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Alternatives to the Use of Endangered Species in Chinese Medicine

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Abstract

This paper summarises emerging issues related to the use of endangered species of animals and plants in Chinese medicine. In particular it focuses on:

1. Newly identified substitutes for endangered species which have reliable and similar therapeutic effects (for example, buffalo horn instead of rhinoceros horn; pig bone instead of tiger bone; and *Radix Berberidis* instead of *Rhizoma Coptidis*).
2. Cultivating wild plants and breeding endangered animals where possible (for example, cultivating *Gastrodia elata* BL., breeding deer *Cervus nippon* Temminck and antelope *Saiga tatarica* L.).
3. Removing medicinal parts from the live animals or plants other than destroying them (for example, obtaining musk from live musk deer *Moschus berezovskii* Flerov or peeling off the bark of *Eucommia ulmoides* Oliv. without damaging the tree).
4. Using plant tissue and cell culture to propagate medicinal herbs, increase active constituents and protect resources from extinction (for example, tissue culture of *Artemisia annua* L). To obtain more quantity of artemisinin, tissue cultures *Scopolia acutangula* C.Y. Wu et C. Chen to obtain and adjust different amount of l-hyoscyamine, scopolamine and anisodamine.
5. Using man-made artificial substitutes instead of using the parts of the animals.

The cases provided are the artificial Calculus Bovis and the Synthetic Muskone which both come from endangered species. Both alternatives are successful in experiments and clinical trials conducted.

The Chinese Government and organisations associated with the use or regulation of Chinese medicine need to further develop these techniques and undertake appropriate research to remove all medicinal reliance on endangered plants and animals to ensure endangered animals and plants to be protected and enforce the law.

Introduction

The Chinese Materia Medica is the basis for the treatment and cure of disease in Chinese medicine, and used for over the centuries for health and longevity. Since Chinese medicine has been successfully used in many treatments of diseases and causes less toxicity and side effects, Chinese herbal medicine is becoming increasing popular with both health care practitioners and the public.

With the increasing awareness, instruction and practice of Chinese medicine, the issue of use of parts from endangered species such as tiger *Panthera tiger* and *rhinocerotidae* spp. as ingredients in traditional Chinese medicine has become an international conservation concern.

Chinese medicine practitioners had used these medicinal materials in the past. However, these practices have been banned in China for many, many years, even though these materials still appear in some textbooks of traditional Chinese medicine (Zhang 1990).

Chinese medicine always emphasises the harmony and balance between mankind and environment. According to Chinese medicine, it is important to understand that the body reflects universal order (*tian ren he yi* or microcosm and macrocosm). As a matter of fact, a lot of experimental and clinical research has been undertaken to find effective, abundant and safe substitutes and already quite a lot of achievements have been made.

In the past, some illegal and banned raw or manufactured products containing endangered species have been found on the market in Australia, causing some misunderstanding of the common opposition to this in Chinese medicine. With a better understanding, we believe that Chinese medicine will grow and develop healthily and smoothly.

The following information is part of research achievement in pharmacological effects, active chemical constituents and observation of clinical application in China over the recent years.

Newly Identified Substitutes for Endangered Species

Buffalo Horn (Shui Niu Jiao) Instead Of Rhinoceros Horn

There are five species of rhinoceros: white rhinoceros *Ceratotherium simum* and black rhinoceros *Diceros bicornis* found in African, and greater one-horned (Indian) rhinoceros *Rhinoceros unicornis*, Javan rhinoceros *Rhinoceros sondaicus* and Sumatran rhinoceros *Dicerorhinus sumarensis* found in Asia. According to traditional Chinese medicine theory, rhinoceros horn removes heat from the blood induces hemostasis, clears away heat-fire to calm *shen*, removes toxins and relieves feverish rashes or eruptions. Clinically, it is applied to treat bleeding due to blood heat, acute febrile diseases with heat invasion of the heart and *ying* system, and epidemic febrile diseases with excessive noxious heat (Zhang 1990).

Now in China, buffalo horn (Shui Niu Jiao, *Cornu bubalis*) has replaced rhinoceros horn. It has been regulated in Chinese Pharmacopoeia (1995). Pharmacological study has shown that buffalo horn has antipyretic, cardiotonic and anti-atherosclerosis effect, and lowers blood-fat etc. Chemical analysis demonstrates that buffalo horn has similar constituents to rhinoceros horn. Clinical trials show that effectiveness in treating epidemic Encephalitis B for rhinoceros horn is 80 % and for buffalo horn is 82.4 %, in treating febrile diseases for rhinoceros horn is 67.8 % and for buffalo horn is 70 % (School of Pharmacy, Beijing Medical University 1979).

Pig Bone Instead of Tiger Bone

Tiger bone (Hu Gu, bone of *Panthera tigris* L.) In Chinese medicine, its therapeutic action is related to the channel of liver and kidney. Clinically, it was used for relieving pain (especially rheumatism), strengthening muscles and bones and treating weakness of the lower limbs due to deficiency of the liver and kidney (Zhang 1990).

Dog bone and pig bone has been determined to have the effects similar to tiger bone. Clinical trials showed that the preparation, which contains dog bone as the major component, has significant therapeutic effect on treating rheumatic arthritis and rheumatoid arthritis. The total effective rate is 92.7 % (Chen 1982, p. 25). The experimental research showed that pig bone is a good medicine to treat bone fracture and soft tissue injury. Pharmacological research also showed that pig bone has anti-inflammatory and anti-oncotic effects (Zhu and Deng 1992).

Radix Berberidis Instead of Rhizoma Coptidis

Rhizoma Coptidis (Huang Lian) has significant effect of clearing away heat, drying dampness, purging fire and clearing away toxin. But its resource becòme less and less, and tends to exhaust.

Berberis is abundant in China and has approximate 200 species. Chemical analysis showed that the roots of Berberis have similar chemical components to those *Rhizoma Coptidis*, some constituents of *Radix Berberidis* (San Ke Zhen) which have not been found in *Rhizoma Coptidis*. Pharmacological experiment showed that *Radix Berberidis* has anti-microbial, anti-infective and anti-fungal effects, as well as immunological enhancement. It has been widely used in clinical practice in China (School of Pharmacy, Beijing Medical University 1979).

Cultivating Wild Plants and Breeding Endangered Animals

Cultivating Rhizoma Gastrodiae (Tian Ma)

Rhizoma Gastrodiae is the dried tuber of *Gastrodia elata* Bl. (Fam. Orchidaceae). It is the top-grade herb which can relieve rheumatism, make free blood vessels and strengthen bones and tendons. It is used to treat;

(1). the vertigo arising from different causes of disease, such as cerebral arteriosclerosis, inadequate blood supply in vertebral basal artery, coronary disease, high blood pressure, etc;
(2). Acroteric numbness, insomnia;
(3). Epilepsy, angina pectoris, and neurasthenia.

However, it is such an important herb with so limited resource. Now scientific research has achieved turning wild tuber of elevated Gastrodia into a domestic plant. According to the relationship that the growth of *Gastrodia elata* must depend on the existence of *Armillaria mellea*, the Medicines Institute of the Chinese Academy of Medical Sciences carried out the studies of the utilisation of *Armillaria mellea*. After repeated tests, they have scored a great success in the artificial cultivation of *Armillaria mellea* of *Gastrodia elata*. It has medicinal effects of quick action and regulating nerves and strengthening the physique. This medicine has sedative and shock-resistant effects on the central nervous system, improves blood circulation and increase the blood flow in the cerebral and coronary arteries. Clinical trials have found that *Gastrodia elata* has specific effects on the treatment of such diseases as vertigo, headache, insomnia, high blood pressure, coronary disease, angina pectoris, epilepsy, neurasthenia, etc. with the average efficiency above 91 % (China National Corporation of Traditional and Herbal Medicine).

Breeding and Propagating Saiga Antelope and Deer

Saiga Antelope horn (horn of *Saiga tatarica* L., Ling Yang Jiao) is used in calming the liver to check endogenous wind, clearing away heat from the liver to improve acuity of vision and clearing away heat and toxin. Chinese scientists have introduced Saiga Antelope from Kazachstan, Russia and have established an antelope farm to breed for medicinal supplies.

Pilose antler (*Gornu Cervi Pantotrichum)* is the hairy, non-ossific young horn of stag of *Cervus nippon Temminck* or *Cervus elaphus Linnaeus*. Its therapeutic effect is reinforcing the kidney-yang, tonifying the vital essence and blood and strengthening the bones and muscles. The researchers in China have successfully introduced captive-bred deer programs and have set up a farming stock of deer.

Removing Medicinal Parts from Live Animals or Plants without Destroying Them

Musk (Moschus, She Xiang) is the dried secretion from the musk sac of adult male musk deer. It had been used to restore consciousness, to activate blood circulation, stimulate menstrual discharge, reduce swelling and to relieve pain. Because the musk deer is a very rare and endangered animal, Chinese scientists have already employed modern science and technology to explore the medicinal properties of deer musk. They use artificially bred wild musk deer, and successfully extract the musk from the live deer. Multiple harvesting not only stimulates musk production, but also increases the male musk deer reproductive ability (Xu et. al. 1987).

Eucommia Bark (*Cortex Eucommiae*, Du Zhong) comes from the trunk bark of *Eucommia ulmoides* Oliv. It is applied to nourish the liver and kidney, strengthen the bones and muscles and prevent miscarriage. It is very effective to treat hypertension and vascular diseases. People used to obtain the medicinal part by peeling bark from the trunk causing the tree to die. After much research, the people developed new biotechnology to peel off the bark without damaging the tree. The method also stimulates the tree cortex to grow quickly.

Using Plant Tissue and Cell Culture to Propagate Medicinal Herbs

Sweet Wormwood (*Herba Artemisiae*, Qing Hao) is the herb obtained from the above-ground part of *Artemisia annua* L. It is used clinically in removing heat from the blood, bringing down hectic fever, clearing away heat from the gall bladder, relieving summerheat and preventing the recurrence of malaria and fever. Artemisinin is the main component of sweet wormwood. To obtain more quantity of artemisinin, researchers in China have made success of developing and applying the technique of cultivation and are using the tissue culture of *Artemisia Annua L* to improve crop yields (Xu et. al. 1987).

Scopolia acutangula C. Y. Wuet C. Chen (San Fen San) is used to clear away wind-dampness and relieve the pain and spasm. Pharmacological research shows it can improve microcirculation. It contains three main biological active constituents of l-hyoscyamine (l-Lang Dang Jian), scopolamine (Dong Lang Dang Jian) and anisodamine (Shan Lang Dang Jian) etc. They apply the tissue culture *in vitro* to increase both the output and quality and adjusts different amounts of these alkaloids (Xu et. al. 1987).

Using Artificial Substitutes Instead of Animal Parts

Calculus Bovis *(Niu Huang)* is the gallstone (in the gall bladder and, less commonly, in the bile ducts) of *Bos taurus* domesticus Gmelin of Bovidae. It is used to restore consciousness by reducing *fire*, eliminating *phlegm*, relieves convulsions and counteracts toxicity. If the gallstone is found when slaughtering an ox, it is taken out and dried in the shade The outer thin covering removed.

The artificial substitutes of Calculus Bovis consist of similar constituents, which include Bilirubin, Cholic acid and deoxycholic acid. Experiments and clinical trials show that the artificial Calculus Bovis has antipyretic, anticonvultic, apophlegmatic and bacterial inhibiting effects and is reliable for further medical use (School of Pharmacy, Beijing Medical University 1979).

Synthetic Muskone (he cheng she xiang tong) is widely used in China to substitute *Moschus* (she xiang). Experiments show that Muskone has similar resuscitation, angina pectoris relieving and also anti-inflammatory effects and is popular in clinical treatment. (Huang 1994).

Developing Chinese Medicine and Protecting the Environment

The Chinese Government has made regular surveys on the utilisation and availability of medicinal materials. so that the protection and control of the wild medicinal materials could be enforced. Over recent years, the Chinese Government has introduced tough measures to control the possession and sale of products containing endangered plants and animals. Chinese environment and resource protection laws ban harming, killing and smuggling endangered species in and out of China.

Owing to the rapid development of the research and production of medicinal materials, the traditional Chinese herbal medicine industry has satisfied the needs of medicinal treatment and health care at home as well as increasing trade exports.

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