The cottonwood mushroom (*Tricholoma populinum*): a food resource of the Interior Salish Indian peoples of British Columbia

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Tricholoma populinum Lange is identified for the first time as one of the edible mushroom species traditionally eaten by Interior Salish Indian peoples of British Columbia. A description of this species is given, and harvesting and preparation information is provided based on its use by contemporary Native people. Nutrient composition data are also reported. This mushroom continues to be an important food source for some Native people in British Columbia.

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Pour la première fois, le *Tricholoma populinum* Lange est identifié comme un champignon comestible traditionnellement consommé par les indiens Salish vivant à l'intérieur de la Colombie-Britannique. Les auteurs décrivent l'espèce et donnent des informations sur les méthodes de récolte et de préparation basées sur l'usage qu'en font les autochtones contemporains. On donne également des informations sur la composition nutritive. Ce champignon constitue toujours une importante source de nourriture pour certaines nations autochtones de l'intérieur de la Colombia-Britannique.

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Introduction

Mushrooms or other fungi are known to have been eaten traditionally by four Interior Salish groups of south central British Columbia: Thompson, Lillooet, Okanagan, and Shuswap (Turner 1978; Steedman 1930; Turner et al. 1984; Turner et al. 1980; Palmer 1975). Other Native groups of the British Columbia interior, including Kootenay, Chilcotin, and Carrier, and Native peoples of coastal British Columbia, from all available evidence, did not formerly eat mushrooms (Turner 1978; Turner 1973; Turner and Bell 1971, 1973; Turner and Efrat 1982; Turner et al. 1983).

It is difficult to identify actual mushroom species used traditionally, because the seasonality and unpredictability of appearance of fungi makes collecting specimens difficult. This problem was emphasized by Turner (1978) after attempts were made to identify certain mushrooms from descriptions of Native consultants. One mushroom known to have been used, but heretofore not accurately identified, grows under cottonwood trees (*Populus balsamifera* L. ssp. *trichocarpa* (T. & G.) Hult.; syn. *P. trichocarpa* T. & G.), and is referred to in this paper as "cottonwood mushroom." This mushroom was incorrectly identified by Turner (1978) as *Phaeolepiota aurea* (Mattuschka: Fr.) Maire ex Konr. & Maubl., a species that occurs abundantly in the interior of the province and is associated with deciduous trees (A. Szczawinski, personal communication). Other literature references to the "cottonwood mushroom" are equally misleading. For example, Steedman (1930) identifies this mushroom, called "mEtlkái" (original transcription), simply as "variety of mushroom; *Agaricus* sp." and further notes that "nothing was learned concerning this plant other than that the mushroom was eaten. . . ."

Many contemporary Interior Salish people in British Columbia are familiar with, and still harvest, the "cottonwood mushroom." In October 1982, Turner and Kuhnlein collected "cottonwood mushrooms" in the Nicola Valley with one of the Thompson people who still use them, Hilda Austin (HA), of Lytton, B.C. In October 1985, Turner accompanied four Lillooet Native people, Edith O'Donaghey (EO) of Lillooet, and Desmond and Teresa Peters (DP, TP) and Bill Edwards (BE) of Pavilion, to harvest the mushrooms at Crown Lake, near Pavilion Lake. Specimens collected with HA were identified as *Tricholoma populinum* J.E. Lange. Two samples of *T. populinum* subsequently collected from the Bella Coola Valley by Turner (in 1983 and 1985) and the samples from Crown Lake, all verified as *T. populinum*, were analyzed for nutrient content by Kuhnlein. Voucher specimens of the original collections made with HA and of the samples used for nutrient analysis are reposited with the National Mycological Herbarium of Canada (DAOM). Results of nutrient analyses and a summary of Native harvesting and preparation techniques for *T. populinum* are presented here.

Species description

MACROSCOPIC: Pileus 7–12 cm across, rounded to flat at maturity; light brown on the margin to reddish brown towards the centre of the disc; cuticle slightly viscid, easily peeled from

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TABLE 1. British Columbia Interior Salish names for "cottonwood mushroom" (*Tricholoma populinum*)

Language	Name*	Notes	Reference
Lillooet (Fraser River dialect)	s-məƛ-áqaʔ	General, mushroom, specifically *T. populinum*	J. van Eijk (personal communication)
Lillooet (Fraser River dialect)	məlx-qín	? borrowed from Shuswap; specifically *T. populinum*	B. Edwards and E. O'Donaghey (personal communication)
Lillooet (Pemberton dialect)	nəq̓ʷ-níq̓ʷ-aż q̓əm̓s	Specifically *T. populinum*	N. Wallace and J. van Eijk (personal communication)
Thompson (Lower dialect)	məƛqíʔ	Specifically *T. populinum*	Turner et al. 1984, p. 113
Thompson (Nicola dialect)	məƛqíʔ	Specifically *T. populinum*, general for all mushrooms	Mabel Joe (personal communication)
Shuswap (central western, e.g., Kamloops, Deadman's Creek)	s-məƛ-áqaʔ ("semtl'ák̓a7")	General for all mushrooms, including *T. populinum*	R. Bouchard (personal communication)
Shuswap (eastern, e.g., Chase)	s-məƛ-áqaʔ ("semtl'ák̓a7")	General for all mushrooms, including *T. populinum*	R. Bouchard (personal communication)
Shuswap (northerly, e.g., Canim Lake)	s-məƛ-qín̓ ("smet'k̓ín̓")	General for all mushrooms, including *T. populinum*	R. Bouchard (personal communication)
Okanagan–Colville	p̓əƛ-qín̓ ("petl'k̓ín")	General for all mushrooms, specific for *T. populinum* and another indeterminate species	Turner et al. 1980, p. 16

*The orthography follows a standard one based on international phonetic symbols used by many northwest linguists. Shuswap and Okanagan–Colville show the original renderings of the terms in a practical orthographic system developed by R. Bouchard.

until brown; and (*iv*) stipes were cut in pieces and fried. The cooked mushrooms are firm in texture and somewhat nutty in flavour.

These mushrooms are relished especially by the elders of the Interior Salish community. HA preferred "cottonwood mushrooms" to the other types of mushrooms that were eaten, e.g., "pine mushrooms." However, AY preferred pine mushrooms, saying that the former were "flat tasting" and often wormy. Later, however, she said that these mushrooms were usually used for "salt," which presumably meant they had "extra flavour" and that they were practically the only means people had in the old days to add "salt" to a stew. Traditionally, they were often cooked in soups and stews with deer meat or salmon (AY and HA; Turner et al. 1980).

In the past, "cottonwood mushrooms" were stored after being sliced and dried. Often they were threaded on a string and hung up to dry. Before they were used the mushrooms would be soaked in water overnight and then cooked. In recent times, the usual way to store mushrooms is to sauté them lightly, then freeze them or can them in Mason jars (HA; MJ; EO; BA; JK; NJ).

MJ mentioned that the juice from cooking cottonwood mushrooms (or pine mushrooms) was traditionally used to wash infants. It was believed to make them strong and independent like a mushroom, which is able to push logs and rocks out of its way as it grows.

Native nomenclature

The names applied to the "cottonwood mushroom" in the various dialects of four British Columbia Interior Salish languages are shown in Table 1. A map showing the territories of these groups is illustrated in Fig. 5. The Okanagan–Colville, Shuswap, Lillooet, and Nicola Valley Thompson terms can be applied generally for all kinds of mushrooms. In fact, the Okanagan–Colville and Shuswap terms are almost invariably used in a general context (R. Bouchard, personal communication). At the same time, they can pertain to the "cottonwood mushroom," one of the major edible types. In the Nicola Valley, the Thompson name "məƛqíʔ" is most commonly used in the context of its specific application as "cottonwood mushroom," but if a general term for "any mushroom" is required, this is the term applied. For example, the term can be used to refer to commercial mushrooms, fresh or canned, or to a mushroom, not necessarily edible, for which no specific identification can be made (MJ). In contrast, in the Lower Thompson and Pemberton Lillooet dialects the general terms for mushroom are "q̓áḿes" and "q̓əm̓s," respectively. These terms also apply specifically to the "pine mushroom," which is the more common edible species in these regions.

In the Fraser River dialect of Lillooet, one name for "mushroom – cottonwood mushroom" is tentatively analyzed by Jan van Eijk, a linguist specializing in Lillooet (personal communication), as follows: s-məƛ-áqaʔ (literally "cylindrical object that is stroked, tapped"), s-, nominalizer; məƛ, "to stroke, pet," probably also "to tap"; -aqaʔ, suffix probably pertaining to "barrel, cylindrical object."

The Fraser River and D'Arcy Lillooet also use a name apparently borrowed from the neighbouring Shuswap, məlx-qín (literally "stick-head" in Lillooet, but in Shuswap, "cottonwood-head"): məlx, reduced form of mulx "stick", this term is polysemous with "cottonwood" in Shuswap; -qin, "head, top." Some Pemberton Lillooet speakers use the descriptive name, nəq̓ʷ-níq̓ʷ-aż q̓əm̓s (literally "cottonwood–(pine)–mushroom"): nəq̓ʷ-níq̓ʷ-aż, "cottonwood tree"; q̓əm̓s, "pine mushroom" (*T. magnivelare*).

In contrast, the corresponding Thompson term, məƛqíʔ, is not able to be analyzed (Turner et al. 1984). The Shuswap terms, s-məƛqín̓ and s-məƛaqaʔ, are apparently related to the Thompson name. A derivation from the root, məƛ, meaning "mix" has been suggested for these Shuswap names (R. Bouchard, personal communication). It is unlikely that the derivations of the Lillooet name, s-məƛ-áqaʔ, and Shuswap terms s-məƛ-qín̓ and s-məƛ-áqaʔ are different, given the close relationship of the languages, but at this time, it is not clear what was the original meaning of the root. In any case, it is probable that the Thompson term was "borrowed" from either

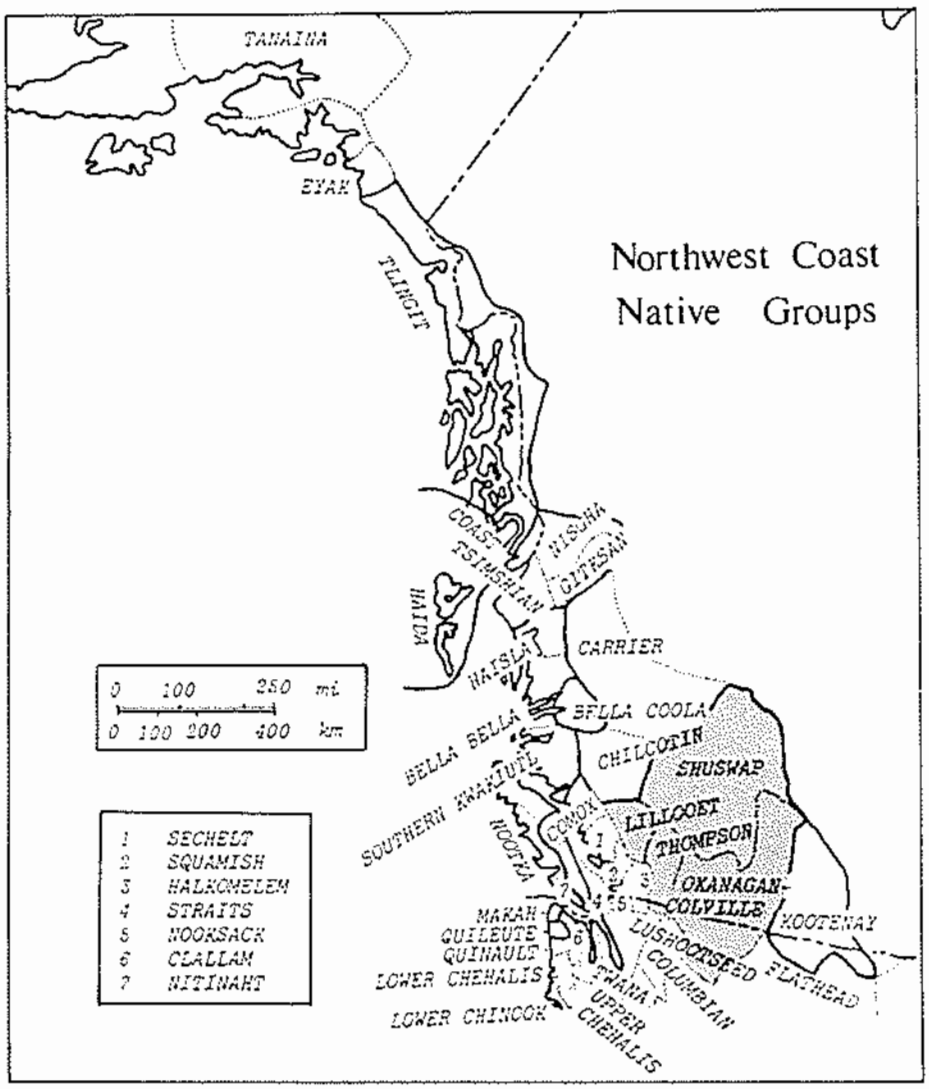

FIG. 5. Map showing the territories of the four British Columbia Interior Salish groups using *T. populinum*.

Lillooet or Shuswap because it has no meaning in Thompson other than as a mushroom name. (It is a generally accepted linguistic premise that words within the same etymon that can be analyzed in one language but not in another were likely "borrowed" from the first language and placed in the second.)

The Okanagan–Colville language is in a different division of Interior Salish from the other three languages, and its name for "mushroom," p̓ax̌-qín, is apparently unrelated to the others, except in the use of the suffix, -qín, meaning "head, top." The derivation from the root, pux̌, "come to an end, completed" (R. Bouchard, personal communication), indicates its different origin. As well as applying in a general way to all mushrooms and specifically to *Tricholoma populinum*, the origin also applies specifically to another mushroom, as yet unidentified, which is white, about 5 cm tall and 2.5 cm across, with a rounded cap (Turner et al. 1980[3]). The complex puzzle of the origin of names for "cottonwood mushroom" in the various Interior Salish languages and the evolution of their application from specific to general (or general to specific) still needs considerable attention. One can only speculate that its use is long-standing in all of the Interior Salish areas.

Nutrient composition

Nutrient analyses were completed for two samples of *Tricholoma populinum* collected at Horsetail Falls Creek in the Bella Coola Valley and for one sample from Crown Lake north of Lillooet. Voucher specimens for these samples are deposited in the National Mycological Herbarium of Canada (DAOM; Turner nos. 1700, 1880, and 1891). To our knowledge no nutrient composition data on this species have been published previously.

The mushrooms used for analysis were cleaned and the caps peeled with stainless-steel knives, using the same method demonstrated by HA, then washed free of soil, first in tap water (at Bella Coola) and then in distilled water. They were frozen immediately for later analysis.

Proximate composition, including fiber, was assessed with standard methods and minerals were analyzed with plasma atomic emission spectroscopy as described in Kuhnlein et al. (1982).

[3]In the 1980 publication by Turner et al., the colloquial name, "cottonwood mushroom," was applied to a different type of fungus that grows on the trunks and stumps of cottonwoods. It was tentatively identified as *Polyporus sulphureus* (Bull.) Fr.; however, from recent work in the Nicola Valley area, it has been identified as *Pleurotus ostreatus* (Jacq.: Fr.) Kummer, the oyster mushroom (cf., DAOM 193929; N. J. Turner no. 1801, Nooaitch Reserve, 26 October 1985; identity confirmed by S. Redhead).

TABLE 2. Nutrients in raw, peeled "cottonwood mushrooms" (*Tricholoma populinum*) (per 100 g) in comparison with published values for other mushrooms*

Nutrient	*T. populinum* A	*T. populinum* B	*T. populinum* C	Other B.C. wild mushrooms† (range of values)	Mushroom data in "common-foods" table‡
Moisture, g	94	94	94	89–93	90
Total energy					
kcal	21				28
kJ	89				120
Ash, g	0.52	0.40	0.42	0.37–1.23	
Protein, g	0.75	0.76	0.85	1.87–4.03	3
Total carbohydrate, g	4.24	4.17	4.24	3.07–3.92	4
Lipids, g	0.49	0.67	0.49	0.14–0.86	Trace
Fiber					
Acid detergent, g	1.0	1.0	0.68		
Fiber					
Neutral detergent, g	1.98	1.92	1.58		
Thiamine, mg	—	—	0.04		0.1
Riboflavin, mg	—	—	0.08		0.46
Niacin, mg	—	—	0.46		4.3
Vitamin C, mg	2.14	—	1.83	3.5–8.6	3
Calcium, mg	1.58	1.37	2.53	0.89–6.23	6
Iron, mg	0.67	0.17	0.24	0.52–3.05	0.8
Sodium, mg	0.20	0.35	0.66		15
Copper, mg	0.51	0.12	0.29	0.25–0.82	
Zinc, mg	0.25	0.27	0.45	0.49–1.57	
Phosphorus, mg	36.6	33.77	36.13		
Magnesium, mg	5.46	4.33	4.61		
Chromium, μg	32.0	6.50	20.88		
Manganese, μg§	68.6	63.96	46.52		

*A homogeneous sample was prepared from approximately 1 kg of cottonwood mushrooms collected at Horsetail Falls Creek, Bella Coola Valley, in October 1983 (A), the same site in October 1985 (B), and at Crown Lake, east of Pavilion Lake, in October 1985 (C).

†From Leichter and Bandoni (1980). The species reported are *Marasmius oreades*, *Suillus subluteus*, *Cantharellus cibarius*, and *Pleurotus ostreatus*.

‡Data from the Health Services and Promotion Branch and Health Protection Branch (1979). The species reported is presumably *Agaricus bisporus*.

§The following minerals were undetectable at the microgram level noted: beryllium, 4; molybdenum, 2; nickel, 10; lead, 10; antimony, 20.

The nutrient composition data are presented in Table 2, along with published data from other species of wild British Columbia mushrooms (Leichter and Bandoni 1980) and the data that are cited in the tables commonly used for nutrient computations of Canadian diets (Health Services and Promotion Branch and Health Protection Branch 1979).

All mushrooms have a high moisture content and minor amounts of total carbohydrate and fiber, protein, and lipids. The total energy contributions, calculated using the Atwater factors (Watt and Merrill 1963), of the species reported in this paper are 21–28 kcal/100 g fresh weight. Although the protein contents of mushrooms are often minor, the amino acid patterns have been reported to be favourable because all the essential amino acids required by humans are present in the mushrooms, with the possible exception of the sulphur-containing amino acids. The chemical scores derived from the amino acid levels when compared with the WHO/FAO reference protein are reported to be variable in British Columbia mushrooms (Leichter and Bandoni 1980). In a report on nutrients in dry matter of wild mushrooms from western Finland, Kreula et al. (1976) showed that total protein varied from 12 to 31%.

In general, the vitamin levels of *Tricholoma populinum* and other wild and cultivated species are minor. Vitamin C varied from 1.8 to 2.1 mg/100 g in fresh *T. populinum* and from 3 to 8 in other species, as shown in Table 2. Total folate in British Columbia species as reported by Leichter and Bandoni (1980) varied from 23 to 28 μg/100 g fresh weight, which indicates that a 100 g serving (less than 100 mL when cooked) would provide up to one-eighth of daily needs (Bureau of Nutritional Sciences 1983). Unfortunately, folate values were not available for *T. populinum* samples. Thiamine, riboflavin, and niacin were present in low levels.

The 100-g serving of *T. populinum* would contribute small but meaningful amounts of iron (0.17–0.67 mg), copper (0.12–0.51 mg), and zinc (0.25–0.45 mg) to the diet. Calcium (1.4–2.5 mg), phosphorus (33.8–36.6 mg), sodium (0.2–0.6 mg), magnesium (4.3–5.5 mg), chromium (6.5–32.0 μg), and manganese (46.5–68.6 μg) are present in minor amounts in comparison with daily needs for these nutrients. The levels of calcium, iron, manganese, zinc, and copper are within the range values reported for Finnish wild mushrooms by Kreula et al. (1976). These mushrooms are particularly rich in zinc and copper when compared with other vegetable foods.

Conclusions

The "cottonwood mushroom" (*Tricholoma populinum*) has been, and will continue to be, a popular source of food for the Interior Salish Indian peoples of British Columbia. The mush-

room is little known as an edible mushroom to other British Columbians, even other Native peoples; however, it should nevertheless be considered as an important traditional food, not only to be used in season but throughout the year as a stored product. It enhances the flavour of other foods, such as meat, as well as being a satisfying food served alone. Small but meaningful levels of nutrients, particularly minerals, are present in this mushroom.

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