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New combinations and notes in clavarioid fungi

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Abstract — The revision of several families of clavarioid fungi in the Iberian Peninsula necessitated new combinations and names to be used for the Iberian fungal flora. Eight new combinations are proposed in *Clavulina*, *Ramariopsis*, and *Typhula*, and nomenclatural and taxonomic comments are provided in each case. Lectotypes are designated for *Clavaria contorta*, *Clavaria fistulosa* (type species of *Macrotyphula*), and *Clavaria phacorrhiza* (type species of *Typhula*). The genus *Macrotyphula* is reduced to synonymy under *Typhula*.

Key words — *Clavariaceae*, *Clavulinaceae*, *Typhulaceae*, nomenclature, taxonomy

Introduction

Clavarioid fungi form an artificial assemblage of fungi, since clavarioid fruitbodies have evolved in several lineages (Parmasto 1965, Pine et al. 1999, Dentinger & McLaughlin 2006, Hibbett 2007). However, for practical reasons, clavarioid fungi have often been the target group for monographs and smaller papers (Corner 1950, Petersen 1988, Dentinger & McLaughlin 2006). During the last years, a monograph that deals with some families of clavarioid fungi (*Clavariaceae*, *Clavulinaceae*, *Pterulaceae*, and *Typhulaceae*) has been completed as a result of a PhD (Olariaga 2009), following the framework of Flora Mycologica Iberica (Tellería & Melo 1995). The taxonomic and nomenclatural revision of many names and type collections in the light of current phylogenetic knowledge has necessitated the creation of new names to be used in the context of the Iberian fungal flora. Thus, the purpose of this work is to effectively publish nomenclatural novelties required as a result of the mentioned monograph (Olariaga 2009).

Materials & methods

Herbaria abbreviations follow Holmgren & Holmgren (1998). The collections examined in this study are deposited in BIO, G, MA, PORTU (Mycological Society of Portugalete, Biscay), S, SEST (Natural Science Society of Sestao, Biscay), and UPS herbaria. Abbreviations of author names, periodicals, and non-periodical publications follow Kirk & Ansell (2003), Bridson & Smith (1991), and TL2 (Stafleu & Cowan 1976, 1979), respectively. All validly published homotypic synonyms are given under each new combination.

Taxonomy

Clavulina incarnata (Corner) Olariaga, **comb. et stat. nov.**

MycoBank 563526

≡ *Clavulina cristata* var. *incarnata* Corner, Ann. Bot. Mem. 1: 692. 1950.

Of the few *Clavulina* species known to have cystidia (Corner 1970), *C. cristata* var. *incarnata* is the only taxon that has been recorded in Europe (Corner 1950, Pilát 1958). Corner (1950) described the variety for two British collections that developed a pink to grayish drab colour and, above all, possessed cystidia. He granted the taxon the rank of variety, not without noting that it might deserve the species rank. This taxon would differ from *C. cristata* (Holmsk. : Fr.) J. Schröt. as treated by Olariaga et al. (2009) in the early development of pink to grey tones, presence of cystidia, and the lack of profusely cristate apices. Two recent Swedish collections that match Corner's description have enabled the senior author to confirm these differences and thus to propose a new combination to accommodate the only cystidiate *Clavulina* species known in Europe.

Specimens examined—**SWEDEN**. **Uppland**: Sollentuna parish, Hansta naturreservat, 33VXF64579094, under *Quercus robur*, *Corylus avellana*, *Populus tremula*, and *Fraxinus excelsior* on rich ground, 08/IX/2010, Hansen, Gillen & Olariaga, S-F197088; 33VXF6462690942, 14/IX/2010, Olariaga, S-F197089. Stockholm, Hagaparken, under *Pinus* and *Betula*, on acidic ground, 24/X/2011, Zamora & Olariaga, BIO-Fungi 16400.

Clavulina reae Olariaga, **nom. et stat. nov.** [non *Clavulina gracilis* Corner 1950].

MycoBank 516723

≡ *Clavaria cinerea* var. *gracilis* Rea, Trans. Brit. Mycol. Soc. 6: 62. 1918 ["1917"].

≡ *Clavulina cinerea* var. *gracilis* (Rea) Corner, Ann. Bot. Mem. 1: 309. 1950.

Morphological and phylogenetic studies among the European *Clavulina* taxa indicate that more species than are generally accepted are present in Europe. Olariaga et al. (2009) showed that specimens identified as *C. cinerea* var. *gracilis* that conform to the original description by Rea (1918) form a well-supported clade that should be assigned to a species. Because the epithet *gracilis* is not available, we propose a substitute with a new epithet honouring the memory of Carleton Rea. No type material is extant at K (Begoña Aguirre-Hudson, pers. comm.).

Ramariopsis bispora (Schild) Olariaga, **comb. et stat. nov.**

MycoBank 516724

≡ *Ramariopsis kunzei* var. *bispora* Schild, Westfälische Pilzbriefe 8: 30. 1970.

The type material deposited in Schild's personal herbarium could not be traced. However, after examining the comprehensive original description and further Iberian specimens, we consider that *Ramariopsis kunzei* var. *bispora* deserves to be recognized at the species level. In addition to the 2-spored basidia and the absence of clamps (attributed to parthenogenesis as a reproduction mode), *R. kunzei* var. *bispora* differs macroscopically from *R. kunzei* (Fr. : Fr.) Corner in having smaller basidiomata and lacking pinkish patches in age. Microscopically, although bi-pyramidal crystals are present among the context hyphae of the branches in all the material examined, as Schild (1970) depicted, we have never observed crystals in the typical variety of *R. kunzei*. The narrower basal tomentum hyphae (2.5-3 µm) of *R. kunzei* var. *bispora* appear to be a good taxonomic character to separate the variety from *R. kunzei,* with hyphae 3-4 (5.5) µm diam.

Specimens examined—**SPAIN**. **Bizkaia**: Larrinagatxu, Izurtza, 30TWN2878, 280 m, under *Chamaecyparis lawsoniana* along a slope, 01/X/2003, Iglesias, Arauzo & Olariaga, BIO-Fungi 12383; Sopuerta, barrio Castano Viejo, 30TWN2464, 600 m, forest with *Fagus sylvatica* var. *purpurea* and *Chamaecyparis*, 01/VII/2004, Fernández-Vicente, PORTU 7100704 [as *Ramariopsis kunzei*], BIO-Fungi 12563. **Burgos**: Pantano de Ordunte, under *Chamaecyparis lawsoniana* on the soil, 07/X/2007, Pérez-Butrón, SEST 7100705 [as *Ramariopsis* sp.], BIO-Fungi 12567. **León**: Riaño, Puerto del Pontón, 30TUN3677, 1000 m, slope along the road, 01/X/2003, Olariaga, BIO-Fungi 9922. **Asturias**: Proaza, 29TQH4192, 280 m, under *Quercus ilex* on calcareous soil, 27/X/2002, Olariaga, BIO-Fungi 9705.

Ramariopsis luteonana (Schild) Olariaga, **comb. nov.**

MycoBank 516725

≡ *Clavulinopsis luteonana* Schild, Fungorum Rar. Icon. Color. 5: 28. 1971.

The type material could not be traced. The complete original description by Schild (1971) deals with a fungus with simple to forked fruitbodies, small smooth spores, and short basidia. This short basidia and the small spores make *Clavulinopsis luteonana* closer to *Ramariopsis kunzei* [type of *Ramariopsis* (Donk) Corner] than to *Clavulinopsis miniata* (Berk.) Corner (= *Clavulinopsis sulcata* Overeem, the type of *Clavulinopsis* Overeem). Furthermore, the Iberian material matching Schild's fungus in basidioma shape, presence of bi-pyramidal crystals, short basidia, and small spores also shows a very faint ornamentation in some spores when viewed through the light microscope. Hence, we believe that the species is better placed in *Ramariopsis*.

Specimens examined—**SPAIN**. **Bizkaia**: Korostadui, Iurreta, 30TWN2981, 140 m, under *Chamaecyparis lawsoniana* and *Pseudotsuga menziesii*, 17/X/2007, Iglesias, Arauzo & Olariaga, BIO-Fungi 12374.

Ramariopsis subumbrinella (S. Imai) Olariaga, **comb. nov.**

MycoBank 516726

≡ *Clavaria subumbrinella* S. Imai, Trans. Sapporo Nat. Hist. Soc. 13(4): 386. 1934.

≡ *Clavulinopsis subumbrinella* (S. Imai) Corner, Ann. Bot. Mem. 1: 392. 1950.

The type material could not be located. The original description by Imai (1934) noting small spores, small basidia, and branched basidiomata suggests a species of *Ramariopsis*. The Iberian material that matches in several aspects the original description shows a very low ornamentation in some spores through the light microscope, also typical of many *Ramariopsis* species.

Specimens examined—**SPAIN**. **Cádiz**: Parque Natural de los Alcornocales, Arroyo Carlos el Tiradero, 30SF61, 150 m, under *Pistacia lentiscus*, *Olea europaea* and *Quercus suber*, 26/XI/2003, Pérez-Daniëls & Olariaga, BIO-Fungi 10015. **Córdoba**: Córdoba, Arroyo Pedroches, 30SUG4398, 200 m, on bare soil under *Myrtus communis*, 5/XII/2003, Pérez Daniëls & Olariaga, BIO-Fungi 10224. **Segovia**: Prádena, El Nido del Cuervo, 30TVL4351, 1350 m, bajo *Ilex aquifolium*, 20/XI/1997, Pérez Daniëls, MA-Fungi 40223 [as *Clavulinopsis subtilis*], MA-Fungi 40225 [as *Clavulinopsis* sp.].

Typhula contorta (Holmsk. : Fr.) Olariaga, **comb. nov.**

MycoBank 516730

≡ *Clavaria contorta* Holmsk., Beata Ruris 1: 29. 1790 : Fr., Syst. Mycol. 1: 478. 1821.

≡ *Clavaria fistulosa* var. *contorta* (Holmsk.) Höhn., Öst. Bot. Z. 54: 425. 1904.

≡ *Clavaria fistulosa* f. *contorta* (Holmsk.) Bourdot & Galzin, Hyménomyc. France: 121. 1928 ["1927"].

≡ *Clavariadelphus fistulosus* var. *contortus* (Holmsk.) Corner, Ann. Bot. Mem. 1: 273. 1950.

≡ *Macrotyphula fistulosa* var. *contorta* (Holmsk.) Nannf. & L. Holm, Publ. Herb. Univ. Uppsala 17: 8. 1985.

≡ *Macrotyphula contorta* (Holmsk. : Fr.) Rauschert, Feddes Repert. Spec. Nov. Regni Veg. 98: 660. 1987.

Lectotype (**designated here**): Holmsk., Beata Ruris 1: pl. 12. 1790.

The epithet *contorta* has traditionally been used for specimens with irregular, wrinkled, or brain-like basidiomata. It has often been synonymized with *Typhula fistulosa* (Jülich 1984, Rauschert 1987, Berthier 1976) or considered a variety of it (Knudsen 1997), due to high morphological plasticity (Holmskjold 1790, Bourdot & Galzin 1928). However, some authors have noted that *T. contorta*-like basidiomata have larger basidiospores (Harper 1918, Corner 1950, Maas Geesteranus 1976, Breitenbach & Kränzlin 1986). Comparison of the examined *T. contorta* material with typical *T. fistulosa* collections supports this view. Accordingly, *T. contorta* is treated as an independent species in the Iberian revision of the group (Olariaga 2009), although further focused studies are desirable to confirm its identity. The reasons for accommodating this taxon in *Typhula* (Pers. : Fr.) Fr. are given under *T. fistulosa*.

Specimens examined—**FRANCE**. **landes** (40): Tartas, bois mort, 16/11/1987, G 110719, Gilles, [LY-Cl 349, as *Macrotyphula fistulosa* f. *contorta*]. **SPAIN**. **Araba**:

Gillerna, 30TQH1881, 750 m, *Alnus glutinosa* twigs, 7/XII/1985, Martínez-Irigoyen, BIO-Fungi 12614, BIO-Fungi 12615, *Alnus glutinosa* twigs, 18/I/1986, BIO-Fungi 12616, *Alnus glutinosa* twigs, 6/12/1986, BIO-Fungi 12617, *Corylus avellana twigs*, 30/XI/1985, BIO-Fungi 12613; Oleta, Aramaio, 30TWN3189, 600 m, *Corylus* or *Alnus glutinosa* twigs, 15/X/2004, Salcedo, BIO-Fungi 10516. **Ávila**: Barquillo, El Loscar, 29TOF8776, 970 m, *Alnus glutinosa* twig, 8/XI/2004, Sarrionandia & Olariaga, BIO-Fungi 10608. **Bizkaia**: Getxo, Martiartu, 30TWN0298, 100 m, *Alnus glutinosa* twigs, 22/XI/2003, Olariaga, BIO-Fungi 10107, BIO-Fungi 10105. **Cáceres**: Hervás, La Garganta, 30TTK5963, 790 m, *Alnus glutinosa* wood, 9/XI/2004, Sarrionandia & Olariaga, BIO-Fungi 10620. **Asturias**: Pigüeces, 30TQH1881, 750 m, *Alnus* stump, 6/X/2005, Olariaga, BIO-Fungi 11191. **Salamanca**: Candelario, 30TTK6571, 100 m, *Corylus avellana* twig, 8/XI/2004, Sarrionandia & Olariaga, BIO-Fungi 10641. **SWEDEN**. **Blekinge**: Karlskrona, Västra Mark, strandsnåret, på murkna algrenar, 10/XI/1946, Wikland 243, UPS F-124250 [as *Clavaria contorta*]. **västergötland**: Hisingen, Göteborg, Rya skog, på *Alnus glutinosa*, 26/XI & 9/XII/1999, Nordin, UPS F-124213 [as *Macrotyphula fistulosa* var. *contorta*].

Typhula fistulosa (Holmsk. : Fr.) Olariaga, comb. nov.

MycoBank 516731

- ≡ *Clavaria fistulosa* Holmsk., Beata Ruris 1: 15. 1790 : Fr., Syst. Mycol. 1: 479. 1821 [non Tode 1783].
- ≡ *Eriocladus fistulosus* (Holmsk. : Fr.) Lév., Ann. Sci. Nat., Bot., Sér. 3, 5: 159. 1846.
- ≡ *Clavariella fistulosa* (Holmsk. : Fr.) P. Karst., Rev. Mycol. (Toulouse) 3(9): 21. 1881.
- ≡ *Clavariadelphus fistulosus* (Holmsk. : Fr.) Corner, Ann. Bot. Mem. 1: 272. 1950.
- ≡ *Macrotyphula fistulosa* (Holmsk. : Fr.) R.H. Petersen, Mycologia 64: 140. 1972.

Lectotype (**designated here**): Holmsk., Beata Ruris 1: pl. 6. 1790.

This species was proposed as the type of *Macrotyphula* R.H. Petersen (Petersen 1972), a currently used generic name. Morphological comparison between *Macrotyphula fistulosa* and *Typhula phacorrhiza* [selected type species of *Typhula* (Donk 1933)] revealed the following morphological similarities:

1. Basidiomata with similar appearance, ochre brown-coloured, pubescent at the base.
2. Stipe surface formed by thin hyphae, slightly gelatinized, and with similar caulotrichomes.
3. Basal tomentum formed by scarcely septate, thick-walled hyphae
4. A slight hyaline zebra-like striped encrustation on the medulla hyphae.

Based on these similarities, *Macrotyphula fistulosa* and *T. phacorrhiza* appear to be closely allied species, as molecular phylogenetic inference also suggests (Pine et al. 1999, Dentinger & McLaughlin 2006, Hibbett 2007). Therefore, we reduce *Macrotyphula* to synonymy under *Typhula* to which we transfer several *Macrotyphula* species.

Specimens examined—**ANDORRA**. Pal, 31TCH7511, under *Pinus*, *Populus*, *Betula pendula*, and *Corylus avellana*, 15/X/2002, Olariaga, BIO-Fungi 12772. **FINLAND**. **etelä-Hame**: Mustiala, X/1867, P.A. Karsten, UPS F-124239 [as *Clavaria fistulosa*]. **LATVIA**. **baldone**: Kekava, Birzuli, ad terram, in alnetum glutinosae, 30/X/1955, A. Abolina, UPS F-552624 [as *Clavaria fistulosa*]. **SPAIN**. **León**: Puerto del Pontón, Riaño, 30TUN3677, 1000 m, branches of *Fagus sylvatica*, 01/X/2003, Olariaga, BIO-Fungi

9914. MADRID: Dehesa de Somosierra, 30TVL5153, 1500 m, buried remnants of *Corylus avellana*, 2/XI/2007, J.C. Zamora, BIO-Fungi 12611. ASTURIAS: Somiedo, 29TQH3373, 1150 m, among litter in acidophilous *Fagus sylvatica* forest, 27/X/2002, Olariaga, BIO-Fungi 9711. **SWEDEN**. GÄSTRIKLAND: Gävle, Lövudden, on fallen decaying log of *Alnus* (?), 10/XI/1957, R. Nannfeldt, UPS F-124234 [as *Clavaria contorta*]. UPPLAND: Vänge, Fiby urskog, S. Lundell n. 58l, 09/IX/1932, UPS F-124218 [as *Clavaria fistulosa*]. VÄSTERGÖTLAND: Töreboda, Gastorp, asplunden söder om Sommarhemmet, J. Lundberg 27/X/1955, UPS F-124212 [as *Clavaria fistulosa*]. **SWITZERLAND**. VALAIS: Mayoux, 30TVL5206, 1500 m, *Corylus avellana* branch, 31/VIII/2007, Felipe & Olariaga, BIO-Fungi 12610.

Typhula phacorrhiza (Reichard : Fr.) Fr., Observ. Mycol. 2: 298. 1818 : Fr., Syst. Mycol. 1: 495. 1821, as "*phacorrhiza*".

≡ *Clavaria phacorrhiza* Reichard : Fr., Schriften Berlin. Ges. Naturf. Freunde 1: 315. 1780.

≡ *Phacorhiza filiformis* Grev., Scott. Crypt. Fl. 2: 93. 1824.

LECTOTYPE (**designated here**): Sowerby, Col. Fig. Eng. Fung. 2: tab. 233. 1798, as "*phacorhiza*".

To our knowledge, the type species of *Typhula* has not previously been typified. We select a lectotype according to Articles 9.2 and 9.10 in the forthcoming "International Code of Nomenclature for algae, fungi, and plants (Melbourne Code)" (ICN 2012, in prep.). Fries (1821: 495) referred to the lectotype as "t. 253", a typographic error for t. 233. The sanctioned epithet spelling (Fries 1821) has been adopted, in agreement with the proposal by Demoulin (2010; subsequently ratified at the 18th International Botanical Congress, Melbourne, 2011).

SPECIMENS EXAMINED— **Without locality**, E. Coemans, [Rabenh. Fungi Eur. 418], UPS F-000023. **FRANCE**. HAUTES PYRENÉES ATLANTIQUES: near Candanchú, 30TYN0041, 1500 m, *Chaerophyllum aureum* leaves, 10/IX/2004, Olariaga, BIO-Fungi 10521. **SCOTLAND**. FIFE: Balmuto, 01/X/1822, Berkeley, E 218190 [as *Phacorhiza filiformis*]. **SWEDEN**. VÄSTERGÖTLAND: Göteborg, Stora Änggården, on decaying leaves, Sphagna etc. in a bog, T. Nathorst-Windahl, 29/IX/1937, [Lundell & Nannfeldt, Fungi Exs. Suec. 550], UPS F-011279. **SWITZERLAND**. VALAIS: Schwartzsee, bare soil under *Petasites*, *Chaerophyllum aureum* and *Cirsium*, 5/IX/2007, Felipe & Olariaga, BIO-Fungi 12618. **UNITED STATES OF AMERICA**. NEW YORK: Whetzel´s garden, Fores Home, on buckwheat straw, 17/IV/1937, Remsberg, UPS F-552623.

Typhula tremula (Berthier) Olariaga, **comb. nov.**

MYCOBANK 516732

≡ *Macrotyphula tremula* Berthier, Bull. Mens. Soc. Linn. Lyon 43: 187. 1974.

Typhula tremula shares with *T. phacorrhiza* the characteristics explained above, as well as slender fruitbodies that make the two species appear very similar macroscopically.

SPECIMENS EXAMINED—**FRANCE**. HAUTE-SAVOIE: Hte. Savoie, Samoëns, les Saix, sur rachis d´*Athyrium filix-femina*, 08/IX/1965, G 110723, [Holotype, LY-Cl 14]. **SPAIN**. LEÓN: Soto de Sajambre. Vegabaño, 30TUN8187, 1500 m, dead remants of *Oreopteris*

limbosperma, Olariaga, 3/X/2004, BIO-Fungi 10727. **SORIA**: Laguna Negra, 30TWM1649, 1190 m, dead remnants of *Athyrium filix-femina*, Olariaga, 06/XI/2004, BIO-Fungi 10609. **SWEDEN**. **JÄMTLAND**: Tännäs socken, Svanskökläppen, 31SDE9209, stems of *Athyrium distentifolium*, Olariaga, 16/VIII/2006, BIO-Fungi 11702. **SWITZERLAND**. **BERN**: Grimselpass, 30TUN8187, 1500 m, on *Athyrium distentifolium* remnants, Olariaga, 02/IX/2007, BIO-Fungi 12609, BIO-Fungi 12699.

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