

The Ice Man's Fungi: Facts and Mysteries

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The discovery of a Neolithic corpse in 1991 in an Alpine glacial field, near the Austrian–Italian border, attracted worldwide attention. The finding's circumstances and the recovery of the mummy proved to be quite chaotic: it took five days for the corpse and most of the artifacts found with it to be transferred to a lab of forensic medicine in Innsbruck, the capital of Tyrol. During this time (September 19–24, 1991) the Neolithic origin of the corpse was unknown, and at least 22 different persons came into contact with it (Egg and Spindler, 1993). Many of the artifacts, some damaged by the visitors, were carelessly thrown into a garbage bag and brought to Vent, the next mountain village. Therefore, the exact original position of these artefacts (including fungal objects) could not be reconstructed.

Today, we know that the real age of the so-called “Ice Man” ranges, according to nine independent radiocarbon measurements, between 3350 and 3100 BC (Prinoth-Fornwagner and Niklaus, 1995). Among the numerous items of the Ice Man's equipment were three fungal objects: two different shaped, polypore-like fungal fragments, each mounted separately on a leather thong; and a mysterious “black matter,” filling up the major part of his “girdle bag.” The black matter, which was first thought to be resin representing part of a prehistoric repair kit (Lippert and Spindler 1991; Egg and Spindler 1993), was later shown to be tinder material prepared from the true tinder bracket *Fomes fomentarius* (L.: Fr.) Fr. (Sauter and Stachelberger 1992; Pöder et al., 1995; Peintner et al., 1998). The two whitish, polypore-like

objects—one shaped more or less like a Scots pine cone, the other more spheroidal—were identified as fruitbody fragments of the polypore *Piptoporus betulinus* (Bull.: Fr.) P.Karst. (Pöder et al., 1992; Peintner et al., 1998).

So far, this represents the only case in which mushrooms were obviously part of a prehistoric person's equipment; it fired the imagination not only of the public and the media but also of scientists. Due to a general fever of excitement, facts have often been mixed up with fictions.

Thus, for instance, our first publication on the identity of one of the polypore-like fragments (Pöder et al., 1992) has prompted a flurry of controversial discussions both in newspapers and scientific journals (e.g., Nieszery, 1992; Chapela and Lizon, 1993; Denman, 1993; Grant, 1993). Our “educated guess” was—and still is—that the “razor strop fungus” (*P. betulinus*) does not provide a good tinder, and, therefore, might have served some purpose other than making fire. Referring to biologically active compounds produced by *P. betulinus* and its special host—it grows exclusively on birch, which is regarded as the tree of life and fertility in many European and Siberian myths (e.g., Heeger, 1936; Wasson, 1968)—we indicated a possible medical–spiritual use. At this time (the existence of tinder material in the Ice Man's girdle bag was still unknown) the reaction of the public, archaeologists, and some biologists to our assumption was clearly negative. Mycological facts and ethnomycological hints could not argue archaeologists out of their

standard hypothesis: ancient humans used polypores as tinder and for nothing else.

Such discussions stopped after the discovery of classic tinder material prepared from the tinder bracket *Fomes fomentarius*, which filled up the major part of the Ice Man's girdle bag (Pöder, 1993, Pöder et al., 1995). Others, obviously confusing "spiritual" with "spirituous," complained that the Ice Man was not a drug dealer. Referring to biologically active components produced by polypores, some authors (e.g., Sauter and Stachelberger, 1992; Capasso, 1998) mistook *Piptoporus betulinus* for *Laricifomes officinalis*. The latter contains agaric acid (2-hydroxy-nonadecan-tricarboxylic acid) and has been used as a purgative or as medicine against pulmonary diseases right up to the 20th century. This mushroom was already known to the ancient Greeks for its medical properties and played an important spiritual as well as medical role in many societies worldwide (Buller, 1914; Blanchette et al., 1992; Blanchette, 1997; Peintner and Pöder, 2000).

Thus, presumptions such as "the Ice Man was aware of his intestinal parasites and fought them with measured doses of *Piptoporus betulinus*," which contains agaricine (Capasso, 1998) is simply wrong (Pöder and Peintner, 1999). In our studies, agaricine was not detected in the two fungal fruit body fragments of the Ice Man or in recent material of *P. betulinus* (Pöder et al., 1992; Pöder, 1993). The

pharmacologically active substances of *P. betulinus* are ergosta-7,22-dien-3- β -ol, fungisterol, ergosterol, tumulosic acid, and a group of triterpenes. Among the latter, polyporenic acid A, B, and C were separated (Cross et al., 1940). Recently, the finding of a new antibiotic produced by *Piptoporus betulinus*, called piptamine (a tertiary amine) was published by Schlegel et al. (2000). It is active against a series of Gram-positive bacteria and fungi including yeasts. Unfortunately, piptamin is a homonym of an alkaloid isolated from plants (*Piptanthus nanus*, *Ormosia nobilis*; Fabaceae) more than 40 years ago (Wilson, 1965).

Although no indications could be found regarding a prehistorical use of *P. betulinus*, what can be finally said about the significance of the Ice Man's fungi?

Concerning the Black Matter, its interpretation as classical fire-starting tinder seems well confirmed by the current body of evidence. Regarding the *P. betulinus* objects, it is much more difficult to find an adequate answer without leaving a firm scientific footing. As outlined in detail by Peintner and Pöder (2000), a merely alimentary use or use as some kind of commodity can be excluded; also a pure ornamental or decorative function without any spiritual background seems very unlikely. Consequently, we have to admit that we simply do not know the Ice Man's intentions concerning these mushrooms.

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