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Chaga and Himematsutake

Lesser Known Medicinal Mushrooms

By

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While the Asian mushrooms of Shiitake, Maitake and Reishi have captured headlines with their immune enhancing properties, a number of medicinal fungi from areas lesser known for medicinal mushrooms, Russia and Brazil, are heralded for equally remarkable properties. **Chaga**, from the northern climes of Russia, and **Himematsutake**, from the tropics of Brazil, have both gained fine reputations for their beneficial effects on health.

doctor to guide him in a folkloric treatment renowned in that area for cancer, that of Chaga or the 'Birch mushroom', found on birch trees. He regales fellow patients about the legendary herb, and of a country doctor who had noticed 'there was no cancer among the peasants who came to him.' Having observed them to drink much brewed Chaga, the doctor pondered whether it might be what "had cured the Russian peasants of cancer for centuries without their even knowing it." Solzhenitsyn's own cure which he regarded as miraculous, took place in Tashkent, where he underwent radiation and evidently Chaga therapy.(3)

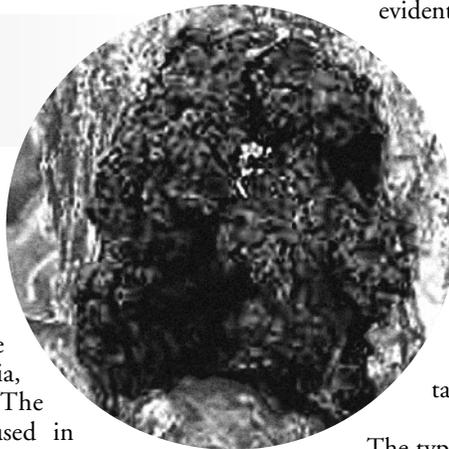
CHAGA

Inonotus Obliquus

Chaga has long been collected for its medicinal properties, especially in the Northern 'Taiga' forests of Russia. Stories of its healing repute originates from the indigenous peoples of Siberia, the Baltic, and Finland. The fruiting bodies have been used in Eastern Europe and Russia as a folk medicine since the 17th century, for cancer and gastrointestinal diseases.

Although Chaga's renown in Russia for cancer is rooted in folklore, it was validated by the Medical Academy of Science in Moscow when in 1955, it recommended and approved Chaga for public use in the treatment of cancer.(1) An alcohol extract of Chaga, *Bifungen*, has been manufactured in Russia since the 1950's as an official anticancer preparation.(2)

Awareness of Chaga in the West was triggered greatly by a literary novel reference "The Cancer Ward" written in 1968 by the Russian writer Solzhenitsyn. The protagonist, much like Solzhenitsyn, is released from prison camp only to be diagnosed with cancer. While in a clinic undergoing radiation, he seeks a



ORIGINS OF USE

Folklore of a northwestern Russian province tells of a fungus on birch trees, revered for a variety of cancers. Many peasants forewent other beverages for a steady intake of tea made from Chaga. It was also taken as a liquor.

The types of cancers Russians traditionally utilized Chaga for, include inoperable breast cancer, lip, gastric, parotid gland, pulmonary, stomach, skin, rectal cancer, and Hodgkin's disease.(4). For cancer, the tea was taken until clear improvement. Likewise, contemporary Russian clinicians have concluded that the use of Chaga for cancer requires long term use of at least one year.(5)

Other Russian uses are as a tonic, blood purifier, and pain reliever, as well as for tuberculosis, stomachache, ulcers, gastritis, heart or liver disease, worms, and as an internal and external cleanser, called 'soap water'. Colonics of Chaga decoction are used to treat the lower bowel. (6,7)

The Russian extract of Chaga, *Bifungen*, has been well reputed for fifty years in the treatment of stomach and intestinal disorders. (8)

In prehistorical times, it was also one of the 'tinder conks', its cork-like interior able to kindle and hold an ember, enabling early peoples to transport their fire-making ability throughout long migrations. In 1991, a close species of Chaga, *P. Betulinus*, or **Birch Polypore**, was found on the remains of the 'Ice Man', well preserved in the frozen Alps since his death over 5,300 years ago. Clearly crucial to him on his journey, it is theorized he carried them as tinder for starting fires, and medicine to treat his arrow wounds and intestinal pathogens, a use substantiated by laboratory studies which found them active against numerous bacteria and viruses.(9)

HABITAT

Siberian Chaga, *Inonotus Obliquus*, is a polypore mushroom that grows in cold, northern regions of the Boreal forests of Western Siberia, Poland, Scandinavia, and North America, including Alaska. Although it grows on the trunks of alder, beech and birch trees, for medicinal purposes, only the fruiting bodies on birch are considered suitable, giving it the common name of '**Birch mushroom**'.

Other common names, **Clinker Polypore**, or **Cinder conk**, lend a tone reflecting its appearance; a hard, dark, charred, cracked and gnarled surface with a tumor like shape, lodged in the trunks of birches. Its interior reveals a yellow-brown cork like consistency, striated with cream colored veins.

Chaga is traditionally wildcrafted, a search that requires walking long distances through dense forest as the fruits occur very sparsely; only one conk is found in more than a thousand birches (10). Once found, the mushroom is harvested from ten to thirty feet up the trunk. A prized Chaga may be 25 years old, attain lengths of 4 to 5 feet (11), and weigh upwards of ten pounds. The development of production methods has made the use of Chaga more accessible. Today, Kan MycoHerb water/alcohol extracts of Chaga are produced from the live mycelial body and grown on an organic rice substrate.

RESEARCH

Researchers, Wasser and Weis (1999a), indexed the medicinal properties of the higher Basidiomycetes mushrooms, among them, *Inonotus Obliquus*, listing it with the properties of anti-inflammatory, antitumor, immunomodulating, and hepatoprotective.(12)

Cancer, Anti-tumor

The direction of scientific research on Chaga has generally been to investigate its extensive folkloric claims, especially those for cancer. Alcohol extracts of Chaga were studied by a number of Russian and Polish researchers, including the 1954 study by Gatty Kostyal et al, who documented promising antitumor activity.

The most comprehensive Chaga studies are by Kirsti Kahlos, a pharmacognocyst at the University of Helsinki. Kahlos and other researchers, have found antitumor effects of several extracts and isolated compounds in tumor cell systems and in animal assays.

Kahlos found a wide variety of active Triterpenes, the most active being Inotodiol, which have antitumor properties.(13) Oxygenated Triterpenes, especially Inotodiol, of Chaga showed antitumor activity on a specific mammary adenocarcinoma in vitro and in vivo in mice.(14) Another Triterpene, Obliquol, has also been theorized to be responsible for the antitumor activity.

The compound, Betulin, actually a compound in the host birch tree, has been found to have anticancer properties. Chaga absorbs, concentrates, and transforms the betulin into an ingestible form. The anticancer properties of betulin or betulinic acid are now being studied for use as a chemotherapeutic agent.

A 1996 Polish study, using a water extract of Chaga on malignant human cervical uteri cells in vitro, concluded it inhibited their growth, via a decrease of the cell proteins, disturbing mitosis by elevating the number of mitotic cells in metaphase (15).

Immune Stimulating

Mushrooms of the family *Polyporaceae*, the woody conks which include Chaga, show the most promise for antiviral activity, the active compounds being found in both the mycelium and fruiting bodies.

Research has found that Chaga, like most medicinal mushrooms, such as Shiitake and Maitake, is rich in active immune stimulating polysaccharides and, in 1996, Kahlos found preliminary evidence of antiviral activity against influenza viruses.(16) A Japanese study found that water soluble lignins of high molecular weight, isolated from *Inonotus Obliquus*, Chaga, inhibited protease of HIV type 1.(17) However, Chaga did not test as active in vitro against Staphylococcus aureus and E. coli.(18)

HUMAN STUDIES

Although anecdotal and folkloric stories of recovery from illness using Chaga abound, the amount of human clinical studies fall far behind, and are well worth developing. However, a Polish study of 48 patients with third and fourth stage malignancies, primarily women with cancer of the breast or genital organs, is impressive. Injections of Chaga, using cobalt salts, was found to be the most effective administration. Ten of the 48 experienced reduced tumor size, pain level, and hemorrhaging, while their sleep, appetite, and sense of progress improved. (19)

PREPARATIONS

Regarding proper preparation of Chaga, folklore and scientific research outcomes agree; it must be heated or decocted. Infusion, or steeping, and unboiled extracts, are not sufficient methods. Concurring with the Russian peasants' tradition to make a tea by boiling the grated fungus in water, research found antitumor activity only in Chaga prepared this way. Boiling evidently activates the antitumor properties.(20) Russian studies indicate alcoholic extracts may also be effective. Kan Herb Company's proprietary water/alcohol extraction method involves simmering the herb/liquid mixture at boiling temperature for a sufficient period of time.

TRADITIONAL CHINESE MEDICINE

Chaga may be used according to TCM theory as well, in which it is considered to possess a sweet flavor, smooth the Qi, strengthen Mind and Shen, and remove harmful Wind.(21)

HIMEMATSUTAKE

Agaricus Brasiliensis

Forty years ago, the medicinal properties of **Himematsutake** were known only to inhabitants of a small village in Brazil, who experienced unusually good health. In the decades since discovery, research has confirmed its health potential, as an immunomodulator, and possessing anti-tumor activity. Although it is found in the Southeastern United States, it flourishes prolifically in South America.

ORIGINS OF USE

The origins of *Agaricus Brasiliensis*, formerly known as *Agaricus Blazei*, named Himematsutake and Kawariharatake in Japan, can be traced to a small mountain town of Piedade, near Sao Paulo, Brazil. Himematsutake thrives in the sultry, humid climate of this area, where daytime temperatures reach the mid nineties, dropping to the sixties and seventies at night, with an average humidity of 80% due to daily tropical rains. The residents of the region have long savored Himematsutake as a part of their diet, honoring it with names such as the "mushroom of God", "sun mushroom" and "mushroom of life", and attributing it for their low incidence of cancer, and great longevity.

DISCOVERY AND RESEARCH

In 1965, a Brazilian farmer of Japanese descent, Takahisa Furumoto, noticed an aromatic, tasty mushroom growing in the mountains beside Piedade that appeared to be of the *Agaricus* family. Wondering if he had found a new species, he sent spores of the mushroom to the Iwade Research Institute of Mycology, in Japan, where it was noted the mushroom was longer and thicker than other *Agaricus*, of which there are about 30 species including the common button mushroom. Iwade sent a sample to Belgian taxonomist Heinemann for assessment, who declared it a new species of *Agaricus*, naming it *Agaricus Blazei* Murrill, after an American mycologist, Murrill, who had found it on a lawn in Gainesville, Florida.

Iwade also took on the lengthy process of attempting to grow the mushroom in his laboratory, not an easy task due to its unique requirements. Whereas most mushrooms prefer shady, damp environments, *Agaricus Brasiliensis* thrives in the hot, humid

climate of its native Brazil, growing only in the summer months, dying if temperatures drop too low.

A group of American researchers led by Dr. W.J. Cinden, of Pennsylvania State University, began their own research into the unknown *Agaricus*, having come to Piedade to investigate the exceptionally low rate of adult diseases, and remarkable longevity there. They noted the unusual mushroom was an integral part of the local peoples diet, reporting their findings to the scientific community in 1965.(22)

Today *A. Brasiliensis* is cultivated in Japan, Korea, Denmark, Holland, Brazil, and the United States, often on sugarcane bagasse, or organic grain substrate.

RESEARCH

A report presented at the general convention of the Japanese Cancer Association in 1980, triggered clinical interest in the mushroom. (23) It documented pharmacological research with animal models that indicated Himematsutake contains an immune modulating polysaccharide of the Beta-D-glucan series with antitumor effects greater than those of other medicinal mushrooms including maitake, shiitake, and reishi.

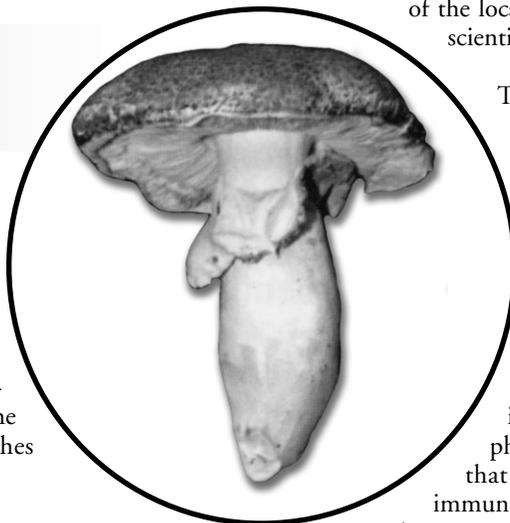
In subsequent research studies, a number of immune enhancing, anticancer and antitumor fractions were isolated from *A. Brasiliensis*. Beta glucan polysaccharides are theorized by some to mimic bacterium, tricking the immune system into vigilance. Their immune enhancing and tumor retarding effects are remarkable. They activate various immune effector cells, such as macrophages, NK and T-cells, to attack tumor cells, and also potentiate the activities of various immune mediators, including lymphokines, and interleukin 1 and interleukin 2. These immune mediators are important components of white blood cells that regulate the immune system.

The beta glucan of *A. Brasiliensis* has a lower molecular weight than other mushrooms, making it more easily absorbable, therefore more effective. Himematsutake also contains a high percentage of protein, carbohydrates, and digestive enzymes including amylase, trypsin, and protease.

Immune-Enhancing

Dr. Ghoneum, a prominent researcher from the UCLA Medical Center addressed the Ninth World Immunology Congress in 1995 with his findings that *A. Brasiliensis* increases the total number of all immune cells within the body, and also makes individual NK cells more powerful. (24)

A study on *A. Brasiliensis* for its potential, as a prophylactic for patients at risk of contracting serious bacterial peritonitis, was published in April, 2006 in the medical periodical, "Shock". Bacterial septicemia is increasingly a life threatening condition following gastroenterological surgery, due to bacteria lingering in hospitals developing multiresistance against antibiotics. Mice were



treated orally with *A. Brasiliensis* extract, or a control substance, one day before induction of peritonitis with various concentrations of fecal contamination. The state of septicemia was measured by the number of colony forming units of bacteria in the blood. Mice treated with *A. Brasiliensis* extract before bacterial challenge showed significantly lower levels of septicemia, and higher survival rates. (25)

Anti-Tumor

Himematsutake is especially advantageous against tumor cells. In 1995, at the Technical Discussion Group for Fungi, held in Japan, Dr. Mizuno, who had studied *A. Brasiliensis* for many years, discussed a beta glucan he isolated, as the first case of an antitumor compound found in an edible mushroom. (26)

In 1999 a group of researchers from Japan conducted an experiment monitoring the effects of injecting Himematsutake into the tumors of lab mice. The researchers noticed a marked inhibition of the tumors. One of the components they extracted, a polysaccharide complex with low molecular weight called Alpha-1, 4-Glucan-Beta, 6-Glucan, was found to have the strongest antitumor effect, able to selectively kill tumor cells without affecting normal cells. Not only was the tumor injected inhibited, but other tumors were as well, leading to the conclusion that this mushroom stimulates the migration of white blood cells that scavenge and kill malignant cells. (27)

A fundamental step in the transition of tumors from a dormant to a malignant state is the process of angiogenesis, the growth of new blood vessels from preexisting vessels. The first report of antiangiogenic activity due to a certain compound isolated from *A. Brasiliensis*, ergosterol, was reported in *The Journal of Nutrition*, in 2001. The study at Ehime University, Japan, found tumor growth was hindered by oral administration of a lipid extraction of *A. Brasiliensis* in sarcoma 180 bearing mice. The antitumor substance isolated via chromatography was identified as ergosterol. It significantly reduced tumor growth at doses of 400 and 800 mg/kg when given for 20 days. Most promising, the mice did not show a decrease in their body weight or that of adipose tissue, the thymus, or spleen, nor a decrease in leukocyte numbers; all usually induced by chemotherapy drugs. Through further analysis, the antitumor effect of ergosterol was noted to inhibit neovascularization, and thereby angiogenesis induced by solid tumors. (28)

Anti-Cancer

The Japan Cancer Association has stated that *A. Brasiliensis* is effective against Ehrlich's ascites carcinoma, sigmoid colon cancer, ovarian cancer, breast cancer, and lung cancer. (29)

Research by the National Cancer Center Laboratory and Tokyo College of Pharmacy shows that Himematsutake produced a high anticancer effect, as well as complete recovery, in an animal model.

The study consisted of vaccinating Guinea pigs with cancer cells (sarcoma 180), a process which typically causes cancer to spread to the entire body within four to five weeks, and is usually fatal. This was countered by the subsequent administration of Himematsutake for 10 consecutive days. Four to five weeks later the animals were assessed. Remarkably, 90% of the Guinea pigs experienced a

complete recovery, and 99.4% a significant anticancer effect. Researchers concluded that Himematsutake polysaccharide extract activates the immunity of normal biological tissue. It activates macrophage and interferon production to prevent the multiplication, metastasis and reoccurrence of cancer cells. (30)

However, two studies at the Instituto de Biologia, Brazil, found varying levels of its protective effect against liver toxicity and carcinoma, depending on when in the progression of disease the *A. Brasiliensis* was given. A 2002 study found treatment with the mushroom prior to exposure to hepatotoxin, DEN, exerted a hepatoprotective effect on both conditions, whereas a 2003 study by the same research team found no protective effect, when *A. Brasiliensis* treatment was begun two weeks after injection of DEN. (31)

Findings of a human study at the Catholic University of Korea, on the benefit of *A. Brasiliensis* in use with women undergoing chemotherapy for gynecological cancer was published in the *International Journal of Gynecological Cancer*, in 2004. One hundred women, diagnosed with cervical, ovarian, or endometrial cancer, were treated with carboplatin plus etoposide, or taxol, every 3 weeks for at least three cycles, with or without the consumption of *A. Brasiliensis*. The NK cell activity was 'significantly higher' in the *A. Brasiliensis* treated group, as compared to placebo. Quality of life signs improved, such as appetites, general weakness, alopecia lessened, and greater emotional stability was noted. (32)

Meanwhile, anecdotal stories abound, both in Brazil, Japan, and in the U.S. Santa Cruz Acupuncturist, Chikurin Takai, tells a healing story of Himematsutake, which she says is very popular in Japan. Her aunt was diagnosed fifteen years ago with lymphoma; so bleak was her prognosis that family was already making arrangements should she pass on. After not responding to a physician prescribed medication, she turned to Himematsutake, from which she consistently, daily simmered a tea of the whole fruiting body. Fifteen years later she still carries on this daily health ritual.

OTHER BENEFITS

Cardiovascular: In addition to its anticancer effect through the induction of cytokines, including interferon and interleukin, Himematsutake is known to reduce blood pressure, lower cholesterol, and aid in reversing the effects of arteriosclerosis.

Autoimmune: Individuals with Autoimmune conditions such as rheumatoid arthritis, diabetes, lupus, or atopic dermatitis, experience benefits from the healing benefits of Himematsutake. (33)

Alopecia: It was recently discovered that Himematsutake forms tyrosinase, the enzyme which is used by the human body to synthesize the protein melanin, which could bring aid to those who suffer from alopecia. Melanin, the substance that gives color to the skin, is also an essential constituent of semen and hair.

The Traditional Chinese Medicine energetics for Himematsutake are that it is neutral in temperature, and with a mildly sweet taste.

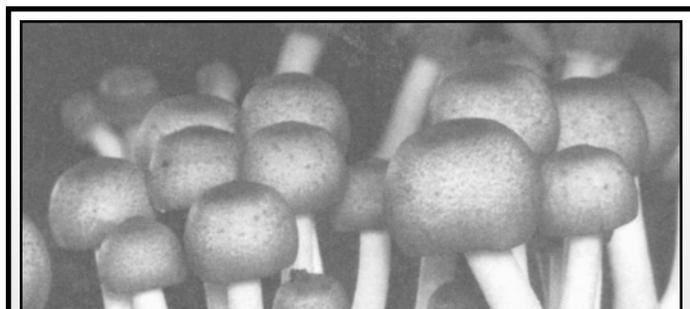
CURRENT STUDIES

The historical reputation of medicinal fungi for cancer therapy has to a great degree, inspired the direction of mushroom research; the focused search for chemotherapy agents. A number of quality projects are currently underway, including one sponsored by the American Cancer Society on the potential anticancer properties of a vast array of North American mushrooms collected from the wild. Headed up by natural products chemist, Dr. Oberlies, the study is being conducted at the Research Triangle Institute (RTI) International in Raleigh, the same lab that isolated the active compound of the bark of the Pacific yew tree, leading to the development of the chemotherapeutic agent, Taxol. Preliminary studies found approximately 3 percent of 600 mushrooms tested had the ability to kill cancer cells. The study made headlines in November, 2003, when the research team commented on their findings of more than 1,300 mushroom extracts they had tested in one year alone.

Dr. Oberlies is intrigued by how mushrooms protect themselves from animals in nature, theorizing they “*might produce chemical compounds that have some sort of advantage. In the case of mushrooms, nature has spent thousands of years evolving chemical defenses. As pharmacognosists, we search for unique, bioactive chemicals in nature - ones that humans haven't thought of - to improve the human condition*”. (34,35)

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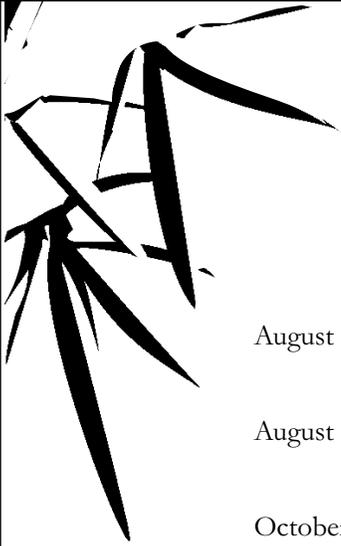
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