

Dr WALTER ARDIGÒ

HEALING WITH MEDICINAL MUSHROOMS

A practical handbook

*Agaricus - Auricularia - Coprinus Cordyceps -
Ganoderma - Grifola - Hericium Lentinus - Pleurotus
- Polyporus*

Take care of yourself

Edited by

Solomon P. Wasser & Paul A. Volz

N.B.

The scientific knowledge presented in this book was taken from prestigious research papers published in international scientific journals. The objective of the book, therefore, is simply to provide information; it is not intended to replace diagnosis and treatment, tasks which pertain to a doctor.

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A practical handbook

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To my daughters Francesca and Susanna
And my parents-in-law Ester and Giuseppe

*Let no doctor say this sickness is incurable.
He denies God our Creator,
he denies nature
with her abundance of hidden powers,
he depreciates the great
arcana of nature and the mysteries of creation...
there is no disease so great
that He has not provided its cure.*

PARACELSUS (16th century A.D.)

CONTENTS

Foreword by Solomon P. Wasser & Paul A. Volz	7
INTRODUCTION	15
PART A Practical mycotherapy	21
Chap 1: From its origins to the present day	22
Chap 2: A treasure trove of invaluable substances	24
Chap 3: Certified remedies with no side effects	28
Chap 4: Also together with conventional medicine	32
Chap 5: An expert is better	36
PART B	
Holistic Functional Medicine	41
Chap 6: The body is a set of apparatuses and communicating functions	42
Chap 7: From function to dysfunction: how health is damaged	53
Chap 8: Pseudo-health	61
Chap 9: The progression from dysfunction to illness	66
PART C	
Preventing and treating disease with mycotherapy	73
Chap 10: Healing mushrooms are the basis of prevention	74
Chap 11: How to decide on treatment	83
Chap 12: The "successful protocols" - (how to combine mushrooms)	90
Chap 13: The infallible diet (fruit, vegetables, legumes and oilseeds)	111
PART D	
The diseases of the four apparatuses and the four powers of healing mushrooms	117
Chap 14: Immune system disease: <i>Lentinus, Ganoderma and Agaricus</i>	118

Chap 15: Diseases of the digestive system and metabolism: <i>Hericium, Auricularia, Grifola</i> and <i>Coprinus</i>	143
Chap 16: Diseases of the cleansing apparatuses: <i>Polyporus, Pleurotus, Cordyceps</i> and <i>Ganoderma</i>	164
Chap 17: Diseases of the energy apparatuses (muscles, mind, heart, hormones and structure): <i>Cordyceps, Agaricus, Ganoderma</i> and <i>Auricularia</i>	202
PART E	
Information on each of the 10 healing mushrooms	247
<i>Agaricus (Agaricus brasiliensis)</i>	249
<i>Auricularia (Auricularia auriculae-judae)</i>	259
<i>Coprinus (Coprinus comatus)</i>	276
<i>Cordyceps (Cordyceps sinensis)</i>	282
<i>Ganoderma (Ganoderma lucidum)</i>	295
<i>Grifola (Grifola frondosa)</i>	313
<i>Hericium (Hericium erinaceus)</i>	321
<i>Lentinus (Lentinus edodes)</i>	329
<i>Pleurotus (Pleurotus ostreatus)</i>	337
<i>Polyporus (Polyporus umbellatus)</i>	346
PART F	
Appendices	355
Short Dictionary	356
Bibliography	362
Index of diseases and problems	381
Index of the 18 successful protocols	388
Index of pictures of mushrooms	388

Foreword

Medicinal mushrooms have an established history of use in traditional ancient therapies. Contemporary research has validated and documented much of the ancient knowledge. The interdisciplinary field of science that studies medicinal mushrooms has been developed and for the last three decades continues to demonstrate potent and unique properties of compounds extracted from a range of mushroom species. Modern clinical practice in Japan, China, Korea, Russia, the USA, France, and several other countries rely on mushroom-derived preparations.

Ancient oriental traditions have stressed the importance of several mushroom species, namely, Ling Zhi or *Ganoderma* mushroom (*Ganoderma lucidum* (W. Curt.: Fr.) P. Karst.) and *Lentinus* mushroom (*Lentinus edodes* (Berk.) Singer). Mushrooms have also played an important role in the treatment of ailments affecting rural populations of Eastern European countries. The most important species in these countries were *Inonotus obliquus* (Pers.: Fr.) Pilát (Chaga), *Fomitopsis officinalis* (Vill.: Fr.) Bond. et Singer (Wood Conk or Agaricon), *Piptoporus betulinus* (Bull.:Fr.) P.Karst. (Birch Polypore), and *Fomes fomentarius* Fr.: Fr (Tinder Bracket). 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 traditional use of mushrooms as curatives in Mesoamerica (especially for species of the genus *Psilocybe*), in Africa (Yoruba populations in Nigeria and Benin), Algeria, and Egypt. A very special role was found in Fly Agaric (*Amanita muscaria* (L.:Fr.) Pers.) in Siberia and Tibetan shamanism, Buddhism, and Celtic myths.

Mushrooms and fungi in general are extremely abundant and diverse worldwide. Recent estimates of the number of fungi on Earth range from 500,000 to more than 5 million species, with a widely accepted number of around 1.5 million published more than 20 years ago. To date, it is recommended that as many as 3 million species of fungi should be accepted for general application. Meanwhile, the total number of described fungi of all kinds is currently 110,000 species. The figure is based on the total number of species added to each genus given in the last edition of the Dictionary of Fungi and other recent publications. Mushrooms constitute 16,000 species of this total amount. The number of mushroom species on Earth is currently estimated at 150,000-160,000, so only around 10%

of the existing mushroom species are known to science. Summarizing these data, we can assume that, currently, approximately 2% of world fungal biota and around 10% of world mushroom biodiversity were discovered by mycologists, thus the bulk of fungal biodiversity still remains unknown.

Specialists in the taxonomy of some groups of medicinal mushrooms are familiar with “known” species, but some of their biochemical and pharmacological properties are still unknown. We have summarized the data on approximately 700 mushroom species with pharmacological properties from 2,000 known safe species. It can be seen that there is great potential for uncovering medicinal mushroom diversity.

Nowadays, medicinal mushrooms are used as: a) dietary food (world mushroom production was 33 million tons in 2015); b) dietary supplement (DS) products (the market of medicinal mushroom DS products is rapidly growing and comprises a value of more than 20 billion US dollars per year); c) natural biocontrol agents in plant protection demonstrating insecticidal, fungicidal, bactericidal, herbicidal, nematocidal, and antiphytoviral activities; d) cosmeceuticals – different compounds of medicinal mushrooms are used by cosmetic companies for their film-forming capability, activation of epidermal growth factor, antioxidative, antiallergic, antibacterial and anti-inflammatory activities, stimulation of collagen activity, inhibition of autoimmune vitiligo, and treating acne, and e) a new class of drugs called “mushroom pharmaceuticals”. Medicinal mushrooms are comparable to “medicinal plants” and can be defined as macroscopic fungi, mostly higher Basidiomycetes and some Ascomycetes, which are used in the form of extracts or powder for prevention, alleviation or healing multiple diseases, and/or in balancing a healthy diet. According to the definition of “herbal drugs”, dried fruit bodies, mycelia, or spores are considered “mushroom drugs” or “fungal drugs”. Analogous to “phytopharmaceuticals” or “herbal preparations”, the resulting mushroom preparations should be considered as “mushroom pharmaceuticals” or “mushroom preparations”.

Particularly, and most importantly for modern medicine, are polysaccharides with antitumor and immunostimulating properties. Several of the mushroom polysaccharide compounds have successfully completed Phase I, II, and III clinical trials and are used extensively and successfully in Asia to treat various cancers and other diseases. There are a total of more than 200 medicinal func-

tions produced by medicinal mushrooms and fungi. Recently studied medicinal actions of mushrooms included antitumor, immunomodulating, antioxidant, radical scavenging, cardiovascular, cholesterol-lowering, antiviral, antibacterial, anti-parasitic, antifungal, detoxicative, hepatoprotective, anti-diabetic, anti-obesity, neuroprotective, neuroregenerative, and some other effects as well. Also, substances derived from medicinal mushrooms can be used as painkillers and analgesics. The best implementation of medicinal mushrooms drugs and medicinal mushroom dietary supplements has been in preventing immune disorders and maintaining a good quality of life, especially in immunodeficient and immunodepressed patients, patients under chemotherapy or radiotherapy, patients with different types of cancers, chronic blood-borne viral infections of Hepatitis B, C, and D, different types of anemia, the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), Herpes simplex virus (HSV), chronic fatigue syndrome, Epstein Bar virus, patients with chronic gastritis and gastric ulcers caused by *Helicobacter pylori*, and people suffering from dementia (especially Alzheimer's disease). Very important studies are conducted in anti-tumor and immunomodulating actions of polysaccharides like B-glucan. It is important to note that B-glucans directly affect many kinds of immune cells and different types of chemical messengers, including increases in antibodies, interferons, interleukins, TNF, colony stimulating factors production, and the activation of macrophages, monocytes, neutrophils, NK cells, dendritic cells, T-cells, B-cells, and many other immune cells. Anticancer therapies using MMs have been effectively applied effectively in the prevention of oncogenesis by oral consumption; in direct antitumor activity; immunopotential activity in conjunction with chemotherapy, and in prevention against tumor metastasis.

Dr. Walter Ardigò's book, "Healing with medicinal mushrooms. A practical handbook", is the first book in Europe published in English by an Italian scientist and medical doctor. In all of Europe only four books were published in the last 25 years dedicated to medicinal mushrooms. Another book in Italian of the same author is "I 4 poteri del *Ganoderma* e della Micoterapia". Professor J. Lelley wrote "Kompendium der Mykotherapie" in German. Czech authors wrote "Houby jako lek", M. Stajic wrote "Nutritivna svojstva I medicinski potential macromiceta" in the Serbian language. The structure of the book of W. Ardigò is clear and compact. It contains an Introduction and the main body of the book is divided in 5 main parts, plus a short dictionary, bibliography, and indexes.

It is important to point out that this book has been prepared not by a mycologist, as with previously published European books, but by a medical doctor which helps in the understanding of the holistic approach to medicine using medicinal mushrooms and combines eastern (especially traditional Chinese medicine) and western medicine, as well as conventional and alternative medicine. Part A, "Practical mycotherapy", contains 5 chapters dedicated to general knowledge including historical information on using medicinal mushrooms from ancient times to the present time; similarities and differences of mycotherapy and herbal medicine; chemical composition and active ingredients of medicinal mushrooms useful to promote health; how to use medicinal mushrooms, dosages of different types of medicinal mushroom preparations, and possible side effects; how to combine treatment using medicinal mushrooms and conventional medicine; the last chapter of Part A is dedicated to the importance of consulting with an expert in mycotherapy before using medicinal mushroom products.

Part B is dedicated to "Holistic functional medicine" and contains 4 chapters, describing the four functions needed for normal functionality of our body including immunity, digestion, cleansing, and production of energy. Medicinal mushrooms are important biological response modifiers (BRM). BRMs are defined as non-specific agents that modify the host's biological response by stimulation of the immune system. An important concept here is found in the words «non-specific». Medicinal mushrooms act through many pathways, and their action is very holistic; it affects many physiological systems at the same time. When Chinese medicine claims that *Ganoderma* mushrooms activate «chi or ki», energy, they mean about the same thing. It is not only the immune system, or just the heart, or liver - medicinal mushrooms activate heart and liver, blood, brain, etc. - at the same time.

Part C, "Preventing and treating disease with mycotherapy", contains 4 chapters dedicated to informing readers on the impact of medicinal mushrooms on an individual's general health, the impact of medicinal mushrooms on different health conditions including strengthening the immune system, detoxification effects, improving mental and physical conditions, improving sleep, etc. For overall general health, the author gives a list of medicinal mushroom species that are recommended in the prevention and treatment of specific health conditions. In part C a very important chapter, "The successful protocols" gives information on how to combine mushrooms dedicated to the prevention of different types of

illnesses (approximately 200 illnesses or their combinations are listed). The end of part C is dedicated to the importance of correctly combining mushrooms together with healthy dried fruits, vegetables, legumes, and oilseeds for more effective results. Parts D and E represent the core of the book. Part D, "The diseases of the four apparatuses and the four powers of healing mushrooms", contains four chapters describing immune system diseases, diseases of the digestive system, metabolism, cleansing apparatuses, of the energy apparatuses (muscles, mind, heart, hormones and structure) and lists helpful medicinal mushrooms *Lentinus edodes*, *Ganoderma lucidum*, *Agaricus brasiliensis*, *Hericium erinaceus*, *Auricularia auricular-judae*, *Grifola frondosa*, *Coprinus comatus*, *Cordyceps sinensis*, *Pleurotus ostreatus*, and *Polyporus umbellatus* used for promoting different health conditions (approx. 200). Part E: "Information on each of the 10 healing mushrooms". In a unified form the author describes the medicinal values of the 10 most powerful medicinal mushrooms: *Agaricus brasiliensis*, *Auricularia auricular-judae*, *Coprinus comatus*, *Cordyceps sinensis*, *Hericium erinaceus*, *Grifola frondosa*, *Pleurotus ostreatus*, *Polyporus umbellatus*, *Ganoderma lucidum*, and *Lentinus edodes*. For each mushroom the author describes historical information, strong points, active ingredients, and health values for treatment of various diseases. For example, for *Agaricus brasiliensis*, the author describes diseases related to the immune system and to inflammation including diseases from pathogens (influenza, flu-like syndromes, sore throat, bronchitis, pneumonia, cystitis and recurrent cystitis, vaginal *Candida*, cold sores, and genital herpes), allergic diseases (allergic rhinitis, urticarial, atopic dermatitis, and asthma) and autoimmune diseases (Hashimoto's thyroiditis, Graves' disease, and Sjogren's syndrome), metabolic diseases including diabetes, liver disease (high transaminase, hepatitis A, B, and C, and liver toxicity), skin problems, and diseases (homogeneous suntan, protection from solar and artificial UVA rays, acne, atopic and allergic dermatitis, inflammatory dermatitis, eczema, reaction to cosmetics, and wrinkles), and other conditions also. We are sure that the current book by Dr. Walter Ardigò "Healing with medicinal mushrooms. A practical handbook" will be of interest to medical doctors and specialists in alternative medicine, mycologists, taxonomists, biotechnologists, mushroom producers, researchers, environmentalists, ecologists, wild-crafters, scientists, and anyone else interested in medicinal mushrooms. From folklore to modern scientific analysis, this book presents inspiration and hope for advancing the health and well-being of humans and all other inhabitants of our planet. We recommend this book not only to the specialists but also to everyone who is eager

to learn more about the intriguing world of medicinal mushrooms. This book will help to build the bridge between western and eastern medicine in the field of medicinal mushroom science in the 21st century.

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INTRODUCTION

Take care of yourself

We are perhaps not fully aware of the wonders of our bodies, of good health, that precious gift that we waste in a thousand ways. We are not even aware of the wonders of the world around us. For example, few people know that medicinal mushrooms are powerful guardians which protect health and are great allies in treating disease. This source of health for mankind can be used daily, just like vegetables, fruit, shoots and legumes.

This book takes you on a journey of discovery to find out about healing mushrooms and their extraordinary powers. It is extremely useful to be aware of their efficacy because they always produce a noticeable improvement in any situation. They maintain and improve health, are unbeatable in preventing health problems and can treat illness, from the most minor ailments to the most serious diseases.

Over the next few pages you can discover the simple story of medicinal mushrooms and their prodigious results. Step by step, almost imperceptibly, a framework for a new vision of medicine – integrated and modern - is outlined. The body appears in a new way its functions, how it falls ill and the way in which, with the help of healing mushrooms, it heads for recovery. All systems and organs, like soloists in an orchestra, reveal their individual functions, but also how they are connected with the rest of the body. Solo and ensemble work, individual work and teamwork are the two fundamental factors affecting health and disease. Just as an orchestra's performance depends on its soloists but also on all the musicians, and unity creates strength, so it is in the body. In fact, no organ or system exists in its own right: they all work together. In this model, which I have called "Holistic functional medicine" each organ is studied and treated both as regards its individual function and in relation to the functions of the rest of the body.

Mycotherapy fits in very well with this holistic functional approach, because it strengthens both individual functions and those of the whole organism. Indeed, from this point of view, medicinal mushrooms acquire a more precise identity and their use becomes more simple and intuitive. These ideas largely stem from traditional Chinese medicine (TCM), the knowledge of which, over the years,

has illuminated my work and stimulated my research. It has taught me that the body is one whole integrated system and that it works thanks to the energy it has available. In TCM, wholeness and function are not just theories, but form the basis of all reasoning about health and illness and are concretely reflected in treatment. Wholeness and function, in a simple, systematic and scientifically-based model, are essential for the progress of medicine, because they explain health, disease and treatment in a unified, not fragmented, way. This alone, however, is obviously not enough, because what counts is the result of treatment with medicinal mushrooms.

This book, which is an easy reference guide, summarizes in a simple way the results that can be achieved with healing mushroom remedies for more than 200 diseases. I have been observing these results since 2004, when I returned home from taking a Master's degree at the University of Shanghai and my professional life changed totally. These results are consistent with those of more than 5,000 research projects, conducted with rigorous scientific methods by thousands of researchers in universities around the world over the last forty years, since 1969, date of the first research project on *Lentinus* at the National Cancer Center in Tokyo (Ikekawa, 1969). The information provided in this book can be an extra tool that can enrich or even change your personal and professional life, as in my case.

And what place does conventional medicine have in this journey? It is not an absolute point of reference, but it is the other voice of science, with a different approach to health and disease. It boasts indisputable scientific depth and important results but there are also issues which are still open and unresolved. In communicating with holistic functional medicine it encounters not a younger and inexperienced brother, but an adult interlocutor, whose methods are partly similar and partly different. It is a dialogue between equals in which the contributions of both parties can be harmonized and provide a new vision of medicine.

Also as regards treatment the two types of medicine can work together with excellent results: drugs which act above all on symptoms and medicinal mushrooms which act on symptoms and causes. These great gifts of nature and fruits of human ingenuity, if properly used, can achieve the "miracle" of a life without disease or almost without disease. This result, which seems far away in a society in which more than 50% of the population suffers from chronic disease,

is actually very close.

In conclusion, this simple and clear guide allows you to move easily between symptoms and diseases that are not separate entities but are all linked by a single thread. The information provided in this book reveals the link between symptoms and causes, and also how diet, the mind, and other factors influence disease. In this view, the action of healing mushrooms both on the symptoms and causes of diseases is clear. Moreover, they restore the functions of each apparatus that has weakened, even if it is not closely related to the disease.

Those in search of a manual, a guide to selecting mushrooms in health or in illness, find an easy reference handbook that suggests which mushrooms to choose in the treatment of 200 diseases. Here's how I have organized the guide:

Part A briefly explains the transition from tradition to a ready-for-use tablet and provides effective dosages and useful practical information.

Part B talks about "holistic functional medicine" and what it means to treat an individual part in relation to the rest of the body and to treat the "body machine" according to how it works. Each of the four functions needed to live - immunity, digestion, cleansing, production of energy - is initially thriving, then slowly breaks down and finally succumbs to disease. Health and disease are linked by a thread, similar to a continuous line, in which the cursor heads for decline more or less slowly according to how we treat our bodies.

Part C explains the results of using healing mushrooms, which slow down the advancing cursor, stopping it or heading it back towards health. These results are thanks to the "successful protocols" or to the use of individual mushrooms, both in prevention and in almost all types of illness, from functional diseases to those with organ lesions. An "infallible" diet enhances resources for well-being.

Part D describes the action of medicinal mushrooms in all diseases, divided into the four functions essential for life (immunity, digestion, cleansing and production of energy). **Part E** explains the properties of each mushroom in detail, its effects and its benefits. This part will be particularly useful to those seeking more detailed knowledge, still explained from a holistic point of view. The international scientific name of each mushroom, which identifies it univocally, consists in the name of the genus and of the species and is shown in brackets in the indexes and in the titles. However, in order to make the book

easier to read, each mushroom is generally identified just by using its genus - the first of the two names used in mycology: Agaricus (*Agaricus brasiliensis*), Auricularia (*Auricularia auricula-judae*), Coprinus (*Coprinus comatus*), Cordyceps (*Cordyceps sinensis*), Hericium (*Hericium erinaceus*), Ganoderma (*Ganoderma lucidum*), Grifola (*Grifola frondosa*), Lentinus (*Lentinus edodes*), Pleurotus (*Pleurotus ostreatus*) and Polyporus (*Polyporus umbellatus*).

Reading this book will have far-reaching implications because these pages can sow in hearts and minds an idea of treatment and prevention which, as many people have told me, can change your approach to life.

dr WALTER ARDIGÒ

PS

Everything which is happening in my life is a gift - a gift which I have received and which I offer to all those of good will, as a great opportunity to alleviate suffering. All over the world, both in scientific literature and in everyday speech, the terms “*medicinal mushrooms*” and “*healing mushrooms*” are used. These terms identify mushrooms which are useful as health supplements but their use must not be considered medical intervention.

PART A PRACTICAL MYCOTHERAPY

*Healing with mushrooms -or mycotherapy - is an ancient discipline,
with 5,000 years of history,
but is not well-known all over the world.*

*In recent decades it has also been
legitimized by science,
which has recognized its enormous potential.*

*Indeed, mushrooms can maintain
the body's equilibrium and health and,
when there is some problem or disease,
restore well-being.*

Here's how they work.

CHAPTER 1

From its origins to the present day

*Everything you can imagine,
nature has already created.*

ALBERT EINSTEIN
(1879-1955)

Medicinal mushrooms are so full of beneficial properties for the body that they have become important remedies in a branch of natural medicine now recognized all over the world: mycotherapy.

Healing with mushrooms

Mycotherapy is the science that studies and uses mushrooms to improve human and animal health. Although still relatively unknown in some countries, its origins are ancient. Suffice it to say that mushrooms have been used in traditional Chinese medicine for over 4000 years. They were already mentioned in the first manual of Chinese medicine, the origin of which is attributed to the Chinese Emperor Shennong, who lived around 2,800 B.C.. The Great Herbal of Medicine (Pen-Ts'ao Kang Mu), written towards the end of the 16th century by Li Shizhen, considered the greatest Chinese doctor, also talks about these remedies, especially *Ganoderma* and *Lentinus*.

How mycotherapy has evolved over time

As time has passed, mycotherapy has no longer been confined to Asia and is now well-known all over the world, with a real boom in the last 50 years. Research carried out with increasingly sophisticated techniques has started to prove without doubt what ancient peoples knew and described as far back as the time of the pyramids. Science became aware of the value of medicinal mushrooms in the 1960s and 1970s, discovering that these fungi are the secret of the world's longest living populations. Obviously, in order to reach the desired results, they must be used regularly and on the advice of competent experts.

Confirmation from scientists has given mycotherapy a boost; it is increasingly proving to be an innovative healing method which is highly effective for the

health of the whole body. It is estimated, on the basis of 2004 data, that 9 to 10 million people throughout the world, approximately one person in every 2500, including both Western and Eastern countries, rely on these remedies regularly. In Asian countries, mushrooms are appreciated so much that they have become one of the key elements in nutrition.

Similarities and differences with herbal medicine

The use of healing mushrooms is, in some ways, similar to herbal medicine since it too uses remedies of the plant world to restore the body's equilibrium. However, mushrooms give more effective results than herbs and plants. For example, for inflammation and allergies *Ganoderma* is much more powerful than *Ribes nigrum*; in circulatory disorders *Auricularia* is better than *Gingko biloba*; for gas- tritis *Hericium* has a stronger action than *Papaya*; in prostate disease *Grifola* is much more effective (10-20 times more, because 1 g of *Grifola* is equivalent, as regards its effect on the prostate, to 10-20 g of *Serenoa repens*); in flu diseases *Agaricus* acts in a more targeted way than *Echinacea*; in hepatitis *Cordyceps* is stronger than *Taraxa- cum*; in kidney failure *Polyporus* is better than *Equisetum*.

In any case, medicinal mushrooms are more similar to human beings than to plants. Like human beings, they need oxygen to live, eliminate carbon dioxide and have no absolute need for light. The two also have similar biological mechanisms, such as immunity, cleansing and elimination of excess fluids.

CHAPTER 2

A treasure trove of invaluable substances

Why can mycotherapy reinforce or recreate a state of health? What makes healing mushrooms so special? The secret lies in their composition: these remedies are full of invaluable active ingredients which give them enormous powers.

Rich in beta-glucans and terpenes

Mushrooms contain very high amounts of biological substances useful to health. According to scientific studies conducted to date, the "poorest" mushroom, *Pleurotus*, contains more than 150, while the "richest", *Ganoderma*, over 400. Most of the active components enhance immune functions. Others provide excellent healing effects, rare in nature, that are active in the rest of the body.

Between the 1970s and 1990s, the interest of scientists focused primarily on beta-glucans. These molecules are extremely beneficial because they enhance the immune system with their anti-inflammatory properties, proving effective in many illnesses, from inflammation to autoimmune disease. In addition, they are able (depending on the type) to regenerate stomach mucosa in gastritis and ulcer, to eliminate *Helicobacter pylori* (bacteria that can cause stomach disease), to improve the utilization of glucose in tissues and/or lower blood sugar levels. Beta-glucans account for half the immunostimulatory power of mushrooms. To understand the importance of this powerful characteristic, it is worth noting that the only plant that is similar to mushrooms in beta-glucan content (although it contains less, about half) is *Aloe arborescens*, which is attributed with considerable anticancer effects due to the presence of these molecules. However, this plant does not contain terpenes or the hundreds of other active ingredients present in mushrooms, which are effective in all other functions too. Much smaller amounts of beta-glucans are present in certain seeds, such as malt.

Since the end of the 1990s researchers have also been devoting increasing attention to terpenes, the small odorous molecules of mushrooms. They too are important in viral, inflammatory and immune disease but also in hormonal, allergic and degenerative illnesses. They act at a much more minute level: for example, they are able to influence cellular DNA and prevent viruses from entering the nucleus of cells to reproduce. Moreover, they possess a powerful

antihistaminic and ACE inhibitor effect (reducing high blood pressure).

Other active ingredients useful to health

In addition to the main families of beta-glucans and terpenes, other very important active ingredients contained in mushrooms are:

- nucleotides. The main nucleotide is adenosine, an excellent vasodilator which influences the blood vessels of the heart, brain, retina, kidneys, muscles, skin and, in general, of the whole body. Furthermore, it has antiplatelet properties, which can reduce blood viscosity, and is an effective anxiolytic and anti-stress agent, which relaxes the muscles;
- some proteins with biological activity. In particular, LZ 8, a protein that combats anaphylaxis (severe allergic reaction); - substances similar to certain hormones produced by the pituitary, which in women induce the ovaries to produce female hormones, when they are lacking, and in men the testes to produce lacking male hormone. In addition, they stimulate the adrenal gland with invigorating and anti-stress effects;
- tyrosinase, which keeps the skin beautiful and smooth and modulates the production of melanin (the pigment that colors the skin), eliminating skin spots.

A source of vitamins, minerals, proteins and antioxidants

Besides these, mushrooms are composed of other beneficial substances, such as:

- antioxidants in general, that counteract the action of free radicals which are harmful molecules responsible for the premature aging of cells and tissues, DNA degeneration and the onset of many diseases(Asatiani, 2010; Chen, 2015);
- polyphenols, which have antioxidant properties and protect the cardiovascular system;
- some chelating agents which capture heavy metals;
- vitamin D (ergosterol), important for bone synthesis;
- the B-complex vitamins (riboflavin, niacin, biotin, folic acid). Mushrooms, in particular, contain vitamin B12 or cobalamin, a substance essential for the health of the nervous system, for iron metabolism and the production of hemoglobin. The only other food with a similar content of vitamin B12 is meat. For this reason, mushrooms are very useful in vegetarian diets;

- minerals, such as magnesium, potassium, manganese and very little sodium. In addition, iron, in which many people are deficient, germanium (very rare), which has an energizing and purifying action, selenium, which has a high antioxidant potential, and zinc, useful for acne, pregnancy and sexuality;

- essential amino acids that, apart from in mushrooms, are found only in legumes and meat and which are important to integrate a vegetarian diet. Moreover, mushrooms are rich in protein and fibre and low in fat: they are, therefore, also useful for keeping fit.

They restore or strengthen the body's state of equilibrium

Healing mushrooms, thanks to their particular composition, are therefore useful to everyone, both to people who are ill and to those who are perfectly healthy. The active ingredients they contain, in fact, activate the self-healing force of the whole body, re-storing a state of well-being and equilibrium if this is impaired or strengthening it as necessary.