

CONTRIBUTION TO THE KNOWLEDGE OF THE *GASTEROMYCETES, BASIDIOMYCOTA*, FROM UKRAINE

by

F.D. CALONGE¹ & E.V. SYVOKON²

¹Real Jardín Botánico, CSIC, Plaza de Murillo 2. 28014 Madrid, Spain.

²Department of Mycology and Plant Resistance, V.N.Karasin's National University,
Svobody sq. 4, 61077 Kharkov, Ukraine.

Summary. CALONGE, F.D. & E.V. SYVOKON (2008). Contribution to the knowledge of the *Gasteromycetes, Basidiomycota*, from Ukraine. *Bol. Soc. Micol. Madrid* 32: 91-95.
Within the study of several collections of *Gasteromycetes* from Ukraine, *Bovista* aff. *acuminata*, *B. cunninghamii* and *B. promontorii* are new records for the country. On the other hand, *Lycoperdon nigrescens* and *L. norvegicum* are two rare species in the territory.

Key words: *Gasteromycetes*, taxonomy, ecology, chorology, Ukraine.

Resumen. CALONGE, F.D. & E.V. SYVOKON (2008). Contribución al conocimiento de los *Gasteromycetes, Basidiomycota*, de Ukrania. *Bol. Soc. Micol. Madrid* 32: 91-95.
Como consecuencia del estudio de una serie de muestras de herbario de *Gasteromycetes* procedentes de Ukrania, se han identificado tres especies nuevas para el país: *Bovista* aff. *acuminata*, *B. cunninghamii* y *B. promontorii*. Por otro lado, también se han determinado *Lycoperdon nigrescens* y *L. norvegicum*, dos especies muy raras en Ukrania.

Palabras clave: *Gasteromycetes*, taxonomía, ecología, corología, Ukrania.

INTRODUCTION

The study of the *Gasteromycetes* of Ukraine has received quite good attention, as demonstrated by the approximately 100 papers already published. The first records have been given by WEINMANN (1836), BORSCOW (1869), WALZ & RISHAWI (1871) and SREDINSKY (1873).

CZERNIAIEV (1845) was the first who considered the problem of the biodiversity of this group and published 23 species from Ukraine. He proposed four new genera: *Disciseda*, *Endonevrum* (= *Mycenastrum* Desv.), *Endoptychum* and *Trichaster* Czern. (= *Geastrum* Pers.: Pers.), two of them are still valid, and six species: *Lycoperdon horrendum*, *Tulostoma brachipus* (= *Tulostoma*

fimbriatum Fr.), *Endoptychum agaricoides*, *Trichaster melanocephalus* (= *Geastrum melanocephalum* (Czern.) Stanek), *Disciseda collabescens* and *Disciseda compacta*.

KALENICZENKO (1865) gave information on the uses of *Phallus impudicus* L.: Pers. in popular medicine. Later, PITRA (1870) described the anatomy and biology of *Sphaerobolus stellatus* Tode. In 1876 SOROKIN studied the *Scleroderma verrucosum* Bull.: Pers. fruitbodies. Data on the *Gasteromycetes* diversity in Ukraine were compiled by JACZEWSKI (1913); his monograph contains systematics and brief descriptions of all species of *Gasteromycetes* known in Russian Empire in that time: 97 species, 7 varieties and 10 forms in total. In 1940 PILAT published a

Ecology.- Near Zadonetskoe village, National

Matterial studied. - Several basidiomata up to 15 mm diam., sessile, with mycelial cords. Exoperidium squamulose at first then granular, yellowish brown, formed of sphaerocysts and hyphae. Endoperidium membranous, of the same colour. Gleba yellowish brown. Subgleba absent or very thin, up to 1 mm. thick. Capillitium of intermediate-type, 3-5 μ m diam., with spores. Spores globose to subglobose, 3-4 μ m diam., almost smooth or punctate under the LM.

Bovista cunctinighamii Kreisel, Beih. Nova Hedwigia, 25: 103 (1967).

Observations. *Bovista acuminata* has only been mentioned in America, growing on the bark of living trees (KREISEL, 1967). Despite the Ukrainian material showing a similar macro- and microscopical features, the fact of being found growing on soil makes impossible its identification with *B. acuminata*. On the other hand, the exoperidium in *B. acuminata* has claviform cells, while in our material is made of hyphae. The study of more collections would facilitate this real identity; it could well be an undescribed taxon.

Ecolegy - Natural Reserve "Dneprovsko-Orel'skiy", near Dnepropetrovsk city, Dnepropetrovskiy region, with *Festuca valesiaca* and *Elytrigia repens*, 27-07-1997, leg. N.P. Pydyuk. KW 23338.

Material studied. Only one basidiole, globose, 25 mm diam., sessile. Exoperidium squamous, pale yellowish. Each scale is made of mucilose, pale brownish. Each scale is made of degenerated, hyaline, septate hyphae, 4-6 μ m diam. Endoperidium membranous, fragile, the same colour.

\equiv *Lycoperdon acuminatum* Bosc apud Fr.,
Nov. Symb.: 134 (1851).

Repert. 69: 201 (1964).

RESULTS

Each sample was treated with 5 % KOH before the microscopic observation. Size of the spores includes the ornamentation. All the studied material is preserved in the herbaria CWU (MyC)GB and KW.

MATERIAL AND METHODS

Despite the long history studying the Gastromyceetes of Ukraine, most data remain fragmentary and an urgent need of a taxonomic classification of Ural herbarium material, should be welcome. According to the bibliography used by us, 104 species, 9 varieties and 1 form are actually known from Ukraine. The present article describes five new or rare for Ukraine.

Other authors have contributed to the knowledge of the Gasteromycetes of Ukraine, such as ZERROVA (1950, 1956, 1963); WASSEER (1971, 1974, 1987); BUCHALO (1960); BUCHALO & WASSEER (1981); HARKEVICH (1959); GANZHA (1970); TARAŃ (1974); KARPENKO (1980, 2004); BEDEŃKO (1984); PRYDIIUK (2003, 2004); DUĐKA & ISIKOV (1998). Contributions to the study of Gasteromycetes in nature reserves have been carried out by SYVOKON (2006, 2007).

Important contributions to the knowledge of the Gasteromycetes of Ukraine have been made by several Gasteromycetologists who described at least 15 new species: *Tulasnoma chersoniensis*, *T. poltavensis*, *Cyatitus brasiliensis*, *Sclerodermella poltavensis*, *Calvatia fulvida*, *Calvatia summa*, *Calvatia heterospora*, *Lycoperdon curtisiforme*, *Lycoperdon poltavensis*, *Lycoperdon verticu-*
sum, *L. weinmannii*, *Bovista acutinica*, *Gaeumannella charckovense*, *G. komarovii* and *G. sovieticum*. However, many of these new species show

Park "Gomol'shanskie lesa", Zmievskoj rajon, Kharkov region, in mixed forest with *Quercus robur* and *Pinus sylvestris*, 10-07-2004, leg. E.V. Syvokon. CWU (Myc.) GB 00378.

Observations.- When we compare our material with KREISEL's description (1967), it is possible to observe small differences. In our material some specimens show a very thin subgleba and the spores being spherical to subglobose, features which normally does not happen in the original description (KREISEL, 1967). But these differences are within the variability of the species. *Bovista cunninghamii* has been previously recorded in Australia (KREISEL, 1967) and Spain (CALONGE, 1998).

Bovista promontorii Kreisel, *Beih. Nova Hedwigia*, 25: 105 (1967).

Material studied.- Only one basidioma, globose, about 20 mm diam., in bad conditions. Exoperidium squamulose, to granular, fractured, due to its fragility, orange yellowish, formed of sphaerocysts 7-12 µm diam. Endoperidium papery, of the same colour. Gleba olive brown. Subgleba compact, very thin, paler. Capillitium of intermediate-type, 3-5 µm diam., with abundant pores. Spores ellipsoid, 4-5 x 3-4 µm, almost smooth under LM, with a pedicel less than 1 µm long.

Ecology.- Growing in soil under *Quercus robur*, National Park "Gomol, shanskies lesa", Zmievskoj rajon, Kharkov region, 12-07-2004, leg. E.V. Syvokon. CWU (Myc.) GB 00376.

Observations.- The type material was found in South Africa (KREISEL, 1967) and we have collected it in several provinces of Spain (CALONGE, 1998). It is quite close to *B. oblongispora* (C.G. Lloyd) Bottomley, but this shows longer spores, 5-7.5 µm, with longer pedicels, 3-7 µm. *Bovista longispora* Kreisel is another similar species, but it has lycopedon-type capillitium and apedicellate spores.

Lycoperdon nigrescens Pers.: Pers., *Syn.*

Meth. Fung.: 146 (1801).

≡ *Lycoperdon perlatum* var. *nigrescens* Pers.,
Syn. Meth. Fung.: 146 (1801).

Material studied.- Half of a basidioma which coincides well with the description of the type collection. In other words, basidioma pyriform, exoperidium forming spines olive brown, convergent, curved, falling off from the top, leaving a clear reticulation delimited by very small warts, endoperidium papery, yellowish, Gleba greyish brown, subgleba of the same colour. Capillitium 3-6 µm diam., pored, partially covered by crystals. Paracapillitium present. Spores globose 3.5-5 µm diam.

Ecology.- In soil under *Pinus sylvestris*, near Kikoly village, National Park "Ichnjanskij", Chernigov region. 31-08-2006. Leg. E.V. Syvokon. CWU (Myc.) GB 00464.

Observations.- The only difference with *Lycoperdon perlatum* is the exoperidium, which has whitish conical spines, not curved, while the spines are dark brown, curved, in *L. nigrescens*. That is why the latter has been considered a variety of the former. It is a common species in Europe.

Lycoperdon norvegicum Demoulin,
Norwegian J. Bot. 18 (3-4): 166 (1971)

Material studied.- Basidioma pyriform, 23-40 x 18-30 mm, cream colour. Exoperidium forming spines up to 0.7 mm high, falling off from the top leaving or not a reticulation delimited by small warts. Spines are made of sphaerocysts, 12-20 µm diam. Endoperidium papery, cream yellowish. Gleba pale brown. Subgleba dirty white. Capillitium up to 5 µm diam. Paracapillitium present. Spores globose, 3-3.5 µm diam., almost smooth under the LM.

Ecology.- In soil under *Pinus sylvestris*, National Park "Ichnjanskij", near Ichnja town, Chernigov region. 26-08-2006. Leg. E.V. Syvokon. CWU (Myc.) GB 00401; 25-08-2006. Leg. E.V. Syvokon. CWU (Myc.) GB 00405. In soil under

Materiāl studied. - Several basidiomata up to 15 mm diam., sessile, with mycelial cords. Exoperidium squamulose at first then granular, yellowish brown, formed of sphaerocysts and hyphae. Endoperidium membranous, of the same colour. Gleba yellowish brown. Subgleba absent or very thin, up to 1 mm. thick. Capillitium pores. Spores globose to subglobose, 3-4 μ m diam., almost smooth or punctate under the LM, without pedicel.

Hedwigia, 25: 103 (1967).

Observations. *Bovista acuminata* has only been mentioned in America, growing on the bark of living trees (KREISEL, 1967). Despite the Ukrainian material showing a similar macro- and microscopical features, the fact of being found in living trees (KREISEL, 1967). Despite the study of more collections would facilitate its real identity; it could well be an undescribed taxon.

EcoLOGY - Natural Reserve "Dneprovsky Orel'skiy", near Dneprovsky city, Dneproprivolskij region, with *Festuca vallesiana* and *Elytrigia repens*, 27-07-1997, leg. N.P. Przydruk. KW 23338.

Material studied.—Only one basidiole, globose, 25 mm diam., sessile. Exoperidium squamous, pale yellowish. Each scale is made of a mucilose, degenerated, hyaline, septate hyphae, 4-6 μ m diam. Endoperidium membranous, fragile, the same colour.

Gleba pale brownish. Subgleba absent. Capillitium lycopodion-type, 4-8 μ m diam., clearly poroid. Spores 3-3.5 μ m diam., smooth with a pedicel smaller than 1 μ m long.

\equiv *Lycoperdon acuminatum* Bosc apud Fr.,

Bovista aff. acuminata (Bosc) Kreisel, Fedd's Repert. 69: 201 (1964).

RESULTS

Despite the long history studying the gastronomic species of Ukraine, most data remain fragmentary and an urgent need of a taxonomical revision, in all herbarium material, should be welcome. According to the bibliography used by us, 104 species, 9 varieties and 1 form are actually known from Ukraine. The present article describes and comments five taxa of gastronomic species new or rare for Ukraine.

MATERIAL AND METHODS

Each sample was treated with 5 % KOH before the microscopic observation. Size of the spores includes the ornamentation. All the studied material is preserved in the herbaria CWU (MyC) GB and KW.

MATERIAL AND METHODS

Other authors have contributed to the knowledge of the Gastromycetes of Ukraine, such as ZERNOVA (1950, 1956, 1963), WASSEER (1971, 1974, 1987); BUCHALO (1960); BUCHALO & WASSEER (1981); HARKEVICH (1959); GANZHA (1970); TARAN (1974); KARPENKO (1980, 2004); BEDENKO (1984); PRYDILUK (2003, 2004); DUDKA & ISIKOV (1998). Contributions to the study of Gastromycetes in nature reserves have been carried out by SYVOKON (2006, 2007).

Despite the long history studying the fragmentary and an urgent need of a taxonomic revision, in all herbarium material, should be welcome. According to the bibliography used by us; 104 species, 9 varieties and 1 form are actually known from Ukraine. The present article describes and comments five taxa of Gastromycetes new or rare for Ukraine.

Impor tant contributions to the knowledge of Gasteromycetes of Ukraine have been carried out by SOSIN (1952, 1973), who described at least 15 new species: *Tulostoma chersonen sis*, *T. poltavensis*, *Cyatinus bratzlavensis*, *Scleroderma poltavensis*, *Calvatia fulvipes*, *Calvatia sumana*, *Calvatia heterospora*, *Lycoperdon curtisii forme*, *Lycoperdon poltavensis*, *Lycoperdon verrucosum*, *L. weinmannii*, *Bovista ucrainica*, *Gaeatum charackovense*, *G. komarovii* and *G. sovieticum*. However, many of these new species show

Park "Gomol'shanskie lesa", Zmievskoj rajon, Kharkov region, in mixed forest with *Quercus robur* and *Pinus sylvestris*, 10-07-2004, leg. E.V. Syvokon. CWU (Myc.) GB 00378.

Observations.- When we compare our material with KREISEL's description (1967), it is possible to observe small differences. In our material some specimens show a very thin subgleba and the spores being spherical to subglobose, features which normally does not happen in the original description (KREISEL, 1967). But these differences are within the variability of the species. *Bovista cunninghamii* has been previously recorded in Australia (KREISEL, 1967) and Spain (CALONGE, 1998).

Bovista promontorii Kreisel, Beih. Nova Hedwigia, 25: 105 (1967).

Material studied.- Only one basidioma, globose, about 20 mm diam., in bad conditions. Exoperidium squamulose, to granular, fractured, due to its fragility, orange yellowish, formed of sphaerocysts 7-12 µm diam. Endoperidium papery, of the same colour. Gleba olive brown. Subgleba compact, very thin, paler. Capillitium of intermediate-type, 3-5 µm diam., with abundant pores. Spores ellipsoid, 4-5 x 3-4 µm, almost smooth under LM, with a pedicel less than 1 µm long.

Ecology.- Growing in soil under *Quercus robur*, National Park "Gomol, shanskie lesa", Zmievskoj rajon, Kharkov region, 12-07-2004, leg. E.V. Syvokon. CWU (Myc) GB 00376.

Observations.- The type material was found in South Africa (KREISEL, 1967) and we have collected it in several provinces of Spain (CALONGE, 1998). It is quite close to *B. oblongispora* (C.G. Lloyd) Bottomley, but this shows longer spores, 5-7.5 µm, with longer pedicels, 3-7 µm. *Bovista longispora* Kreisel is another similar species, but it has lycopedon-type capillitium and apedicellate spores.

Lycoperdon nigrescens Pers.: Pers., Syn.

Meth. Fung.: 146 (1801).

≡ *Lycoperdon perlatum* var. *nigrescens* Pers.,
Syn. Meth. Fung.: 146 (1801).

Material studied.- Half of a basidioma which coincides well with the description of the type collection. In other words, basidioma pyriform, exoperidium forming spines olive brown, convergent, curved, falling off from the top, leaving a clear reticulation delimited by very small warts, endoperidium papery, yellowish, Gleba greyish brown, subgleba of the same colour. Capillitium 3-6 µm diam., pored, partially covered by crystals. Paracapillitium present. Spores globose 3.5-5 µm diam.

Ecology.- In soil under *Pinus sylvestris*, near Kikoly village, National Park "Ichnjanskij", Chernigov region. 31-08-2006. Leg. E.V. Syvokon. CWU (Myc) GB 00464.

Observations.- The only difference with *Lycoperdon perlatum* is the exoperidium, which has whitish conical spines, not curved, while the spines are dark brown, curved, in *L. nigrescens*. That is why the latter has been considered a variety of the former. It is a common species in Europe.

Lycoperdon norvegicum Demoulin,
Norwergian J. Bot. 18 (3-4): 166 (1971)

Material studied.- Basidioma pyriform, 23-40 x 18-30 mm, cream colour. Exoperidium forming spines up to 0.7 mm high, falling off from the top leaving or not a reticulation delimited by small warts. Spines are made of sphaerocysts, 12-20 µm diam. Endoperidium papery, cream yellowish. Gleba pale brown. Subgleba dirty white. Capillitium up to 5 µm diam. Paracapillitium present. Spores globose, 3-3.5 µm diam., almost smooth under the LM.

Ecology.- In soil under *Pinus sylvestris*, National Park "Ichnjanskij", near Ichnja town, Chernigov region. 26-08-2006. Leg. E.V. Syvokon. CWU (Myc) GB 00401; 25-08-2006. Leg. E.V. Syvokon. CWU (Myc) GB 00405. In soil under

APPENDIX

Observations.—This species has affinity with *L. perlatum*, *L. nigrescens*, *L. pectinii* and *L. pedi-cellatum*. However, the presence of very small, almost smooth, spores in *L. norvegicum* distinguishes it from the other close species. On the other hand, its boreal distribution is other good feature to separate this taxon, which has been recorded in Norway, Sweden, Finland, USSR, Poland, Germany, the late Czechoslovakia, Canada and USA (DEMOULIN, 1971).

Betula pendula and *Populus tremula*, the same
National Park, 26-08-2006. Leg. E.V. Syvokon.
CWWU (Myc) GB 00402.

- of "Mihaylovskaya Virgin Land "reserve. *Ukrainian Bot. Journ.* 37(3): 73-78.
- KARPENKO, K.K. (2004). New and rare Ukrainian species of macromycetes from the North-East part of the left-bank forest-steppe. *Ukrainian Bot. Journ.* 61(2): 34-40.
- KREISEL, H. (1967). Taxonomisch Pflanzengeographische Monographie der Gattung *Bovista*. *Beih. Nova Hedwigia* 25: 1-244.
- PILAT, A. (1940). *Hymenomycetes Cartatorum orientalium*. *Acta Musei Nation Pragae* II, B. 3.
- PITRA, A. (1970). Some information about *Sphaerobolus stellatus* Tode. *Procc. Soc. Nat. under Kharkov Imp. Univ.* 1: 1-16.
- PRYDIUK, M.P. (2003). Rare finds for the territory of Ukraine. Macromycetes (*Agaricales s.l.*, *Lycoperdales*) from Dnipropetrovsk region. *Ukrainian Bot. Journ.* 60(2): 138-145.
- PRYDIUK, M.P. (2004). Basidial macromycetes of Dnieper-Oril Nature Reserve of Ukraine. I. *Micol. Plant Pathology* 38(6): 45-52.
- SOROKIN, N.V. (1876). The process of *Scleroderma verrucosum* development. *Appendix to Transaction 71 session of Naturalists Soc. under Kazan Univ.* pp. 1-11.
- SOSIN, P.E. (1952). New species of *Gasteromycetes*. *Bot. Mat. Cryptogamic Plants Depart., USSR Acad. Scien.* 8: 125-131.
- SOSIN, P.E. (1973). The key to *Gasteromycetes* of URSSR. *Leningrad Science*. pp.1-164.
- SREDINSKY, N.K. (1873). Materials devoted to the flora of Novorossiskiy region and Bessarabia. *Odessa Nitcze's Press* pp:1-291.
- SYVOKON, E.V. (2006). Gasteroid basidiomycetes of "Velikoburlukskaya steppe" regional landscape park. *Mat. of the XII Congress of Ukrainian Bot. Soc. Odessa.* p.257.
- SYVOKON, E.V. (2007). The first information about gasteroid basidiomycetes of "Desnyansko-Srarogutsky" from National Natural Park. *Mat. III. Intern. Scientific Conference of students and postgraduates*. April 23, 2007, Lvov: pp. 143-144.
- TARAN, N.A. (1974). Some words about myco-flora of Prisamarsky forest. *Ukrainian Bot. Journ.* 31(4): 519-522.
- WALZ, J.J. & RISHAWI, L. (1871). The list of *Myxomycetes* and fungi collected by A.S. Rogowicz, J.J. Walz & L. Rishawi. *Proceedings of Kiev Soc. of Naturalists* 2(2): 187-195.
- WASSER, S.P. (1971). New and little-known species of agarics from steepe areas of Ukraine. *Ukrainian Bot. Journ.* 28(3): 299-304.
- WASSER, S.P. (1974). Modern views on taxonomic position of the genus *Galeropsis* Vel. emend S. Wasser. *Ukrainian Bot. Journ.* 31(5): 567-577.
- WASSER, S.P. (1987). Fungi of Ukrainian SSR which need to be protected. *Ukrainian Bot. Journ.* 44(5): 76-80.
- WEINMANN, J.A. (1836). *Hymeno- et Gasteromycetes Rossiae*. ZEROVA, M.J. (1950). *Scleroderma verrucosum* one of the fungi forming mycorrhiza with trees in steppes of Ukrainian SSR. *Bot. Jour. Ukrainian SSR Acad. Scienc.* 7(4).
- ZEROVA, M. J. (1956). Terrestrial fungi of Ukrainian SSR virgin steppes. *Ukrainian Bot. Journ.* 13(2): 68-77.
- ZEROVA, M.J. (1963). Finding of *Gasteromycetes*; *Scleroderma geaster* Fr. and *Calvatia excipuliformis* Pers.: Pers. var. *obclaviformis* Zerova var. nov. in the territory of Ukraine. *Ukrainian Bot. Journ.* 20(3): 102-105.