

California Porcini: Three New Taxa, Observations on Their Harvest, and the Tragedy of No Commons¹

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California Porcini: Three New Taxa, Observations on their Harvest, and the Tragedy of No Commons. Seven species of California porcini (*Boletus*, sect. *Boletus*) are recognized, including three new taxa that are culturally and economically significant: *B. rex-veris* sp. nov., *B. regineus* sp. nov., and *B. edulis* var. *grandedulis* var. nov. The three new taxa have been intensively gathered during the last century by Italian immigrants, and *B. rex-veris* sp. nov. more recently by southeast Asian immigrants as well as by long-time rural residents. *B. rex-veris* sp. nov. is restricted to inland mountains while the other two are widely distributed, and are abundant in California's heavily populated coastal zone. In the 1990s, reflecting the preservationist policies of mainstream environmental organizations, many park authorities and land management agencies in coastal California closed public lands to mushroom gathering. Organized attempts to establish legal, limited gathering in a few parks were almost entirely unsuccessful. The result is that it is illegal to pick porcini on nearly all public lands over a 6,000-square-mile area, even though they grow prolifically in coastal California. Many of coastal California's porcini are picked anyway by those willing to risk being apprehended and fined. In response to the official intolerance for mushroom gathering, an entire generation of mushroom hunters has grown up practicing the activity in secret.

Key Words: Boletes; California mushrooms; coastal California; commons; environmentalism; king boletes; mushroom harvest; mycorrhizal associations; park policy; porcini; public land management; wild edible fungi.

Introduction

Species belonging to *Boletus* section *Boletus* are popularly known as king boletes, cepes, or, especially, porcini. They are highly desirable, commercially valuable wild mushrooms with a tube or sponge layer under the cap that is white when young, a thick stalk that is reticulate at least at its apex, white flesh in all stages of development, and a characteristic king bolete or “porcino” aroma when dried (Sitta and Floriani 2008, this issue). Porcini occur widely in the northern hemisphere in ectomycorrhizal association with trees, especially members of the Pinaceae and Fagaceae, and even with some shrubs (Oria-de-Rueda et al. 2008, this issue). The porcini species native to Europe are

well known (Leonardi et al. 2005; Beugelsdijk et al. 2008), but those in Asia and North America are little studied despite their cultural and economic value. In this paper the taxonomy of the California species is discussed, as well as the history of their harvest.

Previously Described Taxa

In his treatment of California boletes, Thiers (1975) recognized three species of porcini: *B. aereus* Fr. (now *B. aereus* Bull.), *B. edulis* Fr. (now *B. edulis* Bull.), and *B. mottii* Thiers (correctly spelled *B. mottiae*). He assigned all three to “subsection *Boleti*” of section *Boletus*. In this paper, the menu of California porcini species is expanded to seven: Three new taxa are described (see Appendix), and all seven are discussed briefly below beginning with the four previously described taxa.

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***BOLETUS BARROWSII* THIERS & SMITH**

Color Illustrations: Arora (1986): Color Plate 141; Arora (1991): 161.

Popularly known as the “white king bolete,” this species is easily recognized by its pale cap with a dry, poorly differentiated cap cuticle. Thiers (1976) described it from Arizona and New Mexico under conifers, apparently unaware that it also occurs in coastal California with oaks after warm rains, and as far north as Vancouver Island, British Columbia, where it fruits in the summer (Richard Winder and Adolf Ceska, pers. comm.). Voucher specimens in west-coast herbariums are few, however, because in the words of Ceska, “This bolete is delicious and it is hard to resist [eating it].” Its poorly differentiated, non-gelatinized cap cuticle plus its pronounced tendency to fruit in warm weather strongly suggest that *B. barrowsii* is closely related to the European species, *B. aereus*, and is California’s sole representative of the thermophilic porcini group described by Sitta and Floriani (2008, this issue) and exemplified by the latter species. The closest relatives of *B. barrowsii* are likely to be found in Mexico rather than in the western United States. Species in the thermophilic group are generally superior in flavor and fragrance to those in the mesophilic group typified by *B. edulis* and *B. pinophilus* Pilát & Dermek (Sitta and Floriani 2008, this issue), but the appearance of *B. barrowsii* in California is sporadic at best and it is known and appreciated there by only a few mushroom hunters. In the pine forests of Arizona’s Kaibab Plateau, on the other hand, it is the single most abundant large bolete after summer rains, and its range extends south at least to central Mexico.

***BOLETUS FIBRILLOSUS* THIERS**

Color Illustrations: Bessette et al. (2000): 292, 300 (as *B. mottiae*).

This distinctive edible bolete with a dark brown fibrillose cap and brownish stalk is regularly encountered in the coniferous forests of North America’s Pacific Northwest from northern California to British Columbia; however, it does not occur in sufficient quantity to attract commercial interest. Thiers (1975) erroneously described its pore surface as yellow when immature, and consequently aligned it with other yellow-pored boletes in the disparate group “subsection *Calopodes*.” Bessette et al. (2000) apparently had no firsthand experience with

California boletes and perpetuated the error. The author, however, has repeatedly collected young specimens whose pore surface was white at first before gradually darkening to yellow. This feature, combined with the white flesh and reticulate stalk, place *B. fibrillosus* clearly within the porcini group (section *Boletus*).

***BOLETUS MOTTIAE* THIERS**

Color Illustration: Thiers (1975): Microfiche 14 (as *B. mottii*).

Thiers (1975) based this species on a single collection from the Sierra Nevada foothills and emphasized its distinctive “strongly reticulate or ridged” cap. However, the photograph labeled *B. mottiae* in Bessette et al. (2000) is clearly *B. fibrillosus*, and additional collections in the SFSU herbarium labeled *B. mottii* or *B. mottiae* and examined by the author proved to be either *B. edulis* or *B. fibrillosus*. The type specimen of *B. mottiae* is 35 years old; its DNA is degraded (Bryn Dentinger, pers. comm.), and it is unclear how it is related to other species of porcini in western North America. An effort should be made, therefore, to re-collect *B. mottiae* in its type locality.

***GASTROBOLETUS SUBALPINUS* TRAPPE & THIERS**

Color illustration: Trappe et al. (2007): 35.

Easily recognized by its misshapen fruiting body, reduced stalk, and lack of forcible spore discharge, this species is obviously a member of *Boletus*, sect. *Boletus* by virtue of its white, non-blueing flesh. Formal transfer to *Boletus* has not been made, however, as there are practical reasons for retaining it in *Gastroboletus*, a polyphyletic grouping of gastroid or semi-gastroid (sequestrate) boletes. Trappe et al. (2007) informally describe this species as a “truffle in the making” and note the similarity of its flavor and aroma to *B. edulis*. They state that it grows under mountain conifers from “southern Washington to [the] southern Oregon Cascades,” but it is also common in the mountains of California, as noted by Thiers (1975) and Arora (1986).

Undescribed Taxa

California’s three most culturally salient and commercially valuable porcini are widely recognized by mushroom collectors yet, surprisingly, are heretofore undescribed. The two new species and one new variety discussed below are formally described in the appendix to this article.



Fig. 1. The spring king bolete, *Boletus rex-veris* sp. nov., McCloud, California. (David Arora, all rights reserved).

***BOLETUS REX-VERIS* SP. NOV.** (SEE APPENDIX)

Color Illustration: Wood and Stevens (2008), as *B. pinophilus*.

Known popularly as the “spring king bolete” or “spring king” for short, this is the common late spring mountain bolete (Fig. 1) of California and the Pacific Northwest, and is an important commercial species. Though mild in flavor, it withstands transportation, refrigeration, and freezing better than other western porcini, a crucial attribute for such a perishable product. It has passed in California as *B. edulis* (Thiers 1975), and more recently as *B. pinophilus* (Wood and Stevens 2008). The latter is a closely related European species with a more highly gelatinized pileipellis, a browner stipe, and slightly broader spores. *B. rex-veris* sp. nov. also differs in displaying a pronounced semi-hypogeous tendency, i.e., it typically originates deep in the soil and often barely breaches the surface of the ground when mature. The low degree of gelatinization in the pileipellis of *B. rex-veris* sp. nov. may be due, in part, to the semi-arid environments in which it often grows, but unpublished molecular data (Francisco Camacho, pers. comm.) support the recognition of *B. rex-veris* sp. nov. as a species closely related to, but distinct from, the European *B. pinophilus*. The spring king also appears to be closely related to *B. regineus* sp. nov.

***BOLETUS REGINEUS* SP. NOV.** (SEE APPENDIX)

Color Illustrations (as *B. aereus* sensu Thiers): Thiers (1975): Microfiche 1; Smith (1975): 80; Arora (1986): Plate 140; Arora (1991):151.

This common, dark-capped species (Fig. 2) of hardwood and mixed forests is known popularly as the “queen bolete” (Arora 1986, 1991) and is



Fig. 2. The queen bolete, *Boletus regineus* sp. nov., Mendocino County, California. (David Arora, all rights reserved).

sometimes harvested commercially as an adjunct to the California king bolete (*B. edulis* var. *grandedulis* var. nov., below) or American (white) matsutake (*Tricholoma magnivelare* [Peck] Red-head). It has a very mild flavor when fresh and only a slight “porcino” odor when dried. It has long passed in California as *B. aereus* (Thiers 1975; Smith 1975; Arora 1986, 1991; Bessette et al. 2000). The gelatinized pileipellis, however, clearly distinguishes it from European *B. aereus*, which has a dry, velvety cap cuticle with a non-gelatinized trichodermium of subparallel hyphae, and a browner stalk. Thiers (1975) described the pileus of this species as “never viscid or tacky,” but that is typically true only for immature specimens. Several of Thiers’ collections examined by the author showed signs of gelatinization in the pileus cuticle, and even Thiers’ illustration (1975: Microfiche 1) shows a distinctly shiny, i.e., viscid cap. The cap may indeed be dry or subviscid when young but tends to gelatinize as the white canescence (caused by minute pruina) wears off and the dark color fades. In age it scarcely resembles European *B. aereus*, and its lack of a strong porcino odor plus its bland taste suggest a closer relationship to *B. pinophilus* and *B. rex-veris* sp. nov. in the mesophilic group of porcini than to the thermophilic group typified by *B. aereus* (Sitta and Floriani 2008, this issue).

***BOLETUS EDULIS* VAR. *GRANDEDULIS* VAR. NOV.**
(SEE APPENDIX)

Color Illustrations: Arora 1991: 154, 158; Bojantchev 2008.

The often-massive “California king bolete” (Fig. 3) is a prominent feature of California’s



Fig. 3. John Feci with a California king bolete, *Boletus edulis* var. *grandedulis* var. *nov.*, weighing more than 5 pounds (or 2 kg) found in Monterey County, California. (David Arora, all rights reserved). **Fig. 4.** A basket of spring kings, *Boletus rex-veris* sp. *nov.*, about to be sold in McCloud, Siskiyou County, California. (David Arora, all rights reserved). **Fig. 5.** Mario, a 90-year-old Italian-American, displays a bolete slicer that he adapted from a bread slicer. The sliced boletes are then dried for later use. Mario and his family (four generations) gather every year in McCloud, California, for a week of mushroom picking. (David Arora, all rights reserved).

coastal pine forests, differing from typical *B. edulis* in its brown to slightly reddish pore surface when mature. Pickers refer to the large, mature but still sturdy specimens as “barstools” and local newspapers in the small towns of coastal California often feature photographs of people holding trophy specimens weighing several pounds each. Pigmentation in the cap is apparently photosensitive and buttons still covered by forest humus can be entirely white. Mature individuals growing in dark, closed-canopy forests develop only slight pigmentation and are much paler, typically, than the strongly brown, red-brown, or yellow-brown individuals growing in open forests or at their edges. Curiously, Thiers (1975) makes no mention of the brown to cinnamon-brown pore surface of mature sporocarps. However, all collections from coastal pine forests examined by the author had this feature providing the specimens were mature enough, and several collections from the Sierra Nevada did as well. Since molecular studies of porcini in Europe indicate that *B. edulis* is a wide-ranging and variable species (Leonardi et al. 2005; Beugelsdijk et al. 2008), and since other macro- and micromorphological features of the California population are within the range generally reported for *B. edulis*, recognition at the varietal rather than species level seems warranted. The author’s study of the *B. edulis* complex in California is not exhaustive and varieties without a cinnamon to brown pore surface may also occur, particularly in areas he has not sampled extensively, such as the Sitka spruce (*Picea sitchensis* [Bong.] Carr.) forests along the northern coast. A molecular comparison of California’s *B. edulis* with those in the Pacific Northwest, Alaska, and Eurasia should elucidate whether or not var. *grandedulis* warrants recognition at the species level, how far north it occurs, and what other varieties of *B. edulis*, if any, exist.

The Spring King Harvest

The spring king, *Boletus rex-veris* sp. nov., is the favored bolete of commerce (Fig. 4) in western North America, and occurs in most of the mountain ranges west of the Rockies. According to one mushroom broker (Trent Valvo, pers. comm.), 25,000–60,000 pounds are harvested commercially each year in the Mt. Shasta region alone, where the author interviewed more than two dozen pickers and buyers at buy stands during the years 1998–2003 (see below). Many

additional pounds of spring kings are harvested in the Sierra Nevada of California, but mostly for personal use.

Several small inland mountain towns in western North America have become centers for the harvest and sale of spring kings, including Trout Lake in southern Washington, Sisters in central Oregon (McLain 2008, this issue), La Grande in eastern Oregon, Keno in southern Oregon, and McCloud in northern California. It is fitting that the type locality for this species is McCloud, because spring kings have been harvested there for at least a century and perhaps longer. Situated in a flat basin on the southeast flanks of Mt. Shasta (a volcano, elev. 14,162 feet or more than 4,000 meters), McCloud (pop. 1,600) was once a thriving mill town; during the 1940s, it was the largest pine producer in the United States. A large number of Italian immigrants came to work in the mill between 1907–1910, and discovered, to their delight, that spring kings (i.e., porcini) were conveniently plentiful in the forests of ponderosa pine (*Pinus ponderosa* Dougl.) immediately surrounding the town. One recently deceased immigrant, Joe Triulsi, said:

I was raised in the mountains [in northern Italy] and McCloud look like Switzerland. That’s why I stayed here. Years ago, it was boletes forever. The old families would fill up these big old gunnysacks, then take them home and clean them and dry them. We didn’t have no buyer then ...

Some of the mill workers who retired and moved away from McCloud still return every year during Memorial Day weekend (at the end of May) to look for spring kings. Commercial harvest of spring kings for sale to brokers did not begin until 1985.

The spring king is notable for developing under the ground, and in dry conditions it may not fully surface even when it sporulates. The harvest of spring kings thus mimics the harvest of white matsutake (*Tricholoma magnivelare*) in that pickers must look carefully for slight mounds, humps, “shrumps,” “bumps” or “pushes” in the soil or humus (caused by the developing boletes) rather than for the actual mushrooms. Alternatively, some pickers choose to rake away the pine needle duff in known “patches” or “beds” in order to locate the hidden mushrooms—a method not normally practiced for other porcini species such as the queen bolete and California

king bolete. McCloud's first mushroom buyer, Eric Schramm, describes his outrage at encountering a group of Italian "rakers" at "Pete's Tree," a bolete patch named after an elderly Italian and dominated by a towering ponderosa pine:

He [Pete] was one of the rototillers. That's what we call it when they stir up the [pine] needles. One day there was about ten Italians there all in a line with rakes, and they were rakin' it all up, and they had a pile of needles you could park a VW under, with exposed dirt all the way around. That's when I came flyin' out of the car and told them that they were screwin' up everything. And this guy that was probably 85 years old looked at me and said, 'But we've been doin' this [here] for 80 years!' Now, I don't like that they rake because then I can't see the bumps [formed by developing boletes], but I got to admit he had a point, and I've come around to seeing that he's right. I don't see any lasting damage being done to the mycelium. They weren't raking into the soil very deep, they were raking needles and anything that was between the mineral soil and the needles, so it's hardly surprising that the area recovered in a short time.

The season for spring kings lasts for about one month in the pine flats around McCloud. As the weather warms, the crop moves higher into the surrounding mountains, where spring kings grow with fir (*Abies* spp.) and lodgepole pine (*Pinus contorta* subsp. *murrayana* [Balf.] Critchf.) at elevations of 4,000 to 6,000 feet. But at any given elevation the season may extend for several weeks because of differing microclimates. As one picker puts it:

They'll move from the sun lanes to the drip line, and from the drip line back under the drip line until they're kissing the tree. Tree-kissers, I call them, and those signal the end of the season in that spot. So there's a natural progression that if you're in touch with it, and stay right on top of the bloom, you can keep right on pickin'...

Very few migrants or "circuit pickers" (Arora 1999; McLain 2008, this issue) come to the McCloud area. The overwhelming majority of those who pick spring kings are either local or come from nearby towns. A few families come on holidays to pick (Fig. 5) and stay for up to two weeks. Because of the local character of the pick, a special and highly localized vocabulary has grown up around the harvest of spring kings: "Tree kissers," "sidecars" (little boletes coming off the bases of bigger ones), "bus stops" (known patches of spring kings right along the road where one can

hop out of one's vehicle and quickly check for them), "double bubbles" (buttons where the cap is about the same size as the swollen stalk), "leavers" (those that one leaves because they are too old or too soft to take), "escapement" (a term for the percentage that completely avoid detection or become leavers), "bolete fields" (highly productive areas), etc.

Today, the small, picturesque town of McCloud typifies the "New West" (Abbott et al. 1997): Its largest mill closed in the 1970s and the town is in the process of reinventing itself as a tourist destination. Its main attraction is the McCloud Railway Co. & Shasta Sunset Dinner Train, a railroad designed originally for hauling logs but which now hauls tourists, offering spectacular scenery and "elegant meals" during a three-hour ride. Globalization is evident in the huge company store once patronized by mill workers but now divided up into a number of boutiques selling smoked salmon, garlic-pepper oil, chocolate-covered coffee beans, and Pacific Mist Mushroom Chowder—"a delightfully different blend of portobello, porcini[sic], and oyster mushrooms." (The package did not specify the origin of the dried porcini but it was likely China [Sitta and Florian 2008, this issue], since nearly all of the commercially harvested spring kings are sold and consumed fresh.) During a visit in 2000, only tourists were seen shopping in the boutiques, and the author was told pointedly that most of the local people could not afford to patronize the train. But, as another local was quick to point out, they could afford to pick the morels (*Morchella* spp.) and boletes growing in the nearby forests. Remnants of the older extractive economy thus survive in downtown McCloud in the form of dried porcini (but from an extractive, forest-based economy in China!), and around the edges of McCloud in the form of mushroom pickers and other low-income residents who spend their spare time in the woods. A mushroom buyer described one such picker as follows:

Every day after a 10-hour shift [at a small mill, now closed], he jumps in his truck and goes immediately to the woods with a six-pack, a bottle probe, a fishing pole, a chainsaw, a rifle, a metal detector, a mushroom bucket, and I'm forgetting several things. So he basically lives in the woods. He sees his wife but occasionally. But he's very efficient at what he does. He's a great mushroom picker; he finds lots of buried purple glass bottles where the 19th century outhouses used to be, and he's an

arrowhead hunter, too. He's got a collection of arrowheads that the university offered to send his three kids to school for if he would donate it. But they didn't want to go to college so he kept it. He's also somewhat of an outlaw. He's been known to eat things out of season ...

There is also an increasingly visible community of southeast Asian immigrants who pick mushrooms regularly around McCloud—mostly Lao, Hmong, Mien, and Khmer families who emigrated to America in the 1980s, and subsequently moved from urban areas such as Sacramento to smaller towns such as Weed and Yreka (20 and 50 miles, respectively, to the north of McCloud) and Redding (70 miles to the south). These immigrants did not specifically pick porcini in southeast Asia, but many grew up in wooded areas and gathered other wild mushroom species. A Lao mushroom picker, Sourinheth, explains why his family moved to Weed:

The first reason we come is because [it's a] small town—in the big city a lot of crime and some kids

they go to school in morning but run away, don't finish. Not so many job here but we want kids to graduate. The second reason is we country people. Like my wife. She like the nature—hunting, fishing, fresh air. It so quiet here. Mount Shasta look like Himalaya, same place the Buddhist look for enlightenment, so we try to get that. But somebody already live on hunting mushroom, so when another group of people come here, they don't like it. Sometime we see sign in woods, 'Gooks go home!' But this my home now, since 1986. I used to be 'Special Force' for Americans in Laos. They use helicopter, they drop me at Vietnam border. We look for arms, the enemy moving ... so now no place for me there, in Laos ... This is my third country: Laos, then I live in Thailand three year. But right here is a freedom, a lot of freedom. We respect white guy. If I see the guy in there [picking], I don't want to go there. Except when they talk nice to me, and then I want to talk to them ...

The Asian immigrants who pick regularly (Fig. 6) typically hunt in small family groups of two to five. (One knowledgeable elderly picker is called "Three Eye" because, in the words of his friends, "he have one eye, his wife have two.")



Fig. 6. A southeast Asian couple picking boletes (in this case mostly *Boletus* aff. *regius* Krombh. along with some spring kings) near Medicine Lake in Siskiyou County, California. Immigrants from southeast Asia are significant contributors to the commercial harvest of boletes around Mt. Shasta in northern California. (David Arora, all rights reserved).

While most buyers do business with anyone, one buyer refused for several years to purchase mushrooms from Asian immigrants even when he couldn't meet customer demand. Several long-time local pickers also expressed resentment, describing the forest as being overrun with Asian "hordes" and "armies" (terms also aptly applied to urban mycological societies who often schedule events with a hundred or more participants, and even use a military word, "foray," to describe the experience.) One Laotian picker readily acknowledged that large families of southeast Asian pickers do come to McCloud, but usually from farther away. Experienced pickers, he explained, understand that if too many people go to one spot together, "it's not good for anybody," whereas the more casual pickers, especially if they are from a different area, feel safety in numbers and treat the hunt as a holiday outing, a time to be together whether or not they are wildly successful.

Nearly all the picking in the McCloud area takes place on National Forest grounds, where mushroom picking is permitted. Because few pickers camp in the McCloud area, there is no designated picker camp as there is in many national forests to the north (see McLain 2008, this issue). But law enforcement is visible, as it is at many mushroom picking or buying venues in the western United States. Despite modest numbers of pickers, the Shasta-Trinity National Forest has already begun tracking them with a permitting process. When the author visited in 2000, people selling boletes at the end of the day were being checked for permits by a uniformed Forest Service officer who explained:

We need to police this. Before I came [to this district] they pretty much ignored mushrooms and never checked for permits, so only two or three people a year bothered to buy them. Now I check the buy stations every day and almost everyone buys one ...

The officer did not know whether fees charged for the permits generated enough money to cover enforcement costs. Some local pickers, however, were unhappy with the amount being charged for the permits. One pointed out that, "a permit to cut four cords of firewood costs \$10, but it's \$100 for 30 days of mushroom picking."

The Queen Bolete Harvest

The queen bolete, *Boletus regineus* sp. nov., is largely, though not exclusively, an inhabitant of hardwood forests. Italians who emigrated to

central and northern California in the late 19th and early 20th centuries commonly established homesteads or small farms in the coastal mountains and inland valleys of central and northern California. Many of these farms have since been swallowed up by suburbia, but those that remain can often be identified by their now huge chestnut trees, mature vineyards, and grape arbors. In many cases the farms were set amidst oak-madrone or tanoak woodlands, and thus many of these early Italian immigrants discovered the queen bolete close to home and probably harvested it in large numbers before they became aware of the California king bolete bounty (*B. edulis* var. *grandedulis* var. *nov.*) in the coastal pine forests. A number of regional names were applied to the queen bolete, just as for the king. Among these, the most common seems to have been (and still is) *moretti* ("dark one"), a reference to the brownish-black color of the young cap. Other names for it included *cupetta* ("little cup") and *porcinelli nero* ("dark little porcini," to distinguish it from the larger, paler California king bolete). It is interesting to note that, in contrast to California's 20th-century mycologists, the Italian immigrants interviewed by the author did not consider the *moretti* or *porcinelli nero* to be identical to the European *B. aereus*.

John Feci, now 87, grew up on a farm during the 1920s and 1930s in what is now the Silicon Valley. He says that when his parents first settled in California around 1900, concerned relatives would send them packages of dried porcini from Parma province in "the old country." But soon Feci's family and neighbors learned that porcini grew prolifically in the surrounding hills and, to this day, Feci regularly gives or sends dried porcini to friends and relatives. Feci paints a vivid portrait of what it was like to hunt queen boletes in what he calls "the olden days":

When I was ten or twelve, I used to hunt [boletes] with the older guys. They were vegetable farmers, in their forties and fifties. They couldn't speak English, but they had *class*. They weren't in a hurry. They did a lot of things by hand like make their own wine and cheese and *mondicola* [a kind of salami], which we'd have for lunch while they told stories of the olden days. That's how I learned to speak Italian; lots of others my age have forgotten how by now.

We would get up *early* and pile into the car like Al Capone and his gang: six guys in a Buick wearing fedoras—we didn't have the visor caps with the

advertisements like they have now. The first time I went we had an automobile called a Chandler, and we couldn't make it up the hill, even in low gear. So we stopped and found a bunch [of queen boletes] right there, but a lady caught us and made us give them all to her. We never found any hidden loot or bodies but it got pretty intense. We'd see who could find the most, and when we found some we wouldn't say, "Hey, come over here, look at this!" like you do nowadays in a class. Instead, we'd keep real quiet and try to get as many as possible before the others found out.

Outsiders called us the 'Italian community,' but we were more like little tribes. We'd see a lot of Italians in the woods, but they didn't speak our dialect and we'd steer clear of them. The older guys all came from the same place, Campi, and they always made a big distinction between the people from Campi and the people from Pieve di Campi. Years later when I went to Italy I discovered that Campi was on a hill and Pieve di Campi was at the bottom, a couple miles away.

Today, queen boletes are the least important commercially of the three principal California porcini species described in this article. They are also the most vulnerable to population decline as their habitat is being steadily compromised by development, and especially by Sudden Oak Death (*Phytophthora ramorum* Werres, deCock & Man; see Rizzo et al. 2005). They are not as flavorful as California king boletes (*Boletus edulis* var. *grandedulis* var. *nov.*) and do not hold up or transport as well as spring kings (*B. rex-veris* sp. *nov.*). Furthermore, most of the forests in which they occur are either privately owned or are publicly owned parks where mushroom gathering is prohibited. Nevertheless, queen boletes are excellent dried (Fig. 7) and are still hunted with passion by aging Italian-American immigrants who also pick another denizen of the same hardwood forests, the *coccora* or *coccola* (*Amanita calyptroderma* G.F. Atk. & V.G. Ballen). Queen boletes are also sought by a newer generation of



Fig. 7. Italian-Americans in California commonly mix the leaves of California bay laurel, *Umbellularia californica* (Hook. & Arn.) Nutt., with their dried boletes to discourage insect infestation. (David Arora, all rights reserved).

mushroom hunters who learn from field guides and websites.

The Coastal California King Bolete Harvest: Protected Pine Plantations, Furtive Foragers, Plentiful Porcini

The California king bolete, *B. edulis* var. *grandedulis* var. *nov.*, is widely distributed in California, but the coastal pine forests stretching north from San Francisco through Marin, Sonoma, and Mendocino counties are especially renowned for the prodigious size and quantities of king boletes (porcini) they produce. As the San Francisco Bay Area is a major population center with a reputation for being politically and environmentally progressive, it is worth examining the history of porcini harvest in this region and recent efforts to prohibit it.

Records of Amerindian usage of wild mushrooms are sparse, but Goodrich et al. (1980) report that the Kashaya Pomo of coastal Sonoma County ate *B. edulis* “cooked on hot stones, baked in the oven, or fried.” The Kashaya Pomo had considerable contact with Fort Ross in Sonoma County, one of several fur-trading outposts established by Russians in the 19th century, and situated in the heart of coastal California’s “bolete country.” As Russians are great lovers of wild mushrooms (Yamin-Pasternak 2008, this issue), it is quite possible that 19th century Russian fur traders dined on the prodigious crops of king boletes that grew each fall in the Bishop pine forests (*Pinus muricata* D. Don.) surrounding Fort Ross. It is unclear, however, whether Kashaya Pomo usage of king boletes predated Russian contact.

The Russians vacated Fort Ross in 1841, and neither the Spaniards who colonized California nor the Anglo peoples who came later were noted mycophiles (though regions in northern Spain, particularly Catalonia, have a strong mycophilic tradition, those Spaniards who colonized Mexico and California apparently did not). California’s principal porcini hunters of the 20th century were immigrants from mushroom-loving countries, especially Italy.

The author determined from a series of interviews that Italian immigrants have gathered California king boletes in coastal Sonoma County since at least the 1920s, and that their tradition probably stretches back earlier. The first pickers were “local Italians,” i.e., residents of small towns and farms in

Marin, Sonoma, and Mendocino counties; they called the California king bolete *gambone* (“big leg,” a reference to the huge stem). By the 1950s, the king bolete crop in Sonoma County had been discovered by Genovese immigrants residing in San Francisco. Much of their activity centered on a 10-mile stretch of coastal highway passing through pine forests that now comprise Fort Ross and Salt Point state parks. Lorenzo Simi of San Francisco (Fig. 8), now 75 years old, remembers the coastal highway at Salt Point being regularly lined with parked vehicles when boletes were fruiting during the 1970s.

Most of the lands where the Italian immigrants hunted for mushrooms were privately owned for most of the 20th century. Salt Point State Park was created in 1968 and now totals over 6,000 acres; Fort Ross was recognized as a historical park in 1906, but most of its 3,000 + acres of meadows and forests were acquired in 1990. Section 4306 of the California State Parks Code prohibits the removal of any trees or plants but makes a specific exception for up to 5 pounds of mushrooms, berries, and pinecones or 50 pounds of driftwood, leaving the exact policy up to the discretion of the regional park authorities. According to those interviewed, however, the 5-pound limit was not enforced in Marin, Sonoma, and Mendocino counties prior to 1990, perhaps because the tradition of gathering porcini was already well established there before the state parks were created, and perhaps because a single California king bolete from these coastal pine forests can weigh from one to several pounds (see Fig. 3), i.e., a mere two or three mushrooms would constitute or exceed the limit.

Most of the Italian immigrants picked the porcini for themselves and dried their surplus for use in gravies and stews. During the 1980s, however, commercial activity increased. Some Italians began selling fresh porcini to restaurants in the North Beach neighborhood of San Francisco; meanwhile, rural people struggling to adjust to the decline of the logging and fishing industries began picking boletes for themselves and for sale to mushroom brokers. The increased visibility of the mushroom picking and the changing demographics of the pickers incurred the wrath of the Sierra Club and recreational mushroom clubs, who complained that the state parks on California’s northern coast (particularly in Mendocino and Sonoma counties) were being



Fig. 8. Lorenzo Simi (left) and Piero Argannini with a day's haul of California king boletes (*Boletus edulis* var. *grandedulis* var. *nov.*) along the coastal highway in Sonoma County, California, in 1986 (Lorenzo Simi, all rights reserved). **Fig. 9.** California king boletes are abundant in coastal pine forests. 82-year-old Italian immigrant Rico Re gets up before dawn to go bolete hunting and always does so alone. He says, "When I find one, I feel rich. I'm a king." (David Arora, all rights reserved).

exploited and “raped” by commercial interests. The complaints of recreational pickers mirrored those of their counterparts in Oregon who organized to oppose commercial harvest of mushrooms only to see regulations passed that severely restricted their own activities (McLain et al. 1998). Since 5 pounds (which is about 2 kilograms) of boletes is not a commercially significant quantity, a regulatory mechanism to discourage commercial collecting in California state parks already existed had it been enforced. However, the California State Department of Parks and Recreation moved instead to close *all* the state parks in northern California to mushroom hunting, citing both the increased activity and philosophical reasons (Agonia 1990a).

Response to the sudden closure was disorganized. The largest amateur mushroom club in California, the Mycological Society of San Francisco (MSSF), opposed the ban but another, the Humboldt Bay Mycological Society, supported it as a means of thwarting commercial picking. Prominent California mycologists signed a letter saying they supported the ban but that the Parks should make an exception for the mycologists and their classes. The State Parks director (Agonia 1990b) defended the ban by citing their Mission Statement: “To acquire, protect, develop and interpret significant natural, cultural and recreational resources throughout the state for the inspiration, use and enjoyment of all people.” In citing the charter, he was clearly focused on the “natural resources” aspect of the Mission Statement rather than on the “cultural and recreational resources.”

Opposition to the ban appeared to be ineffective until it was joined by Club Italia of Marin, an influential organization of Italian-Americans. Several of its members testified publicly or wrote letters, for example:

My father came to this country 35 years ago from Italy. He always was very happy to discover that the same type of mushrooms grew here. One of the fondest memories I have was watching him dance and sing with joy when he found the first mushroom [king bolete] of the year. (Carlos Bongio, in Murdock 1990)

And:

We all have our favorite trees that we look under every year ... the Boletus we picked at Fort Ross or Salt Point. These were either cooked or dried to add to the various Italian dishes as an important part of the flavoring. In years gone by I hunted wild game

extensively but gave it up fifteen years ago due to a change of heart in the killing of wild animals. Since I retired eight years ago I have looked forward to the fall season and the rains so that I could wander through the forest seeking the mushrooms as my dad, now deceased, and I had done in the past. (Bottini 1990)

The State Park authorities relented slightly, and in 1991 allowed the most famous mushroom picking area, Salt Point State Park, to re-open to gathering within the 5-pound limit. Their decision had two unintended consequences. First, it funneled all those who wanted to pick legally to one area, Salt Point, thus increasing the potential impact on the forest there. Second, by making mushroom collecting for personal use illegal in all the other parks, they increased the number of unpicked porcini in those same parks, making them more attractive to commercial pickers willing to hunt at night or engage in elaborate drop-off and pick-up schemes in order to avoid detection. The State Parks’ decision was also notable for at least two other reasons. First, the MSSF was repeatedly described by the State Parks as a “special interest” group while Club Italia of Marin was seen to embody “cultural values” apparently worthy of recognition under the State Parks’ charter. Second, their decision left open to mushroom gathering the single park most heavily impacted while closing dozens of other parks to gathering including those with low impact “cultural” picking and those with no obvious picking at all. As but one example, Castle Crag State Park near the small town of Dunsuir, nearly 300 miles away from the Sonoma-Mendocino Coast, was suddenly declared off-limits to mushroom hunters. Gene Ammirati, owner of a small market, estimated that a few hundred people, “mostly locals,” picked mushrooms at Castle Crag and often brought them into his store for identification. “Everything that was fun they’re taking away from us,” he said (Holquist 1990). In the same article, the Parks’ superintendent for the Castle Crag region was quoted as saying, “We haven’t found it [mushroom hunting] to be a problem, but we’re following directives from higher up.” In other words, the decision to close the parks to mushroom gathering appeared to be ideologically driven. The policy change coincided with a broader movement toward a “museum under glass” model of park enjoyment within narrowly

prescribed limits also exemplified, for example, by increased emphasis on prohibiting park visitors from leaving designated trails.

Steven Pencall (2006), a geologist in arid southern California where commercial harvesting of mushrooms is all but non-existent, described the broader movement in California to limit human engagement with nature:

It would take a lively imagination to believe that commercial harvesting could ever be viable here [in southern California]. Yet, even here, local, State, and National Forest units have shown an ever-increasing intolerance of mushroom hunting for any reason ... Land management agencies, particularly those managing “parks,” have undergone a profound and long term cultural shift in the way they perceive their role—a change which has been inculcated in virtually every individual who now makes up those agencies. Within a generation, more or less, their principal role, as seen by the agencies themselves, has gone from facilitating public enjoyment of parks and open spaces to one of defenders of the wild, “nature cops” if you will, determined to keep the public’s enjoyment of “their” parks within carefully proscribed limits.

This cultural shift has not taken place in a vacuum. A significant, if not signal driver of these changes has been the influence of major environmental organizations. Agencies know that these organizations are tireless advocates both for increasing agency budgets and the size of the territories they administer—powerful fuel for any bureaucracy. They also know that the organizations can be equally tireless in rallying opposition to [or filing lawsuits against] any manager who does not manage to a standard they deem acceptable.

It has been apparent for some time that people in the top levels of many major environmental organizations regard mushroom collecting with hostility, or at best, deep ambivalence, although I suspect few of the dues paying members share these sentiments.

Fearful that the existence of only one major public venue (Salt Point State Park) for legal mushroom gathering within two hours driving distance of San Francisco would result in a “tragedy of the commons” (Hardin 1968), the MSSF looked for other public parks that might be amenable to some form of limited gathering. The East Bay Regional Parks District (EBRPD) seemed an obvious candidate, for it administers nearly 100,000 acres in more than 50 different parks. The EBRPD parks are not pristine lands but green belts—wooded hills and ravines and grasslands surrounding or buffering the cities of Berkeley, Oakland, and others directly across the bay from San Francisco—and the EBRPD

appeared to embrace a multi-use approach, allowing a range of activities in designated parks such as golf, archery, fishing, horseback and bicycle riding, and off-leash dog walking. They also grazed cattle in some areas to reduce the danger of grass fires.

In 1992–1993, the MSSF put forth a modest proposal for allowing limited (5 pound) gathering of mushrooms in a single park (out of more than 50) for a trial period of one year, after which time the policy would be reviewed. But opposition to the proposal was far more vehement than the MSSF expected. In a hearing before the EBRPD Board of Directors, the EBRPD’s own staff advocated vociferously against the proposal, with ranger after ranger parading up to the microphone and painting doomsday scenarios. One park naturalist warned that, “It will open the worst Pandora’s Box the District has ever seen” and another quoted from the Bible, urging the Board to uphold its “sacred duty” to protect forest creatures. As the major newspaper of that area (*Oakland Tribune*, 1993) noted in an editorial following the hearing:

To hear the East Bay Regional Parks District tell it, letting mushroom hunters roam in their territory would be like turning *Tyrannosaurus rex* loose in Jurassic Park or perhaps defoliating Vietnam with Agent Orange.

The Sierra Club also delivered passionate testimony against the MSSF proposal, their spokesperson choking back tears at the end of his presentation while uttering the memorable line, “The environment is no one’s to touch.”

The Board, which had initially showed interest in the MSSF proposal, seemed taken aback by the vehement opposition of the EBRPD rangers (or “nature cops,” to use Pencall’s phrase) and the Sierra Club, and deferred to them. The MSSF’s proposal for limited gathering in one park for a trial period of one year was rejected. The EBRPD staff also rejected a request by the MSSF to conduct a yearly mushroom census for educational purposes in another park, citing its mission to protect the environment and stating that they could not permit “activities occurring off the trail and in potentially sensitive habitat” (Burger 1992). Condemning the decision, a newspaper columnist (Goff 1993) commented:

They are not biomuseums. The East Bay regional parks are everybody’s back yards. That includes

people with valid priorities distinct from the Sierra Club's.

To this day the EBRPD pursues a vigorous policy of apprehending mushroom hunters and fining them up to \$1,000. The East Bay Municipal Utility District (EBMUD), which administers an additional 27,000 acres, pursues a similar policy and its head ranger is on record telling the press, "Mushroom harvesting is sort of like timber harvesting" (Sherman 2006).

A year after the EBRPD fiasco, another opportunity presented itself to the MSSF, and one that seemed more promising because it entailed trying to maintain an already existing foraging tradition rather than changing established park policy. In 1994, the Presidio of San Francisco, a large tract of land within city limits containing more than 60,000 trees, was transferred from the U.S. Army to the U.S. National Parks Service as part of the more-than-75,000-acre Golden Gate National Recreation Area (GGNRA). Prior to the transfer, mushroom gathering had occurred on the Presidio quietly and uneventfully for many years. By all accounts, the quantities of California king boletes and other mushrooms gathered were very modest, the number of gatherers few, and there was no observed commercial activity because mushroom productivity did not warrant it. The California Native Plant Society, however, ostensibly complained (Gilles 1994) that mushroom gathering might damage local mushroom populations. Their concern as the "native plant" society was, on the face of it, incongruous because mushrooms are not plants and the setting in which this collecting occurred was not a native forest, but a human construct composed largely of Monterey pine (*Pinus radiata* D. Don), Monterey cypress (*Cupressus macrocarpa* Gord.) and blue gum (*Eucalyptus globulus* Labill.). The first two species are native to California but not to San Francisco; the third is native to Australia. Since the San Francisco peninsula was virtually treeless when the Spaniards first arrived, the porcini and most of the other mushrooms occurring there are probably artifacts of human activity, only colonizing the Presidio after humans provided the appropriate tree hosts. Yet the GGNRA moved almost immediately to prohibit mushroom gathering in the Presidio for what appeared, once again, to be ideological reasons. Although national recreation areas such

as the GGNRA are mandated to conserve recreational values (rather than the distinctly preservationist mission of national parks), the GGNRA staff botanist told the press, "There are broader issues than environmental impacts. There is a growing belief that any consumptive use is not appropriate ..." (Gilles 1994).

The MSSF appealed the GGNRA decision before a citizens' advisory board in 1994, and this time their appeal was highly organized. Several people spoke of the virtues of being able to hunt mushrooms locally (even before one's "carbon footprint" was a consideration). One elderly woman said it was unreasonable to expect people of her age to drive three hours or more to areas with rugged terrain in order to gather mushrooms legally, that some city residents did not even own a private vehicle, and that being able to pick some mushrooms for dinner in a local park was one of her great pleasures. Local university mycologists testified forcefully that there was no evidence of adverse effects from the picking of reasonable quantities of mushrooms for personal use, and that there was no biological or ecological basis for such a ban (see Jansen and van Dobben 1987; Arnolds 1991; Norvell 1995; Egli et al. 2006).

The GGNRA botanist apparently did not have any mycological training and admitted in her statement that she knew of no adverse effects from the mushroom gathering. But she shifted the burden of proof to the park users, saying that they had to show that their actions would have no long-range repercussions.

Only two members of the public spoke in favor of the ban. One was a photographer who argued that if a mushroom was picked somewhere then she couldn't photograph it and therefore no one should be allowed to pick a mushroom because it belonged to "everyone." The other was a spokesperson for the California Native Plant Society. He did not offer any evidence of harm resulting from mushroom gathering in the Presidio but instead read into the record the life cycle of a rust that grows on white spruce in Alaska, emphasizing how little was known about it. He argued that even a 10-year harvest study would not be enough to prove that mushroom gathering was harmless because "aspen and bamboo flower only on rare occasions."

At no time did anyone speaking in favor of the ban mention the names of the mushroom species (or other organisms) that they believed might be adversely impacted by picking, and as the hearing

progressed it became apparent that only the mushroom gatherers speaking in favor of lifting the ban knew which mushroom species occurred in the Presidio. Nevertheless, the GGNRA advisory council denied the MSSF's request to reinstate mushroom gathering with the notably vocal dissent of one Italian-American council member. The GGNRA did allow up to "one pint" (less than one California king bolete) in one section of the Presidio called Land's End, but then proceeded to cut many of the trees in that area that made conditions favorable for mushroom growth. Thus, a small, scarcely visible, and environmentally benign local tradition was curtailed by a federal agency with the strong support of a local environmental advocacy group, the California Native Plant Society.

The three cases documented here involved bureaucracies at the federal (GGNRA), state (California State Parks and Recreation), and local (EBRPD) levels, each acting independently but at the behest (at least to some degree) of conservation groups. Despite a vastly different setting, their actions recall the words of Karl Jacoby (1997):

The most striking feature of conservation was its reconceptualization of many long-standing local practices as crimes... [resulting in] a novel vision of nature: A "wilderness" shorn of local use rights in favor of management by the bureaucratic state.

But while Jacoby's victims were the rural poor of the Adirondacks, the losers in coastal California were a broad range of people, both rural and urban, middle class and of modest means, recent immigrants and long-time residents, including people who regarded themselves as environmentalists but who valued picking wild mushrooms (or berries or greens) for the dinner table.

Conclusion: The Tragedy of No Commons and the Future of Porcini Picking

For mushroom hunters in the San Francisco Bay Area and the north-central California coastal region, the widely cited "tragedy of the commons" (Hardin 1968) has become a tragedy of *no* commons. All of the various land management agencies in the area, both public agencies such as those described above and private ones such as the Nature Conservancy, imitate each other in establishing protected or "sacred" spaces with little or no consideration of previously existing informal usage rights or tradi-

tions. Many of the mushrooms are picked anyway (Sherman 2006), and the porcini crop of 2007 was by many accounts one of the largest in recent memory. But an entire generation has grown up foraging furtively in the shadows, skulkers and creepers playing hide-and-seek with authorities. In the words of Sommer and Sommer (2006):

We are here at Salt Point ... where mushroom collecting is permitted. We are legal! Legal! We didn't bring our baskets on this excursion; it has been so long since we picked legally that baskets are no longer on our trip list. Occasionally we see beautiful African wicker baskets for sale in craft shops, but there is no point in buying them in view of the scant usage they'd receive.... Illegal foraging is a downside of Northern California mushrooming. And at Salt Point, we feel like career criminals working their first honest jobs ... Only when we pick legally are we truly free. Liberty is not synonymous with anarchy but with the legal exercise of individual rights within a societal context. Coming to Salt Point reminds us of what is missing when we move about like rodents hiding in the shadows to avoid notice. It is good to celebrate freedom, not our success in evading the authorities.

Recent immigrants to California from mushroom-loving countries such as Russia, the Czech Republic, and northern Spain are often baffled by the institutional animosity toward mushroom gathering in northern California, a region that goes out of its way to celebrate its cultural diversity and tolerance for different lifestyles. In the words of one recent immigrant:

I don't understand. In Catalonia we can pick everywhere, but here the authorities are watching, we have to sneak around ...

Meanwhile, the MSSF and other amateur mushroom clubs find themselves in the awkward position of publicly encouraging people to discover wild mushrooms as a means of knowing nature while privately engaging in a great deal of "scofflaw" activity. Many mushroom hunters interviewed by the author were willing to risk being apprehended and fined in order to continue doing what they love doing (Fig. 9), but were extremely reluctant to take their children with them to look for mushrooms. In the words of one:

I don't take the kids anymore because of being hassled. I've been caught three times, and twice they were really nasty about it. I didn't want my kids to see that. Now I want to take my granddaughter with me but where am I gonna go that's legal?

The result is that mushroom hunting—an exciting, highly social family activity practiced openly in many parts of the world—has become a surreptitious, adults-only affair in the San Francisco Bay region and most of coastal California.

The environmental consequences of this “tragedy of no commons” extend beyond the future of porcini picking and deserve to be explored. Children’s direct experience and knowledge of nature, already seriously compromised by larger social and historical processes (Nabhan and Trimble 1994), is now being further stymied and eroded by a preservationist, anti-foraging model of public land use that aggressively discourages knowledge acquisition and hands-on experience of nature even when the particular activity is exciting, of low impact, and fosters enduring ties with the natural world. Any adult who has tried to take children berry *looking* instead of berry *picking* can attest to the huge difference in their response. In the words of Grainger Hunt, a raptor biologist who testified at the EBRPD hearings:

What are the consequences of raising a generation of people with no opportunity to forage? I believe that a child who grows up with the notion that nature is not to be touched soon develops a feeling of indifference, and indifference towards nature is the greatest of all threats to her.

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Literature Cited

- Abbott, C., S. Adler, and M. Post Abbott. 1997. *Planning a New West: The Columbia River Gorge National Scenic Area*. Oregon State University Press, Corvallis, Oregon.
- Agonia, H. 1990a. Letter to Mark Norton (Collecting Policies Chairman, Mycological Society of San Francisco), November 19.
- . 1990b. Letter to Mark Norton (Collecting Policies Chairman, Mycological Society of San Francisco), December 20.
- Arnolds, E. 1991. Decline of Ectomycorrhizal Fungi in Europe. *Agriculture, Ecosystems & Environment* 35:209–244.
- Arora, D. 1986. *Mushrooms Demystified*, 2nd ed. Ten Speed Press, Berkeley, California.
- . 1991. *All That the Rain Promises, and More*. Ten Speed Press, Berkeley, California.
- . 1999. The Way of the Wild Mushroom. *California Wild* 52(4):8–19.
- Bessette, A., W. Roody, and A. Bessette. 2000. *North American Boletes*. Syracuse University Press, Syracuse, New York.
- Beugelsdijk, D. C. M., S. van der Linde, G. C. Zuccarello, H. C. den Bakker, S. G. A. Draisma, and M. E. Noordeloos. 2008. A Phylogenetic Study of *Boletus* Section *Boletus* in Europe. *Persoonia* 20:1–7.
- Bojantchev, D. http://mushroomhobby.com/Gallery/Boletus/Boletus_edulis_California.jpg (24 June 2008).
- Bottini, H. 1990. Letter to Carl Chavez (Regional Director of California State Dept. of Parks and Recreation), November 29.

- Burger, K. 1992. Letter to Mark Norton (Collecting Policies Chairman, Mycological Society of San Francisco), November 17.
- Egli, S., M. Peter, C. Buser, W. Stahel, and F. Ayer. 2006. Mushroom Picking Does Not Impair Future Harvests—Results of a Long Term Study in Switzerland. *Biological Conservation* 129 (2):271–276.
- Gilles, John. 1994. Mushroomers Fight Limits on Collection. *Marin Independent Journal*, December 6.
- Goff, T. 1993. Ms. Nature, Take Another Memo to J. Muir. *Oakland Tribune*, June 18.
- Goodrich, J., C. Lawson, and V.P. Lawson. 1980. *Kashaya Pomo Plants*. Heyday Books, Berkeley, California.
- Hardin, G. 1968. The Tragedy of the Commons. *Science* 162(3859):1243–1248.
- Holquist, R. C. 1990. Fun Done for Fungi Pickers in State Parks. *Record Searchlight* (Redding, California), December 27.
- Jacoby, K. 1997. Class and Environmental History: Lessons from 'The War in the Adirondacks'. *Environmental History* 2(3): 324–342.
- Jansen, E., and H. F. van Dobben. 1987. Is Decline of *Cantharellus cibarius* in the Netherlands Due to air pollution? *Ambio* 16:211–213.
- Leonardi, M., F. Paolocci, A. Rubini, G. Simonini, and G. Pacioni. 2005. Assessment of Inter- and Intra-Specific Variability in the Main Species of *Boletus edulis* Complex by ITS Analysis. *FEMS Microbiology Letters* 243:411–416.
- McLain, R. 2008. Constructing a Wild Mushroom Panopticon: The Extension of Nation-State Control over the Forest Understory in Oregon, USA. *Economic Botany* 62(3).
- McLain, R., H. Christensen, and M. Shannon. 1998. When Amateurs Are the Experts: Amateur Mycologists and Wild Mushroom Politics in the Pacific Northwest, USA. *Society & Natural Resources* 11:615–626.
- Murdock, D. 1990. Mushroom Pickers Caught in a Pickle. *Marin Independent Journal*. December 27.
- Nabhan, G. P., and S. Trimble. 1994. *The Geography of Childhood*. Beacon Press, Boston, Massachusetts.
- Norvell, L. 1995. Loving the Chanterelle to Death? The 10 Year Chanterelle Project. *McIlvainea* 12:6–25.
- Oakland Tribune. 1993. Gather Ye Mushrooms While Ye May (editorial page). July 6.
- Oria-de-Rueda, J. A., P. Martín-Pinto, and J. Olaiola. 2008. Bolete Productivity of Cistaceous Scrublands in Northwestern Spain. *Economic Botany* 62(3).
- Pencall, S. 2006. Freedom Song—Another View. *Mycena News* 57(05):2.
- Rizzo, D. M., M. Garbelotto, and E. M. Hansen. 2005. *Phytophthora ramorum*: Integrative Research and Management of an Emerging Pathogen in California and Oregon Forests. *Annual Review of Phytopathology* 43:309–335.
- Sherman, L. 2006. The Mushroom Hunters: It's a Long Route from Forest Floor to Chez Panisse Tabletop. *San Francisco Chronicle Magazine*, April 30.
- Sitta, N., and M. Floriani. 2008. Nationalization and Globalization Trends in the Wild Mushroom Commerce of Italy with Emphasis on Porcini (*Boletus edulis* and Allied Species). *Economic Botany* 62(3).
- Smith, A. 1975. *A Field Guide to Western Mushrooms*. University of Michigan Press, Ann Arbor, Michigan.
- Sommer, B., and B. Sommer. 2006. Freedom Song. *Mycena News* 57(01):7.
- Thiers, H. 1975. *California Mushrooms: A Field Guide to the Boletes*. Hafner Press, New York.
- . 1976. Boletes of the Southwestern United States. *Mycotaxon* 3:261–273.
- Trappe, M., F. Evans, and J. Trappe. 2007. *Field Guide to North American Truffles*. Ten Speed Press, Berkeley, California.
- Wood, M., and F. Stevens. 2008. *Boletus pinophilus*. www.mycoweb.com/CAF/species/Boletus_pinophilus.html (20 June 2008).
- Yamin-Pasternak, Sveta. 2008. From Disgust to Desire: Changing Attitudes toward Beringian Mushrooms. *Economic Botany* 62(3).

Appendix: Three New Taxa of California Boletes

(David Arora and Giampaolo Simonini)

The three new taxa of boletes discussed previously in this paper are formally described below. A more detailed descriptive treatment of all seven California porcini species is in preparation.

Boletus rex-veris D. Arora & Simonini *sp. nov.*
Pileus rufus, testaceus vel suffusus ochraceus, vulgo siccus. Pagina pori juventute alba, lutescens tum olivacens vel viridulescens. Stipes crassus, juventute albus sed maturitate saepe bruneus vel ferrugineus suffusus, ad partem superam reticulatus. Contextus crassus, albus, ubi incisus immutabilis. Sporae 15–17×4.5–4.9 μm. Pileipellis trichodermium intertextum. Typus hic designatus Arora 2254 (SFSU), Pilgrim Creek Rd., McCloud, CA.

Etymology: (*rex*, king; *veris*, of the spring)

Pileus (cap) 10–30 cm broad or occasionally larger, broadly convex or bun-shaped, becoming nearly plane or uneven, usually reddish-brown but varying to tan or paler where hidden by soil or humus and often developing ochre tones in age or where exposed to sunlight, and at other times dark dull brown. Surface typically not viscid except when wet or old, glabrous except for a very fine white bloom that covers often irregular areas of the young cap. *Pore surface* and tube layer white when young, gradually becoming yellow or yellowish-buff and finally olive-yellow or greenish; pores near the pileus margin may become cinnamon-brown in areas, but the pore surface doesn't become uniformly brown or cinnamon. *Stipe* 2.5–10 cm thick and 5–20 cm long or more, typically clavate with a pointed (and often curved) base when young, becoming more or less equal in age but usually retaining a tapered or pointed base. *Stipe surface* white when young, often developing tan or more often reddish-brown tinges in age, especially in the upper portion but occasionally throughout; typically reticulate over the upper portion; reticulum fine and white when young (and sometimes barely discernible), often brown in age as the meshes become wider and coarser. *Context* white in both the cap and the stipe (or reddish-tinged

just above the tube layer), unchanging when cut, firm; odor and taste mild.

Spores olive-brown in deposit but yellowish under the microscope, ellipsoid-subfusiform with a prominent suprahilar depression, (14) 15–17 (19)×(4) 4.5–5 (5.2) μm, Q=(3.02) 3.25–3.65 (3.87), *n*=31. *Basidia* (40) 45–60 (65)×9–11.5 μm, clavate, 4-spored. *Pleurocystidia* cylindrical-fusiform, hyaline, (45) 50–65×6.5–7.5 μm. *Cheilocystidia* clavate, sometimes narrowing or with capitulum or wide-fusiform, (30) 45–70×11–17 μm. *Pileipellis* an interwoven trichodermium, often weakly gelatinized in old specimens but typically not at all gelatinized in young ones, made up of chains of cells with cylindrical end cells having sharpened or rounded tips, (20) 30–80 (128)×(6.5) 8–14 (20) μm.

Material Examined: Holotype: Arora 2254 (SFSU), collected May 20, 2000, on Pilgrim Creek Rd. under ponderosa pine (*Pinus ponderosa*) at 3,400 ft. elevation near McCloud in Siskiyou County, CA. Isotype: UC 1860313, Siskiyou County, CA. Other: Arora 2255 (SFSU), Siskiyou County, CA; Arora 8202 (SFSU), Plumas County, CA; Arora 8203 (SFSU), Plumas County, CA; Arora 8226 (SFSU), Siskiyou County, CA; Swearingen 052 (SFSU), Yuba County, CA; Swearingen 060 (SFSU), Sierra County, CA; UC 1860234, Jackson County, OR.

Habitat and Distribution: Scattered to gregarious or clustered under mountain conifers, especially ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta* subsp. *murrayana*) and fir (*Abies* spp., especially *A. concolor* [Gordon & Glend.] Hildebr.), often buried in the needle duff and soil beneath understory shrubs (e.g., bitterbrush, *Purshia tridentata* [Pursh] DC). In California it is absent at low elevations along the coast but is locally abundant in the mountains; it fruits during the spring months (April–June) at mid-elevations (3,000–4,000 ft.) in the Siskiyou, Mt. Shasta area and Sierra Nevada, and into July at higher elevations (up to 7,000 ft.); it occurs at somewhat lower elevations in the Cascades of Oregon and Washington, extending east through the Blue Mountains to Idaho and perhaps beyond, and north to British Columbia. Outside of California, it also fruits principally in the spring or

early summer, during and after the natural morel crop (*Morchella* cf. *elata* Fr.).

Boletus regineus D. Arora & Simonini *sp. nov.*

Pileus tipice juventute atrobrunneus subter tunica tenui, alba, pruinosa, pallescens vel magis cinnamomescens et viscidescens. Pagina pori juventute alba, lutescens tum viridi-flavescentes. Stipes crassus, vulgo albus, ad partem superam reticulatus. Contextus crassus, albus, ubi incisus immutabilis. Sporae 12–15 × 4–4.6 μm. Pileipellis maturitate cutis omnino gelatinosa. Typus hic designatus Arora 7202 (SFSU), Casa Madera, Gualala, CA.

Etymology: *regineus*, with the quality of a queen; queenly.

Pileus (cap) 7–30 cm broad, at first convex, then broadly convex to nearly plane; color very dark brown when fresh but often entirely or partially overlaid with a fine white bloom that gives it a paler, frosted appearance, in age the hoary patches tending to disappear and the surface often becoming paler brown or cinnamon blotched with even paler (white to pale tan) areas; surface glabrous except for the hoary patches, moist at first but typically becoming viscid in age or wet weather, sometimes uneven or with broad depressions. *Pore surface* and tube layer white when young, becoming yellow, then greenish-yellow as it matures; not blueing when bruised. *Stipe* 2.5–8 cm thick, 7–20 cm long, equal to clavate or slightly bulbous (usually more bulbous when young); surface finely reticulate over at least the upper portion, the reticulation white at first, white or brown in age; surface otherwise glabrous and white or nearly so, sometimes becoming brownish in age but more often remaining white. *Context* thick and white in both the cap and stalk (but sometimes vinaceous-tinged when young), not staining appreciably when cut or sometimes exhibiting a very slight blueing just above the tube layer; odor and taste mild.

Spores olive-brown in mass, but yellower than closely related species under the microscope, variable in shape and dimensions, long ellipsoid-fusiform, (11.5) 12–15 (17) × (3.9) 4–4.7 (5.4) μm; Q=(2.5) 2.8–3.3 (4.2), n=30. *Basidia* clavate, hyaline, mostly 4-spored, 23–40 × 8–11.5 μm. *Hymenial cystidia* thin-walled, inconspicuous. *Pileipellis* a completely gelatinized cutis when mature (and sometimes even in

youth), typically 200–250 μm thick. Cuticular cells 7–10 μm wide, variable in shape, sometimes branched or with diverticula.

Material Examined: Holotype: DA7202 (SFSU), under tanoak (*Lithocarpus densiflorus* Rehd.) and madrone (*Arbutus menziesii* Pursh), Casa Madera, Gualala, Mendocino County, CA, Nov. 27, 2007. Isotype: UC 1860314, Mendocino County, CA. Other: DA 0036 (SFSU), Santa Cruz County, CA; Arora 7155 (SFSU), Plumas County, CA; DA 9400 (SFSU), Sonoma County, CA; HDT 21316 (SFSU), Mendocino County, CA; HDT 26948 (SFSU), San Mateo County, CA; HDT 45351 (SFSU), Mendocino County, CA; HDT 45406 (SFSU), Mendocino County, CA; HDT 45406 (SFSU), Mendocino County, CA; HDT 48146 (SFSU), Yuba County, CA; Hoare (SFSU), Marin County, CA.

Habitat and Distribution: Solitary or in groups, commonly associated with hardwoods, especially tanoak (*Lithocarpus densiflorus* Rehd.), but also with madrone (*Arbutus menziesii* Pursh), golden chinquapin (*Chrysolepis chrysophylla* [Dougl. ex Hook.] Hjelmq.), manzanita (*Arctostaphylos* spp.), and oak (*Quercus* spp.); common in the coastal ranges from central California north to Oregon, and in the foothills of the Sierra Nevada, usually fruiting in the fall (October–December) and occasionally in the spring. It also occurs in the low to mid-elevations of the Cascades of Oregon and Washington in association with conifers, but is not nearly as abundant there as in the hardwood forests of California.

Boletus edulis var. ***grandedulis*** D. Arora & Simonini *var. nov.*

Similis *Boletus edulis* var. *edulis* sed interdum magnus et pagina pori maturitate brunneus vel cinnamomeus. Holotypus Arora 7188 (SFSU), Casa Madera, Gualala, CA.

Etymology: *grand*, large; *edulis*, referring to *B. edulis*.

Similar to typical (European) *B. edulis* but larger and with brown to cinnamon pore surface when mature. *Pileus* (cap) 10–50 cm broad or more, convex or bun-shaped in most stages, viscid when moist, whitish soon becoming pale brown

to brown or often deep reddish-brown as it matures, or yellow-brown in dry weather (often yellowest at margin); smooth or wrinkled. *Pore surface* whitish when young, becoming tan or slightly yellowish as it matures and then becoming distinctly brown to cinnamon or even reddish at maturity; *not* blueing when bruised but may stain slightly brownish; tube layer olive-yellow or olive when mature. *Stipe* often massive, up to 15 cm thick and 40 cm or more long, often bulbous when young, clavate to more or less equal in age; surface typically white at first, remaining white or becoming pale brown to brown in age; upper portion covered with a fine white reticulum when young, the reticulum sometimes obscure in age and at other times conspicuous and extending nearly to the base. *Context* in both the cap and stipe thick, firm, white, not staining when cut (or rarely blueing slightly just above the tube layer); odor and taste mild or pleasant.

Spores olive-brown in mass, yellower under the microscope, smooth, fusiform to subellipsoid, (12) 13–15.5 (17) X (3.8) 4–5.5 (6) μm ; Q=(2.5) 2.7–3.5 (3.9), $n=30$. *Basidia* clavate, 2-, 3-, or 4-spored. *Hymenial cystidia* inconspicuous, fusoid-ventricose. *Pileipellis* an often gelatinized trichodermium of interwoven hyphae with irregular, often diverticulate end cells 34–52 \times 6–10 μm .

Material Examined: Holotype: Arora 7188 (SFSU), with *Pinus muricata*, Casa Madera, Gualala, Mendocino County, Nov. 17, 2007. Isotype: UC 1860315, Mendocino County, CA. Other: Arora 0201 (SFSU), Mendocino County, CA; Arora 0206 (SFSU), Mendocino County, CA; Arora 6001 (SFSU), Monterey County, CA; Arora 7190 (SFSU), Mendocino County, CA; Thiers 8155 (SFSU), Mendocino County, CA; Thiers 30750 (SFSU), Sonoma County, CA; Swearingen 044 (SFSU), Monterey County, CA; Swearingen 049 (SFSU), Monterey County, CA; Swearingen 98–02 (SFSU), Tuolumne County, CA.

Habitat and Distribution: Solitary to gregarious in coastal pine forests and at their edges (especially with *Pinus muricata*, *P. radiata*, *P. attenuata* Lemmon, and *P. contorta* Dougl.), less commonly associated with live oaks (*Quercus agrifolia* Née and *Q. parvula* var. *shrevei* [C.H.Mull.] Nixon), and found at mid-to-high elevations in the Sierra Nevada with *Pinus* and *Abies* spp. Abundant in the fall and winter (and occasionally spring) from San Luis Obispo County in central California north along the coast to Mendocino County and beyond, and fruiting during the summer and fall in the Sierra Nevada and other mountain ranges.