

**LAB-GROWN
CORDYCEPS SINENSIS HYBRID:
A Nano-processed Medicinal Mushroom that Really Delivers**

By Richard Alan Miller, 2005

*Widely used for more energy, enhanced libido, sports and work performance;
VIRTUALLY EVERY PROFESSIONAL ATHLETE USES CORDYCEPS*

ABSTRACT: *The medicinal mushroom Cordyceps sinensis is used for its health-promoting qualities: vitality, energy, libido, and immune enhancement. Lab grown, Aloha Medicinals' 5x hybrid alohaensis is a [Full Spectrum™](#) product, including mycelium, fruit, spores, primordial and extra cellular compounds. Hybridization with rattlesnake venom amplifies target compounds (nucleosides). Nanoprocessing (40 nanometers particles) assures greater absorption at lower doses. It makes the non-water soluble compounds injectible or soluble without extraction. Cordycepin inhibits the DNA repair mechanism and is probably responsible for it's anti-viral (HIV) effects. Research shows this fungi delivers even more life-enhancing benefits than we claim.*

INTRODUCTION

So many products in the marketplace make so many claims that we automatically discount their alleged properties, often by orders of magnitude. We hope they work as

billed and aren't just hype, but are amazed if they even approach claims. Savvy manufacturers blithely offer money-back guarantees because they know most people simply won't bother.

CORDYCEPS SINENSIS Hybrid (Patent Pending) is an extraordinary nutritional supplement and medicinal mushroom that not only delivers as promised, but has tremendous potential, globally. In the USA, we can only say it delivers *more* than it claims, and is nontoxic, which is more than most miraculous pharmaceutical cures can claim.

My decades of marketing at the farm and wholesale level in the herb trade have given me tremendous insight on the trends that have made and ruined certain otherwise viable products. Some come and go in fads, trends based on marketing or new research. Some are victims of their own popularity: supply cannot keep up with demand and are business failures. Some are eclipsed by pricier but fail-safe drugs such as Erectile Dysfunction (ED) pills.

Some botanical products have the potential to deliver real chemistry, but there is little uniformity in potency, due to agricultural and marketing problems. Quality control at the foraging and farm level as well as shelf life are crucial issues. How long does the product sit on the wholesaler's and retailer's shelf, losing potency, much less in the household before use? If a product doesn't deliver as promised, the valued customer will not return. Even new buzz words, such as Nutraceuticals or Immunocuticals cannot regain their confidence once disappointed.

St. John's Wort, which became a faddish substitute for Prozac as a botanical antidepressant, is a good example. Thousands of pounds – perhaps tonnage -- of product wound up losing all potency sitting on the shelf after the market peaked once interest in its antidepressant qualities waned. Was it a shortcoming of the initial research, the plant, the processing, or even the delivery system – how the plant

chemistry enters the body in a particular form?

Aloha Medicinals' 5x potency hybrid *CORDYCEPS SINENSIS* overcomes all these objections. Since it is meticulously lab-grown, rather than collected in the wild, each phase of the process ensures a consistently potent product. This patent-pending process has produced the most consistent product of its type in the world, and its effects supercede all other forms, including CordyMax (Pharmanex) which has been listed in the physician's PDR for the last few years.

Not only does the Aloha brand *Cordyceps* (*Cordyceps sinensis* Alohaensis) surpass all other production qualities, owner John Holliday has developed a nanoprocessing technique that increases its absorbability even more than its potency. This is a boon to the consumer, who can then get much more "bang for his or her buck", or perhaps afford an otherwise unaffordable level and course of self-treatment.

Cordyceps has been used traditionally for centuries for its health-promoting and antiviral qualities. It was hailed as the Emperor of treatments and largely reserved for Chinese royalty in ancient times. Today, around the globe medicinal mushrooms are routinely used to produce anti-cancer heteropolysaccharides. This is the field of immuno-modulation.

Yet, even the non-medical applications of cordyceps are numerous and dramatic. The big three are Sports Performance (*Performax*), Immune Assistance (*Immune Assist/Critical Care*), and as a Sexual Tonic. *Cordyceps* first came under global scrutiny when the Chinese gymnasts swept the 1993 Olympics and were suspected of "doping".

Cordyceps was their secret, and athletes quickly adopted it to remain competitive.

WHAT IS CORDYCEPS?

The story of *Cordyceps* is a wild one, involving a colorful pageant involving the Himalayas, dead insects, wild yaks, adventuresome natives, arduous journeys, Chinese Emperors, and diamondback rattlesnake venom! Any herbalist or mycologist has to agree that is quite the profile for the life cycle of any botanical.

Since the dawn of shamanic healing, over 50,000 years ago, mankind has combed the globe looking for healing ingredients to concoct the ultimate panacea – a cure all. This extraordinary substance has probably come as close as any medicinal mushroom in filling that bill, long before the advent of modern pharmacology and wide-spectrum drugs such as antibiotics.

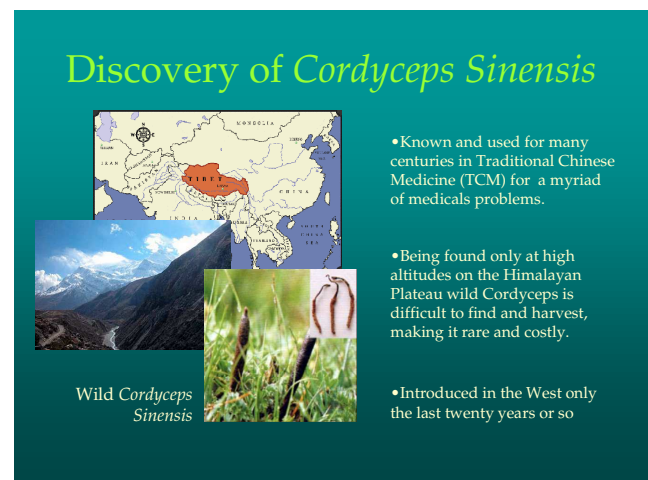
This royal treatment of Chinese Emperors has an extraordinary and astounding history. Chemical analyses have shown that none of its alleged remarkable properties are superstition or mere folklore. You *know* when you consume this product that it is chemically fulfilling its promise.

Much of what is known about *Cordyceps sinensis* we owe to the research of Dr. Georges Halpern, a physician and professor emeritus with the University of Hong Kong, and author of several books about *Cordyceps*.

How well it does that depends on how faithful you are with your own dosing. Want to feel like a King? Traditional dosages of wild cordyceps are in the range of 3-4 ½ grams a day; sometimes as high as 9-10 grams per day, if someone could afford

it. Critical care dosage may have ranged as high as 30-50 grams daily. To live like a king, stay with the cordyceps regularly and get plenty of water, proper nutrition and exercise (10,000 steps per day or more), as we all know!

Wild *Cordyceps* is found at high altitude in the Himalayas. Natives first noticed yaks seeking them out and some courageous individual followed suite. Just imagine having to forage for tiny dead insects with these fruit bodies growing from them. The local name for this mushroom is **Dong Chong Xia Cao**, which means "summer grass, winter worm". No wonder only Emperors could afford it.



The infographic features a teal background with the title "Discovery of *Cordyceps Sinensis*" in yellow. It includes a map of China with the Himalayan region highlighted in orange, a photograph of a mountain landscape, and a close-up of the mushroom. Three bullet points are listed on the right side.

- Known and used for many centuries in Traditional Chinese Medicine (TCM) for a myriad of medical problems.
- Being found only at high altitudes on the Himalayan Plateau wild *Cordyceps* is difficult to find and harvest, making it rare and costly.
- Introduced in the West only the last twenty years or so

Unappetizingly, wild cordyceps is consumed with the insect still attached, but hybridization has eliminated this “Fear Factor”, making the product fully vegan. Further, as of April 2003, the wholesale cost in China for lots of 100 kg or more was between \$2000 - \$3000 per kilogram, making it cost-prohibitive to most would-be consumers. However, this natural product is no longer the “best” nor most desirable pharmacological form in the world.

There are over 630 different *cordyceps* species named, but probably there is only one, which expresses itself differently

depending on which insect it is cohabitating. So why does it have such wide-ranging medical usage? It has evolved these particular compounds to keep its host healthy!

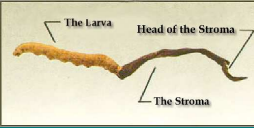
Uses of Wild *Cordyceps Sinensis* in Traditional Chinese Medicine (TCM).

Helpful with such health problems as:

- Low energy following serious illness
- Cough, anemia, tuberculosis, lower back pain
- Impotence, infertility & irregular menstruation
- Night sweats, and senile weakness
- Reduce phlegm, and stop hemorrhages
- Has tonic effect on lungs, kidneys and bone marrow


It's no advantage to the symbiont to kill the insect. It has to fool the host insect's immune system, but not by disabling that system. So, cordyceps has evolved non-toxic compounds, which act as bidirectional immuno-modulators. It up-regulates some aspects of immune function like viral and bacterial protection and down-regulates other aspects of immune function.

Growth Patterns in the Wild



The club fungus, *Cordyceps sinensis*, whose stroma or fruitbody extends from the mummified carcasses of insect larvae usually grows in the caterpillar larva of the Himalayan Bat Moth, *Hepialis armoricanus*

Cordyceps sinensis is an Ascomycetes fungus closely related to the mushrooms. While not actually a mushroom in the taxonomic sense, it has been regarded as, and called a medicinal mushroom throughout history



Right – *Cordyceps* growing from a beetle.

It is a fact that insects do not get viruses. Insects, have in their blood – the chemolymph -- single-celled yeast-like

symbionts, which perform the functions of red blood cells in higher organisms. They are involved in energy release, nutrient absorption – the equivalent of red blood cells in higher organisms.

We take these single-celled yeastlike symbionts out of the insect and cultivate them – THIS IS *CORDYCEPS*. First they go mycelial, then they form fruit-bodies. So, this is a symbiotic relationship in insects. It is on its way evolutionarily to becoming the red blood cells of the insect and arachnid, and protects them from viral infection.

Cordyceps: Parasite or Symbiont?

“Although the spore is possibly an ‘infectious’ agent that attacks the moth larvae as some authors have advanced, it is worth noting that the entomopathogenicity of the *Cordyceps* mushroom is disputed. A growing body of logical and empirical data is suggesting to many prominent researchers that *Cordyceps sinensis* actually has a symbiotic relationship with the host; that the connection is mutually beneficial, rather than pathogenic. This stands to logical reason, considering the remote and inhospitable environment in which the moth/*Cordyceps* pairing occurs. Nature tends to select against a parasite, in that a parasite usually results in the death of the host. A more logical explanation for the unique pairing between an insect and this fungus would be that it is a mutually beneficial symbiosis, whereby the moth perhaps gains an energy boost from the *Cordyceps* living in its body, as is known to occur when other animals consume *Cordyceps* (Jia et al 2004).”

On the Trail of The Yak: Ancient *Cordyceps* in the Modern World

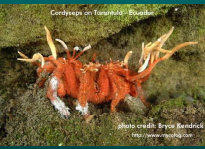


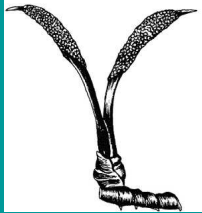
Photo credit: Eric Sorensen

Mushrooms only fruit in response to stress – heat, cold, fire, flood. When the insect dies, it is the death of the host that triggers fruiting. In the fruiting from that yeast-like single celled symbiont to the final fruiting, *cordyceps* appears not to put out a fixed genetic structure.

DNA is generally a fixed biological fingerprint but *cordyceps* incorporates some of the insect DNA into its own DNA structure, creating this unparalleled medicinal mushroom. But it can be grown on grain (organic millet and sorghum) as or more effectively, without incorporating insect DNA. This makes it aesthetically

more palatable, certainly for vegetarians or vegans.

Definitions



Fruit Body: The mushroom that you see is the equivalent to a flower of a plant. The fruit body produces the spore and forms only under stressful environmental conditions such as heat, cold, fire, flood & running out of food


Mycelium - This is the growth form of the organism, the stable state in which all of the life processes occur; eating, growth, competing for food, some forms of reproduction, etc.

Extract - Either the mushroom or the mycelium, extracted with a specific solvent with the intention of concentrating some desirable portion and eliminating or at least reducing some unimportant portion of the mushroom.

HYBRIDIZATION: AN INNOVATIVE PRODUCTION TECHNIQUE


Cordyceps has one problem. You can't grow it under 14,000 feet. Or can you? By simulating a high-altitude environment – low oxygen, low temperature – mycelium and even fruit can be grown. Stressing the primordia encourages it to increase potency and/or to fruit. But we no longer need to rely on fruit for high-quality chemistry. Aloha's patent pending process has fooled *cordyceps* into thinking it lives in paradise and it thrives on that loving care without an insect host.

Cultivation



Through a specialized cultivation process, the cordyceps is "stressed" into producing fruitbodies.

The concentration of any target compound of interest in the cultivated mushroom exceeds what is found in the wild crafted mushroom.



All the secondary metabolites produced throughout the **entire growth process** are present in this glass jar.

- Cordycepin
- discoerylenosine
- hydroxyethyladenosine
- cordycepin triphosphate
- adenosine
- deoxyuridines A & B
- deoxyguanosines
- HEAA

Hybridization, like in the cultivation of corn for sweetness or potatoes for size and texture, accentuates target medicinal compounds. Its novel bio-active compounds have been amplified to 5X potency. Very extreme modification of the culture parameters – light, temp, and oxygen content - amplify qualities such as anti-viral compounds.

Quality in Cultivation

1. Select species-specific substrate (or target-compound specific, as the case may be) for the mushroom in question.
2. Select the growth parameters of temperature, light, O2, etc. for the results desired.
3. Grow for lengthy periods of time (20-45 weeks) in glass containers, capturing all of the metabolic exudates. (This is the hard part; to grow the mycelium in their own metabolites without stunting the growth. Look at beer or wine production for example: the alcohol accumulation eventually stops the growth.)
4. Fruit the mushrooms in the glass container at the end of the growth term.
5. Harvest the whole thing, Mycelium, fruitbodies, primordia, all of the extra-cellular compounds which have been produced over the entire life cycle, and even some spore mass in many cases.
6. Dry, powder, package, sterilize and supply

Hybridization concentrates the dosage, lowering volume ingested substantially over the wild varieties. You also get the full spectrum of chemistry contained in the whole mushroom versus an isolated standardized extraction. All compounds work synergistically to optimize its effectiveness and minimize side effects. Plants that create toxins often also harbor their own modulators or antidotes. Nature creates a holistic balance, which it is best not to ignore.

Manufacturer John Holliday, in a recent interview with this author, says,

"[Cordyceps] is a direct-acting antibiotic agent. Since cordyceps lives in insects, it has evolved quite a comprehensive compliment of compounds, which it produces, with the sole purpose of keeping the insect healthy. If you consider for a moment fungi, in general, there a quite a

number of interesting things that go on at that level of organization.

If you have a nice chunk of organic something that hits the ground, like an apple, everything in the environment competes to use it as a food source – bacteria, mold, everything. The fungi, in general, have evolved an interesting mechanism to give themselves an advantage in the food chain. As the mycelium slowly grows up across the surface of that apple, it exudes certain extracellular compounds out of the cell walls that stun or kill other microorganisms. So, it has a chance to get the food.

Those compounds are what we call antibiotics. Penicillin, tetracycline, erythromycin, cephalosporin are all examples of fungi-produced antibiotics. Cordyceps has a number of different type antibiotics that work on different organisms.”

In nature, one out of every hundred mushrooms may be suitable for artificial lab cultivation. Out of every hundred in the lab, only one or two will excel in medicinal properties. So we’re taking them and crossbreeding to increase the specifications of antiviral properties, immune enhancement properties, and performance properties. That’s the concept of hybridization.

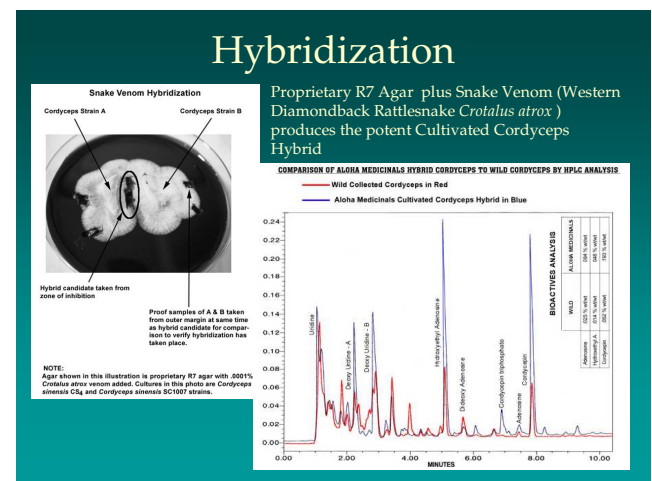
Hybridization is just good husbandry. We do that with cordyceps for target medicinal compounds, vigorous or fast growth to produce lots of it, and resistance to infection with other organisms. We’re trying to create healthy cultures

We have filed for US and international patents. It looks like we’ll be issued those patents on the fact we’re growing it under 18,000 feet elevation. In other words, low

oxygen, low temperature controlled conditions. We also use our own unique substrate. We have our own very solid fermentation process, as I reported in the International Journal of Medicinal Mushrooms in 2004.

As if the cordyceps relation to insects isn’t wild enough, it is hybridized through the morphogenic qualities of purified snake venom. If you think that smacks of the old quackery “snake oils” of carnival barkers, you aren’t the only one conjuring this vision.

However, in this case it actually amplifies the potency of the overall product while not remaining within it in toxic form. It changes the form of the cordyceps, by breaking down its cell walls, rather than being added into the final product. It is essentially a catalyst for hybridization. The venom allows the fusion of the two differing DNAs. The venom is used only once to successfully create the hybrid; after that it is a matter of tissue cloning the desirable strain – which is the growth technology as a whole.



Once substrate and growth parameters are optimized for target compounds, chemical profiles of different species and what can be done to boost active ingredients can be considered. Cordyceps flourishes by fusing with foreign genetic material, and snake

venom has been the best performer in this fusion for hybridization. Milked venom of Western Diamondback rattlesnake is added to the agar medium.

According to Holliday (2004b): *[D]ifferent strains when inoculated together onto one petri dish will normally grow towards each other until they almost meet, at which point they form a zone of inhibition, where neither strain can grow. Eventually, one strain may prove stronger than the other and overgrow the plate, but they will remain genetically distinct; two different cultures residing in the same petri dish.*

With the addition of a sufficient quantity of snake venom to the agar, we found that what happens is the two cultures grow towards each other until they meet and form their mutual zone of inhibition. This period of inhibition is short lived however, for in only about 2 or 3 hours the colonies each start sending out mycelial strands into this no-mans land, the zone of inhibition. These strands grow together and exchange nuclear material through their venom-weakened cell walls. They form a hybrid strain at this point of mutual contact.

**Overview of the Properties of
*Cordyceps Sinensis***

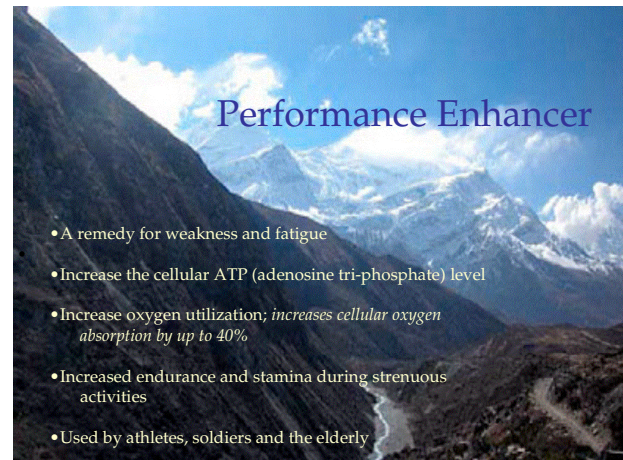
- Cordyceps Improves the Respiratory Function
- Cordyceps increases cellular Oxygen Absorption by up to 40%
- Cordyceps Improves the Functioning of the Heart
- Cordyceps Helps Maintain Cholesterol
- Chronic kidney diseases improvement
- Cordyceps Shown to Shrink Tumor Size in Several Clinical Studies
- Improvements in the Immune System
- Cordyceps Reduces Fatigue
- Cordyceps Improves Stamina and Athletic Performance

This new strain is distinctly different from either of the parent strains, and is called *Cordyceps sinensis* Alohaensis. By utilizing

these new methods of cultivation, the best quality *Cordyceps* is now within economic reach of even the common man throughout the world.

NANO-PROCESSING

Powdered medicinal mushrooms have been in the market for a long time. But newer nano-mesh myco products allow for optimal absorption of effective compounds. With less waste, dosage volume can again be lowered.



Performance Enhancer

- A remedy for weakness and fatigue
- Increase the cellular ATP (adenosine tri-phosphate) level
- Increase oxygen utilization; *increases cellular oxygen absorption by up to 40%*
- Increased endurance and stamina during strenuous activities
- Used by athletes, soldiers and the elderly

Nano refers to a size; one nanometer is a millionth of a meter. This represents a particle size so small it can virtually penetrate the skin without chemical aids such as DMSO. Nanoparticles amazingly absorb right through the spaces between the cells with three times the absorbability, economically reducing dosages by one third. Also, nanoparticulation can make non-water soluble compounds injectible. Sports performance and other beverages are another good application for nanoprocessed nutraceuticals.

According to nanoprocess developer, John Holliday of Aloha Medicinals, Inc.,

“When we look at size reduction, there are a whole bunch of things that take place. Let’s compare this to a human blood cell. The human red-blood cell is about a 7000-10,000 nanometers in diameter. A nanometer is very small measure. So if we take something down to 40-50 nanometers, that is something very small in relation to the cell. One of the issues where nanotech is being used in pharmaceuticals is to take compounds which are not soluble and use them for injectable drugs.

In the past a compound had to be soluble to be used by the body. So if we look at morphine or cocaine, free-base morphine or cocaine cannot be injected – they have to make a water-based chloride or sulphide out of it. Then it becomes soluble. If you could take it and reduce it to such a small size that it can be used direct, then you have much better utilization of the drug.

So, that is one of the first applications of nanoizing cordyceps. You gain all the benefits of a water-soluble form without losing any of the potency, which you lose in the very nature of making an extract of something. If you take kilos of something and you cook it down to make extract, the question is what was in the kilos you threw away to make the extract? We aren’t smart enough yet to know what all the compounds are.

What we produce is a full-spectrum cordyceps. Undoubtedly, the most comprehensive cordyceps being produced – it is a full spectrum for each species including mycelium, fruit, spores, primordia, most importantly the compliment of all the extracellular compounds produced in the cycle. Much of that is not water-soluble. So, full spectrum is everything produced by that 6-month growth cycle.

If you want to use it traditionally, such as an energy drink, you have to make it water soluble with a hot water extract. Now you’ve got a power you can use for various applications, but its only a portion of what you started with, because everything that did not go into solution has been eliminated. Nanoparticulation means it doesn’t really become soluble, but its so small it becomes fully suspensible. We’re able to take nonsoluble material and use it for soluble applications.

Look back on 15,000 years of history of how it was used to determine what will become of it. Its like asking in the 1950s what will become of transistors? It’s so new, we don’t know. We know instinctively it has greater potential than before we took it to the nano-step. Really where that horizon lies we don’t know yet.

Nanotechnology provides improved activity levels and solubilized ingredients for clear beverages that previously could not be used. It further enhances the stability of the products, generally for a pH of 2, allowing pasteurization (thereby achieving thermodynamic stability). control of reaction rates and reducing browning reaction impact.

While this process is under non-disclosure, we can say it uses jet engine technologies running at Mach 70 to tear the product apart.

ENERGY ENHANCEMENT

Cordyceps is widely used in weightlifting and other sports for enhancing oxygen utilization. A unique natural ATP pathway increases the concentration of ATP in the cells, oxygen utilization, etc. We breathe in 20% oxygen, 80% nitrogen; yet, when we

exhale we see about 13% oxygen in the exhaled breath, using only the difference.

Importance of ATP (adenosine tri-phosphate)

- ATP is the molecule that actually releases energy in the cell.
- ATP releases energy in the cell by losing a phosphate and converting from a three-phosphate form of adenosine to a two-phosphate form, called ADP (adenosine di-phosphate). When the ATP loses a phosphate, the breaking of that bond releases energy that is then available for the cell to use.
- An increase in cellular ATP means a real increase in actual energy available for use.
- With *Cordyceps* use, the double effect of increased ATP and better oxygen utilization go hand-in-hand; more fuel to burn and more oxygen to burn it with.

After *cordyceps*, there is only 8 or 9% percent exhaled, so use increases. How much the person gets from each breath increases about 40%. The other part of it is ATP, the actual molecule which releases energy in the cell. When the cell needs energy, it breaks off a phosphate from triphosphate converting to biphosphate. The energy of that breaking is what becomes available for use. It's very easy to calculate ATP level from the liver or heart by assaying ATP. How much ATP you have present at any given time is how much potential energy you have at that particular moment.

Immune Boost

- Improves the Respiratory Function, reduces cough and phlegm, shortness of breath, bronchial discomfort, COPD, and alleviates asthma symptoms.
- Increases NK (Natural Killer) cell activity,
- Fungal derived simple- and protein-bound polysaccharides increase the production of such cytokines as TNF- α , interleukins, and interferons, NO, and antibodies by the activated immune cells
- Has *Immunomodulating* Effects: bi-directional regulation of immune function, which can be either up-regulated or down-regulated making *Cordyceps* very useful in adjunct nutritional therapies of such immune-deficient states as found in cancer, hepatitis or HIV infection; and conversely to hyper-immune states such as is found in Lupus, Lymphoma or Rheumatoid arthritis

According to Holliday's research, repeating the test 2 weeks after cordyceps daily, ATP

concentration goes up 28 to 30% higher...30% more energy is available on demand. It doesn't trigger the pathway in the brain that makes you *feel like* you have more energy, like amphetamines or ephedra, or sinepherrine. With the latter you erroneously *think* and *feel* you have more energy, but eventually it robs you of it. With ATP increase, you don't feel like you have more energy, you simply can and do go further.

Those who really recognizes it are repetitive athletes, like someone who has run several marathons and knows their water and break patterns. They find themselves extending further more easily. If you find the same is true for you sexually, then that is a pleasurable bonus.

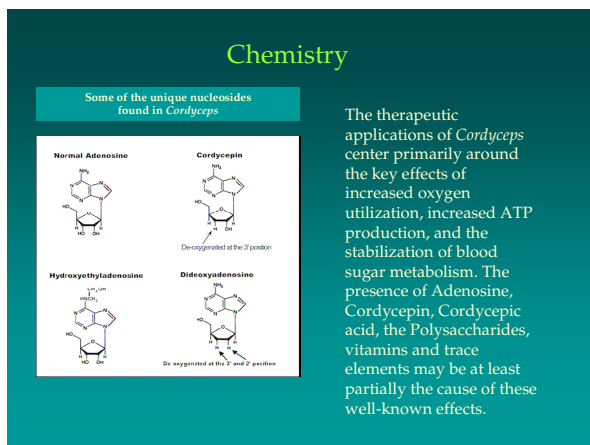
Though it is rarely discussed for fear it will be outlawed, virtually EVERY PROFESSIONAL SPORTS FIGURE USES *CORDYCEPS*!

UNIQUE NUCLEOSIDES: POTENTIAL BENEFITS EXCEED OUR CLAIMS

The chemistry of full-spectrum *Cordyceps* is complex, and its richest potentials may remain to be discovered. The mechanism of DNA synthesis inhibition is probably the responsible mechanism for the anti-viral effects seen with cordycepin.

According to John Holliday (2005), there is evidence of another mechanism at play in the *Cordyceps* antitumor response besides the well-known immune modulation triggered by the polysaccharide compounds. It is related to the structure of at least some of the altered nucleosides found in *Cordyceps*, exemplified by the compound cordycepin [3'deoxyadenosine].

This is a molecule almost identical to normal adenosine, with the exception that it is lacking an oxygen atom on the ribose portion of the molecule at the 3' position. The same lack of this 3' oxygen can be seen in other *Cordyceps* compounds as well, such as Dideoxyadenosine, (Didanosine™, Videx™).



The lack of oxygen at this particular position is thought to be important in a very specific way. The structure of DNA depends on this oxygen to create the bond between adjacent nucleosides. This bond is between the 3' and the 5' positions on the ribose portions of the nucleosides, effectively forming the 'ladder structure' that holds the DNA together.

In the replication of any cell, the first step is the separation of the DNA molecule down the middle, like unzipping, between the pairs of complimentary nucleosides. The next step is the insertion, one at a time, of new complimentary nucleosides. These form hydrogen bonds between the complement

Most bacteria and all viruses (including the HIV virus) lack this DNA repair mechanism. When we look at the rate at which cancer cells replicate, it is clear how this mechanism could exert a significant antitumor response.

pairs, and form phosphate-sugar bonds between the 3' and 5' position at the outside edge of the molecule, which is the ribose portion. This, in essence, is the structure that holds the DNA together.

The synthesis of the new DNA molecules proceeds with the sequential insertion of new complimentary nucleosides one at a time into the newly forming DNA molecule, until the original strand of DNA is replicated twice, each of these strands being exact copies of the original and forming the genetic code for a new generation of cells. That is, this synthesis continues to proceed with the insertion of each new nucleoside, unless a 3' deoxyadenosine (cordycepin) molecule is pulled in. When this happens, there is no oxygen present at that vital position to form the 3'-5' bond, and the replication of the new DNA molecule stops.

Once the DNA synthesis stops, the cell cannot continue to divide and no new cell is formed. In normal mammalian cells, this insertion of the deoxygenated adenosine is of little importance, as healthy cells have an inherent DNA repair mechanism. When this sort of error occurs, the altered nucleoside (the cordycepin) is removed from the string of nucleosides, and a new segment of adenosine is inserted. However, by their very nature, cancer cells have lost this DNA repair mechanism. (If they could correct their DNA errors, they would not be cancer cells).

For example, normal healthy breast tissue cells have an average life span of about 10 days, after which they reproduce and a new cell is formed. But breast cancer cells multiply much quicker than healthy cells. They reproduce themselves on average every 20 minutes. This means that the breast cancer cells are replicating about 750 times faster than the surrounding healthy tissue. If

the cordycepin were equally toxic to both types of cells, it would be killing off the cancer cells 750 times faster than the healthy cells.

But because of that DNA repair mechanism in the healthy cells, cordycepin appears not to interfere with the healthy cell replication, and the tumor-cell kill rate is actually much higher than the 750-to-1 ratio. The same sort of DNA interruption mechanism is responsible for the antitumor effects of some other chemotherapy agents as well.

This same mechanism of DNA synthesis inhibition is probably the responsible mechanism for the anti-viral effects seen with cordycepin as well. (Holliday 2004b) (Liu and Zheng, 1993 and others by inference) .

CONCLUSIONS

Aloha grows hybridized full-spectrum mycelium under tightly controlled conditions of temperature and oxygen content for a long period of time; up to 6 months in a special low temperature, low oxygen grow room. (Compare to 18-21 days for all the other American grown *Cordyceps* and typically 4-5 days for Chinese grown).

Cordyceps sinensis Alohaensis is the only one grown under specially controlled low temperature and low oxygen conditions, which replicates the natural habitat. **It is fully vegan.** No imported ingredients, each lot is independently analyzed and certified pure by a third party FDA certified lab using the latest HPLC/MS technology.

The mycelium is then dried using special low temperature air dryers which we designed and built especially to capture all of the bio-active components. Extraction is

dry, using no solvents or even water. It is then encapsulated. It is the powdered, sterilized, and packed in sealed metal tins, insuring a 5 year self life.

The best known medicinal action of *Cordyceps* is for the increase of physical stamina. Cordycepin, is very effective against all sorts of bacteria that have developed resistance to the other antibiotics. *Cordyceps* improves the internal balance mechanism, thus making the utilization of oxygen more efficient.

Numerous studies have demonstrated the benefits of *Cordyceps sinensis* on heart rhythm disturbances, such as cardiac arrhythmias and chronic heart failure (Chapter “Effects on the Cardiovascular System”, pages 436 – 441). Huang Y, Lu J, Zhu B, Wen Q, Jia F, Zeng S, Chen T, Li Y, Xheng G, Yi Z.. *Zhongchengyao Yanjiu* 1987;(10):24-25).

Four excellent studies have demonstrated that *Cordyceps sinensis* helps to lower total cholesterol by 10 to 21% and triglycerides by 9 to 26%. At the same time it helps to increase HDL-cholesterol (“good cholesterol”) by 27 to 30% (Chapter “Effects on blood lipid metabolism and arteriosclerosis”, Zhu, J.S., Halpern, G.M., and Jones, K. (1998): *The Scientific Rediscovery of an Ancient Chinese Herbal Medicine: Cordyceps sinensis*. Part I. *Journal of Alternative and Complementary Medicine* 4(3), pp 289-303. pages 299 – 301).

Human clinical studies involving both men and women of 189 patients with decreased libido and desire showed improvement of symptoms and desire of 66% (Wan F, Guo Y, Deng X. *Chinese Traditional Patented Med* 1988;9:29-31). The most dramatic physical proof came from Fertility Study

(Guo YZ. J., Modern Diagnostics Therapeutics 1986;(1):60-65) involving a clinical research of 22 males showed that cordyceps supplement increased clear evidence of 33% increase in sperm count, decreased 29% incidence of sperm malformations, and a 79% increase in survival rate after 8 weeks of cordyceps supplement.

These properties and others may account for the overall physical enhancement, the added endurance, libido enhancing and the anti-fatigue effects which are seen in humans using the *Cordyceps* supplement.

Polysaccharides in Cordyceps have shown various activities: hypoglycemic (CS-F30) (Kiho et al., 1996); hypolipidemic (CS-F30) (Kiho et al., 1996); immunostimulating (CS-81002) (Gong et al., 1990) immunostimulating/radioprotective/antitumor (polysaccharide I) (Zang et al., 1985); and antileukemic (polysaccharide fraction-conditioned medium) (Chen et al., 1997).

Certain nucleosides in *Cordyceps*, such as adenosine, inhibit platelet aggregation (Ikumoto et al., 1991; Shiao et al., 1994) and others have shown calcium antagonist and inotropic activity (Furuya et al., 1983). Nucleosides reported in Cordyceps include adenosine, uracil, uridine, guanine, guanosine (Shiao et al., 1994) and 2'- and 3'- deoxyadenosine (cordycepin) (Chen and Chu, 1996)

Cordyceps sinensis also contains: galactomannans (Miyazaki et al., 1977; Kiho et al., 1986), polyamines (spermine, spermidine, homospermidine, putrescine, 1,3-diaminopropane) (Zhu and Masaru, 1993), various uncommon cyclic dipeptides, minerals, vitamins B1, B2, B12, E and K, all the essential amino acids (Yue et al., 1995; Huang et al., 1991; Xu et al., 1992; Guo,

1986; Tao, 1995; Xia et al., 1985), glutamic acid, Ltryptophan, L-arginine, and lysine (Zhang et al., 1991). *C. sinensis* also contains d-mannitol, ergosterol, ergosterol derivatives, alkaloids, fatty acids (mainly oleic, linoleic, palmitic, and stearic acids) (Shiao et al., 1989), and sterols (Kadota et al., 1986).

The altered nucleosides found in *Cordyceps*, exemplified by the compounds cordycepin [3'deoxyadenosine] and others such as Dideoxyadenosine, (Didanosine™, Videx™) inhibit the DNA repair mechanism. and is probably the responsible mechanism for it's anti-viral (HIV) effects. Worldwide studies have shown that this unassuming fungi delivers even more potentially life-enhancing benefits than we claim.

We infer this connection because:

Didanosine is used with other medications to treat human immunodeficiency virus (HIV) infection in patients with or without acquired immunodeficiency syndrome (AIDS).

Didanosine is in a class of medications called nucleoside reverse transcriptase inhibitors (NRTIs).

Didanosine works by slowing the spread of HIV in the body. Didanosine does not cure HIV infection and may not prevent you from developing HIV-related illnesses.

Didanosine does not prevent you from spreading HIV to other people.

<http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a691006.html>

NOTE: These claims have not been evaluated by the FDA. Our products are not intended to diagnose, treat, cure or prevent any disease. Health decisions are much too important to be made without the advice of a Doctor or other licensed Health Care Practitioner. We invite and encourage you to share this information with your doctor. We are happy to share all of our research materials with any interested physicians.

REFERENCES

- Bao, Z.D., Wu, Z.G., and Zheng, F. (1994). [Amelioration of aminoglycoside nephrotoxicity by *Cordyceps Sinensis* in old patients]. *Chinese Journal of Integrated Medicine* 14: 259,271-273.
- Berne, R.M., 1980: The role of Adenosine in the regulation of coronary blood flow. *Circ. Res.* 47: 807-813, 1980.
- Bau TT, 1995. Further Study of Pharmacological Functions of JinShuiBao. *Journal of Administration Traditional Chinese Med* 1995;5 (supl):6
- Bok JW, Lermer L, Chilton J, Klingeman HG, Towers GH., (1999) *Antitumor sterols from the mycelia of Cordyceps sinensis*. *Phytochemistry* 1999 Aug;51(7):891-8
- Chamberlain, M. (1996). Ethnomycological experiences in South West China. *Mycologist* 10 (4): 173-176.
- Chang, H.M. and But, P.P.H. (Eds.) (1986). *Pharmacology and Applications of Chinese Materia Medica*, 1. Philadelphia, PA: World Scientific, pp. 410-413.
- Chen, J.R., Yen, J.H., Lin, C.C., Tsai, W.J., Liu, W.J., Tsai, J.J., Lin, S.F., and Liu, H.W. (1993). The effects of Chinese herbs on improving survival and inhibiting anti-DNA antibody production in lupus mice. *American Journal of Chinese Medicine* 21: 257-262.
- Chen K, Li C. (1993) Recent advances in studies on traditional Chinese anti-aging Materia Medica. *J Tradit Chin Med* 1993 Sep;13(3):223-6, 53.
- Chen D.G., (1995) Effects of JinShuiBao Capsule on the Quality of Life of Patients with Heart Failure. *Journal of Administration of Traditional Chinese Medicine* 5 (1995): 40-43
- Chen, S.Z. and Chu, J.Z. (1996). [NMR and IR studies on the characterization of cordycepin and 2'-deoxyadenosine]. *Zhongguo Kangshengsu Zaxhi* 21: 9-12.
- Chen, Y.J., Shiao, M.S., Lee, S.S., and Wang, S.Y. (1997). Effect of *Cordyceps sinensis* on the proliferation and differentiation of human leukemic U937 cells. *Life Sciences* 60: 2349-2359.
- Chen, Y.Q., Wang, N., Qu, L., Li, T., and Zhang, W. (2001). Determination of the anamorph of *Cordyceps sinensis* inferred from the analysis of the ribosomal DNA internal transcribed spacers and 5.8S rDNA. *Biochemical Systematics and Ecology* 29: 597-607.
- Chen, Y., Zhang, Y.P., Yang, Y., and Yang, D. (1999). Genetic diversity and taxonomic implication of *Cordyceps sinensis* as revealed by RAPD markers. *Biochemical Genetics* 37: 201-213.

Chen, K. T., Su, C.H., Chang, H.C., and Huang, J.Y. (1998). Differentiation of genuines and counterfeits of Cordyceps species using random amplified polymorphic DNA. *Planta Medica* 64: 451-453.

Chen YJ, Shiao MS, Lee SS, Wang SY. (1997) Effect of Cordyceps sinensis on the proliferation and differentiation of human leukemic U937 cells. *Life Sci.* 1997;60(25):2349-59.

Creadon, M. and Dam, J. (1996). " Drink up." *Time* (August 19): 55. a biologically active compound from cultures mycelia of Cordyceps and Isaria species. *Phytochemistry* 22: 2509-2512.

Gist Gee, N. (1918). Notes on Cordyceps sinensis. *Mycological Notes* 54: 767-768.

Gordon, D. (1993). : The rumored dope on Beijing's Women." *Newsweek* September 27): 63.

Grey, P. and Barker, R. (1993). Cordyceps or plant eats animal! *The Victorian Naturalist* 110: 98-107.

Guan, Y.J., Hu, G., Hou, M., Jiang, H., Wang, X., and Zhang, C. (1992). Effect of Cordyceps sinensis on T- lymphocyte subsets in chronic renal failure. *Chinese Journal of Integrated Medicine* 12: 323, 338-339.

Guo, Y. Z. (1986). [Medicinal chemistry, pharmacology and clinical applications of fermented mycelia of Cordyceps sinensis and JinShuBao capsule]. *Journal of Modern Diagnostics and Therapeutics* (1): 60-65.

Guo QC, Zhang C. (1995) Clinical Observations of Adjunctive Treatment of 20 Diabetic Patients with JinSHuiBao Capsule. *J Administration Traditional Chinese Medicine* 1995:5(suppl):22

Guowei Dai, Tiantong Bao, Changfu Xu, Raymond Cooper, and Jia Xi Zhu, CordyMax™ Cs-4 Improves Steady-State Bioenergy Status in Mouse Liver. *The Journal Of Alternative And Complementary Medicine* Volume 7, Number 3, 2001, pp. 231-240

Halpern, G., (1999) Cordyceps, Chinas healing mushroom. Avery Publishig 1999: 63-70

Hammerschmidt, D.E. (1980). Szechwan purpura. *New England Journal of Medicine* 302: 1191-1193.

Hobbs, Christopher L. Ac. 1986. *Medicinal Mushrooms, An Exploration of Tradition, Healing and Culture*, pp 81-86

*Holliday, J., Cleaver, P., Loomis-Powers, M., and Patel, D., Analysis of Quality and Techniques for Hybridization of Medicinal Fungus Cordyceps sinensis, *International Journal of Medicinal Mushrooms*, Vol. 6, pp. 147-160 (2004)

*Holliday PhD, John C., Phillip Cleaver BS, Megan Loomis-Powers BS. THE HYBRIDIZATION OF *CORDYCEPS SINENSIS* STRAINS AND THE MODIFICATIONS OF

THEIR CULTURE PARAMETERS, IN ORDER TO OPTIMIZE THE PRODUCTION OF TARGET MEDICINAL COMPOUNDS,

<http://www.immunoceuticals.nwbotanicals.org/lexicon/cordyceps/hybridcordyceps.htm>

*Holliday, J., (2004b) Investigation into mechanism of action with Aloha Medicinals Inc. hybrid Cordyceps altered nucleosides. unpublished research , 2002-2004

* Holliday, J., Cleaver, J. (2004c) *On the Trail of the Wild Yak: Ancient Cordyceps in the Modern World*. MS in press.

<http://www.immunoceuticals.nwbotanicals.org/lexicon/cordyceps/rediscoveryprt1.htm>

* Holliday, J., Clinical Trial report on Chronic Hepatitis treatment using Immune-Assist brand mushroom extract mixture in conjunction with the drug Lamivudine http://alohamedicinals.com/Hep_B_Study2.htm

Huang, Q., Li, D., Liang, J., Liao, S., and Liang S., (1991). [Weak polar chemical components in Cordyceps]. *Journal of Chinese Medical Materials* 14: 33-34.

Huang , Y. et al (1987) Toxicology studies on cultured Cordyceps sinensis strain B414. *Zhongchengyao Yanjiu* 10:24-25 From Abstracts of Chinese Medicine 2:321

Ikumoto, T., Sasaki, S., Namba, H., Toyama, R., Moritoki, H., and Mouri, T. (1991). [Physiologically active compounds in the extracts from tochukaso and cultured mycelia of Cordyceps and Isaria]. *Yakugaku Zasshi* 111: 504-509. Institute for Natural Products Research Cordyceps Monograph.

Jia-Shi Zhu, M.D., Ph.D. and James Rippe, M.D. (2004) Presented at the American Physiological Society's (APS) annual scientific conference, Experimental Biology 2003, held April 17-21, 2004, in Washington, D.C.

Kadota, S., Shima, T., and Kikuchi, T. (1986) [Steroidal components of "I-Tiam-Hong" and Cordyceps sinensis. Separation and identification by high-performance liquid chromatography]. *Yakugaku Zasshi* 106: 1092-1097.

Kiho, T., Tabata , H., Ukai, S., and Hara, C., (1986). A minor protein-containing galactomannan from a sodium carbonate extracted of Cordyceps sinensis. *Carbohydrate Reseach* 156: 189-197.

Kiho T, Hui J, Yamane A, Ukai S. (1993) Hypoglycemic activity and chemical properties of a polysaccharide from the cultural mycelium of Cordyceps sinensis. *Biol Pharm Bull* 1993 Dec;16(12):1291-356

Kiho T, Yamane A, Hui J, Usui S, Ukai S. (2000) Hypoglycemic activity of a polysaccharide (CS-F30) from the cultural mycelium of Cordyceps sinensis and its effect on glucose metabolism in mouse liver. *Phytother Res* 2000 Dec;14(8):647-9

Koh JH, Yu KW, Suh HJ, Choi YM, Ahn TS. (2002) Activation of macrophages and the intestinal immune system by an orally administered decoction from cultured mycelia of *Cordyceps sinensis*. *Biosci Biotechnol Biochem*. 2002 Feb;66(2):407-11

Kuo, Y.C., Tsai, W.J., Shiao, M.S., Chen, C.F., and Lin, C.Y. (1996) *Cordyceps sinensis* as an immunomodulatory agent. *American Journal of Chinese Medicine* 24: 111-125.

Kuo, Y.C., Tsai, W.J., Wang, J.Y., Chang, S.C., Lin, C.Y., and Shiao, M.S. (2001). Regulation of bronchoalveolar lavage fluids cell function by the immunomodulatory agents from *Cordyceps sinensis*. *Life Sciences* 68; 1067-1082.

Hawksworth D. L., et al. 1995 *Ainsworth and Bisbi's Dictionary of the Fungi*: 8th ed. International, University Press and Cambridge, 616 pp.

Hirose K., and Yahagi N. 1997. *Japan tochukaso, Shock to Disappear of Cancer*. Metamoru shyupan, Tokyo, 175 pp.

Itami H., and Yahagi N. 1996. *Japan tochukaso, Challenge for Terminal Cancer*. Metamoru Shyupan, Tokyo, 140pp.

Jiang, JC, Gao, YF. Summary of treatment of 37 chronic renal dysfunction patients with JinShuiBao. *J Administration Traditional Chinese Med* 1995: 5(suppl):23-24 57

Kiho T., and Ukai S. 1995. *Tochukaso (Semitake and others), Cordyceps species*. *Food Rev Int*, 11, 231-234.

Kiho T., Hui, J., Yamane A., and Ukai S. 1993. Hypoglycemic activity and chemical properties of a polysaccharide from the cultural medium of *Cordyceps sinensis*. *Bio Pharmacol Bull*, 16 1291-1293.

Hiho T., Yamane A., Hui J., Usui S., and Ukai S. 1996. Hypoglycemic activity of a polysaccharide (CS-F30) from the cultural mycelium of *Cordyceps sinensis* and its effect on glucose metabolism in mouse liver. *Biol Pharmacol Bull*, 19, 294-296.

Hsu T. H., Shiao L. H., Hsieh C., and Chang D. M. 2002. A comparison of the chemical composition and bioactive ingredients of the Chinese medicinal mushroom *DongChongXiaCao*, its counterfeit and mimic, and fermented mycelium of *Cordyceps sinensis*. *Food Chem*, 78, 463-469.

JIA-SHI ZHU, M.D., Ph.D., GEORGES M. HALPERN, M.D., Ph.D., and KENNETH JONES (4) The Scientific Rediscovery of an Ancient Chinese Herbal Medicine: *Cordyceps sinensis* Part I

<http://www.immunoceuticals.nwbotanicals.org/lexicon/cordyceps/rediscoveryprt1.htm>

Kim Y., ed. 1998. Impact experiences for 50 people came back from the depths of death with vegetable wasps and plant worms. From the last stages of cancer. Nishinhodo, Tokyo, 207pp.

Koh JH, Yu KW, Suh HJ, Choi YM, Ahn TS. (2002) Activation of macrophages and the intestinal immune system by an orally administered decoction from cultured mycelia of *Cordyceps sinensis*. *Biosci Biotechnol Biochem*. 2002 Feb;66(2):407-11

Kobayashi Y., and Shimizu D., 1983. *Iconography of Vegetable Wasps and Plant Worms*. Hoikusha Tokyo, 208 pp.

Kubo M. 1996 *Tochukaso. Its secret and its Power*. Hoikusha., Tokyo, pp. 128, 152.

Li, L.S. and Zheng, F. (1992). Clinical protection of aminoglycoside nephrotoxicity by *Cordyceps sinensis* (CS). *Journal of the American Society of Nephrology* 3: 726 (ABSTRACT 24p).

Liu FA, Zheng X, (1993) Study of *Cordyceps sinensis* on anti-laryngeal carcinoma. *J. Norman Bethune University Med Sci* 1993; 19(1):57-58

Liu, C., Xue, HM., Xu, LM., Zhao, PZ., Zhang, LB., Tang, MG., Treatment of 22 patients with post hepatic cirrhosis with a preparation of fermented mycelia of *Cordyceps sinensis*. *Shanghai J Chinese Materia Medica* 1986;6:30-31

Leung, A.K., Gong, F., and Chau, F. (2000). Analysis of the water soluble constituents of *Cordyceps sinensis* with heuristic evolving latent projections. *Analytical Letters* 33: 3195-3211.

The Merck Index, 11 Edition, 1989. 2524 Cordycepin. Merck and Co., 395 pp.

Mizuno T. 1997. Development and utilization of bioactive substances from medical and edible mushrooms fungi (10) *Charga, Sclerotiana of Fuscopotia oblique* (Fr) Aoshima. *The Chemical Times*, 163, 9-15.

Mizuno T. 1998. *Immunological Diet for Cancer Serious Disease*. Gendaishorin, Tokyo, 188 pp.

Nakamura K, Yamaguchi Y, Kagota S, Shinozuka K, Kunitomo M., Activation of in-vivo Kupffer cell function by oral administration of *Cordyceps sinensis* in rats. (1999) *Jpn J Pharmacol* 1999 Apr;79(4):505-8

Nakamura K, Konoha K, Yamaguchi Y, Kagota S, Shinozuka K, Kunitomo M. (2003) Combined effects of *Cordyceps sinensis* and methotrexate on hematogenic lung metastasis in mice. *Receptors Channels*. 2003;9(5):329-34

Ohmori T., Tamura K., Tsuru S., and Nomoto K., 1986. Antitumor activity of protein-blood polysaccharide from *Cordyceps ophioglossoides* in mice. *Jpn J Cancer Res (Gann)*, 77, 1256-1263.

Ohmori T., Tamura K., Furuki K., Kawanishi G., Mitsuyama M., Nomoto K., Miyazaki t, 1989. Isolation of galactosaminoglycan moiety (CO-N) from protein-bound polysaccharide of

Cordyceps ophioglossoides and its effects against murine tumor. Chem Pharmacol Bull, 37, 1019-1022.

Parcell AC, Smith JM, Schulthies SS, Myrer JW, Fellingham G. (2004) Cordyceps Sinensis (CordyMax Cs-4) supplementation does not improve endurance exercise performance. Int J Sport Nutr Exerc Metab. 2004 Apr;14(2):236-42

Pelleg, A., Porter, R.S. (1990) The pharmacology of adenosine. Pharmacotherapy 10: 157-174, 1990

Segelken, R. (2002) Cyclosporin mold's 'sexual state' found in New York forest Cornell students' discovery could target additional sources of nature-based pharmaceuticals Cornell University Science News, Sept 16, 1996

Shin KH, Lim SS, Lee SH, Lee YS, Cho SY (2001) Antioxidant and immunostimulating activities of the fruiting bodies of Paecilomyces japonica, a new type of Cordyceps sp. Ann N Y Acad Sci. 2001 Apr;928:261-73.

Shin KH, Lim SS, Lee S, Lee YS, Jung SH, Cho SY. (2003) Anti-tumour and immunostimulating activities of the fruiting bodies of Paecilomyces japonica, a new type of Cordyceps spp. Phytother Res. 2003 Aug;17(7):830-3.

Shimizu D. 1994. Color Iconography of Vegetable Wasps and Plant Worms. Seibundoshinkosha, Tokyo, 381 pp.

Smith, Rowen and Sullivan (2002), Medicinal Mushrooms: Their Therapeutic Properties and Current Medical Usage with Special Emphasis on Cancer Treatment, May 2002, 106-141

Suh SO, Noda H, Blackwell M (2001) Insect symbiosis: derivation of yeast-like endosymbionts within an entomopathogenic filamentous lineage. Mol Biol Evol. 2001 Jun;18(6):995-1000.

Tai-Hao, H., Hui-Chen, L., Biological activity of Cordyceps (Fr.) Link Species (Ascomycetes) Derived from a Natural Source and from Fermented Mycelia on Diabetes in STZ-Induced Rats. Inter J of Med Mush 4; 111-125

Tai-Hao Hsu, Li-Hua Shiao, Chienyan Hsieh and Der-Ming Chang, 2002. A comparison of the chemical composition and bioactive ingredients of the Chinese medicinal mushroom DongChongXiaCao, its counterfeit and mimic, and fermented mycelium of Cordyceps sinensis. Food Chemistry Vol 78, Issue 4, pp463-469

Takeuchi N. 1998. Pharmacological effect of Tochukaso and its utilization for food. Kagaku to Kogyo, 51, 1614-161.

Toda, N., Okunishi, H., Taniyama, K., Miyazaki, M., (1982) Response to adenine nucleotides and related compounds of isolated dog cerebral, coronary and mesenteric arteries. Blood Vessels 19: 226-236 1982

Tsutomu Furuya, Masao Hirotsu and Masayuki Matuzawa 1983. N6-(2-hydroxyethyl)adenosine, a biologically active compound from cultured mycelia of *Cordyceps* and *Isaria* species. *Phytochemistry*, Vol 22, No. 11, pp 2509-2512, 1983

Ukai S, Kiho T, Hara C, Morita M, Goto A, Imaizumi N, Hasegawa Y (1983) Polysaccharides in fungi: XIII. Antitumor activity of various polysaccharides isolated from *Dictyophora indusiata*, *Ganoderma japonicum*, *Cordyceps cicadae*, *Auricularia urricula-judae* and *Auricularia* sp. *Chem Pharma Bull* (Tokyo) 31:741–744

Wang, R., Xu, Y., Ji, P., Wang, X., Holliday, J (2001) Clinical Trial Of A Mixture of Six Medicinal Mushroom Extracts. http://alohamedicinals.com/clinical_trials.html 2001

* Wang, R., Xie, J., Ji, P., Li, S., Zhan, H., Xia, J., Sun, H., Lei, L., Yu, J., Wang, Y., Holliday, J., Clinical Trial report on Chronic Hepatitis treatment using Immune-Assist brand mushroom extract mixture in conjunction with the drug Lamivudine http://alohamedicinals.com/Hep_B_Study2.htm

Wasser, S.P., (2002) Medicinal mushrooms as a source of antitumor and immunomodulating polysaccharides. *Appl Microbiol Biotechnol* (2002) 60:258–274

Wu T. N., Yang K. C., Wang C. M., Lai J. S., Ko K. N., Chang P. Y., and Liou S. H. 1996. Lead poisoning caused by contaminated *Cordyceps*, a Chinese herbal medicine: two case reports. *Sci Total Environ*, 182, 193–195.

Xiao Y., Huang X.Z., Chen G., Wang M.B., Zhu J.S., Cooper C.B.: Increased Aerobic Capacity in Healthy Elderly Humans given fermented *Cordyceps* Cs-4: a Placebo controlled Trial. Ann. Meeting American College of Sports Medicine, Seattle, WA, June 3-5, 1999.

Xu, W.Z., Wei, J.P., Wang N. Q., Liu T., (1988) Experimental study of the combined chemotherapy of Zhiling Capsules and Anticancer agents. *Shanghai Zhongyiyao Zazhi* 1988; (6): 48

Xu, F., Huang JB., Jiang, L., Xu, J., Mi, J., (1995) Amelioration of cyclosporin nephrotoxicity by *Cordyceps sinensis* in kidney transplanted recipients. *Nephrol Dial Transplant* 1995; 10(1):142-143

Yamada H., Kawaguchi N., Ohmori T., Takeshita Y., Teneya S., and Miyazaki t. 1984. Structure and antitumor activity of an alkali-soluble polysaccharide from *Cordyceps ophioglossoides*. *Carbohydr Res*, 125, 107-115.

Yamaguchi N., et al, (1990) Augmentation of various immune reactivities of tumor bearing hosts with an extract of *Cordyceps sinensis*. *Biotherapy*, 2: 199-205

Yamanaka K., and Inatomi S, 1997. Cultivation of *Isaria japonica* fruit bodies on mixed plant/insect media. *Food Rev Int*, 13, 455-460.

Yang, YZ., Wang, LS., Deng, HY., Ma, YS., Wu, HS., Short term observation of treating chronic hepatitis B and post hepatic cirrhosis with XinGanBao. *Res Chinese Materia Medica* 1994;(1):19-20

Yin, DH and Tang, XM 1995. Progress of cultivation of *Cordyceps sinensis*. China, *J Chinese Materia Medica* 1995;20(12):707-709

Yoshida J et al (1989) Antitumor activity of an extract of *Cordyceps sinensis* (Berk.) Sacc. Against murine tumor cell lines *Jpn J Exp Med* 59:157-161

Yue-Qin C, Ning W, Hui Z, Liang-Hu Q. (2002) Differentiation of medicinal *Cordyceps* species by rDNA ITS sequence analysis. *Planta Med.* 2002 Jul;68(7):635-9.

Zhao CS, Yin WT, Wang JY, Zhang Y, Yu H, Cooper R, Smidt C, Zhu JS. (2002) *Cordyceps* Cs-4 improves glucose metabolism and increases insulin sensitivity in normal rats. *J Altern Complement Med.* 2002 Aug;8(4):403-5.

Zhang, Changkai; Zhou, Youchun; Wu, Zhihong; and Bai, Yuqian 1992. Nourishment of *Cordyceps sinensis* mycelium. *Weishengwuxue Tongbao* (1992), 19(3), pp 129-133

Zhu, Jia-Shi, Halpern, G., Jones, K (1998) The Scientific Rediscovery of an Ancient Chinese Herbal Medicine: *Cordyceps sinensis* *The Journal Of Alternative And Complementary Medicine* [part 1]Volume 4, Number 3, 1998, pp. 289—303 [part 2] Volume 4, Number 4, 1998, pp. 429 - 457

ZHU J-S, Halpern GM, Jones, K. The Scientific rediscovery of a precious ancient Chinese herbal regimen: *Cordyceps sinensis*: Part I. *J Alt Comp Med* 1998;4(3):289-303.) ATP/IP ratio. *Cordyceps* has been clinically proven to increase cellular Bio-Energy by as much as 55% (Reported XU C.F et al in

For more information contact:

Pharmaceutical Mushrooms

a division of Northwest Botanicals, Inc.

Full Spectrum™ Mushroom Mycelium Products

Richard Alan Miller

1212 SW 5th Street

Grants Pass, OR 97526-2939

(541) 476-5588

(541) 476-1823 (FAX)

Visit Pharmaceutical Mushrooms online at
<http://www.immunoceuticals.nwbotanicals.org/>

RICHARD ALAN MILLER

Lectures, Writing, & Research

Author & researcher Richard Alan Miller reveals a wealth and depth of knowledge and experience in three major fields; Alternative Agriculture, New Age Physics, and Metaphysics. Before many leading edge concepts became trendy topics, Miller was (and is) in the international front lines of research, experimentation and documentation.



His focus on botanicals made him the leading world authority on herb farming, processing and marketing. With numerous books, bi-lines and websites (www.nwbotanicals.org), Miller's visionary work with Alternative Agriculture continues to be 20 years ahead including concepts such as sustainability, intercropping, and Forest Farming.

Taking a step behind the scenes of "black ops" research is for most of us limited to speculations. Miller began working in that "X-Files" world in the 60s and has amazing experiences and conclusions to share. An original team-member, "man-in-black," Miller's research in the field of Parapsychology & Paraphysics began as a graduate physicist working 10 years with Army Intel/Pentagon.

During this period numerous foundational papers, including "A Holographic Concept of Reality" and "Embryonic Holography" were written. Richard Alan Miller's most recent work, "Synthetic Telepathy and the Early Mind Wars" discusses how some of his earlier work contributed to new "mind altering" technologies and their current applications.

His most recent works at Nexus Conferences in Brisbane, 2004 and Amsterdam, 2005 was titled "The Non-Local Mind In A Holographic Universe." He also has semi-technical papers to be presented in Anaheim at The World Nutra Conference in October, 2005. Title: "Lab-Grown *Cordyceps sinsensis* Hybrid: A Nano-Processed Medicinal Mushroom that Really Delivers."

Offering fresh perspectives on Metaphysical traditions his books, papers & articles integrate his scientific research with time-honored metaphysical concepts, leading to such works as The Modern Alchemist; A Guide to Personal Transformation and The Diamond Body, a Synergetic Approach to Mysticism.

He brings a similar integration to The Magical & Ritual Use of Herbs and The Magical & Ritual use of Aphrodisiacs. Miller is listed in Who's Who in the World, America, and the West.

Richard Alan Miller
Northwest Botanicals, Inc.
(541) 476-5588
(541) 476-1823 (fax)
www.nwbotanicals.org
www.herbfarminfo.com