DOI: 10.4025/actascibiolsci.v33i1.6726

Gasteroid mycobiota of Rio Grande do Sul State, Brazil: Lysuraceae (Basidiomycota)

Vagner Gularte Cortez[1*], Iuri Goulart Baseia[2] and Rosa Mara Borges da Silveira[1]

*[1]Universidade Federal do Paraná, Rua Pioneiro, 2153,, 85950-000, Jardim Dallas, Palotina, Paraná, Brazil. [2]Departamento de Botânica, Ecologia e Zoologia, Universidade Federal do Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil. *Author for correspondence. E-mail: cortezvg@yahoo.com.br*

ABSTRACT. As part of a review of gasteroid mycobiota from Rio Grande do Sul State, in southern Brazil, members of the Lysuraceae (Phallales) family were studied. Fresh and herbarium specimens were analyzed macro- and micromorphologically. *Lysurus cruciatus, L. cruciatus* var. *nanus* (new record from Brazil) and *L. periphragmoides* have been collected in the area. Their specific limits, distribution and ecological data are discussed. Macroscopic photographs and line drawings of the basidiospores are presented.

Key words: *Clathraceae*, *Phallomycetidae*, *Simblum sphaerocephalum*, taxonomy

RESUMO. Micobiota gasteróide do Estado do Rio Grande do Sul, Brasil: Lysuraceae (Basidiomycota). Como parte de um trabalho de revisão dos fungos gasteróides do Estado de Rio Grande do Sul, Brasil, a família Lysuraceae (Phallales) foi estudada. Espécimes recém-coletados e preservados em herbários foram estudados macro e micromorfologicamente. *Lysurus cruciatus*, *L. cruciatus* var. *nanus* (primeiro registro para o Brasil) e *L. periphragmoides* foram coletadas na área de estudo. Seus limites taxonômicos, ecologia e distribuição são discutidos. Fotos macroscópicas e ilustrações dos basidiósporos são apresentadas.

Palavras-chave: *Clathraceae*, *Phallomycetidae*, *Simblum sphaerocephalum*, taxonomia

Introduction

Phallales E. Fisch. (Basidiomycota) comprises gasteroid fungi that have a gelatinous gleba and usually spread an odor akin to rotten meat. The unpleasant smell is directly related to the dispersal of basidiospores attracting arthropods, such as flies and bees (OLIVEIRA; MORATO, 2000; TUNO, 2002). Other species, in contrast, have developed pleasant scents similar to those of some orchids, as is the case of the tropical American species *Staheliomyces cinctus* E. Fisch. (BURR et al., 1996). Fungi in the Phallales are among the most attractive and mythic mushrooms and are known worldwide in many cultures for their medicinal properties, food value, or as evil entities (LÆSSØE; SPOONER, 1994; OSO, 1976; PEGLER et al., 1995).

In more traditional classifications (DRING, 1973; ZELLER, 1949), Phallales comprises the families Clathraceae E. Fisch., Gellopellidaceae Zeller, Hysterangiaceae E. Fisch., Phallaceae Corda and Protophallaceae Zeller. However, the group has been redefined in recent years, especially due to developmental and molecular approaches. As results, a series of apparently unrelated fungi were incorporated into the core of the phalloids. Among these changes are the inclusion of Geastraceae Corda, Gomphaceae Donk, Hysterangiaceae, and Ramariaceae Corner (KIRK et al., 2001). More recently, the group of 'gomphoid-phalloid fungi' was recognized as an independent subclass (Phallomycetidae K. Hosaka, Castellano and Spatafora), comprising the orders Geastrales K. Hosaka and Castellano, Gomphales Jülich, *Hysterangiales* K. Hosaka and Castellano, and Phallales (HOSAKA et al., 2006).

Lysuraceae was originally segregated from Clathraceae by Corda (1842, as 'Lysuroideae'), who included the genera *Lysurus* Fr. and *Aseroë* Labill. in the family. However, his assertion was neglected by most mycologists of the last century (CUNNINGHAM, 1942; DRING, 1980; LLOYD, 1909; ZELLER, 1949) because they considered Lysuraceae a synonym for Clathraceae. Recent molecular research by Hosaka et al. (2006) reported that Lysuraceae must be considered apart from Clathraceae, as it is more closely related to Phallaceae. Moreover, sequestrate species of *Calvarula* Zeller, *Gastrosporium* Mattir. and *Protubera* Möller have been grouped within the Lysuraceae clade, along with *Lysurus*, *Neolysurus* O.K. Mill., Ovrebo and Burk and *Simblum* Klotzsch ex Hook. (K. Hosaka, pers. comm.). The generic

relationships between *Lysurus* and other phalloid and clathroid genera were discussed in detail by Dring (1966, 1980) and Pegler and Gómez (1994).

Studies on southern Brazilian phalloids were published by Spegazzini (1881), Möller (1895), Rick (1929, 1961), Braun (1932), where some new taxa were described. Additional species were reported in general accounts of macrofungi by Guerrero and Homrich (1999), Sobestiansky (2005), Meijer (2006), Cortez et al. (2008a) and Trierveiler-Pereira et al. (2009), and broader revisions of phalloid genera, such as those of Lloyd (1909), Wright (1949; 1960) and Dring (1980). Recent studies in northeastern Brazil have provided new data on the distribution of Brazilian phalloids (BASEIA et al., 2006; LEITE et al., 2007) and allowed the discovery of new taxa (BASEIA et al., 2003; BASEIA; CALONGE, 2005).

The present paper belongs to a series of studies on the gasteroid fungi of southern Brazil (CORTEZ et al., 2008a, 2008b, 2008c, 2009, 2010) and aimed at reviewing the diversity of Lysuraceae in the mycobiota of Rio Grande do Sul State, based on the study of fresh and herbarium specimens following the most recent systematic arrangement proposed (HOSAKA et al., 2006).

Material and methods

Fresh specimens were collected in the state of Rio Grande do Sul, southern Brazil, from March 2006 to December 2008, and are deposited at the ICN herbarium (Universidade Federal do Rio Grande do Sul, Instituto de Biociências). Collections deposited at the ICN, HURG, and PACA herbaria were reviewed. Descriptions of the species are based entirely on the examined materials and include morphological description of macro- and microscopic features (DRING, 1980; MILLER JR.; MILLER, 1988). Color codes follow Kornerup and Wanscher (1978). Synonyms are according to Dring's (1980) monograph; only names reported in the Brazilian literature were considered in order to update their nomenclature.

Results and discussion

One genus (*Lysurus*) with two species and one variety was collected. The taxa can be identified following the dichotomous key below. The descriptions are presented in alphabetical order of the taxa after the key.

Key to the Lysuraceae of Rio Grande do Sul State, Brazil:

1. Fertile apical portion of the receptacle clathrate - 3. *Lysurus periphragmoides*

1'. Fertile apical portion of the receptacle formed by 4–6(–8) arms - 2

2. Arms pastel red to whitish - 1. *L. cruciatus*

2'. Arms strongly orange yellow - 2. *L. cruciatus* var. *nanus*

Lysurus Fr:

1. *Lysurus cruciatus* (Lepr. and Mont.) Lloyd, Synop. Known Phall.: 40, 1909.

= *L. sanctae-catharinae* (E. Fisch.) P. Henn., Hedw. 41: 172, 1902.

= *L. clarazianus* Müller Arg., Flora 56: 526, 1873.

= *L. borealis* (Burt) P. Henn., Hedw. 41: 172, 1902.

= *L. woodii* (MacOwan) Lloyd, Synop. Known Phall.: 40, 1909.

Figures 1 to 4. Basidiomata 63–85 mm high. Receptacle formed by a pseudostipe with a basal volva and pileus formed by arms bearing a slimy gleba. Pileus (fertile portion of receptacle) consisting of 5–6 arms, 21–34 mm long, united when young to free at maturity, internal surface convex, grooved to rugose, color pastel red (7A4) before maturity; external surface concave, smooth, reddish grey (7B2). Gleba slimy, dark brown (8F5) at maturity, odor fetid. Pseudostipe 42–65 × 14–21 mm, cylindrical to slightly subcylindrical, white (8A1), hollow, consistency and surface spongy. Volva (exoperidium remnant) present at the base of pseudostipe, 24–29 × 14–22 mm, saccate, white (8A1), basal rhizomorphs present. Basidiospores 3.5–4.2 × 1.8–2.2 μm, ellipsoid, hyaline, smooth and thin-walled.

Habitat: growing on soil, at forest edges.

Examined specimens: Brazil. Rio Grande do Sul: Salvador do Sul, 04-VI-1943, *J. Rick* (PACA 12158). São Leopoldo, *B. Braun* (PACA 14003, 14004, 14006, 14007, 14008, 14009, 14012, 14013, 14015, 19691, 19692); 1929, *J. Rick* (PACA 14017); 1930, *B. Braun* (PACA 14001, 14002); 1932, *B. Braun* (PACA 14005); VI-1933, *B. Braun* (PACA 14014). Pinheiro Machado, 13-IX-2008, *M. Molz* (ICN 154342).

Geographical distribution: Widespread (DRING, 1980). Brazil: known only in southern Brazil, in the states of Paraná (MEIJER, 2006) and Rio Grande do Sul (RICK, 1961).

Selected descriptions and illustrations: Dring (1980), Grgurinovic (1997), Pegler et al. (1995), Sarasini (2005), Miller Jr. and Miller (2006).

Remarks: This is the most widespread member of *Lysurus,* which have been reported from all continents (DRING, 1980). The type of this species is from French Guyana, but *L. cruciatus* has been re-described from many localities under several names – an exhaustive list of synonyms is provided by Dring (1980). The names included in the above synonymy

are those used by Braun (1932) and Rick (1961) for their collections from Rio Grande do Sul. The specimens identified as *L. mokusin* (Cibot ex Pers.) Fr. (BRAUN, 1932; RICK, 1961) are actually *L. cruciatus* because they lack the longitudinally costate stipe, a diagnostic feature of the species. The specimens studied were collected in sandy soils among grasses or near the forest edges.

Figure 1. Basidioma of *Lysurus cruciatus* (ICN 154342). Photo: Martin Molz.

2. *Lysurus cruciatus* var. *nanus* Calonge & B. Marcos, Bol. Soc. Micol. Madrid 25: 302, 2000.

Figures 2 and 4B. Basidiomata 59–71 mm high. Receptacle formed by a pseudostipe with a basal volva and apex formed by arms bearing the gelatinous gleba. Pileus consisting of 5–6 arms, 9–12 mm long, firstly united, then becoming free at maturity, color orange yellow (4B8) before maturity, internal surface convex, grooved to rugose and external surface slightly concave, smooth. Gleba slowly becoming deliquescent, olive brown (4F4) at maturity, odor fetid. Pseudostipe 44–58 × 7–9 mm, subcylindrical to slightly conical, white, hollow, consistency and surface spongy. Volva present at the base of stipe, 14–21 ×13 mm, saccate, white (4A1), covered with sand, basal rhizomorphs present. Basidiospores 3.5–4.5 × 1.5–2 μm, ellipsoid, hyaline, smooth and thin-walled.

Habitat: Growing on sand or sandy soil, among grasses.

Examined specimens: Brazil. Rio Grande do Sul: Dom Pedro de Alcântara, Cova Funda, XII-2007, *M. A. Reck* (ICN 154343). Rio Grande, CAIC, 08-V-1996, *B. Vall* (HURG 1673). Salvador do Sul, 1943, *J. Rick* (PACA 20227). São Leopoldo, *B. Braun* (PACA 14005); 1929, *J. Rick* (PACA 14016); 1930, *B. Braun* (PACA 14018). Torres, Lagoa Itapeva, 27-IV-2007, *M. A. Reck* (ICN 154344).

Geographical distribution: Europe (CALONGE; MARCOS, 1992). First record from Brazil and possibly South America.

Selected descriptions and illustrations: Calonge and Marcos (1992), Martín et al. (2005).

Figure 2. Basidioma of *Lysurus cruciatus* var. *nanus* (ICN 154343). Photo: Mateus Reck.

Remarks: This taxon differs from the typical variety due to its smaller basidiomata, intense orange and free arms of the receptacle that slowly becomes olivaceous (CALONGE; MARCOS, 1992). Although the variety was described in detail by Calonge and Marcos (1992), it was only nomenclaturally validated by Calonge (2000), where holotype and isotype were correctly designated. Further studies by Martín et al. (2005) showed that differences at molecular level are neither significant enough to separate both varieties nor correlated with any ecological or morphological features. The specimens from southern Brazil were collected

among grasses on sandy soils and near coastal areas, and represent a new record for the country.

3. *Lysurus periphragmoides* (Klotzsch) Dring, Kew Bull. 35: 70, 1980.
= *Simblum sphaerocephalum* Schltdl., Linnaea 31: 154, 1861.

Figures 3 and 4C. Basidiomata 60–122 mm high. Receptacle formed by a pseudostipe with a basal volva and a clathrate pileus in the apex, bearing the gelatinous gleba. Pileus 8–17 high, 11–27 mm diam., clathrate, composed by united, red (4B8) arms. Gleba slimy, olive brown (4F4) at maturity, odor foetid. Pseudostipe 54–105 × 8–21 mm, cylindrical to slightly fusiform, color pastel red (8A4) above to pink (12A3) towards the base, hollow, consistency spongy and surface slightly rugulose or reticulate. Volva present at the base of the stipe, 24–31 ×21–25 mm, saccate, yellowish white (4A2), smooth, with basal rhizomorphs. Basidiospores 3.5–5 × 1.7–2.5 μm, ellipsoid, smooth and thin-walled.

Habitat: Growing on soil and litter, in or near forests.

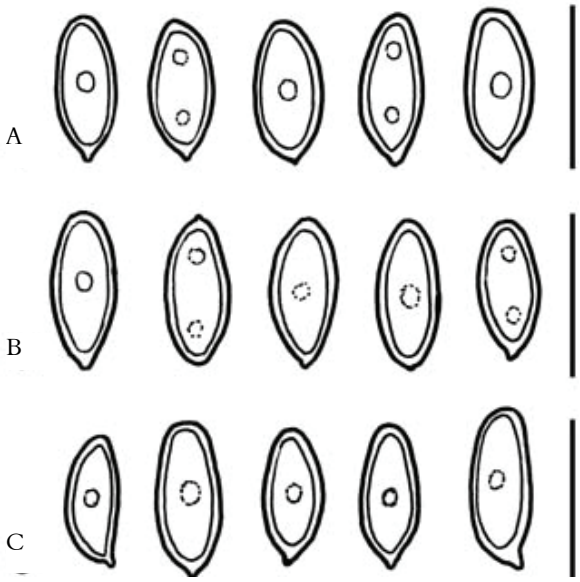
Figure 3. Basidioma of *Lysurus periphragmoides* (ICN 154345). Photo: Mateus Reck.

Examined specimens: Brazil. Rio Grande do Sul: Porto Alegre, *B. Braun* (PACA 14822). São Leopoldo, 1905, *J. Rick* (PACA 14819); 1907, *J. Rick* (PACA 14818); 1930, *J. Rick* (PACA 14820); 1933, *J. Rick* (PACA 14821); 1946, *Steffen* (PACA 20586). Viamão, Parque Schöenwald, 13-VII-1965, *F. R. Schöenwald* (ICN 3722), 29-VII-1965, *F. R. Schöenwald* (ICN 3778), 27-VII-1965, *R. Schöenwald* (ICN 3780); Parque Estadual de Itapuã, 12-VI-2005, *M. A. Reck* (ICN 154345 - material lost).

Geographical distribution: Pantropical along the southern hemisphere: Americas, Africa, and Australasia (DRING, 1980). Brazil: known from the states of São Paulo (DRING, 1980) and Rio Grande do Sul (LLOYD, 1906, 1909; BRAUN, 1932; WRIGHT, 1960; RICK, 1961; GUERRERO; HOMRICH, 1999; CORTEZ et al., 2008a).

Selected descriptions and illustrations: Conard (1913), Dring (1980), Miller Jr. and Miller (2006), Wright and Albertó (2006).

Remarks: Best known in South America under the name *Simblum sphaerocephalum*, this unmistakable fungus is possibly the most common *Lysurus* in subtropical South America. The diagnostic feature of the species is the subglobose and clathrate fertile portion of the receptacle (DRING, 1980).



Figures 4. Basidiospores of *Lysurus cruciatus* (A), *L. cruciatus* var. *nanus* (B) and *L. periphragmoides* (C). Scale bar: 5 μm.

Acknowledgements

Special thanks to Prof. Francisco D. Calonge (Real Jardín Botánico de Madrid, Spain) for providing literature and confirmation of *L. cruciatus* var. *nanus*, Dr. Kentaro Hosaka (National Museum of Nature and Science, Japan) for sharing unpublished data on the phylogeny of phalloid fungi, Mateus A. Reck and Martin Molz (Universidade Federal do Rio Grande do Sul, Brazil) for providing specimens and color photos, and CNPq for financial support.

References

BASEIA, I. G.; CALONGE, F. D. *Aseroë floriformis*, a new phalloid with a sunflower-shaped receptacle. **Mycotaxon**, v. 92, p. 169-172, 2005.

BASEIA, I. G.; GIBERTONI, T. B.; MAIA, L. C. *Phallus pygmaeus*, a new minute species from a Brazilian tropical rain forest. **Mycotaxon**, v. 85, p. 77-79, 2003.

BASEIA, I. G.; MAIA, L. C.; CALONGE, F. D. Notes on *Phallales* in the neotropics. **Boletín de la Sociedad Micológica de Madrid**, v. 30, p. 87-93, 2006.

BRAUN, B. **Estudo sobre as Phalloideas Riograndenses**. Lajeado: Relatório do Ginásio Anchieta, 1932. p. 5-28.

BURR, B.; BARTHLOTT, W.; WETERKAMP, C. *Staheliomyces* (*Phallales*) visited by *Trigona* (*Apidae*): melittophily in spore dispersal of an Amazonian stinkhorn? **Journal of Tropical Ecology**, v. 12, n. 3, p. 441-445, 1996.

CALONGE, F. D. Validation or confirmation of some new taxa recently published. **Boletín de la Sociedad Micológica de Madrid**, v. 25, p. 301-302, 2000.

CALONGE, F. D.; MARCOS, B. Una variedad nueva de *Lysurus cruciatus* (Lepr. & Mont.) Lloyd. **Boletín de la Sociedad Micológica de Madrid**, v. 16, p. 155-157, 1992.

CONARD, H. S. The structure of *Simblum sphaerocephalum*. **Mycologia**, v. 5, n. 5, p. 264-273, 1913.

CORDA, A. C. J. **Icones fungorum hucusque cognitorum.** Prague: JG Calve, 1842. v. 5.

CORTEZ, V. G.; BASEIA, I. G.; SILVEIRA, R. M. B. Gasteromicetos (*Basidiomycota*) no Parque Estadual de Itapuã, Viamão, Rio Grande do Sul, Brasil. **Revista Brasileira de Biociências**, v. 6, n. 3, p. 291-299, 2008a.

CORTEZ, V. G.; BASEIA, I. G.; GUERRERO, R. T.; SILVEIRA, R. M. B. Two sequestrate cortinarioid fungi from Rio Grande do Sul, Brazil. **Hoehnea**, v. 35, n. 4, p. 513-518, 2008b.

CORTEZ, V. G.; SULZBACHER, M. A.; BASEIA, I. G.; SILVEIRA, R. M. B. Two little known gasteroid fungi from Santa Catarina State, southern Brazil. **Mycotaxon,** v. 106, p. 297-302, 2008c.

CORTEZ, V. G.; BASEIA, I. G.; SILVEIRA, R. M. B. Gasteroid mycobiota of Rio Grande do Sul, Brazil: *Tulostomataceae*. **Mycotaxon**, v. 108, n. 20, p. 365-384, 2009.

CORTEZ, V. G.; BASEIA, I. G.; SILVEIRA, R. M. B. Gasteroid mycobiota of Rio Grande do Sul, Brazil: *Arachnion* and *Disciseda* (*Lycoperdaceae*). **Acta Biologica Paranaense**, v. 39, n. 1-2, p. 19-27, 2010.

CUNNINGHAM, G. H. **The gasteromycetes of Australia and New Zealand**. New Zealand: Dunedin, 1942.

DRING, D. M. The morphological relationship between the *Phallaceae* and the *Clathraceae*. **Bulletin of the British Mycological Society**, v. 25, p. 21-24, 1966.

DRING, D. M. Gasteromycetes. In: AINSWORTH, G. C.; SPARROW, F. K.; SUSSMAN, A. S. (Ed.). **The fungi**: an advanced treatise. New York: Academic Press, 1973. v. IVB. p. 451-478.

DRING, D. M. Contributions towards a rational arrangement of the *Clathraceae*. **Kew Bulletin**, v. 35, n. 1, p. 1-96, 1980.

GRGURINOVIC, C. A. **Larger fungi of South Australia.** Adelaide: The Botanic Gardens of Adelaide, 1997.

GUERRERO, R. T.; HOMRICH, M. H. **Fungos macroscópicos comuns no Rio Grande do Sul.** Porto Alegre: UFRGS, 1999.

HOSAKA, K.; BATES, S. T.; BEEVER, R. E.; CASTELLANO, M. A.; COLGAN III, W.; DOMÍNGUEZ, L. S.; NOUHRA, E. R.; GEML, J.; GIACHINI, A. J.; KENNEY, S. R.; SIMPSON, N. B.; SPATAFORA, J. W.; TRAPPE, J. M. Molecular phylogenetics of the gomphoid-phalloid fungi with an establishment of the new subclass *Phallomycetidae* and two new orders. **Mycologia**, v. 98, p. 949-959, 2006.

KIRK, P. M.; CANNON, P. F.; DAVID, J. C.; STALPERS, J. A. **Ainsworth and Bisby's Dictionary of the *Fungi*.** 9th ed. Surrey: CABI/International Mycological Institute, 2001.

KORNERUP, A.; WANSCHER, J. H. **Methuen handbook of colour.** 3rd ed. London: Eyre Methuen, 1978.

LÆSSØE, T.; SPOONER, B. The uses of gasteromycetes. **Mycologist**, v. 8, n. 4, p. 154-159, 1994.

LEITE, A. G.; SILVA, B. D. B.; ARAÚJO, R. S.; BASEIA, I. G. Espécies raras de *Phallales* (*Agaricomycetidae*, *Basidiomycetes*) no Nordeste do Brasil. **Acta Botanica Brasilica**, v. 21, n. 1, p. 119-124, 2007.

LLOYD, C. G. Concerning the Phalloids. **Mycological Notes**, v. 24, p. 293-301, 1906.

LLOYD, C. G. **Synopsis of the known phalloids.** Cincinnati: The Lloyd Library, 1909.

MARTÍN, M. P.; CALONGE, F, D.; MARCOS, B. The limits between *Lysurus cruciatus* and *L. cruciatus* var. *nanus.* A comparative DNA sequential study. **Boletín de la Sociedad Micológica de Madrid**, v. 29, p. 31-36, 2005.

MEIJER, A. A. R. Preliminary checklist of the macromycetes from the state of Paraná, Brazil. **Boletim do Museu Botânico Municipal (Curitiba)**, v. 68, p. 1-55, 2006.

MILLER JR., O. K.; MILLER, H. H. **Gasteromycetes: morphological and development features.** Mad River: Eureka, 1988.

MILLER JR., O. K.; MILLER, H. H. **North American mushrooms**. Guilford: Falcon, 2006.

MÖLLER, A. **Brasilische pilzblumen**. Jena: Gustav Fischer, 1895.

OLIVEIRA, M. L.; MORATO, E. F. Stingless bees (*Hymenoptera*, *Meliponini*) feeding on stinkhorn spores (*Fungi*, *Phallales*): robbery or dispersal? **Revista Brasileira de Zoologia**, v. 17, n. 3, p. 881-884, 2000.

OSO, B. A. *Phallus aurantiacus* from Nigeria. **Mycologia**, v. 68, n. 5, p. 1076-1082, 1976.

PEGLER, D. N.; GÓMEZ, L. D. An unusual member of the cage fungus family. **Mycologist**, v. 8, n. 2, p. 54-59, 1994.

PEGLER, D. N.; LÆSSØE, T.; SPOONER, B. M. **British puffballs, earthstars and stinkhorns**. London: Royal Botanic Gardens Kew, 1995.

RICK, J. Phalloideas Riograndensis. **Egatea**, v. 14, p. 299-305, 1929.

RICK, J. *Basidiomycetes* Eubasidii in Rio Grande do Sul, Brasilia - 6. **Iheringia**, v. 9, p. 451-489, 1961. (Série Botânica).

SARASINI, M. **Gasteromiceti epigei.** Trento: Associazione Micologica Bresadola, 2005.

SOBESTIANSKY, G. Contribution to a macromycete survey of the states of Rio Grande do Sul and Santa Catarina, in Brazil. **Brazilian Archives of Biology and Technology**, v. 48, n. 3, p. 437-457, 2005.

SPEGAZZINI, C. Fungi Argentini additis nonnullis Brasiliensibus Montevideensibusque. **Anales de la Sociedad Científica Argentina de Buenos Aires**, v. 12, p. 208-227, 1881.

TRIERVEILER-PEREIRA, L.; LOGUERCIO-LEITE, C.; CALONGE, F. D.; BASEIA, I. G. An emendation of *Phallus glutinolens*. **Mycological Progress**, v. 8, n. 4, p. 377-380, 2009.

TUNO, N. Spore dispersal of *Dictyophora* fungi (Phallales) by flies. **Ecological Research**, v. 13, n. 1, p. 7-15, 2002.

WRIGHT, J. E. Gasteromycetes Argentinos I. El género *Itajahya*. **Lilloa**, v. 21, p. 175-190, 1949.

WRIGHT, J. E. Notas sobre Faloideas Sud y Centroamericanas. **Lilloa**, v. 30, p. 339-359, 1960.

WRIGHT, J. E.; ALBERTÓ, E. **Guía de los hongos de la Región Pampeana. II.** Hongos sin laminillas. Buenos Aires: L.O.L.A., 2006.

ZELLER, S. M. Keys to the orders, families and genera of the Gasteromycetes. **Mycologia**, v. 41, n. 1, p. 36-58, 1949.

Received on March 23, 2009.
Accepted on October 5, 2009.