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Commentary on: Carter DO, Tibbett M. Taphonomic mycota: fungi with forensic potential. J Forensic Sci 2003;48(1):168–71.

Sir:

In a recent article, *Taphonomic Mycota: Fungi with Forensic Potential* (1), David Carter and Mark Tibbett propose the use of various wild fungi for forensic purposes. As a mycologist, I found this paper very intriguing. However, I feel the authors have overstated the usefulness of many of the fungal species they list in the paper and accompanying data table. Furthermore, a number of errors were found within the data table. I offer this commentary to clarify these points.

The authors correctly point out (1) that fungi of potential forensic importance all occur in response to the release of nitrogenous compounds from the decay of corpses. Mycologically speaking, it would be safe to assume that most fungi will occur anywhere, terrestrially, where there is a high nitrogen source (given that other temporal factors in the species' niches are met). Of all the fungi mentioned by Carter and Tibbett, only *Hebeloma syriense* (commonly found in eastern North America and known as the "corpse finder") and *H. radicosum* (common to Europe and closely related to, if not synonymous with, *H. syriense*) are routinely described as associated with corpses (2–4). All other fungi discussed (1) are saprophytes, with a penchant for ammoniated substrates (urea, dung, rotting plant material) or are mycorrhizal (that is, symbionts with plant roots) in habit. Furthermore, despite the frequent mention of *H. syriense* and *H. radicosum* (in mushroom guidebooks) as associated with corpses, I've seen few firsthand claims; most authors are likely reiterating the claims of previous authors.

Another difficulty with utilizing fungi of forensic importance is in their identification. Typically, identification is made by analysis of sexual or asexual reproductive structures. Frankly, few individuals besides expert mycologists would be able to notice, much less identify, any of the species noted. The authors list fungal species that are minute to microscopic in nature (e.g., *Rhopalomyces strangulates, Amblyosporium botrytis, Ascobolus* sp.; see below). In such cases, I would guess that investigators able to see such tiny fungi emerging from, say, the forest floor, would more quickly note other clues to a buried corpse, such as disturbed or raised soil, disturbed plant material, swarming necrophilic insects, scraps of clothing, or even bits of hair. *Hebeloma* species, previously noted as the most reliable, forensically (if that can be said of any fungi), are very difficult to distinguish from other small brown mushrooms. Such mushrooms are known to mycologists as "little brown mushrooms or LBMs" and are poorly researched taxonomically for this very reason. Arora, in one of the most comprehensive of North American mushroom guidebooks, calls the genus *Hebeloma* ". . . yet another faceless and featureless collection of brownish mushrooms" and that "200 species of *Hebeloma* occur in North America, but none are exceptionally distinctive or colorful" (3). Positive identification of most macrofungi ("mushrooms") requires microscopic observation of spores, as well as noting chemical reactions of tissues or spores to chemical reagents (iodine stain, Melzer's reagent, potassium hydroxide, etc.). All fungi can be unpredictable in occurrence and produce reproductive structures (necessary for identification) seasonally (in "good" years; in many years, as a result of less than optimal conditions, they fail to reproduce altogether). Additionally, fungal fruitbodies can be quite ephemeral. The mushrooms of some species (e.g., *Coprinus* sp.) may "last only a few hours, making them difficult to study. . . Consequently, the North American species are not well known" (5).

As previously stated, the data table (1) has a number of errors and lacks information regarding geographic range of many fungal species, associated vegetation, or substrate. Where missing from their original data table (1), these data are given below. *Rhopalomyces strangulatus* is a microscopic Zygomycete fungus; members of the Zygomycetes are typically generalist saprophytes. Not stated in their data, *Amblyosporium botrytis* is microscopic and common to North America, and although a Deuteromycete fungus (that is, reproduces by asexual means only), it is a Hyphomycete fungus whose members primarily parasitize other fungi. Two species of *Ascobolus* are listed (*A. denudatus, A. hansenii*) but are probably of limited efficacy due to their minute size; *Ascobolus* fruitbodies may be only a few microns in size. *Tephrocybe tesquorum* is listed as an Ascomycete, but is actually a Basidiomycete (which can make a big difference when looking for fruitbodies). *Coprinus neolagopus* and *C. phlyctidosporus* occur in Japan; all species of *Coprinus* are associated with dung and many are difficult to identify, even with the aid of a microscope (5). *Crucispora rhombisperma* is native to Indonesia. *Hebeloma syrjense* [sic] is common in eastern North America and Europe; *H. radicosum* is common to Japan and Europe (6) and may be synonymous with the "corpse finder," *H. syriense*. *Lactarius chrysorrheus* is common to Japan and southeastern North America where it is associated with mixed hardwoods and conifers (2). *Laccaria amethystine* [sic] is common throughout North America and Europe; *L amethystina* is associated with oak and mixed forest (2,6). *Lepista nuda* is commonly found associated with leaf litter in mixed forests of Europe and North America. *Suillus luteus* is common in North America and occurs beneath Scots pine, red pine, and spruce; *S. bovinus* occurs in Europe beneath two-needled pines. *Mitrula* sp. is listed as a Basidiomycete, but is actually a genus of tiny Ascomycete fungi.

The authors state (1) that a great deal more research is needed to develop fungi into a suitable forensic tool. It is hoped that these comments will help facilitate those who choose to take up the cause.

References

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