Journal Title: The mycologist

Volume: 1
Issue: 4
Month/Year: 1987
Pages: 178-

Article Author: Crundwell,

Article Title: The unnatural history of the fly agaric

Imprint: google (Via SFX)

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THE UNNATURAL HISTORY OF THE FLY AGARIC

E CRUNDWELL
Formerly, School of Pharmacy, Portsmouth Polytechnic

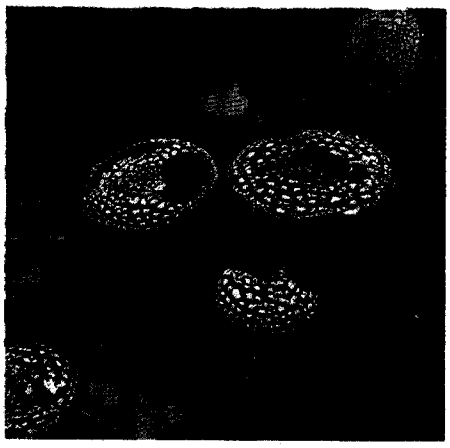

Photo: G T Cambridge

Amanita muscaria has had a reputation for killing flies at least as far back as the *De Vegetalibus* of **Albertus Magnus** in the 13th century.

The first published account of the effects of *Amanita muscaria* on man was made by **von Strahlenburg** (1730), a Swedish colonel who spent 12 years in Siberia as a prisoner of war. *"The Russians who trade with them (Koryak), carry thither a Kind of Mushrooms, called in the Russian tongue, Muchumur, which they exchange for Squirrels, Fox, Hermin, Sable and other Furs: Those who are rich among them, lay up large Provisions of these Mushrooms, for the Winter. When they make a Feast, they pour Water upon some of these Mushrooms and boil them. They then drink the Liquor, which intoxicates them: The poorer Sort, on these Occasions, post themselves round the Huts of the Rich, and watch the Opportunity of the Guests coming down to make Water; And then hold a Wooden Bowl to receive the Urine, which they drink off greedily, as having still some Virtue of the Mushroom in it, and by this Way they also get Drunk."*

A fuller description came from a Russian traveller, **Krasheninnikov** (1755): *"Sometimes for their enjoyment they also use the mukhumor, the well known mushroom that we ordinarily use for poisoning flies. It is first soaked in must of kiprei (Epilobium angustifolium) which they drink, or else the dried mushrooms are rolled and swallowed whole, which method is very popular. The first and usual sign by which one can recognize of man under the influence of the mukhumor is the shaking of the extremities which will follow after an hour or less after which the persons thus intoxicated have hallucinations, as if in a fever: they are subject to various visions, terrifying or felicitous, depending on differences in temperament: owing to which some jump, some dance, others cry and suffer great terrors, while some might deem a small crack to be as wide as a door, and a tub of water as deep as the sea. But this applies only to those who overindulge, while those who use a small quantity experience a feeling of extraordinary lightness, joy, courage, and a sense of energetic well-being."*

Von Strahlenburg's account was translated into English in 1736 and given a wider currency by **Oliver Goldsmith** in his *Citizen of the World* (1762) — fictional letters supposedly from a Chinese philosopher residing in London. Goldsmith elevates mushroom intoxication to the nobility in order to point a moral about excessive flattery, likened to making use of excreted material. However, the central effects he describes are those of mild alcohol intoxication.

Carl von Ditmar (1900) on his journey of 1851-1855 noted use of divination by Shamans, the priestly practitioners of the native animal cults. From 1865-1870, **George Kennan** (1871) surveyed Siberia for the Western Union Telegraph Company. He reported that trade in intoxicating mushrooms was prohibited but that he saw $20 of furs traded for a single fungus. Most earlier writers stress the inertia and euphoria produced but **Jocelson** (1908) describes also an uncoordinated frenzy. He repeats claims of increased stamina and strength, which are reflected in the Koryak legends. In a typical example *Big Raven* had caught a whole whale and could not send it home because he was unable to lift the bag containing its travelling provisions. He appealed to *Existence* to help him. The deity said *"find white soft stalks with spotted hats — these are the spirits wa'pag". Big Raven* found the fungus, lifted the bag and sent the whale home. The fungi were normally dried and swallowed with water when used, but **Enderli** (1903) observed that the initial effect can be to produce nausea — so the Koryak gave the fungi to their wives for a preliminary chew! Not only men were fond of the fungus, **Steller** (1774) noted that reindeer became addicted, and their flesh was then reported to become intoxicating.

There is other historic evidence of the use of *A. muscaria*. The Aryans invaded India from the North in about 1500BC. Their religion appeared to be one of praise and prayer. Sanskrit hymns written in this period, especially the Rig Veda, were recorded down to 800BC. The religion became fused with Dravidian image worship and the Hindu pantheon emerged (Rowland, 1977). **Gordon Wasson** (1969), a New York banker turned mycologist, made an extensive study of the Rig Veda. It has 1028 hymns, of which 120 are to *Soma* (literally 'the pressed one') sometimes called *amrta* (linguistically cognate with ambrosia). *Soma* comes from mountains, south of the Oxus birch, with which *A. muscaria* is most frequently associated, growing only at 2400-3000m. There are no early references to roots, leaves, blossom or seeds characteristics consistent with *A. muscaria*. Later substitutes e.g. *Ephedra* are red, small, leafless and with fleshy stalks, the nearest characteristics obtainable in lowland plants. Interestingly there are two forms of *Soma*. The Sanskrit can be interpreted to imply that one form of *Soma* is for the priests who then

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John Allegro, in his *Sacred Mushroom and the Cross*, sought to explain Christianity as an *Amanita*-cult. His arguments are difficult to challenge without a detailed knowledge of ancient languages, but Robert Graves (1970) was unconvinced. Perhaps one sample will suffice. Allegro claims that the appelation Magi comes from the Latin *magus*, itself from the Old Persian *magush*, cognate with the Greek *pharmakon* (and hence *pharmacist*). Ultimately all derive from the Sumerian *balag* (literally 'big penis'). *Amanita*, of course, are phalloid in the early stages of development. So the Three Wise Men were fungus freaks!

Before leaving the subject of Christianity and fungi, a chapel near the Chateau de Plaincouralt must be considered. Located in the Berry, between Ingrades and Merigny, and constructed in 1291, the chapel contains a fresco of the Garden of Eden in which the Tree of Knowledge apparently sprouts spotted toadstools. However, **Erwin Panofksky** informed Gordon Wasson (1957) that the *"similarity with A. muscaria is purely fortuitous. The fresco is only one example of the conventionalised tree type, prevalent in Romanesque and early Gothic art — it comes about by the gradual schematization of the impressionistically rendered Italian Pine Tree in Roman and Early Christian painting . . ."*

In pagan Europe in the Dark Ages, the Norse sagas refer to *beserkgangr* (literally 'bearskin wearers'). **Snorri Sturklson** in the Ynglinga Saga speaks of them as *"raging, half mad, insensate (who) went into battle without armour — mowing*

down everything in their path, immune to fire or iron". The followers of Harald Haadrade fought on after his death at the battle of Stamford Bridge until they dropped from exhaustion. The symptoms are again more typical of a drunken frenzy, but in 1784, **Odman** proposed intoxication by *A. muscaria* in explanation and the controversy has rumbled on ever since. No contemporary literary references or illustrations supporting the idea have ever been found.

Central America has yielded definite evidence of the ritual use of fungi. *Amanita muscaria* could possibly be depicted in the Guatemalan fungus stores dating from 500BC to 200AD, and from 600-900AD, but there are no historic records. The Spanish conquerors of Mexico carefully documented the ritual use of the small fungi termed *teonanactl*. **Roger Heim** presented convincing evidence identifying these fungi with *Psilocybe* species and unearthed the continuing modern use.

Magic fungi early found their way into fiction. In her *Adventures in Wonderland*, Alice encounters a caterpillar seated on a mushroom and requests his help to change size again. After an irrelevant dialogue the caterpillar descends and remarks as it goes off "*one side will make you grow taller, and the other side will make you grow shorter*". Alice has difficulty in identifying sides in a radially symmetrical object, and experiences some trouble in stabilising the dose! **Graves** (1956) suggested that perhaps **Lewis Carrol** was influenced by M C Cookes's *Plain and Easy Account of British Fungi*, published in October 1862. Charles Dodgson began to write down the stories on 13 November 1862. Cooke refers to the macropsia experienced after ingestion of *A. muscaria* and reported by the explorers of Siberia, quaintly exemplifying it as a "*straw lying in the road becomes a formidable object, to overcome which a leap is taken sufficient to clear a barrel of ale*". **Charles Kingsley**, in *Hereward, Last of the English* (published 1866), describes an old Lappish nurse who possessed the secret of the scarlet toadstools, to make men intoxicated and blab secrets. There is no direct evidence that either author possessed or saw Cooke's book.

In **Dorothy Sayers'** 1930 novel, *The Documents in the Case, A. muscaria* plays a central role. George Morrison, a retired engineer, is fond of unusual foods and is writing a book entitled *Neglected Edible Treasures*. He dies, with symptoms of poisoning by muscarine, after eating a dish of fungi. The plot turns on how muscarine got into the meal, either from the presence of *A. muscaria* or by addition of muscarine, and on how naturally occurring muscarine could be distinguished from synthetic material. There exist both chemical and pharmaceutical errors (Crundwell, 1983). In comparison with 400ppm in the toxic muscarinic species, *Inocybe patouillardii*, *A. muscaria* contains only 2ppm of muscarine (Waser, 1961). **Lampe** (1978) has stated "of the extremely limited number of fatal incidents in the medical literature in which these species are unequivocally implicated, all the victims exhibited a precarious state of health prior to the poisoning. Even an attempted suicide with *A. muscaria* was dismally unsuccessful". The major active components are not muscarine but muscimol and the related ibotenic acid. Interestingly, the red skin contains 50% more muscimol than the flesh. There is also a yellow pigment, muscaflavine (Barth *et al.*, 1981).

Modern experience of *A. muscaria* effects is poorly documented. **Wasson & Wasson** (1957) tried the raw juice and found it caused nausea, somnolence and vivid dreams (by no means comparable with *Psilocybe mexicana*). **McDonald** (1978) tested powdered North American *A. muscaria* in volunteers, and all reported nausea and lethargy. Some underwent visual disturbance, few experienced hallucination or euphoria. **Waser** (1967) found that ibotenic acid produced lassitude and later a migraine-like visual disturbance. He found that muscimol produced disorientation, illusions and perserveration of optical perception ('echo pictures'). It was excreted unchanged in the urine. It is not surprising that the sixties hippies came to prefer *Psilocybe*. Modern experience seems far removed from either uncontrolled rage or blissful euphoria (albeit tinged with macropsia).

Asiatic and American varieties have been described for *A. muscaria*. Pharmacognosists now recognise chemical races in some species of medicinally important plants. Perhaps *A. muscaria* exhibits a similar phenomenon.

This article is a shortened version of the lecture delivered by the author *In Memoriam Alec Westrup* on 16 November 1984 to the Portsmouth & Distr. Nat. Hist. Society.

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WANTED

Professor E B Gareth Jones, Director of Research, School of Biological Sciences, King Henry Building, King Henry 1 Street, Portsmouth Polytechnic, Hampshire PO1 2DY, needs fresh material of the following aquatic fungi for a large scale investigation of spore ontogeny and phyletic relationships:

Halosarpheia fibrosa, Halosphaeria (remispora) cucullata, and *Torpedospora ambispinosa*. Also needed are species with unfurling spore appendages, including *Halosarpheia ratnagiriensis, H. betotensis, H. viscidula, Lignincola tropica, L. longirostris, L. cincinnatula, Aniptodera mangrovii, Cucullospora mangrovii,* and the temperate species *Nais inornata, Halosarpheia unicaudata.*

Material should be sent air mail in sealed plastic bags; cost of postage will be refunded.