

A NATURAL HISTORY OF BRACKEN FERN  
*Pteridium aquilinum* (L.) Kuhn

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This natural history of bracken fern is a broad overview of the plant *Pteridium aquilinum* (L.) Kuhn. This ethnobotanical work is meant to synthesize all aspects of the knowledge about bracken fern from scientists as well as various world cultures. This overview includes an examination of the common and scientific names, authors of plant names, and the names of the subspecies or varieties discussed. Some botanists agree that *P. aquilinum* is a single worldwide species but others are still reviewing this issue. The morphology, reproduction, habitat and distribution sections describe the bracken fern and reveal comparative views of the subspecies or varieties of *P. aquilinum*.

This natural history of bracken fern also includes an overview of the relationship between the plant and human activities. As a warning, the toxicity of *P. aquilinum* to animals as well as to people is discussed first. Bracken fern is utilized by many different cultures around the globe and has been used over a great period of time. This single plant has such a variety of profitable and/or dangerous aspects to it that several different research projects have been conducted. Some researchers have studied the toxicity to people and farm animals who regularly consume bracken fern. Some researchers have studied the allelopathic and beneficial effects on other plants for the purposes of determining the effectiveness of *P. aquilinum* as a mulch. Still others have researched the ability of the mature fronds to preserve

foods. There are many medicinal uses of *P. aquilinum* described in this natural history by individuals from various ethnic groups. However, western medicinal scientists need to conduct further research to validate or disprove any of these health claims. Despite the warnings of toxicity, several different cultural groups utilize *P. aquilinum* as a food source. Some research shows that when the young shoots are cooked, toxicity levels are reduced. This natural history of bracken fern includes recipes and methods of food preparation by different ethnic groups, including some outdoor enthusiasts from Indiana.

In describing the variety and apparently contradictory uses of *P. aquilinum*, it is possible to realize areas of needed research and further investigations. Some of the profitable uses of *P. aquilinum*, such as for mulch, food preservation and possible medicinal uses, could financially offset the problems caused by overgrowth in areas where animals graze. The bracken fern, well known throughout history, has made appearances in ancient mythology and famous literature. However, our modern societies have much to learn about this and other plants. Various groups of people have knowledge of only certain aspects of this plant so it is beneficial to describe the bracken fern with a wider perspective.

#### SCIENTIFIC NOMENCLATURE AND COMMON NAMES

In 1753 Linnaeus first named the bracken fern of Europe *Pteris aquilina* (McVaugh and Pyron, 1951). Linnaeus cut the stem obliquely at the base and found that the vascular bundles form a pattern resembling a spread eagle so he gave the species name of *aquilina* (Grieve, 1971). The genus name *Pteris* is derived from *pteron* which means feather. The fronds have an appearance of large feathery plumes. Kuhn renamed the plant *Pteridium aquilinum* in 1879 (Wherry, 1964). This name means eagle wing (Parsons, 1961) or eagle fern (Fischer-Rizzi, 1996).

Linnaeus is the original author of a great many plant names because he invented binomial nomenclature or the use of two names, genus and species, to identify a single kind of plant. Sometimes the name of a plant is changed to correct its

classification at the genus, species or subspecies level. Note that the classification levels of subspecies and variety are equivalent, one being used predominantly in some locations more than others. The abbreviated format of some authors' names is a legal part of the scientific name of a plant and should always be listed in this form at the beginning of a paper when it is first used. Even Linnaeus is reduced to a single letter when listed as an author of a plant name. Where there is a secondary author, this is an indication of a name change of the plant.

Some consider *P. aquilinum* to be a single worldwide species with the two subspecies or varieties *aquilinum* in the Northern Hemisphere and *caudatum* in the Southern Hemisphere (Chavez and Gill, 1999). According to the International Code of Botanical Nomenclature (Greuter *et al.*, 1994), there are no legitimate taxon names available at the rank of subspecies or variety. Bonaparte used the combination *P. aquilinum* subsp. *caudatum* (L.) Bonap. in 1915. Bonaparte used the same epithet that Sadebeck had used in his combination *P. aquilinum* var. *caudatum* (L.) Sadeb. in 1897. Each of the author names, Bonaparte and Sadebeck, is legitimate and both can be used. Other sources recognize *Pteridium caudatum* (L.) Maxon, lacy bracken, and *Pteridium aquilinum* as separate species (Lellinger, 1985). Lellinger lists three varieties of *P. aquilinum* in the United States: var. *pseudocaudatum* (Clute) Heller, tailed bracken; var. *latiusculum* (Desv.) Underwood, eastern bracken; and var. *pubescens* Underwood, western bracken. In New Zealand and Australia the Austral Bracken is considered by some to be the subspecies or variety *P. aquilinum* var. *esculentum* (G. Forst.) Kuhn. Others consider *P. esculentum* (G. Forst) Cockayne to be a distinct species (APNI, 1994; PFAF, 1999). The word *esculentum* means edible. For the purposes of this paper, I will consider *P. aquilinum* as the single world wide species and all other names listed in this paper as subspecies or varieties. The varieties of *P. aquilinum* referred to here are: *aquilinum*, *caudatum*, *pseudocaudatum*, *latiusculum*, *pubescens*, and *esculentum*.

With regard to common names there are several that are somewhat similar: bracken, brake, southern bracken (Grelen and Hughes, 1984), pasture fern (Brill, 1994), hogbrake, pasture brake, female fern (Grieve, 1971), western bracken, western brake fern (Krochmal, 1973), eastern bracken (Lellinger, 1985) and Austral bracken. Sometimes the directional portion of the name refers to its position within a state rather than the country. For example, in Tennessee, var. *latiusculum* is referred to as eastern bracken and var. *pseudocaudatum* is referred to as southern bracken (Shaver, 1954). According to Grieve (1971), in parts of England, *P. aquilinum* is called “King Charles in the Oak Tree” due to its feathery fronds. Also, in Scotland, it is referred to as “Devil’s Foot” even though it reputedly deters witches. The witches were afraid of the bracken because the Greek letter O, which is the initial of Christ, can be seen on the cross-sectional surface of the cut stem. Further, this plant is called the “Fern of God” in Ireland because the letters G, O, and D can be found in the stem when it is cut into three sections.

#### MORPHOLOGY

In general, around the world, the varieties of *P. aquilinum* are similar in appearance to one another. They are usually 0.3 to 0.9 meters (1 to 3 feet) tall but can grow to greater heights (Parsons, 1961; Brill, 1994). In Oregon, the average height is 1.8 to 2.1 meters (6 to 7 feet) tall; and in the Andes, they reach up to 4.3 meters (14 feet) tall (Parsons, 1961).

The above ground stipe is coarse, upright, and is continuous with the rhizome, which can extend for some distance. A rhizome is an underground stem with adventitious roots. The upper part of the stipe is straw colored and glabrous. The base of the stipe is dark brown with scattered hairs (Grelen and Hughes, 1984). While the blades or fronds often incline to the side and flatten out parallel to the ground, the stipe is erect (McVaugh and Pyron, 1951).

The fronds are solitary, about 0.3 to 0.6 meters (1 to 2 feet) wide, and are separated into three primary divisions (Parsons,

1961). Each of the three primary divisions is broadly triangular with opposite, finely divided segments which are tripinnately compound. The fern usually matures and dies before the first frost but the dead fronds remain standing through the winter (Grelen and Hughes, 1984). The color of a frond in spring or early summer is light green and in later summer becomes a dark, dull shade of green. In the fall, the bracken fern turns brown, but does not wither away until the following spring (Parsons, 1961).

There are many leathery oblong leaflets. The lower leaflets are cut into blunt-tipped subleaflets (Peterson, 1977). The leaflets or pinnules are deeply lobed. The terminal segments are lanceolate or oblong to linear (McVaugh and Pyron, 1951). The ultimate segment of var. *latiusculum* is pubescent while the ultimate segment of var. *pseudocaudatum* is glabrous to glabrate. Variety *pseudocaudatum* superficially resembles var. *latiusculum* but can also be distinguished by its less dissected frond and narrower segments. The longest entire segment of var. *latiusculum* is 3 to 5 times longer than broad and the longest entire segment of var. *pseudocaudatum* is 8 to 14 times longer than broad (Cranfill, 1980).

#### REGENERATION AND SEXUAL REPRODUCTION

The bracken fern's regeneration is primarily vegetative (Chavez and Gill, 1999). It spreads over extensive areas. The rhizomes are horizontal, forking, elongate, and creeping (Grelen and Hughes, 1984). The bracken fern of peninsular Florida (variety *caudatum*, lacy bracken) will grow in hammocks which are fertile, raised areas with hardwood trees. The rhizome will occasionally act as a vine and the leaves will climb up trees to a height of about 6.1 meters (twenty feet) (Small, 1931). These rhizomes are believed to be more hardy than those of any other fern (Parsons, 1961). Some living rhizomatous clones of *Pteridium* are over 1000 years old (Chavez and Gill, 1999). The black, hairy rhizomes are woody (Grelen and Hughes, 1984; Brill, 1994), fibrous, very thick, succulent (Grieve, 1971), and hardy. They store water for the plant's needs. The subterranean rhizomes

are resistant to fire as well as to most herbicides and easily produce new growth. The apex of the var. *latiusculum* rhizome is glabrate, with a few whitish hairs. The apex of the var. *pseudocaudatum* rhizome is covered with a dense tuft of brownish hairs (Cranfill, 1980).

The bracken fern also reproduces sexually via spores. Spores are minute (Grelen and Hughes, 1984) and tetrahedral (Cranfill, 1980). They are borne in sporangia which congregate in a continuous line along the undersurface margins of the pinnae (Parsons, 1961; Krochmal, 1973; Grelen and Hughes, 1984). There is an indefinite or rudimentary inner indusium which is further covered by the false indusium. The false indusium is the leaf margin rolled back over the marginal sori (McVaugh and Pyron, 1951; Radford *et al.*, 1964; Grelen and Hughes, 1984). Spore generation seems to require soil sterilized by fire (Chavez and Gill, 1999).

Whether from spores or rhizomatous regeneration, new fronds first develop as croziers or fiddleheads. The fiddlehead of a bracken looks like an eagle's claw. The curled-up tri-prong resembles an "arthritic bird's talons" (Brill, 1994). Unlike other fern species, bracken fiddleheads are covered with woolly, silver-gray or grayish-white hairs and lack scaly coverings or long hairs. Due to the vegetative regeneration from the spreading rhizomes, fiddleheads often appear in colonies (McPherson and Clark, 1977; Brill, 1994).

## HABITAT

The bracken ferns are not cultivated but inhabit relatively barren lands, mostly open pinelands with well drained sandy acidic soils (Wherry, 1964; Grelen and Hughes, 1984). They also grow in woods and old fields. In Britain, they flourish "luxuriantly on heaths and moors" (Grieve, 1971). Some people in Britain try to transplant large clumps of dormant rhizomes in the early spring by removing them from the moors and placing them in their gardens. If successful, the bracken fronds serve as a screen in the wild sections of the garden; however, they are often killed by spring

frosts (Grieve, 1971). Despite the problems with transplanting or cultivation, bracken is considered robust since it is capable of prevailing against the domineering roots of grass (Radford *et al.*, 1964; Brill, 1994). These ferns can be found on dry hillsides in sterile soil or on wooded mountain slopes. They can even be found in damp, shaded ravines (Shaver, 1954). They are mostly confined to acid soils and so are abundant in limestone regions (McVaugh and Pyron, 1951). They are mostly absent from plains areas (Foster and Duke, 1990) and the bluegrass areas of Kentucky (Cranfill, 1980). According to Brill (1994), "Most ferns can't tolerate pollution, poor soil, or disturbed habitats, but bracken encroaches on grassy areas next to highways and parking lots."

#### DISTRIBUTION

Bracken fern grows throughout the world, occurring almost everywhere with the exception of hot or cold deserts. In fact it may be the single most widespread vascular plant in the world (Chavez and Gill, 1999).

Within North America, *P. aquilinum* occurs in every U.S. State, Canadian Province and Mexican State (Chavez and Gill, 1999). It occurs from Siberia south to Australia, east to Japan and China, and west to Europe (Brill, 1994). Some variety of *P. aquilinum* grows from Argentina to Alaska and Newfoundland, as well as South Africa and New Zealand to Sweden (Shaver, 1954). Variety *caudatum*, lacy bracken, was originally discovered in the West Indies. It was later discovered in the Keys of Florida in the earlier half of the eighteenth century (Small, 1931).

#### USES

Bracken fern has many uses as food, medicine, and a variety of other things. Several sources give recipes and medicinal formulas as well as step-by-step processes for making dyes or baskets. Much scientific research has been done and continues

with regard to *Pteridium* and forestry, chemistry, agriculture, horticulture, and pest control.

### Toxicity

There is almost as much negative economic value to bracken fern as there is positive economic value (Cranfill, 1980). Some financial losses are due to the fatal poisoning of cattle, sheep, swine and horses. The effects are cumulative so that a cow has to eat an amount equal to its body weight over a period of several months in order to be fatal (Chavez and Gill, 1999). The toxic compounds can even be passed through the milk of cows (Lewis and Elvin-Lewis, 1977; Munro, 1993). The animals can safely graze bracken if done in moderation and over a long period of time. However, horses are more sensitive to the toxins than cattle (Grelen and Hughes, 1984). The primary problem with *P. aquilinum* is the toxicity of the enzyme thiaminase which breaks down thiamin in the blood. Eventually, the body of the consumer would be depleted of vitamin B<sub>1</sub> (Grelen and Hughes, 1984; Brill, 1994). Other toxins in *P. aquilinum* include ptaquiloside, prunasin, and aquilide A (Munro, 1993). Munro lists the general symptoms of poisoning for cattle, horses, sheep, swine, and humans. The general symptoms of poisoning for cattle include: anemia, bone marrow damage, cancer and tumors, hemorrhage and death. The general symptoms of poisoning for horses include: anemia, anorexia, ataxia, colic, convulsions, staggering, incoordination, opisthotonos, recumbency, weight loss, and death. The general symptom of poisoning for sheep is blindness. The general symptoms of poisoning for swine include loss of appetite and death. The general symptoms of poisoning for humans include cancer and tumors. The carcinogenic compound Ptaquiloside is particularly abundant in fiddleheads. If the fronds are not processed in any way before consumption, the incidence of tumors in rats is 78%; but the percentage is reduced to 4-25% when the fronds are boiled in water alone or with wood ash, sodium bicarbonate, or salt (Munro, 1993). However, green and dried bracken has been used by Europeans in the past as fodder for



cattle, horses, sheep, and swine. In Hampshire, England, the fiddleheads are boiled and fed to pigs in order to develop a particular flavor in Hampshire bacon (Grieve, 1971).

#### Asia and Asians in the United States - (Edible Uses)

Despite its toxicity, many human cultures have a prominent place for bracken in their diets, particularly Asian populations. The Japanese and Koreans include bracken fern fiddleheads in their traditional menus. Scientists point to an over-consumption of the fiddleheads as the cause of a high rate of stomach cancer (Munro, 1993; Chavez and Gill, 1999). Some people will have an immediate adverse reaction of the gastrointestinal system. However, there is little danger in eating reasonable quantities of wild fiddleheads during the short growing season (Brill, 1994).

The young shoot or fiddlehead can be eaten raw as in a salad but cooking is recommended to reduce the enzyme thiaminase (Peterson, 1977). In Japan, the shoots are specially treated prior to cooking.

The tender shoots are first washed carefully in fresh water, then plunged into boiling water for two minutes or so, and then immersed again in cold water for a couple of hours. After this preparation they may be used for cooking, either being prepared as a purée, like spinach, or like asparagus heads, being served with melted butter or some similar sauce (Grieve, 1971).

According to Chavez and Gill (1999), many Asian-Americans will often visit the National Forests in search of bracken fiddleheads. For about a six week period beginning in April, people travel great distances to visit the Arrowhead Ranger District of the San Bernardino National Forest in California for

gathering in the wild. In 1981, the Forest Service determined that bracken was more a forest product than a recreational activity and so began selling permits to gather. There is a \$20.00 permit fee to gather up to 18.2 kilograms (40 pounds). Although gathering bracken is very popular among Asian-Americans, only a minimal amount is ever picked for sale. Many of those interviewed by Chavez and Gill stated that they do not even purchase fern harvested by others. The majority of pickers are middle and older generations and a greater proportion are women. Some of the young men said that they would not eat the bracken fern because they believed it would cause impotency. Many of those interviewed remarked that the activity in the mountains reminded them of home. Perhaps this is the simplest reason for the popularity of fiddlehead picking for many of them.

There seems to be no religious significance associated with the bracken among Koreans; however, fiddleheads are often used for major holidays such as Hard Moon Festival (Aug. 15), Bigger Moon Festival (harvest festival in late fall), New Year's Day (Jan. 1) and Chinese New Year. Many simply utilize the ferns in their daily diets. Quite a few confess that the significance of meaning is in the sharing of their family heritage with younger members of the family (Chavez and Gill, 1999).

Bracken ferns are among the "mountain vegetables" eaten by vegetarian Buddhist monks. They believe that every mountain is inhabited by a god which must be served. Before a monk can eat or drink in the god's territory, he must first scatter a small portion of his food and drink on the ground in a gesture of thankfulness (Chavez and Gill, 1999). Native Americans also have this custom of food offerings to "the Great Spirit."

#### North America - (Edible and Medicinal Uses)

In North America, Native American Indians have a long history of using ferns in their diet, and among them is *P. aquilinum*. Although the U.S. Forest Service rates this fern a low-use plant for deer (Grelen and Hughes, 1984), H.H. Smith, as

quoted by Weiner (1972) reported the use of the fern by American Indian men who were hunting deer.

Hunters are very careful to live wholly upon this when stalking does in the Spring. The doe feeds upon the fronds and the hunter does also, so that his breath does not betray his presence. He claims to be able to approach within 20 feet without disturbing the deer, from which distance he can easily make a fatal shot with his bow and arrow.

Most Native American and Canadian First Nations tribes have utilized young thick stalks as raw or cooked vegetables. After the bases and curled tops have been removed, the stalks should be "...boiled in salted water for 30 to 60 minutes or until tender" (Weiner, 1972). According to Weiner, members of the Menominee tribe would boil the fiddleheads in soups as a thickener. While the shoot can be flavorless or bitter, the rhizomes contain a sweet saccharine substance (PFAF, 1999). The sweet rhizomes can be dried and pulverized for use in making bread. "The white center was baked in hot embers until it became soft and doughy. This pulp was then eaten or stored for future use." (Weiner, 1972). The rhizomes are rich with white starch (60%) and can be eaten raw or cooked. When dried, it can be stored for years (PFAF, 1999).

American Indians also used and still use *P. aquilinum* for medicinal purposes. Foster and Duke (1990) report in A Field Guide to Medicinal Plants that American Indians have used root tea for the following: "...stomach cramps, diarrhea, smoke for headaches; poulticed root for burns and sores, caked breasts; wash to promote hair growth; astringent, tonic. Historically, root tea was used for worms." Krochmal's (1973) field guide to medicinal plants adds that an infusion of the plant was used to expel intestinal

worms as well as to treat diarrhea. It was also used to increase urine flow. Another source listed this fern as a treatment for cancer, tuberculosis, and arthritis. For arthritis, the leaves were used in a steam bath. For rheumatism, a wine tincture of the root was used. A poultice made from the frond was used to treat sores and help bind broken bones (PFAF, 1999).

Kate Debeau, Mohawk, has used *P. aquilinum*, with four other herbs for prolapsus of the uterus and for old men who cannot retain urine. Chauncy Johnny-John, Seneca/Cayuga, has used it in a recipe for rheumatism, weak blood, and liver problems. Peter Hops, Mohawk, includes this fern in his recipe for consumption. Jonas and Josephine Snow, Seneca, explain:

Makes good blood after mensus.  
Also used after baby is born by the  
mother. For TB in women, too.  
Wash, pound 1 handful, boil in  
water, and drink (Herrick, 1995).

Members of the Menominee tribe make a decoction of the root and give it to new mothers for caked breast. Then a dog whisker is used to pierce the teat. The Eastern Algonkians have used the fronds as a bed to strengthen the backs of babies and old people. The Ojibwa have used the smoke from dried leaves on burning coals to relieve a headache. The Yana heat the roots, pound them, form a poultice, then apply it to burns. The Costanoan people make a decoction with the root and apply it to the scalp to promote hair growth (ARS, 1999). The Delaware have used bracken for a diuretic and the Ojibwa have used it for stomach cramps in women (Vogel, 1970). “While some of the ferns in the aboriginal materia medica have been used in white medicine, none became official drugs” (Vogel, 1970).

*Pteridium aquilinum* has been used in witch craft. Jim Davis, Cayuga, places two ingredients, including one from the morning glory family, together into a small coffin. The broken fern rhizome is carved into the shape of a person and placed into

the coffin. Nails are then used to pierce the doll and thereby affect the victim. Davis says that the victim will die in ten days (Herrick, 1995). An anonymous informant of Herrick stated that *P. aquilinum* has been used by people who make thunder and lightning (Herrick, 1995).

*Pteridium aquilinum* has also been used for edible and/or medicinal uses in North America by people other than Native American Indians and people of Asian descent. McPherson and Clark (1977), authors of a book about wild food plants of Indiana, describe their culinary experiences with bracken fern. The shoot is asparagus-like and can be prepared in any way that asparagus is prepared.

One early May day while camping in southern Indiana we feasted on fiddleheads found along a small stream in Hoosier National Forest. We chose young fiddleheads not more than six to eight inches high, breaking them off as low as they remained tender and washing off the woolly hairs. Since wild leeks were equally abundant, we put fiddleheads and washed leeks in a skillet with heated oil and sautéed them uncovered for 10 minutes, then added just enough water to steam and a vegetable bouillon cube, and covered them with a lid until they were tender. The vegetables were served over brown rice and topped with sunflower seeds and cheese cubes. It was a feast to remember. Camp meals are certainly enhanced by the addition of fresh, wild foods. Many people eat fiddleheads raw as

a nibble but we prefer them cooked.  
Any recipe for asparagus may be adapted for fiddleheads.

Fiddleheads in wine sauce are delicious served over whole wheat spaghetti. To prepare the sauce, melt 1/3 cup butter in a heavy skillet. Add 1 cup sliced mushrooms and sauté until soft. Over low heat blend in 3 tablespoons flour and cook for 2-4 minutes. Slowly add 2 cups milk and stir with a wooden spoon or wire whisk until the sauce begins to thicken. Add 1/2 cup red wine and 1 1/2 cups steamed fiddleheads. Continue cooking the sauce until it is creamy and thick. The sauce is equally good served over rice or whole wheat toast.

#### Other Countries - (Edible and Medicinal Uses)

The Austral bracken, *P. aquilinum* var. *esculentum*, is a popular food item in New Zealand (Grieve, 1971). In New Zealand and Australia, the aborigines have used the rhizomes and young shoots for food, despite their toxicity (Brill, 1994). From Dr. Thompson's "Story of New Zealand," Parsons (1961) quotes a chant that young women recite as they place baskets of cooked fern-root in front of travelers.

What shall be our food? Shall shellfish and fern-root? That's the root of the earth; that is the food to satisfy a man; the tongues grow by reason of the licking, as if it were the tongue of a dog.

In Siberia and Norway, fiddleheads are combined with about two thirds of their weight of malt in order to brew a beer. In some of the Canary islands, the rhizome is ground to a powder and mixed with a small amount of barley meal and used as a food called *goflo*. It is noted that this food is used by inhabitants that are extremely impoverished (Grieve, 1971).

Ancient Europeans also made use of this fern medicinally. Fronds and stems were used in diet-drinks. Smoke from burning bracken should be wafted near the legs for pain caused by sciatica (Grieve, 1971). Mrs. M. Grieve quotes Culpepper:

The roots being bruised and boiled in mead and honeyed water, and drunk kills both the broad and long worms in the body, and abates the swelling and hardness of the spleen. The leaves eaten, purge the belly and expel choleric and waterish humours that trouble the stomach. The roots bruised and boiled in oil or hog's grease make a very profitable ointment to heal the wounds or pricks gotten in the flesh. The powder of them used in foul ulcers causes their speedier healing (Grieve, 1971).

#### Other Uses

Bracken fern is also used for dyes, basket making, potash for glass making, soap, a very durable thatch, mulch, and as bedding for animals and campers (Grieve, 1971; Chavez and Gill, 1999). For dyes, the young shoots produce colors between yellows and greens; while the roots produce oranges to yellows (Mabey *et al.*, 1988). The colorful tannins are leached out of the plant when boiled (Brill, 1994). The astringent properties of the rhizome are

useful in the “dressing and preparation of kid and chamois leather” (Grieve, 1971). Perhaps the yellow dye from the bracken makes the leather a deeper shade of yellow or orange. The rhizome can also be used to make a glue. The pounded rhizome with the bark removed can be split into flat bands and used in basketry (PFAF, 1999).

Potash for glass making is obtained from the ashes of bracken that has been burned. The ashes have a high alkalinity and in Europe were used in abundance for glass making before the introduction of soda from sea salt and other sources (Grieve, 1971). There is enough potash in the ashes to be used as a kind of soap as well.

The ashes are mixed with water and formed into balls; these made hot in the fire are used to make lye for the scouring of linen (Grieve, 1971).

Grieve also mentions that the waxy fruit of Chinese tallow can be boiled with the bracken ash in order to make a soap. The level of potash in the stem and leaves is variable according to the seasons. Green bracken can be harvested between June and October.

In the month of June, the fronds and stems hold as much as 20 per cent of potash, but in August that amount is reduced to 5 per cent, a large proportion having been given back to the rhizome or soil (Grieve, 1971).

Grieve then states that the yield of potash is about 1 ton per 50 tons of dried fern. The potash is very soluble and so should be kept dry until needed for use.

The fronds are useful as a bedding for animals for various reasons. “Folk wisdom says that evil spirits flee from fern—especially those with many legs who torture people and animals”



(Fischer-Rizzi, 1996). The evil spirits referred to here are fleas. Mrs. M. Grieve (1971) quotes Culpepper:

Fern, being burned, the smoke  
thereof drives away serpents, gnats,  
and other noisome creatures, which  
in fenny countries do, in the night-  
time, trouble and molest people lying  
in their beds with their faces  
uncovered.

Perhaps further research could prove bracken fern to be another useful source along with citronella as an insect repelling incense for outdoor activities. Another form of bedding used in pre-modern Europe was floor litter for farm animals overwintering indoors. The mixing and trampling of manure with the fern fronds primed them for use as compost and fertilizer (Taylor and Thomson, 1998). The potash from burned leaves is a particularly important fertilizer for land on which potatoes and sugar-beets are grown, "...especially for light loams and gravels and sandy soils" (Grieve, 1971).

Past uses of bracken fern are now being reviewed, modified and adapted for present day application. It could possibly be used as the base for a peat substitute in horticulture (Taylor and Thomson, 1998). The potash from bracken fern that is useful for glass making is also useful for making mulch (Fischer-Rizzi, 1996). Some benefits to mulching with dead bracken fronds are water conservation and weed control. Recent studies have been done in Australia (var. *esculentum*) to measure the "...effects of bracken fronds on the germination and growth of a representative range of plants" (Taylor and Thomson, 1998). The growth of some plants is stimulated by the presence of bracken mulch, perhaps due to the release of mineral nutrients into the soil. The seedlings studied that had a statistically significant (8 - 20%) positive growth effect were white mustard (*Sinapis alba* L.), white clover (*Trifolium repens* L.), perennial ryegrass (*Lolium perenne*

L.), and brown barrel (*Eucalyptus fastigata* Deane and Maiden). On the other hand, there was a 25% reduction in the germination of yellow teatree (*Leptospermum polygalifolium* Salisb.). It is thought that the release of active phytochemicals indirectly affects the yellow teatree by allelopathically retarding the growth and establishment of the mycorrhizae associated with it. Further studies on various plants would help determine the potential application of mature green bracken fronds as agricultural herbicides due to the higher concentration of toxic compounds. After composting, the frond litter would become uniform and non-toxic. In this form, it would be an ideal mulch product (Taylor and Thomson, 1998). Fischer-Rizzi (1996) states:

For this purpose, cover the soil between the [potato] plants with Fern fronds and put Fern leaves into the hole before planting. Placed beneath strawberries [sic] plants, Fern will prevent the fruit from rotting too soon. Also, fruits and vegetables keep longer on storage shelves spread with Fern leaves—as will hard and soft cheeses wrapped in Fern leaves.

Many ferns are strongly antiseptic and so have preserving properties. *Pteridium aquilinum* has even been used as a preservative for wine. “The root of Ferne cast into an hogshead of wine keepeth it from souring” (Grieve, 1971). More research is needed in this area to determine the marketability of this non-toxic method of food preservation. Fischer-Rizzi (1996) quotes Dr. Ferdinand Müller who described in an 1874 herbal his own observations and research in regards to the use of fern fronds for this purpose.

On our last visit to London we observed that fruit offered for sale, especially the more valuable varieties, was packed in Fern leaves. Initially we paid little attention to this fact, thinking that this was done because of a lack of wine leaves. However, a friend and famous botanist L. pointed out to us that Fern leaves possess the quality to keep substances of animal or plant origin surrounded by them fresh for a longer time period and preserve them from rotting. This we noted on the Isle of Man where fresh herrings were packed in Fern leaves for shipping. Later we performed our own experiment: In a storage pit, we surrounded half of the potatoes with straw and the remaining half with fern leaves. By spring most of the former were rotten while the latter were perfectly preserved.

#### MYTHS, LEGENDS, AND NAMESAKES

The usefulness and widespread distribution of bracken fern makes it a prime candidate for inclusion in myths and legends. “It was once widely believed that burning the bracken would frighten away witches and trigger rain” (Cranfill, 1980). Fields of bracken were set ablaze in the seventeenth century in an effort to cause rainfall. This custom has continued into the twentieth century on the Devonshire moors (Grieve, 1971). As with all other ferns, the gathering and possession of spores on St. John’s Eve would render the bearer invisible at the moment of St. John’s birth (Grieve, 1971; Brill, 1994). It was also claimed that the bracken could bestow “perpetual youth” (Grieve, 1971).

Many English towns and villages were named after the “fearn of the early Saxons,” such as Fearnhow, Farnhow, and Farningham (Parsons, 1961). Ferns also made appearances in literature. Shakespeare used “fern-seed,” most likely from bracken, in his stories. The character Gadshill from 1 Henry IV used “fern-seed” so he could “walk invisible” (Grieve, 1971; Cranfill, 1980). Bracken was mentioned by name in “Lady of the Lake,” in the song of the heir of Armandave as quoted by Parsons (1961):

The heath this night must be my bed,  
The Bracken curtain for my head.

One can easily imagine bracken ferns towering over someone’s head as he or she lies on the ground, which is also covered with heather. Bracken is also environmentally valuable as a protective covering or shelter for wildlife (Grieve, 1971). Bracken fern can reach rather tall heights; and in fact, the primary reason for cutting bracken in forest husbandry is to prevent them from “shading out” tree seedlings (Taylor and Thomson, 1998).

## DISCUSSION

Bracken fern (*P. aquilinum*) is the subject of current research all over the world for its negative as well as positive effects. For more information regarding current research contact the International Bracken Group (IBG, 1999). This plant seems quite paradoxical. The very qualities that make it hazardous also make it beneficial and vice versa. Its phytochemicals and mineral content can enhance or retard germination and growth of other plant species. Some say it tastes good and some say it is bland, but too much of it can be fatally toxic. Research shows that it can cause stomach cancer and yet some Native American Indians have used it to cure cancer. The very plant that may cause gastrointestinal discomfort could also cure a stomach ache. It has been said that the toxins can pass through cow’s milk and yet people have used it with new mothers for problems related to

caked breasts. Old men have used it for incontinence while young men have shied away from it for fear of impotence. The claim that the fern wards off witches seems strange since a person who could attain invisibility from the spores might also be referred to as a witch. Whatever the truth is about bracken fern, it warrants our attention for possible uses. Any positive aspect of bracken that could make it marketable could possibly more than offset any negative aspects. Since it can not easily be eradicated, perhaps it should be more heavily utilized.

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