

The current use of *Phellinus igniarius* by the Eskimos of Western Alaska

ROBERT A. BLANCHETTE¹, CAROLINE C. RENNER², BENJAMIN W. HELD¹,
CARRIE ENOCH² and SARAH ANGSTMAN²

¹Department of Plant Pathology, University of Minnesota, St. Paul, Minnesota 55108-6030 USA

E-mail = robertb@umn.edu

²Yukon-Kuskokwim Health Corporation, Bethel, Alaska 99559 USA

The Inupiaq and Yup'ik Eskimos of western Alaska have used *Phellinus igniarius* for hundreds of years by burning the basidiocarps and mixing the ashes with tobacco. A previous publication (*Mycologist* 15: p.4) reported the historic use of this fungus and documented natural history museum collections of sporophores and special ornate boxes for holding the fungus ashes. When the ashes of *P. igniarius* were mixed with tobacco it added "a powerful kick" to the chewing tobacco. We now report new information that is disconcerting about the current widespread use of *P. igniarius* in many Alaska native communities. The use of the mixture of fungus ash and tobacco is being studied and treated as a serious health concern.

Keywords: Ethnomycology, forest fungi, basidiomycetes, *Phellinus igniarius*, nicotine, tobacco, Native Americans, Eskimo culture

Edward W. Nelson, a weather observer based in St. Michael, Alaska, noted in his journal and later reported in a Smithsonian Institution publication (Nelson, 1899) how fungus ashes were mixed with tobacco and used by many Yup'ik and Inupiaq Eskimos who lived along the western Alaskan coast. The fungus was recently identified as *P. igniarius* and information was presented about its historical significance and widespread use by many Native American groups in the 19th century (Blanchette, 2001). This report also indicated that some Alaska Natives still had knowledge of "punk that was burned and ashes mixed with tobacco" for chewing. Shortly after the publication appeared in the *Mycologist*, health care researchers from the Yukon-Kuskokwim Health Corporation (YKHC) in western Alaska (Caroline Cremona Renner and Carrie Enoch) provided information about how punk ash continues to be used in this region by an extraordinarily high number of Alaska natives. This paper summarizes information from health care professionals and reports results from a collection trip to the Yukon-Kuskokwim Delta region to document how Native Alaskans currently use *P. igniarius*.

In Yup'ik, the punk or fungus ash is called 'araq,' and the fungus ash and tobacco mixture is called 'iqmik', meaning "thing to put in the mouth". The mixture is also commonly called "blackbull". Elders from the Yukon-Kuskokwim region indicate the use of iqmik is very common and estimate that as many as 50% to 80% of the population use it on a regular basis. In one regional survey, over 52% of men and women over 18 years of age reported using smokeless tobacco as compared to a national U.S. average of 2% (YKHC, unpublished data). It has also been documented previously that throughout the region it is very common to collect, burn and mix *P. igniarius* ashes with tobacco before chewing and to share the mixture with elders and children as young as 5 years of age (Renner, 1999). Use during pregnancy is also very common. A recent survey of pregnant women receiving prenatal care at YKHC indicated that 82% used tobacco during their pregnancy. Of those, 61% chewed either 'iqmik' or commercially prepared chewing tobacco (Renner, unpublished data).

Phellinus igniarius is well known by Alaska natives and easily differentiated from other polypores growing on birch trees. Only basidiocarps of *P. igniarius* are used. During a collecting trip with Alaska Natives from the remote village of Akiak, Alaska, we were easily able to find *P. igniarius* fruiting bodies in stands of older birch trees after travelling a few hours up the Kuskokwim

River by boat. Since many local people are unable to travel to these remote inland areas where birch trees grow, collectors of the fungus routinely gather more basidiocarps than they will use themselves. They often sell it raw in 50-100 pound bags, or process it and sell the ash to village stores.

To make 'araq' the fungus is air-dried for a few weeks, placed into large open coffee cans and burned on a fire. After burning, the inner context of the basidiocarp forms a very fine, white powder and the outer-crust surface turns into black charcoal-like fragments. The ash is then stored in plastic bags. Some users separate the white ash from the charcoal while others prefer to keep the bits of the fungus charcoal in the ash. To prepare iqmik, the user takes leaves of tobacco and wraps a quantity of fungus ash into it. The wad of tobacco and ash is masticated for a short time to blend the mixture and then placed in containers for later use (Fig 1). Modern storage containers are often plastic, tin or porcelain and are no longer as elaborate as the fungus ash boxes previously described in the Smithsonian Institution collections from the 19th century (Blanchette, 2001; Nelson, 1899). 'Iqmik' is a very expensive commodity with a small plastic bag of fungus ash (approximately 15g) selling at US\$15.00 to \$20.00 in local stores (Fig 2). Uncut, cured tobacco leaves produced in Kentucky are also readily available in the local markets and sell for US\$10.00 for 450 g.

After the fungus is burned, it becomes an extremely fine powder. Elemental analyses using induced coupled plasma spectroscopy and previously described methods (McDougall and Blanchette, 1996; Rizzo *et al.*, 1992) indicate that the ash consists of high concentrations of magnesium, potassium, calcium and phosphorus as

well as elevated amounts of sodium, copper, manganese, lead and other metal ions as compared to birch wood or cured tobacco leaves (Table 1). When mixed with tobacco, the high levels of magnesium, potassium and other alkaline cations increase the pH. It is known that as the pH level of smokeless tobacco increases so does the amount of nicotine absorbed into the body (Centers for Disease Control and Prevention, 1999). The pH level of 'iqmik' can be exceedingly high depending on the amount of ash used. For one wad of tobacco a "heaping spoonful" of ash is usually added (Fig 3). The tremendous "kick" reported in the 19th century, or "buzz" as we heard it referred to in 2001, arises from the rapid delivery of high levels of nicotine to the brain. The very finely powdered ash of the fungus and high concentration of alkaline compounds appear to facilitate nicotine delivery. So much nicotine can be introduced into the brain that nicotine poisoning may result (Renner, 1999). Indeed, people often report feeling sick after the ash and tobacco is first mixed in their mouths with symptoms such as increased heart rate, dizziness and vomiting. These symptoms are typical of nicotine poisoning.

Health hazards associated with tobacco and nicotine use are well known, but the effects of large doses of nicotine from 'iqmik' use on human health are just starting to be understood. Nicotine addiction among the indigenous people of the Yukon-Kuskokwin Delta is common and cases of cancer, chronic hypertension, and stroke are prevalent. In 2001, 8,775 of the prenatal visits to the regional hospital were for hypertension (the total population of the region is 25,000), triple the number of visits for the next most common reason (Renner, unpublished data). Alaska Natives of the Yukon-Kuskokwin region view 'iqmik' as

Table 1. Elemental analyses (ppm) of *Phellinus igniarius* ash, wood ash, birch wood and tobacco

| Sample ¹ | Ca | Cd | Cr | Cu | Fe | K | Mg | Mn | Na | Ni | P | Pb |
|--|---------|----|----|-----|------|--------|---------|------|------|----|--------|----|
| Phellinus igniarius | | | | | | | | | | | | |
| Purchased ash #1 | 120,542 | 5 | 2 | 481 | 3494 | 73,666 | 197,939 | 996 | 709 | 43 | 10,169 | 12 |
| Purchased ash #2 | 122,908 | 5 | 2 | 352 | 2925 | 95,328 | 69,583 | 1169 | 1064 | 45 | 22,714 | 12 |
| Ashed basidiocarp | 191,520 | 2 | 2 | 679 | 402 | 46,995 | 163,315 | 1028 | 165 | 17 | 11,520 | 15 |
| Charcoal-like fragments from burned basidiocarps | 43,630 | 1 | 2 | 148 | 643 | 17,983 | 169,583 | 1167 | 114 | 13 | 2474 | 8 |
| Wood and Tobacco | | | | | | | | | | | | |
| Uncut, cured tobacco leaves | 29,135 | 1 | 1 | 13 | 190 | 34,596 | 2409 | 167 | 39 | 2 | 2803 | 3 |
| Wood ash | 253,813 | 15 | 7 | 116 | 4913 | 50,865 | 41,523 | 1798 | 3845 | 19 | 6945 | 13 |
| Sound birch wood | 691 | 1 | 1 | 12 | 11 | 179 | 126 | 153 | 16 | 1 | 49 | 2 |

¹Purchased ash samples were from two different grocery stores in Akiak, Alaska. The ashed basidiocarp was from a burned sporophore collected by the authors. Charcoal fragments were removed from other samples of purchased ash and analyzed separately. The wood ash was from *Salix* wood and is used by some Native Alaskans when *P. igniarius* ash is not available.



Fig 1 Native Alaskan elder Wassilie Evan from Akiak, Alaska with a basidiocarp of *Phellinus igniarius* and a container of 'iqmik' he prepared. This fungus is easily recognized from other polypores growing on birch and is the only fungus used for making 'iqmik'.

a healthier alternative to smoking, and women often switch from smoking cigarettes to chewing 'iqmik' when they become pregnant (Renner 1999). The current use of 'iqmik' is widespread in teenagers and even children as young as 5 years old. A serious problem of lifelong nicotine addiction is likely to be associated with such use and exposure in young

children. Health care workers and community leaders have serious concerns about the health risks of 'iqmik' use and are currently studying the problem and initiating educational programs to alert Alaska Natives to potential dangers of using 'iqmik'.

The elevated levels of lead and other metal ions in the fungus ash and problems that may be associated



Fig 2 Uncut, cured tobacco leaves and plastic bags of "punk ash" used to make 'iqmik' purchased from local stores in Bethel, Alaska.



Fig 3 'Araq' (*Phellinus igniarius* fungus ash) being spooned into a handful of tobacco leaves by a Yup'ik woman. The ash raises the pH in the mouth increasing the availability and speed of nicotine delivery.



Fig 4 The front page of a pamphlet prepared by the Yukon-Kuskokwim Delta Health Corporation to educate Native Americans on the dangers of 'iqmik' use.

with absorption of these heavy metals into the body when 'iqmik' is used have not been previously reported and need investigation. Most heavy metal cations are stimulated to undergo both hydrolysis and polymerization in solution by alkaline pH (Gadd and White, 1989). These metal ion complexes would be in the mouth for long periods of time when the tobacco and ash mixture is chewed and could be

taken up into the body. Although the concentrations of heavy metals are not excessively high, exposure to elevated heavy metal concentrations every time 'iqmik' is used suggests that over time users are repeatedly being exposed to levels of potentially toxic substances. Similar concentrations of heavy metals are also found in wood ashes (Table 1) that are sometimes used by Native Alaskans when *P. igniarius* ash is not available.

Although it was intriguing to discover that *P. igniarius* had such a prominent role in Native American society in the 19th century (Blanchette, 2001), it is disturbing to learn that so many Native Alaskans still use the fungus as a way to increase nicotine delivery, which is contributing to serious adverse effects on their health. Education and prevention projects as well as nicotine dependence treatment programs (Fig 4) are beginning to alert Alaska Natives to the true effects and risks of 'iqmik' use. Although using *P. igniarius* has become a part of Native Alaskan behavior since tobacco was introduced, the detrimental effects on human health are important considerations that should end this tradition for those individuals seeking a healthier life style.

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Editor's Note: The native peoples of arctic North America are Eskimos and Inuits. The latter refers mostly to those living in northern Canada and who have recently been granted their own Province, Nunavut. See: <http://www.gov.nu.ca>. The former refers mostly to those living in Alaska and who inhabit a wide variety of environments ranging from the North Slope arctic tundras and coasts to the Bering Sea lowlands and the mountainous, forested coasts of South Alaska. See: www.mnh.si.edu/arctic/features/croads/eskimo.html.