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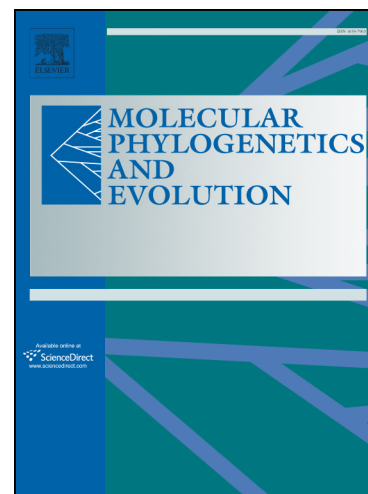
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Evolutionary history of ergot with a new infrageneric classification (Hypocreales: Clavicipitaceae: *Claviceps*)

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Key words: molecular dating; Clavicipitaceae; host pathogens; multilocus phylogeny; alkaloids; ergochromes

Abstract

The ergot, genus *Claviceps*, comprises approximately 60 species of specialised ovarial grass parasites famous for the production of food toxins and pharmaceuticals. Although the ergot has been known for centuries, its evolution have not been resolved yet. Our approach combining multilocus phylogeny, molecular dating and the study of ecological, morphological and metabolic features shows that *Claviceps* originated in South America in the Palaeocene on a common ancestor of BEP (subfamilies Bambusoideae, Ehrhartoideae, Pooideae) and PACMAD (subfamilies Panicoideae, Aristidoideae, Chloridoideae, Micrairoideae, Arundinoideae, Danthonioideae) grasses. Four clades described here as sections diverged during the Paleocene and Eocene. Since *Claviceps* are parasitic fungi with a close relationship with their host plants, their evolution is influenced by interactions with the new hosts, either by the spread to a new continent or the radiation of the host plants. Three of the sections possess very narrow host ranges and biogeographical distributions and have relatively low toxicity. On the contrary, the section *Claviceps*, comprising the rye ergot, *C. purpurea*, is unique in all aspects. Fungi in this section of North American origin have spread all over the world and infect grasses in all subfamilies as well as sedges, and it is the only section synthesising toxic ergopeptines and secalonic acids. The evolutionary success of the *Claviceps* section members can be explained by high toxin

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