

Another fossil agaric from Dominican amber

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Abstract: We report the discovery of a fossil agaricoid homobasidiomycete from Dominican amber (ca 15–20 Ma). *Aureofungus yaniguaensis* appears to be a member of the euagarics clade, but its precise taxonomic placement is obscure. This is the fourth known fossil agaric and the third from Dominican amber.

Key words: Agaricales, *Aureofungus yaniguaensis*, euagarics clade, paleomycology

Three fossil agarics are known to science. *Coprinites dominicana* Poinar and Singer and *Protomyccena electra* Hibbett, Grimaldi and Donoghue are both from Dominican amber and are 15–20 million years old (Ma), while *Archaeomarasmium leggeti* Hibbett, Grimaldi and Donoghue is from Atlantic Coastal Plain amber and is 90–94 Ma (Grimaldi, Beck and Boon 1989, Poinar and Singer 1990, Hibbett et al 1995, 1997, Iturralde-Vinent and MacPhee 1996). Here, we report the discovery of a fourth fossil agaric (FIGS. 1–5), which was collected in the Yanigua mine in the eastern Dominican Republic and purchased from an amber dealer living in the town of El Valle in August 2000. A single fruiting body is present (FIGS. 1–2, 4), as well as many basidiospores that are laid down in masses, suggesting that they were produced by the fruiting body in the amber (FIGS. 3, 5). Based on comparisons to *Coprinites* Poinar and Singer, *Protomyccena* Hibbett, Grimaldi and Donoghue and *Archaeomarasmium* Hibbett, Grimaldi and Donoghue, we conclude that the fossil represents a previously undescribed genus and species.

Aureofungus yaniguaensis Hibbett, Binder and Wang, gen. et sp. nov.

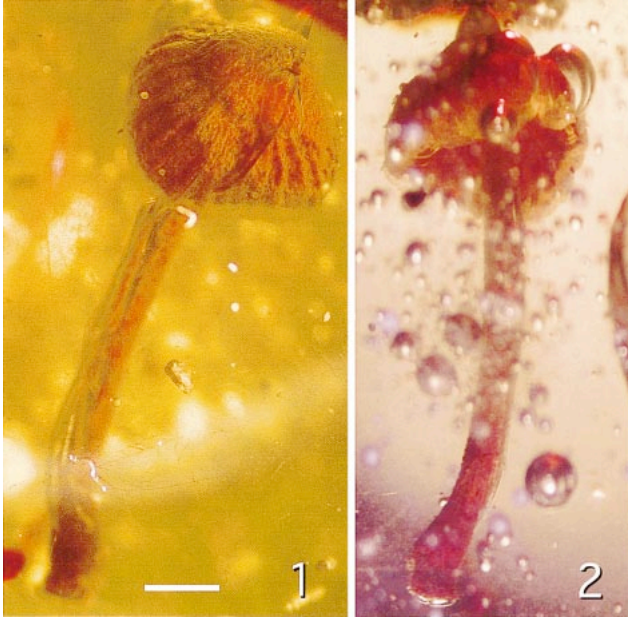
Etymology.—The generic name means “golden mushroom”; the epithet refers to the collection locality.

Pileus 3 mm broad, convex, with a broad raised center, glabrous or minutely textured, yellow-brown; margin incurved, striated. *Lamellae* subdistant; margins smooth; lamellulae or anastomoses absent; attachment not observed. *Stipe* central, 0.8 × 7 mm, cylindrical, smooth; annulus, volva and rhizoids absent. *Basidiospores* 3.5–4.4 × 3.0–3.5 μm, broadly elliptic.

HOLOTYPE: DOMINICAN REPUBLIC: El Valle, Yanigua mine. In the private collection of Yale Goldman (s.n.).

Aureofungus yaniguaensis is an agaricoid homobasidiomycete. The vast majority of such forms occur in the euagarics clade (= Agaricales pro parte), which contains about 8500 described species (Hawksworth et al 1995, Hibbett and Thorn 2001). The shape and stature of the fruiting body suggest that *A. yaniguaensis* might be related to the smaller pale-spored genera traditionally classified as Tricholomataceae (e.g., *Collybia* (Fr.) Staude, *Mycena* (Pers.) Roussel, *Marasmius* Fr., *Marasmiellus* Murrill), or perhaps certain non-deliquestent, dusky-spored taxa (e.g., *Coprinellus disseminatus* (Pers. : Fr.) J. E. Lange). Unfortunately, the anatomical characters that would be needed to resolve the placement of *A. yaniguaensis* could not be observed. Because of the thickness of the amber it was not possible to view the specimen with greater than a 10 × objective, which made it difficult to assess the ornamentation of the spores and the surface textures of the pileus and stipe. The spores appear to be pigmented (FIG. 3), which would suggest a relationship to extant chromosporic groups, but this could be an artifact of preservation or an optical effect of the amber. Lacking evidence of its precise taxonomic placement, we suggest that *A. yaniguaensis* should be classified as *incertae sedis* among the Agaricales, euagarics clade.

Although it is not possible to precisely place *A. yaniguaensis*, sufficient characters can be seen to distinguish it from *Coprinites dominicana*, *Protomyccena electra* and *Archaeomarasmium leggeti*. The pileus of *Coprinites dominicana* (Poinar and Singer 1990) was described as squamulose-pectinate with a pleated or grooved margin and a small depression in the center, whereas that of *A. yaniguaensis* is smooth or glabrescent, with faint striae and a broad raised central area.



FIGS. 1–2. *Aureofungus yaniguaensis* fruiting body. Scale bar = 100 μm .

In addition, the hymenophore of *Coprinites* is reported to have lamellulae, which are absent in *A. yaniguaensis*. Finally, the spores of *Coprinites* differ from those of *A. yaniguaensis* in being larger (6–7 μm long) and oblong-elliptic. *Protomyccena electra* (Hibbett et al 1997) differs from *A. yaniguaensis* in having a more campanulate pileus with a reflexed margin, and more distant lamellae with lamellulae and anastomoses. *Archaeomarasmius leggeti* (Hibbett et al 1995, 1997) differs from *A. yaniguaensis* in having a more strongly sulcate pileus and larger spores (6.5–8.3 \times 4.0–5.2 μm). The differences described above certainly warrant recognition of *A. yaniguaensis* as a new species. While we cannot rule out the possibility that *A. yaniguaensis* is closely related to any of the

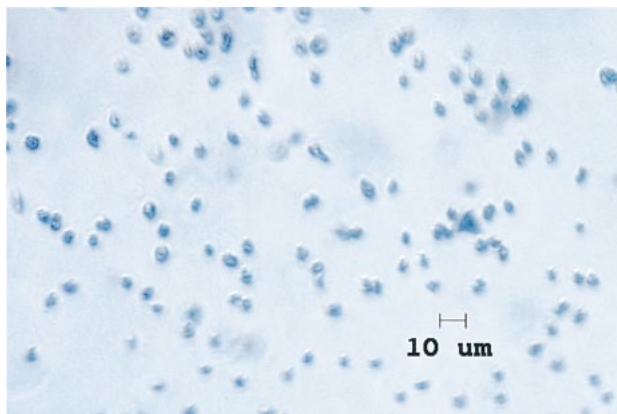
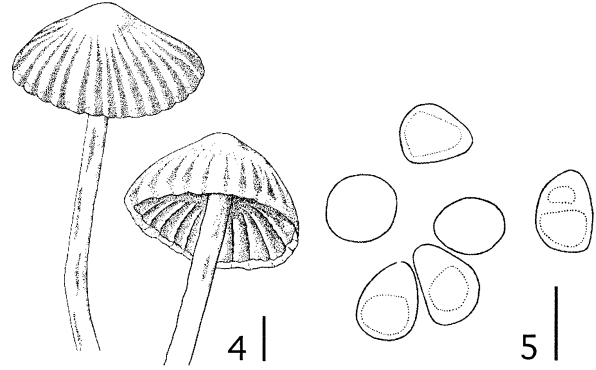


FIG. 3. *Aureofungus yaniguaensis* basidiospores. Scale bar = 10 μm .



FIGS. 4–5. *Aureofungus yaniguaensis*. 4. Fruiting body. 5. Basidiospores. Scale bars: 4 = 100 μm , 5 = 4 μm .

previously described fossil agarics, there are no characters (synapomorphies) that provide positive support for such a relationship. Therefore, we think it is appropriate to classify *A. yaniguaensis* in a new genus.

Fossil evidence (*Archaeomarasmius*) indicates that the euagarics clade is at least 90 million years old (Hibbett et al 1995), and molecular clock studies suggest that the basidiomycetes as a whole could be anywhere from 500 million years to 1.2 billion years old (Berbee and Taylor 2001, Heckman et al 2001). Iturralde-Vinent and MacPhee (1996) suggested that all Dominican amber was formed in a single sedimentary basin during a 5 million year interval in the Miocene (15–20 Ma; contra Poinar and Singer 1990). Thus, *A. yaniguaensis* does not affect the minimum age estimates for either the euagarics clade or the basidiomycetes. Nevertheless, fossil fungi in Dominican amber, such as *A. yaniguaensis*, are of value for understanding the ecology of Miocene ecosystems in the Caribbean and could help evaluate certain historical biogeographic hypotheses (see Hibbett 2001 for an example). The discovery of a third fossil agaric from Dominican amber suggests that many more such finds might lie in store.

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