

A Book Review: *The Fungal Pharmacy: Medicinal Mushrooms of Western Canada* (Robert Rogers, 2006, Prairie Deva Press, Edmonton Alberta, 234 pp., \$39.95 CDN)

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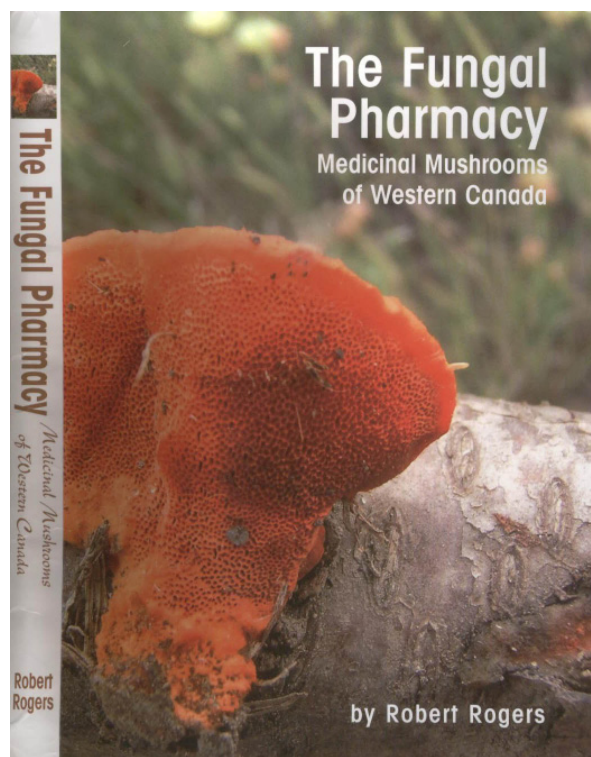
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Medicinal mushrooms have an established history of use in traditional oriental therapies. Contemporary research has validated and documented much of the ancient knowledge. Over the last three decades, the interdisciplinary field of science that studies medicinal mushrooms has sprung up and has increasingly demonstrated the potent and unique properties of compounds extracted from a range of species. Currently, the field is being developed into a very fruitful area. Modern clinical practice in Japan, China, Korea, and other Asian countries rely on mushroom-derived preparations.

Ancient oriental medicine has stressed the importance of several mushroom species, mostly *Ganoderma lucidum* (W. Curt.: Fr.) P. Karst. (Ling Zhi or Reishi) and *Lentinus edodes* (Berk.) Singer (Shiitake). For instance, Ling Zhi was valued for both its medicinal and spiritual properties. It was considered a symbol of happy augury and good fortune, good health, longevity, and even life with the immortals. Many preparations from Ling Zhi have helped thousands of patients throughout the centuries.

Mushrooms have also played an important role as a cure for ailments affecting the rural populations of Russia and other Slavic European countries. The most important species used with these rural populations were *Inonotus obliquus* (Pers.: Fr.) Pilat (Chaga), *Fomitopsis officinalis* (Vill.: Fr.) Bond. et Singer, and *Fomes fomentarius* Fr.: Fr. These species were used in the treatment of gastrointestinal disorders, various forms of cancers, bronchial asthma, night sweats, etc. There is also a long history of the traditional use of mushrooms as curatives in Mesoamerica (especially species of the genus *Psilocybe*).

Meanwhile, mushrooms comprise an extremely abundant and diverse world of fungi. The number of mushroom species on Earth is currently estimated at 140,000; yet, perhaps only 10% (approximately 14,000 named species) are known to science. Mushrooms are being evaluated for their nutritional value and acceptability as well as for their pharmacological properties. They make up a vast and yet largely untapped source of powerful new pharmaceutical products. In particular, and most importantly for



modern medicine, mushrooms present an unlimited source of polysaccharides and polysaccharide–protein complexes with anticancer and immunostimulating properties. Many, if not all, Basidiomycetes mushrooms contain biologically active polysaccharides in their fruit bodies, cultured mycelia, and cultured broth. The data on mushroom polysaccharides today include 660 species and intraspecific taxa from 182 genera of higher Hetero- and Homobasidiomycetes.

Recently studied medicinal actions of mushrooms include antitumor, immunomodulating, antioxidant, radical scavenging, cardiovascular, antihypercholesterolemia, antiviral, antibacterial, antiparasitic, hepatoprotective, and antidiabetic effects.

Over the last 15 years, different general books on medicinal mushrooms have been published.^{1–8} I am only familiar with one book that was published on medicinal mushrooms from a specific region: *Icones of Medicinal Fungi from China*.⁹

It is my pleasure to review *The Fungal Pharmacy: Medicinal Mushrooms of Western Canada*, written by Robert Rogers. This book is unique in that it contains general information on medicinal mushrooms but is based only on medicinal mushroom species diversity information existing in Western Canada. The author has over 35 years of experience as a medicinal herbalist.

The Fungal Pharmacy begins with a short historical perspective on how mushrooms have been used through time and culture, from ancient Greece and Rome to the Far East and beyond. R. Rogers mainly describes medicinal mushrooms of Western Canada, but many of the species discussed are found throughout the boreal forests of North America, Europe, and Asia. He has researched the unique properties of various fungi used in ancient times in these parts of the world and incorporated their contributions into the text.

The Fungal Pharmacy explores the diverse uses of mushrooms, ranging from those that inspire musical compositions to those that have application in biological fuel cells; medical research of fungi exhibiting *in vivo* and *in vitro* activity on bacteria, viruses, and pathogenic fungi is extensive and includes a number of both edible and poisonous species with potential for present and future research; myco-remediation that could help reduce toxic materials

presently related to disposal facilities, help decontamination and minimize road and farm runoff, create buffer zones, reduce agricultural waste, reduce pollution in watersheds, reduce forest fire potential, and clean up contaminated pathogenic bacteria such as *Escherichia coli*. The author pays special attention to the use of fungi to clean up the contamination produced by the Athabasca Tar Sands in northern Alberta, one of the largest petroleum deposits in the world.

The book delves into mythology as well as medicine. The chapter on *Amanita muscaria*, for example, is filled with Celtic, Egyptian, and First Nation mythology to inspire the imagination and is guaranteed to surprise the reader with medicinal uses for various neuromuscular and psychosomatic conditions.

Many unusual species, including *Boschniakia rossica*, *Collybia maculata*, *Cortinarius* spp., *Echinodontium tinctorium*, *Haploporus odorus*, *Hydnum repandum*, *Leccinum* spp., *Mycena* spp., *Phallus impudicus*, *Pholiota* spp., *Plectania nigrella*, *Polyporus tuberaster*, *Rozites caperata*, *Tricholoma magnivelare*, and a wide variety of *Russula* species, are mentioned. *Leccinum boreale* (Northern Rough Stem, or Red Cap), according to the author, should soon be the official provincial mushroom of Alberta, which is the first jurisdiction in Canada to honor a member of the kingdom in this manner.

The author's main interest is the polypores. This is evidenced throughout the book by the inclusion of extensive chapters on *Fomes fomentarius* (Amadou or German Tinder), *Fomitopsis officinalis* (Quinine Conk or Agarikon), *F. pinicola* (Red Belted Conk), *Ganoderma applanatum* (Artist's Conk), *G. tsugae* (Varnished Conk), *Inonotus obliquus* (Chaga), *Lenzites betulina* (White Gilled Polypore), and *Piptoporus betulinus* (Razor Strop or Birch Conk). The author lives on the edge of the boreal forest and mentions that millions of tons of these medicinal conks are available for harvest from public lands. He explains that the northern part of Canada has a number of economically marginalized communities that could benefit from cooperative collection and extraction of these medicinal mushrooms.

R. Roger's appreciation of the people of the First Nations' medicine shows through his numerous descriptions of traditional uses of fungi. Chaga, for

example, is crumbled for divination by the Dene First Nation people of Saskatchewan. Two long piles of tinder that represent two related events are laid out end-to-end and ignited at opposite sides. Whichever pile burns through first determines which activity takes place first. He mentions that Chaga is the True Tinder Conk because it needs no preparation as a fire starter.

The author supplies two recipes for Chaga—one from Russia and the other from a Cree healer from the Flying Dust First Nation. Both accounts include a slow decoction and fermentation to extract valuable sugars using water and heat. Currently, an 8:1 extract is produced commercially in the region for medicinal formulations.

Fomes fomentarius, or False Tinder Conk, is prepared by cutting it into strips, soaking it in saltpeter, and then drying. He mentions the long-time use by the Cree of Alberta who call the polypore, *waskaskwitoy*. The hoof-shaped conk is dried and hollowed out, and then packed with hot embers and repacked. This can be transported for several days, and upon reaching the destination, the *waskaskwitoy* can be fanned into flame. They also threw the conks onto nighttime fires. The glow and smolder kept wild animals at bay, and a morning fire could easily be started. The dry powder was also sprinkled on frostbite.

R. Rogers mentions that the conk has cosmetic use—in the repair of aging skin related to sun exposure and for rough, irritated skin. Several other polypores mentioned for skin, fragrance, and cosmetic application include *Fomitopsis officinalis*, *F. pinicola*, *Ganoderma tsugae*, *Hydnellum suaveolens*, *Hypsizygus ulmarius*, *Lactarius helvus*, *Lentinula edodes*, *Lentinus cochleatus*, *Trametes versicolor*, *Ceratocystis populina*, and *Tremella* species.

In the chapter on *Haploporus odorus* (the Diamond Willow Fungus), the author describes work of Dr. R. Blanchette on artifacts from the Glenbow Museum in Calgary. The fungus was carved into tennis ball shapes and worn around the neck, or on robes and blankets of First Nations people. The bracket polypore is closely related to *Trametes suaveolens* and has an anise/coumarin odor when burned. This special incense of the Cree and other native tribes of Western Canada is smudged or smoldered to guard and protect against unseen forces, for blessings, and during cleansing and empower-

ment ceremonies. The author shares his own personal experience and mentions the brightening effect of the smoke on dream states.

In the chapter on *Phellinus igniarius* (the False Tinder Polypore), the author mentions that First Nation adults in the Yukon and Alaska combined the burned ash of this polypore with chewing or smoking tobacco. Science now reveals that this method makes nicotine delivery to the brain rapid and powerful. Clinical studies on various medicinal applications of this polypore include the work of many authors.

A number of user-friendly charts at the back of the book list medicinal properties of various mushrooms, including antiviral, anticancer, and antibacterial activity, and immune function. The charts also summarize species that show laboratory and clinical application for various diseases, including diabetes, hypertension, hepatitis, and autoimmune conditions.

Several medicinal mushrooms given less attention in other publications are covered in *The Fungal Pharmacy*. *Bjerkandera fumosa* (the Smoky Polypore), for example, has been used in traditional Chinese medicine for uterine cancer. The stimulating effect of *B. fumosa* on both interleukin-1 and interleukin-8 (proinflammatory cytokines) has been found in both the mycelium and fruiting body, but no influence has been found on interleukin-2. Studies by various authors suggest that the *Bjerkandera* species can help degrade anthracene, benzopyrene, phenanthrene, herbicides, and styrene, as well as daunomycin, produced by industrial processes, and nonylphenol, an endocrine disruptor.

Cryptoporus volvatus, the Concealed Polypore, reveals constituents with anticancer activity, as well as inhibition of leukotriene B₄, which is related to the reduction of inflammation in asthma and related respiratory conditions.

Crucibulum leave (the Yellow Bird's Nest) is found as far north as the Arctic Circle in Canada. A fermentation broth of *Crucibulum* species yields a range of compounds that possess aldose reductase, a compound that might aid eye health and the possible prevention of glaucoma and cataract formation.

Under *Phallus impudicus* (Stinkhorn), the author devotes a small section to the related *Dictyophora* genus. He mentions one Hawaiian species that grows on hot lava flows for 1 to 4 hours. It emits a strong

odor rich in sex pheromones that can be perceived by the human olfactory system 30 feet away. The compound is identical to or closely mimics a compound produced in females during the sexual arousal stage, but is millions of times stronger, triggering a spontaneous, intense orgasm in women. As one can imagine, the market potential is huge, and research is ongoing.

The *Laccaria bicolor* (two-colored *Laccaria*) is often found in pine forests. The author reports on the relationship of the fungi to white pine. Springtails are one of the most plentiful insects on the planet, numbering up to 100,000 per cubic meter of soil. The mushroom exudes a toxin that paralyzes them and, like the *Cordyceps*, grows inside them while still alive. The mushroom trades the nitrogen to the tree for carbon to synthesize enzymes. In an isotope study, fully one quarter of the nitrogen in the pine needles originated from the springtails. *Laccaria* are the most frequently found ectomycorrhizal genus associated with pine and poplar in the reclamation of the Athabasca Tar Sands, suggesting a means of promoting the regrowth of forests through inoculation.

The Fungal Pharmacy is a valuable resource to mycologists, researchers, oncologists, environmentalists, ecologists, wild-crafters, scientists, and anyone else interested in medicinal mushrooms. From folklore to modern scientific analysis, *The Fungal Pharmacy* presents inspiration and hope for increasing the health and well-being of humans and other inhabitants of our planet.

The Fungal Pharmacy is a short encyclopedic review of the species biodiversity of medicinal mushrooms of Western Canada. The importance of the book is not limited to Western Canada; it is also

useful for all of North America. The general information contained in this book is useful to all those interested in medicinal mushrooms. In this book, the reader can find information on the medicinal properties of approximately 300 species. I would strongly recommend this unique book without hesitation to medical mycologists, botanists, plant pathologists, professionals, and amateurs. I am using this book extensively in teaching mycology, especially medicinal mushrooms, to university students.

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