2022-04-11

Ten genera to replace *Cortinarius*

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Has the beast been tamed?

In a recent article, *Taming the beast* (Liimatainen et al. 2022), the authors at Kew in England observe that our beloved *Cortinarius* is bursting at the seams with more than 5000 named species and almost 3000 sequenced worldwide. The genus is biggest among the macromycetes and alone in the family Cortinariaceæ. Apparently the family is in a dear need of splitting into several genera.

Such a split is not new. As early as before the last century mycologists (Kummer 1871, Wünsche 1877) have created *Myxacium, Dermocybe, Hydrocybe*, and other genera, which nevertheless have not been accepted by modern taxonomists as they lack genetic support. Instead, precisely because of this support, they transferred a series of small traditional genera to *Cortinarius*: *Rozites, Cuphocybe*, and others (Peintner et al. 2001, 2002; Gasparini 2013, 2016), leading to further swelling of the genus.

Liimatainen et al. (2022) recognised the limitation due to the low resolution of most current-day molecular analyses. The latter are habitually based on the ITS region of rDNA, even though sometimes reinforced by a few genes like nrLSU. For example, the big type study of *Telamonia* (Liimatainen et al. 2020) is supported solely by ITS, and that of the sections of *Cortinarius* (Soop et al. 2019) is limited to four genes. In the effort to tame the “”beast” the present authors abandoned ITS altogether, using the new “whole-genome” techniques to further deepen the phylogenetic level. The primary phylogenetic tree is constructed with five genes, while the backbone tree is based on 75!

So, which genera were proposed?

The authors propose 10 genera to replace *Cortinarius*, of which three existing, the remainder new.

Five genera are small with at most 20 species, of which two only grow in the southern hemisphere. Three genera are big with over 100 species, including *Cortinarius* itself, which (fortunately) continues to dominate with > 2000 species. One genus grows only in the north.

Here are the characteristics of these genera with the approximate number of species that have so far been confirmed by genetics (my count). Here one should note that a certain number of sequenced species have not yet been named.

Austrocortinarius gets only 3 species. They are phlegmacioid with enormous fruitbodies, white and glutinous, encountered in the South Pacific.

Mystinarius has only 2 species, contained in section *Lustrabiles*. *C. lustrabilis,* scattered in Europe, and its unpublished sister from New Zealand have foiled the phylogeneticians as it seemed to belong nowhere. Current analyses have now resolved the uncertainty by accomodating them in a new genus.

Cystinarius, so named due to its remarkable cystidia, includes at least 12 species in both hemispheres. It is divided into two sections, *Crassi* et *Rubicunduli*, whose affinity had already been anticipated thanks to morphological and genetic similarities (Soop et al. 2019).

Volvanarius grows only in the South Pacific and includes 11 species in section *Thaumasti*. These resemble small *Phlegmacia* with a volva at the base of the stipe.

Hygronarius is known here by the unique European species: *C. renidens*. This species is noted as the only one that lacks both veil and cortina, and its inclusion in *Cortinarius* has therefore been questioned. One should anyway note that this character is not absent in the other 19 known species in the South Pacific. They are spread among two sections, *Renidentes* and *Austroduracini* (*Viscincisi*) and possess telamonioid fruitbodies.

Aureonarius. This genus joins two sections well-known in our area, *Limonii* and *Callistei*, of which the latter is now split according to its distribution over the hemispheres, the southern part forming the new section *Collybiani*. This reunion was suspected but notoriously hard to endorse without resorting to the resolution offered by a multitude of genes. The majority of the 26 species in *Aureonarius* present bright colours in the yellow-orange to reddish range, evoking those of subgenera *Dermocybe* and *Leprocybe*, which remain, by the way, in *Cortinarius*.

Thaxterogaster was originally created to accommodate about 60 secotioid species in the Southern Hemisphere, but has now grown to over 170 species. Many of the additions inhabit the North, and several used to belong to *Phlegmacium*. For example, sections *Multiformes,Turmales, Scauri, Purpurascentes*, and *Riederi* have been transferred to *Thaxterogaster*, which no doubt will chock many mycologists. This, along with the fact that the name is long and awkward to pronounce and spell, makes one wonder why the authors haven't found a better one. But, seeing that *Thaxterogaster* is he oldest genus whose type species nests in the clade in question, they had no choice (Art. 11.4 of the Code).

Phlegmacium keeps, no surprise, the majority of taxa in the earlier subgenus so named. So, one finds here sections *Phlegmacioides, Arguti, Claricolores, Elastici*, and *Percomes*. Among the sections with a marginate bulb (*Bulbipodium*), there are, for example *Amœnolentes, Aureocistophili, Cærulescentes*, *Glaucopodes* and their allies. In summary, most of the species classified as "*Euphlegmacia*" in Soop et al. (2019). The elusive species *C. russus*, which has always caused problems in classification, belongs here as well. Finally and curiously, *Phlegmacium* includes also a few sections from the South Pacific: *Carbonelli* and *Rufoaurantii*. The former, close to section *Cyanites*, was earlier described with telamonioid species; however, with new insights into their taxonomy, a series of more or less phlegmacioid taxa have joined the section (Soop et al. 2021).

Calonarius is the ancient section *Calochroi* s. lato with almost 100 species, confined to the Northern Hemisphere. It includes section *Fulvi* and the authors introduce a long series of subgenera and sections.

Cortinarius is all the rest. This means, among other things, that subgenera *Dermocybe, Leprocybe, Telamonia* s. lato., *Myxacium* s. str., as well as sections *Anomali* and *Delibuti* maintain their usual place. Among the ex-*Phlegmacia* there isn't much: sect. *Rozites, Infracti*, and *Subtorti*; in short, taxa that were often considered doubtful phlegmacia. The subgenera and sections contain as many species in the southern as in the northern hemisphere, except *Telamonia* s. str., which with its near 600 species is almost endemic for the north (Liimatainen et al. 2020).

What will be the consequences?

In my list above I wished to stick to the earlier section names for simplicity. Moreover, I eschewed most of the numerous new subgenera. It follows that some of these names must be replaced by autonyms, or even be recombined into the new genera. To help us there, the authors have chosen generic names ending in "*-narius*" so as to keep the current grammatical form. The result is nevertheless a long list of recombinations at the end of the paper.

Naturally everyone is free to follow or ignore the new nomenclature. For the majority of mycologists its will probably be enough to update their personal catalogues. But one can anticipate that, sooner or later, the scientific Journals will refuse contributions that don't conform.

References

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