Cordyceps sinensis Medicinal Fungus: Traditional Use among Tibetan People, Harvesting Techniques, and Modern Uses

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The fungus cordyceps (Cordyceps sinensis, Ophiocordycipitaceae) has been known as an effective tonic and aphrodisiac in Traditional Chinese Medicine (TCM) and is increasingly used in China as a popular dietary supplement and/or medicine. Owing to the upsurge in consumer demand for this ingredient in the past few decades, Tibetan peoples have been gathering increased amounts of cordyceps over the high-altitude expanses of Tibetan regions, and this activity has become one of their most important sources of income in certain parts of the country. Prices rose significantly from the early 1980s until 2008, at which point they dropped due to the global economic crisis.

Cordyceps is also renowned within other international markets, and it is available in several countries around the world, where it is sold in different forms. Although not as highly prized in the Tibetan traditional system of medicine as in Chinese medicine, the fungal ingredient is included in the materia medica of Tibetan medicine. Its first citation in Tibetan medical treatises actually pre-dates its reference in Chinese texts by a few centuries.

The present article analyzes the use of cordyceps among Tibetans with particular reference to its classification and therapeutic properties, gathering and processing, combination with other medicinal substances in Tibetan medicine, as well as its use on the popular level.

The Fungus Cordyceps sinensis

Cordyceps is a genus of ascomycete fungi belonging to the family Ophiocordycipitaceae (formerly Clavicipitaceae), parasitic mainly on insects and other arthropods. These type of fungi are thus named entomophagous (feeding on insects) fungi. [Authors’ taxonomic note: According to the recent DNA review of the genus Cordyceps, the new name for Cordyceps sinensis is Ophiocordyceps sinensis (Berk.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora.] Cordyceps sinensis s.l. (in the broad sense) is a parasitic fungus living on lepidopterous...
(butterflies and moth) larvae. It attacks and grows on caterpillars, specifically on larvae from the genus Thitarodes (Hepialidae, Lepidoptera).

*Cordyceps sinensis* thrives from 3000 to 5000 meters above sea level, in cold, grassy, alpine meadows of Tibet Autonomous Region (TAR, Chinese: Xizang), Sichuan, Gansu, Qinghai, and Yunnan Chinese provinces, and in a few Nepalese, Bhutanese, and Indian Himalayan areas. The infected hosts, of which *T. armoricanus* (Oberthür) Ueda is the most commonly-mentioned species, live underground on the Tibetan plateau and Himalayan regions in the same areas where *C. sinensis* thrives, and they spend up to 5 years before pupating.

![A monk from Lithang monastery scans the ground looking for cordyceps, Lithang County, 4200 meters](Photo ©2009 Alessandro Boesi)

The spores of *C. sinensis* are spread by the wind over the soil and onto plants, where they come into contact with *Thitarodes* larvae, particularly when the caterpillars emerge to feed on roots and herbaceous vegetation. Larvae were observed eating tender roots of alpine meadow species such as *Polygonum*, *Astragalus*, *Salix*, *Arenaria*, and *Rhododendron*. The caterpillars may eat the spores or the spores lying on their bodies may germinate and enter their bodies through the mouth or the respiratory pores (2 of them are present over each metamere). When *C. sinensis* attacks *T. armoricanus*, its mycelium invades the caterpillar’s body, filling its cavity, killing the insect, and eventually completely replacing the host tissue. The dead caterpillar appears yellowish to brown in color. The cylindrical club-shaped fruiting body, 5-15 cm long and dark brown to black in color, grows up from spring to early summer, protruding and developing out of the caterpillar’s forehead. The stroma (mass of fungus tissue) bears many small, flask-shaped perithecia (fruiting bodies) that contain the asci (sacs in which the sexual spores are formed). According to Li et al., *C. sinensis* spores disperse and break up into 30-60 propagules, which attach themselves to the larval state of the insect; usually 15 days pass between spore dispersion and larval infection.

In the Lithang area, where most of the fieldwork was conducted, the authors observed *C. sinensis* between 4000 and 4500 meters of altitude in the alpine grasslands on the northern slopes of the Shaluli Shan Range mountains. The length of the larvae varies roughly from 3 to 6 centimeters. The length of the dry mushroom spans from 3 to 10 centimeters.

**Cordyceps Harvesting**

During our fieldwork in east Tibet, we participated in the gathering of cordyceps, both with Tibetan medical practitioners and professional gatherers. The season starts at the beginning of April and lasts until the end of June, although normally the harvesting season spans from the beginning of May until the middle of June. After that period, according to a modern text of Tibetan materia medica, "the body of the ‘worm,’ which is within the ground, gets rotten… until its interior becomes hollow.”

The gathering of cordyceps represents the principal source of income for many Tibetans from Lithang and neighboring areas. Many people from Lithang—young and old, laymen and monks, men and women—walk everyday along the steep path that leads to the collecting areas. A few Chinese citizens, some of them coming from lowland regions, also participate in the gathering. According to our informants, most of the picking areas are located on the north-facing slopes of the mountains. Most of the gatherers lie on the ground over the high-altitude expanses, attentively scanning the terrain. The search for the tiny cordyceps in the high altitude grasslands, interspersed with small Rhododendron bushes and various vegetation, still dormant at the beginning of spring, is a difficult task, requiring concentration and patience. In fact, the height and thickness of the fungus are so small that it cannot be easily seen; in spring the ground is covered with short vegetation stumps as brownish as the tiny cordyceps. But Tibetan people generally seem happy to perform this work since it is not considered particularly strenuous, the enterprise is highly profitable, and because they like spending their time together in the mountains.

![Cordyceps on sale at Chengdu medicinal ingredients market](Photo ©2009 Alessandro Boesi)
The gatherers proceed slowly on hands and knees, or bending the body and leaning on a small hoe. They usually carefully scan the area in front of them, keeping their faces close to the ground. If they do not recognize any cordyceps, they take a few steps forwards and proceed in the search to an adjacent area. Cordyceps is extracted from the soil with a hoe or a small knife. It is important not to damage the larva, because it would lose value. We have noticed many gatherers carrying thin sticks of wood (like toothpicks) that may be used to repair cut or broken larvae or to increase the weight of the product, once inserted in them.

Some gatherers claim that they may find 30 to 40 worms a day. Nawan Tashi, an independent doctor who often spends a few days of the gathering season collecting cordyceps, says that the average amount collected in that area does not usually exceed 20 specimens a day; the maximum specimens number that he has found in one day has been 27. On the day that we met with him, he arrived home late in the afternoon with only 14 specimens in his leather bag. After drying the amount collected, Nawan Tashi saved some of it in his store room with other herbal materials. He generally sells most of the product on the local market to make some money, with which he then buys other medicinal plants, usually manufactured Tibetan pills from the Derge Tibetan Medical Institute. At the time of our fieldwork, a few small bags full of cordyceps were hanging from the wooden ceiling of his home. He had decided to sell them the next winter when the price would be higher.

Cordyceps Use at the Popular Level

Traditionally, Tibetan people perceive cordyceps as a single substance that undergoes a metamorphosis on passing from spring to summer. They refer to it as yartsa gumbu, meaning “summer-grass winter-worm,” although they frequently shorten the name to lu (“worm”) at the popular level. All the Tibetans with whom we spoke believe that, during winter, cordyceps lives as a worm and that, after a metamorphosis occurring at the beginning of spring, it changes into a kind of grass. In certain confined areas, such as a few sacred sites, cordyceps seems to have connections with the local popular religion. Its gathering was banned, for example, in the Dzachuka (Dzha chu kha) and Sertha (Se tha) regions (located in Sêrxü County and Sêrtar County, respectively, Ganzi Tibetan Autonomous Prefecture, Sichuan Province). Animals that dwell underground in burrows, as Huber reports, “are negatively associated with the archaic cosmology. These species are considered to be too close to the realm of the “worm” at the popular level.”

The use of cordyceps is not particularly common at the popular level in Lithang County and in the other fieldwork areas. Several Tibetan medical practitioners agree on the fact that, in general, this substance is seldom used as a medicine or diet supplement among Tibetans, who essentially regard it as a trade item.

The few people who consume the product typically do so as a tonic in the form of a beverage that may be prepared in different ways. We have sometimes observed Tibetans sipping small amounts of these potions from tiny bottles while conducting activities such as carving religious prayers on stones and gambling. Nearly 80 informants (i.e., gatherers of and traders in cordyceps, plus Tibetan traditional doctors) maintain that these potions are helpful to the body’s general health and for increasing strength and vigor, and that they are also a good aphrodisiac. Our informants from Lithang explain that these potions are prepared by dipping a few cordyceps specimens into a container filled with arak (a rag), a local alcoholic spirit processed from barley or rice. The number of specimens may vary according to the quantity of alcohol increases the potion potency and effectiveness. When the arak is exhausted, some more may be added by filling the container again. Most informants state that the refilling can be done several times and are aware that, in this case, the potion’s overall potency decreases. Some people may add other ingredients, as is often done by traditional doctors. Winkler reports that “in Lithang there is already a distillery that produces liquor (single jiü) from regionally grown barley with a few caterpillar fungi or fritillary bulbs floating in the bottle.”

A few informants provide evidence that the popular level in other regions inhabited by populations of Tibetan language and culture. In the Dolakha District (Central-east Nepal), the Sherpa people use cordyceps as an aphrodisiac and tonic: “One to two fruiting body are orally administered with milk, once a day.” According to Sacherer, in the Rolwaling Valley of the same District, the product is popularly used as a tonic and aphrodisiac and “is eaten in combination with barley, rice, caterpillar and fungus, mostly by middle aged men.” In Nar (Central Nepal, Manang District), it is said that “if a person mixes yortsagumbu with 13 other herbs and takes the mixture over a period of three years, he will become as thick as an elephant, quick as a horse and pretty as a peacock,” and it has been assessed that “the product is ground, boiled in milk and drunk with honey or rock candy.” According to a publication by the Ministry of Forests and Soil Conservation of Nepal, in the Thak areas (Central Nepal) cordyceps “is taken orally in combination with Dactylorhiza hatagarea (Orchidaceae), honey and cow’s milk,” and it is also administered as a tonic to yak and sheep. A similar use is attested also among the Tibetan practitioners of Dolpa District (West Nepal). According to Phuntsok Namgyel, who has been conducting extensive survey in Bhutan on cordyceps as an economic resource for local people, in several areas of this country the fungus is also known as a medicine at the popular level.

Distribution of cordyceps in Tibet