and KREISEL (1967). While approaching *Bovista aestivalis* in the forms called *Bovista pusilliformis* by KREISEL this seems a good species, characterized by the blackish (vs. brownish) colour of the granules and the scarcity of pores in capillitium. Old *Bovista aestivalis* with damaged exoperidium and fragile part of the capillitium blown out might be difficult to distinguish.

There are two possible synonyms to this species, *Lycoperdon septimum* C. G. LLOYD, Mycol. Writ. II, Mycol. Notes 24: 306 (1906) and *Lycoperdon umbrino-fuscum* PAT. in PAT. et de LAGERHEIM, Bull. Herb. Boissier 3: 60 (1895) both described from the surroundings of Quito (Ecuador). The latter name is specially troublesome for the priority of *L. dryinum* published the same year is unsettled. In this difficult group I however prefer to wait for an intensive study of the complex in South-America to take a firm stand on synonymy and consider the name *Lycoperdon dryinum* should be used in North America in the new combination:

Bovista dryina (MORG.) DEMOULIN, comb. nov.

Basionym: *Lycoperdon dryinum* MORG., J. Cincinnati Soc. Nat. Hist. XVIII: 39 (1895).

Lycoperdon elegans MORG., J. Cincinnati Soc. Nat. Hist. XIV: 11, pl. I, fig. 4 (1891).

The original material has been lost and the species ought to be typified by the description and plate. Those point toward a *Calvatia*. The fragmentary dehiscence of the peridium is very apparent on the plate, but MORGAN preferred to consider this a *Lycoperdon* on the basis of the capillitium whose "threads are arranged in two sets as in Lycoperdon" One possibility is a monstruous *Lycoperdon rimulatum* with an accidental *Calvatia*-like dehiscence. The capillitium is however not typically *Lycoperdon*-like in that species. New collecting in Iowa of specimens fitting the description would be necessary to clarify the identity of that species. It should be noted that LLOYD (1905) gives a photograph of the type (pl. 58, fig. 12) but this does not tell much more than the original plate.

Lycoperdon eximium MORG., J. Cincinnati Soc. Nat. Hist. XIV: 15, pl. II, fig. 3 (1891).

This rare species well characterized by its large oval spores was described from South Carolina, collected by G. F. Atkinson. There is

no material preserved in Morgan's collection except one specimen unripe and not determinable from Alabama, but in Atkinson's herbarium (CUP) is what seems to be the holotype. It is a specimen that fits well the original description and picture, as well as the classical interpretation of the species. The label runs "389 *Lycoperdon eximium* n. sp. — Morg. woods — Columbia S. C. 1888 G. F. A." The specimen to be used as type (lectotype if it is proved it is not the holotype) is pyriform 5×3,7 cm in dimensions, the spines are dark brown, well developed, caducous on top of the fruitbody where a few granules remain. Capillitium with abundant large regular pores and a few septa. Spores oval 4,7—5,3—5,6×4,0—4,2—4,4 μm with a short pedicel up to 2,1 μm.

Lycoperdon frostii PECK, Bot. Gaz. (Crawfordsville) IV: 139 (1879).

This is a classical synonym of *Lycoperdon pulcherrimum* Berk. et Curt., an unproblematic species. The original description indicates its origin from "Brattleborough, Vermont, C. C. Frost, aug. and sept." A collection in NYS so labelled with the exception no date is indicated is to be considered the type. What can be considered an isotype is in NY. There however the date of September 1874 is indicated.

Lycoperdon glabellum PECK, Annual Rep. New York State Mus. 31: 39 (1879).

Isonyms: — *L. umbrinum* PERS. per PERS. var. *glabellum* (PECK) HOLLÓS, Die Gasteromyceten Ungarns: 98 (1904).

— *L. umbrinum* PERS. per PERS. f. *glabellum* (PECK) F. ŠMARDA, Stud. Bot. Českoslov. 12: 235 (1951).

Two localities are mentioned in the original description: West Albany and North Greenbush. I did not find in NYS material from West Albany which has been seen by COKER and COUCH (1928) but a large collection (42 specimens) from North Greenbush. Those specimens of which only 10 can be considered ripe, answer well the original description (better apparently than the West Albany collection that COKER and COUCH found discordant with the diagnosis). The diagnostic criteria of PECK for his variety are however such that all *Lycoperdon* of the *molle* group with reduced exoperidium would be included. The collection is in fact heterogeneous and contains at least three species, and different forms of *L. molle*.

Two specimens (note 712) and possibly a depauperate one and a fragment belong to the species that should probably be called "*hirtellum*"; the characteristic spines have been washed off by rain from the top and are only locally visible on the lower part of the fruitbody. A single unripe fruitbody apparently belongs to *L. subfloccosum* C. G. LLOYD. 3 rather elongate, pyriform specimens (hence not fitting well the original description: "subglobose or turbinate") (note 711)

are similar to the typical european form of *L. molle* PERS. per PERS. Three ripe fruitbodies are to be considered as *L. molle* in my actual concept but are slightly different from the typical form by the great scarcity of pores in capillitium and almost total lack of spines in the exoperidium which is granular. Those specimens fit the best the original description and traditional concept of the taxon and are also apparently similar to the majority of the unripe fruitbodies. I select one (note n° 710) as lectotype (neotype if it would be proved the collection is posterior to the description) (figs. 5, 6). One of those 3 specimens (note 709) is very similar but the spores are slightly less verrucose. At present this typification makes of *L. glabellum* a synonym of *L. molle*, but further studies of this species might oblige to split it from the type.

Short description of the type specimen: Fruitbody turbinate 2,2 × 2,2 cm. Ornamentation of yellowish brown granules, just a very few small spines. Spores in mass chocolate. Spores verrucose like in typical *L. molle* (C) 4,4—4,6—5,0 µm, 10 warts for 10 µm circumference, capillitium elastic, rather light brown up to 4,6 µm in diam., wall 1,2 µm, with pores punctiform and very rare. Spherocysts up to 22 µm, wall 1,8 µm, all of them thick walled.

Lycoperdon leprosum BERK. et RAV. ex PECK, Trans. Albany Inst. IX: 313 (1879).

This classical synonym of *Bovista acuminata* (BOSC) KREISEL, was introduced without description in RAVENEL, Fungi Am. Exs. I, n° 14 (1877). Peck clearly states he is the author of the description derived "from the dried specimens kindly communicated by Mr. RAVENEL" One is so dealing with an "ex" case (Rec. 46 C) and not an "in" case (Rec. 46 D) as admitted by COKER and COUCH (1928) and KREISEL (1967). The type collection is so the Aiken, South Carolina one but the part seen by PECK rather than that seen by both BERKELEY and RAVENEL.

Lycoperdon muscorum MORG., J. Cincinnati Soc. Nat. Hist. XIV: 16 (1891).

MORGAN named so *L. molle* of PECK (1879) und cited as material seen "New York, PECK" No such collection is retained in MORGAN's herbarium [1]) but in Peck's is one box labelled by Peck "Lycoperdon muscorum MORG., Summit, West Albany, Chas. H. PECK, Sept." and added in pencil "Reported as *L. molle* PERS." It seems so that Peck mixed the collections from Albany and Summit be reported in 1879 and since we may assume this is the material MORGAN saw or of which

[1]) There is however one later collection from West Virginia, 1901 given by LLOYD (note n° 696) which confirms the interpretation of the taxon given here.

he received a part that is now lost, I use it as type. Given the heterogeneity of the collection, which nonetheless looks quite uniform, one specimen has been selected as type (lectotype or neotype) (note n° 640) (fig. 7).

All the specimens agree well with PECK and MORGAN descriptions and most have traces of polytrics at the base. Important features of the material are a very slender subgleba in many specimens and an exoperidium of pale brownish granules or small angular spines, occasionally deciduous on the top of the fruitbody and pores in the capillitium not as abundant as in *L. ericaeum* var. *ericaeum*. So if the material belongs to the species for which I have shown in 1970 *L. ericaeum* BONORDEN is the earliest name, it is not close to the type but belongs in a taxon which I believe should most conveniently be treated as a variety and which was recognised as such by KREISEL (1962) as *L. muscorum* MORG. var. *subareolatum* KREISEL. If KREISEL had been aware of the true identity of the type of *L. muscorum* he should of course have called this var. *muscorum*, but in *L. ericaeum* I do not believe the name should be rejected and introduce the combination:

Lycoperdon ericaeum BONORDEN var. *subareolatum* (KREISEL) DEMOULIN, comb. nov.

Basionym: *L. muscorum* var. *subareolatum* KREISEL, Feddes Repert. 64: 144 (1962).

It should be stressed that if this taxon is given specific rank the correct name is of course *L. muscorum*.

To clarify the taxonomic situation the following table will give the main characteristics of the two varieties, which while many collections can be easily attributed to one or the other seem nonetheless to run one into the other, hence the varietal status is adopted. That some characters might be ecophenic (like the slender subgleba in mosses) should also be considered.

	var. *ericaeum*	var. *subareolatum*
shape	turbinate	capitate, subgleba sometimes remarkably slender
colour of exoperidium	whitish	brownish
type of exoperidium	flocculent connate spines	granules or small usually isolated spines
capillitium	with very abundant pores	pores not so abundant
habitat	in various acidic open habitats	in mosses (Sphagnum, Polytrichum) in very acid soil

Short description of the type specimen:

Fruitbody capitate 3,5 × 2,3 cm, subgleba 7 mm in diam. at basis. Ornamentation cream to brownish granules. Spores in mass brown.

Spores moderately verrucose (B), 4,4—4,6—4,8 µm, 10 warts for 10 µm of circumference. Capillitium elastic, brown, up to 2,8 µm in diam., wall 0,6 µm, septate with regular pores, small to large, moderately abundants (abundance variable with hyphae, on the whole inferior to that of *L. ericaeum* var. *ericaeum*). Spherocysts up to 24 µm, wall 0,8 µm, many of them collapsed.

Lycoperdon pachydermum PECK, Bot. Gaz. (Crawfordsville) VII: 54 (1882).

This is usually known as *Calvatia p.* (PECK) MORG., J. Cincinnati Soc. Nat. Hist. XII: 167 (1890). Of the type (Arizona, Santa Catalina Mts, 22. 6. 1884, PRINGLE) is only left in NYS a very young fruitbody. A piece of a riper specimen is in NY but has lost all spores. One can however see the very thick brown endoperidium made up of short hyphae passing to spherocyst-like elements in periphery, and some septate capillitium with punctiforme pores.

Lycoperdon peckii MORG., J. Cincinnati Soc. Nat. Hist. XIV: 15 (1891).

Isonym: *L. perlatum* PERS. per PERS. var. *peckii* (MORG.) BOWERMAN, Canad. J. Bot. 39: 375 (1961).

The description by MORGAN is unambiguous and clearly refers to the taxon as conceived by modern authors (COKER and COUCH, 1928, DEMOULIN, 1971). There is a single collection under that name in Morgan's collection (no date or locality) and it belongs to a different species: *L. molle* var. *stellare*. This material does not fit the original description (endoperidium covered with granules, gleba already conspicuously chocolate despite the immaturity of the material) and it should not be used for typification. It should however be noticed that such a misinterpretation of his own species by MORGAN also occurs in LLOYD (1905, p. 224). It is however incompatible with both the description of *L. peckii* by MORGAN and the one of *L. echinatum* by PECK, for which MORGAN proposed his new species. In both cases it is clearly stated the species belongs to the olive spored series and the authors had ripe and even over matured specimens at their disposal since they speak of a smooth endoperidium after the fall of the spines (the endoperidium of *L. peckii* should be faintly reticulated after the fall of the spines, but this reticulation is easily washed out by rain in old specimens; this occurs in the two oldest specimens labelled *L. peckii* in PECK's herbarium).

As with *L. muscorum* one should so turn toward PECK's herbarium for typification. There are two collections labelled *L. peckii*. For one the label is in PECK's handwriting, it is from "Hague, Adirondack Mts., sept." but it has been added with an other ink

"(Floodwood)". This is a large collection with several unripe fruitbodies of which many seem to belong to *L. peckii*, and 6 mature ones that definitely do. There are however also one *L. pedicellatum*, one *L. molle*, one *L. molle* var. *stellare*, one *L. ericaeum*. The other collection has been relabelled and no original PECK label is present the label is "*Lycoperdon Peckii* MORGAN, Forestburgh, collected by Charles H. PECK, Sept." 5 speciemens are definitely *L. peckii*, 4 unripe ones are almost certainly identical and 4 are a form of *L. perlatum* that might have been superficially confused with *peckii* but of course present distinct spores.

The collection of Forestburgh can be considered one of those described as *L. echinatum* and later relabelled and is also the one seen by COKER and COUCH (1928) when they redefined *L. peckii*. I select in it one specimen as lectotype (neotype if MORGAN did not use PECK's material) that fits well MORGAN's description and secure the traditional use of the name (fig. 8). The specimen selected might not be perfectly ripe but has the advantage to show well the exoperidial characteristics which are important for that species and even a hint of the reddish tinge that occasionally occurs in that taxon (and also in typical *L. foetidum*, but there goes usually unnoticed because of the general darker pigmentation).

It should also be mentioned that one collection sent by PECK to ELLIS as *L. echinatum* in a set of representatives of his *Lycoperdon* concepts is in NY where it has been examined by COKER and COUCH and also represents *L. peckii*.

Short description of the type specimen:

Fruitbody pyriform 3,5 × 2,8 cm. Ornamentation of cream to pale brown angular spines, occasionally convergent, surrounded by areolae of smaller warts. Spores punctate 3,8—4,2—4,4 µm. Capillitium brown, up to 4,8 µm in diam., wall 1,1 µm, with rather abundant, large pores of regular outline. Spherocysts up to 24 µm, wall 0,6 µm, smaller more in chains and usually collapsed in tips of spines, no pigment visible even after fixation.

Taxonomic note: After considering a large sample of *L. foetidum* and *L. peckii* from Europe and North America I am led to the conclusion there is no sharp limit between the two taxa. The presence of a pigment in the spherocysts after fixation which I advised for the distinction of the two taxa in 1971 does not give as clear cut results as hoped when some of the intermediate forms (as occur in Europe and Rocky Mountains) are considered. On the whole *L. peckii* can only be considered a pale variant of *L. foetidum*. Given its constance in Eastern North America it is worth recognition but given the lack of clear cut barriers, a varietal status is the best and I propose the new combination:

Lycoperdon foetidum BONORDEN var. *peckii* (MORG.) DEMOULIN, comb. nov.

Basionym: *L. peckii* MORG., J. Cincinnati Soc. Nat. Hist. XIV: 15 (1891).

Lycoperdon pedicellatum PECK, Bull. Buffalo Soc. Nat. Sci. 1: 63 (1873).

Two collections (CRAGHAN and CENTER) of this classical and unproblematic species are cited in the original description and preserved in NYS. I select the best one, that of Center as lectotype.

Lycoperdon rimulatum PECK ex TRELEASE, Trans. Wisc. Acad. Sci. VII: 117, pl. IX, fig. 3 (1889).

The name is traditionally attributed to PECK or PECK in TRELEASE but a careful examination of the diagnosis shows this is not a case of "in" (Rec. 46 C) but of "ex" (Rec. 46 D). TRELEASE does validate an herbarium name of PECK with a description mainly based on his Wisconsin specimens but after having seen the material of PECK (introduction and "I am indebted to Mr. PECK for the name employed, which he has applied to immature specimens in his herbarium, from Ohio (MORGAN) and New York" Since as far as I know, TRELEASE's herbarium is lost, a lectotype could be selected among PECK's collections.

None of the three collections present does however fit the mention by TRELEASE of "immature" Since the species is unproblematic, I prefer at the moment to leave it typified by the description.

Lycoperdon separans PECK, Annual Rep. New York State Mus. 26: 73 (1874).

Isonym: *Lycoperdon wrightii* BERK. et CURT. var. *separans* (PECK) PECK, Annual Rep. New York State Mus. 32: 67 (1879).

The type is the collection "Worcester, July" preserved in NYS. This is a classical synonym of *L. marginatum* VITT. ex MORIS et de NOT.

Lycoperdon subincarnatum PECK, Annual Rep. New York State Mus. 24: 83 (1872).

I designate as lectotype the collection "Sandlake, August" (NYS) which is accompanied by a colour painting and the mention "N. sp." The syntype "Greig, September" is also preserved in NYS. This characteristic fungus is often called nowadays *Morganella subincarnata* (PECK) KREISEL et DRING, Feddes Repert. 74: 117 (1967).

Lycoperdon warnei PECK, Bull. Torrey Bot. Club VI: 77 (1876)

I did not find the type (Chicago, leg. H. L. WARNE) in NYS; several other collections are however present. Clearly a synonym of *Secotium agaricoides* (CZERN.) HOLLOS.

Plate I

Fig. 1. One of the type specimens of *L. coloratum* PECK. ×6.

Fig. 2. Elements of the exoperidium in one of the type specimens of *L. coloratum* PECK. ×750

Fig. 3. One of the type specimens of *L. dryinum* MORG. ×6.

Fig. 4. Elements of the exoperidium (spherocysts) in one of the type specimens of *L. dryinum* MORG. ×750

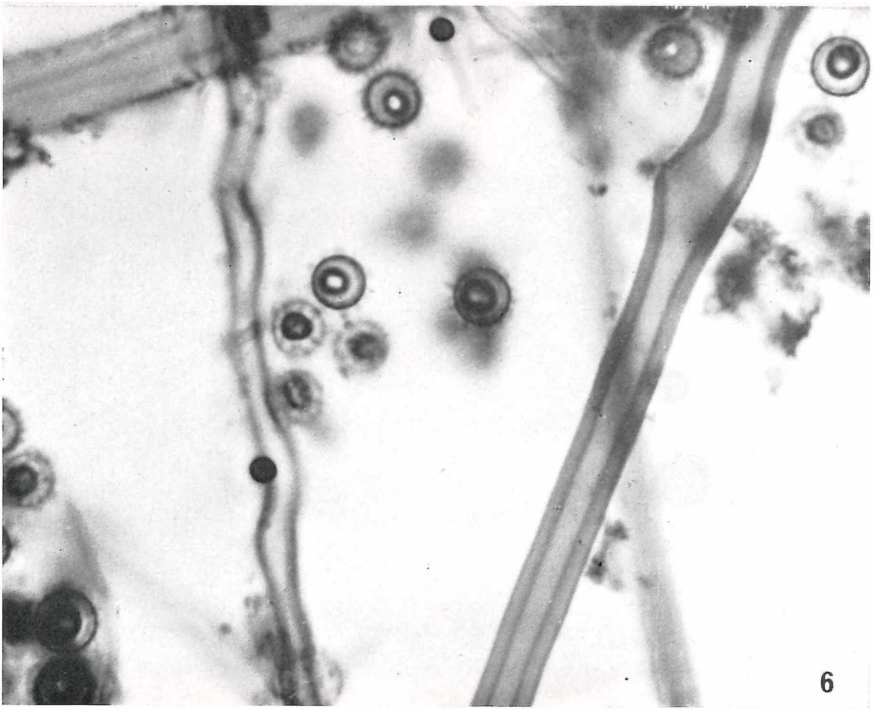
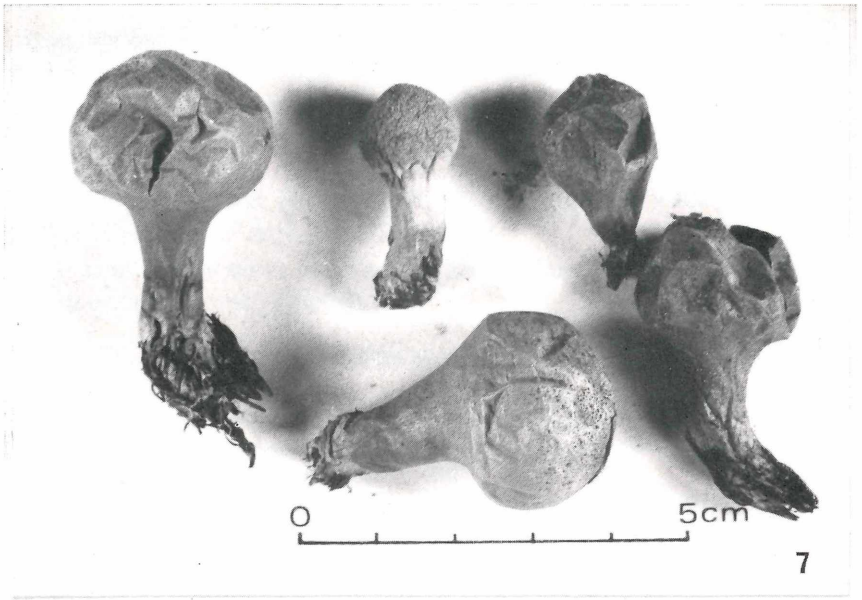


Plate II

Fig. 5. Specimen selected as type of *L. glabellum* Peck. Exoperidium on the lower part of the gleba. Approx. ×8

Fig. 6. Specimen selected as type of *L. glabellum* Peck. Spores and capilitium. ×1500



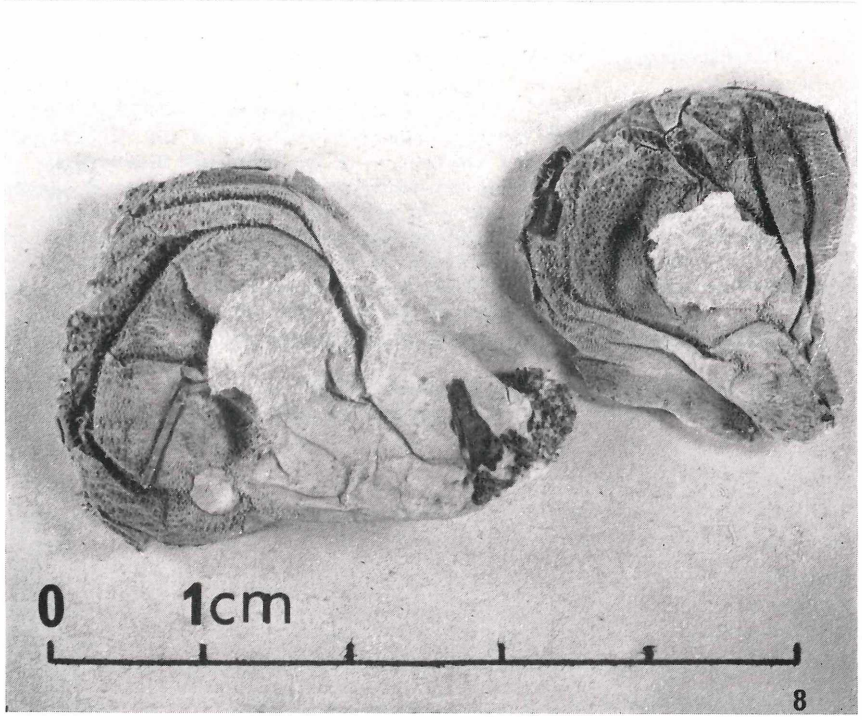


Plate III

Fig. 7. Some of the specimens in the collection in which a type of *L. muscorum* has been selected. The selected specimen is the one in the middle just above the scale. ×1

Fig. 8. Specimen (it is cut in two) selected as type of *L. peckii* Morg. ×2

Lycoperdon wrightii BERK. et CURT. var. *atropunctum* PECK, Annual Rep. New York State Mus. 32: 67 (1879).

No type cited. Apparently a form with darkened spines of *L. marginatum* VITT. ex MORIS et de NOT.

Lycoperdon wrightii BERK. et CURT. var. *typicum* PECK, Annual Rep. New York State Mus. 32: 67 (1879).

This is of course not a valid name (art. 24) and the correct name is *Lycoperdon wrightii* var. *wrightii*.

References

BOWERMAN, C. A. (1961). *Lycoperdon* in Eastern Canada with special reference to the Ottawa district. — Canad. J. Bot. 39: 353—383.

CALONGE, F. D. & DEMOULIN, V. (1975). Les Gastéromycètes d'Espagne. — Bull. Soc. Mycol. France 91: 247—292.

COKER, W. C. & COUCH, J. N. (1928). The Gasteromycetes of the Eastern United States and Canada. IX+201 pp.×123 pl. — The University of North Carolina Press, Chapel Hill.

DEMOULIN, V. (1970). Les spécimens de *Lycoperdon* de BONORDEN dans l'herbier de Genève. — Taxon 19: 775—778.

DEMOULIN, V. (1971). *Lycoperdon norvegicum* Demoulin sp. nov. A New Gasteromycete with Boreo-Continental Distribution in Europe and North America. — Norw. J. Bot. 18: 161—167.

— (1972). Espèces nouvelles ou méconnues du genre *Lycoperdon* (Gastéromycètes). — Lejeunia, N. S. 62: 28 pp.

HOLLOS, L. (1904). Die Gasteromyceten Ungarns. — 278 pp. O. Weigel, Leipzig.

HOLMGREN, P. K. & KEUKEN, W. (1974). Index Herbariorum/Part I. The Herbaria of the world, ed. 6. — Regnum Veg. 92: VII+397 pp.

KREISEL, H. (1962). Die Lycoperdaceae der Deutschen Demokratischen Republik. — Feddes Repert. 64: 89—201, pl. I—IX.

— (1967). Taxonomisch-Pflanzengeographische Monographie der Gattung *Bovista*. — Beih. Nova Hedwigia 25: VIII+244 pp.+70 fig.

LLOYD, C. G. (1905). The Lycoperdons of the United States. — Mycol. Writings II, Mycol. Notes 20: 221—238, pl. 55—67.

PECK, C. H. (1879). United States Species of *Lycoperdon*. — Trans. Albany Inst. Ix: 285—318.

STAFLEU, F. A. et al., eds. (1972). International code of botanical nomenclature. — Regnum Veg. 82: 426 pp.