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Herb Market Report • Herbs for Women's Health • Adaptogens Review • UK Herbalists to be Licensed

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Gotu Kola

Centella asiatica

Family: Apiaceae

Introduction

Gotu kola is a creeping, low-growing (4-18 inches), perennial herb bearing fan-shaped, tasteless, odorless green leaves on thin stems and small white to purplish-pink flowers.[1-3] It commonly grows in damp, swampy areas of India, Sri Lanka, Madagascar, South Africa, and Central and South America,[1,2] and is widespread throughout tropical and subtropical Asian countries including Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, and Vietnam.[4] Most commercial material originates from India, but the finest quality is thought to come from Madagascar.[2] In Europe and North America, the plant part most often used for medicinal purposes consists of the dried aerial parts collected during the flowering period.[2] The dried whole plant (root, stems, leaves, and fruits) is used in the traditional Chinese and Indian Ayurvedic systems of medicine.[5,6]

Gotu kola should not be confused with cola (*Cola nitida*, Sterculiaceae), aka kolanut, the seeds of which contain caffeine and are used in cola beverages.[1] Gotu kola contains no caffeine and is not a stimulant.[1,3] It should also be noted that in India, gotu kola is commonly adulterated or substituted with bacopa (*Bacopa monnieri*, Scrophulariaceae). Both are sold commonly in Indian markets under the same vernacular name *Brahmi*. Although official Ayurvedic texts are clear that *Brahmi* is the Sanskrit name for bacopa (whole plant) while *Mandukaparni* is the Sanskrit name for gotu kola (whole plant), *Mandukaparni* is also the regional name used for bacopa in the Hindi and Kanada languages, respectively, and both plant materials are named *Brahmi* in the Urdu language, among other vernacular confusions. However, bacopa can be recognized easily by both morphological characteristics and chemical assay.[2]

History and Cultural Significance

Centella asiatica (syn. *Hydrocotyle asiatica*) has over 60 common names in addition to those already mentioned; these include pennywort, Indian or water pennywort, marsh penny, *ji xue cao*, and *talepetrako*.[1,2] Gotu kola, in the the Sri Lankan Singhalese language, means cup-shaped leaf.[4] Sri Lankans, noting that elephants, renowned for their longevity, eat the plant, began eating a few leaves a day in hopes of increasing their lifespan.[1,7] Gotu kola's historical use is mentioned in the Chinese *Shennong Herbal* (circa 1st-2nd century CE). It has been called one of the "miracle elixirs of life" because a Chinese herbalist named Li Ching-Yun, who some believe lived to the age of 197 (but not the 256 or 265 years frequently cited), reportedly used gotu kola regularly.[8]

Gotu kola has been used as an aphrodisiac and to treat a variety of illnesses including abscesses, asthma, diarrhea, epilepsy, fever, hepatitis, high blood pressure, mental fatigue, stomach ulcers, and syphilis.[1-3] It was incorporated into the *Indian Pharmacopoeia* in the 19th century and accepted by the French as a drug in the 1880s.[7]

Today, gotu kola is most commonly utilized for a variety of conditions: the treatment of chronic venous insufficiency (CVI, a condition where the leg veins and their valves do not work effectively, impeding blood flow to the heart), burn wounds, stress-related duodenal ulcers, as a stomachic to tone the stomach and improve its function, and for skin conditions such as scleroderma (hardening of the skin and connective tissue), psoriatic arthritis (inflamed scaly skin with swollen, painful joints), and scabies (a parasitic infection caused by a mite).[1-3,9] Gotu kola is available as a dried herb or extract, in teas, ointments, tinctures, capsules, tablets, and in cosmetic preparations.[3]

In Ayurvedic medicine, gotu kola is best known as a mental rejuvenator, or *medhya rasayana*, a tonic used to reduce mental fatigue and improve mental clarity.[10] It is also used for treating various types of skin conditions and internal and external ulcers, as well as for improving blood circulation and reducing edema. The specific therapeutic uses listed in the *Ayurvedic Pharmacopoeia of*

Gotu Kola *Centella asiatica*. Photo ©2011 Steven Foster

Continued on page 2

India include the treatment of inflammation, tastelessness, fever, cough, itching, skin diseases, excessive urination, dyspnea (difficult breathing)/asthma, and anemia.[11] An important Ayurvedic formulation containing gotu kola is *Brahma Rasayana*, a complex mixture of herbs and fruits in a paste form, taken with warm milk as a cerebral tonic for mental exhaustion, nervous weakness, insomnia, and memory loss.

In traditional Chinese medicine (TCM), dried gotu kola whole plant, known as *ji xue cao* (at dosage of 15-30 g), or fresh plant (at dosage of 30-60 g) is indicated for treating jaundice, heat-stroke with diarrhea, urolithiasis (stones forming in the kidney, bladder, and/or urethra), hematuria (blood in urine), carbuncles and boils, and traumatic injuries.[5]

Gotu kola is permitted by regulation in the United States for use in dietary supplements, cosmetics, and homeopathic preparations. In Canada, gotu kola is found as a component in licensed Natural Health Products with the approved claim statement, "Traditionally used in Ayurvedic medicine to relieve lack or loss of the appetite for food and to relieve cough."[12] In the United Kingdom, gotu kola is a General Sale List medicine for external use only.[13] In November 2010, the European Medicines Agency (EMA) published a public statement that it is not possible to propose a Community Herbal Monograph for *C. asiatica* preparations at this time for 2 reasons: (1) Although the medicinal use of titrated extract of *C. asiatica* (TECA) has been established for at least 30 years in Europe, EMA has decided that TECA (commercially known as Madecassol® or Centellase® or Blastoestimulina®) cannot be classified as an herbal preparation; it is a highly purified extract, fractioned and enriched in triterpenic acid and triterpenic sugar ester fractions to reach about 40% asiaticoside and 60% triterpenic genins (asiatic acid and madecassic acid). The purification steps involve chemical treatments that remove the herbal matrix. (2) Although some data are available on other gotu kola preparations, the available data was deemed insufficient for the development of a labeling standards monograph at this time.[14] There is, however, an official *European Pharmacopoeia* quality standards monograph for the dried, fragmented, aerial parts of *C. asiatica*, containing minimum 6.0% of total triterpenoid derivatives, expressed as asiaticoside.[15] As of 2011, 4 new gotu kola dietary supplement quality standards monographs are proposed for inclusion in the *United States Pharmacopeia 34th Revision*: *Centella Asiatica*, Powdered *Centella Asiatica,* Powdered *Centella Asiatica* Extract, and *Centella Asiatica* Triterpenes.[16]

Modern Research

The main chemical components in gotu kola are the triterpenes asiatic acid and madecassic acid, and the triterpene ester glycosides derived from them, asiaticoside and madecassoside.[10] The new USP monograph assay includes 6 triterpenes: madecassoside, asiaticoside B, asiaticoside, madecassic acid, terminolic acid, and asiatic acid.[16] Additional components include brahmoside, brahminoside, and hydrocotyline.[2,17]

The majority of recent clinical studies conducted on gotu kola have addressed its effects on CVI, microangiopathy (a condition, frequently experienced in diabetes, wherein the walls of the capillaries become thick and weak, leading to bleeding, leaking protein, and slowing blood flow), and anxiety. A number of studies were conducted in the 20th century suggesting gotu kola's benefits in wound healing, but no current clinical studies on this aspect of its use are available.

CVI causes blood to pool in the legs (stasis) and can result in venous hypertension, edema (swelling) of the legs, aching or tiredness in the legs, ulcerations, and varicose veins. Many gotu kola-CVI studies have been conducted by a group of European investigators using total triterpenoid fraction of *C. asiatica* (TTFCA, sometimes specified as Centellase® [Bayer S.p.A., Milano, Italy]) and, while there is enough evidence to suggest efficacy, these studies have been criticized as methodologically flawed, inconsistent in dosing, too short (1-12 months), and using nonclinical endpoints.[7]

One 2-month, single-blind British trial randomized 99 participants to receive either 60 mg (30 mg twice daily) TTFCA, 120 mg (60 mg twice daily) TTFCA, or placebo, while healthy subjects were given 60 mg TTFCA thrice daily.[18] Significant improvement in symptoms (edema, pain, muscle cramps, tired/heavy legs) was seen in those taking the TTFCA, more so in the ones taking the higher dose.

In a 4-month study, 3 groups of patients with venous hypertension were given either 30 mg or 60 mg TTFCA thrice daily, or placebo.[19] After 4 weeks, capillary filtration rate, ankle circumference, and ankle edema were significantly improved in the 2 patient groups taking TTFCA, with greater improvement in the higher dose group. There was no significant change in either the placebo group or the healthy subjects taking TTFCA.

Another trial assessed the effect of TTFCA on edema and microcirculation in 40 patients with CVI who were randomized to receive either 60 mg TTFCA twice daily or placebo for 6 weeks.[20] Significant improvement in veno-arteriolar response, increase in pO2 (blood oxygen pressure), decrease in pCO2 (blood carbon dioxide pressure), decrease in leg volume, and decrease in resting blood flow were experienced by the treatment group.

Forty patients with severe venous hypertension, ankle-swelling, and lipodermatosclerosis (brown, smooth, tight, and often painful scarring of skin just above the ankle, usually on the inside surface) were included in a study in which one group received 60 mg TTFCA twice daily for 8 weeks; the other received placebo.[21] The TTFCA treatment group experienced significant improvement in signs and symptoms of venous hypertension.

In one placebo-controlled trial, 50 patients with diabetic microangiopathy were randomized to receive 60 mg TTFCA twice daily, placebo, or no treatment.[22] After 6 months, significant improvement in microrcirculatory parameters and decrease in capillary permeability were observed.

Another study on TTFCA and diabetic angiopathy randomized 100 patients (50 with neuropathy and 50 without) to receive 60 mg TTFCA twice daily or placebo for 12 months.[23] The TTFCA groups (with and without neuropathy) experienced significant decreases in resting blood flow and rate of ankle-swelling compared to placebo.

Another study evaluated TTFCA's effect on microangiopathy alterations in edema in passengers travelling by plane for more than 3 hours; subjects were randomized to receive no treatment or 60 mg TTFCA thrice daily for 2 days before the flight, the day of the flight, and the day after the flight.[24] The rate of ankle-swelling and edema were significantly lower in the TTFCA group.

One 2010 study investigated the effects of a 70% hydro-ethanolic extract of *C. asiatica* (JB Roy State Ayurvedic Medical College and Hospital, Kolkata, India) on generalized anxiety disorder in 33 participants.[25] Participants were given a 500 mg capsule twice daily after meals for 60 days. Results indicated that taking gotu kola significantly attenuated stress anxiety/depression-related disorders. Baseline score on anxiety index decreased to 13.1% in 30 days and 26% in 60 days and self-perceived stress improved 12.5% in 30 days and 23.2% within 60 days.

A double-blind, placebo-controlled study in 2000 evaluated the anxiolytic activity in gotu kola in healthy subjects.[26] Participants (n=40) were randomly assigned to receive either a singe 12 g orally administered dose of gotu kola (encapsulated crude powder, Nature's Way, Canada) or placebo. Results showed that, compared to placebo, gotu kola significantly weakened the acoustic startle response 30 and 60 minutes after treatment but had no significant effect on self-rated mood, heart rate, or blood pressure.

At least 1 study has been done on *C. asiatica* and its effect on cognition and mood in healthy elderly volunteers.[27] Various doses of either 250, 500, or 750 mg of plant extract (Center for Research and Development of Herbal Health Product, Faculty of Pharmaceutical Sciences, Khon Kaen University, Thailand) were given daily to 28 participants for 2 months. Cognitive performance and mood were assessed after single treatment and at 1 and 2 months after treatment. Results suggest that gotu kola may lessen the age-related decline in cognition and mood in healthy elderly people.

Gotu kola has also been studied in combination with other herbs and conventional medications used both internally and topically for effectiveness in treating CVI,[28] atopic dermatitis,[29] photo-aged skin,[30] oral and topical phlebotonics for venous insufficiency,[31] lymph-draining action in the treatment of ulcers of the lower limbs caused by slow-moving blood,[32] for supportive periodontal therapy,[33,34] and on improving the appearance of striae rubra (red stretch marks).[35]

Future Outlook

Total retail sales of gotu kola dietary supplements in the natural and health foods channel in the US totaled $530,686 in 2010, up 4.8% from the previous year.[36]

There are very little recent data on the sustainability and marketability of gotu kola. In 2000, 1 source opined that most of the gotu kola on the US market was of poor quality, and that it was commonly harvested from ditches in India that were contaminated with heavy metals, pollutants, and other harmful chemicals.[37] In 2008, *C. asiatica* was reported to be one of the most important plants in the Indian medicinal plant trade, and that the plant had largely been depleted in the wild due to overharvesting and limited cultivation attempts.[38] Another 2008 report listed *C. asiatica* as one of 46 medicinal plant species in high trade in India sourced mainly from wastelands. It is reportedly found growing wild in abundance in wastelands including farm bunds (liquid-storage tanks), fallow lands, roadsides, and shrubberies. For this reason, it may not require immediate wild-resource management focus but could possibly benefit from being brought into cultivation in order to conform to quality standards.[39] In India, the commercial supply is now obtained from both cultivation and wild collection.[40] In China, it is wild collected for use in TCM preparations. Tissue culture techniques developed in a 2010 study may be useful for propagation of gotu kola and for helping to conserve the germplasm of the species.[40]

In Madagascar, where gotu kola was considered one of the top 10 Malagasy medicinal plants, a 2004 report stated that quality standards had been identified and there was no threat to gotu kola nor to its habitats.[41] It suggested that there was no need for management of gotu kola but that quality could be improved at the collection level, and information sheets regarding potential revenue stream were made available to women who collected the herb.

—Gayle Engels and Josef Brinckmann

Gotu Kola *Centella asiatica*. Photo ©2011 Steven Foster

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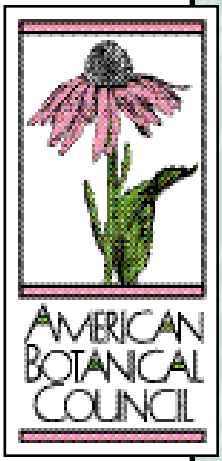
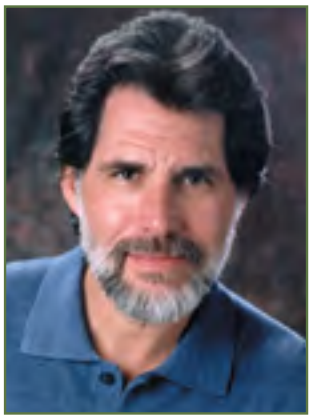




dear *reader*

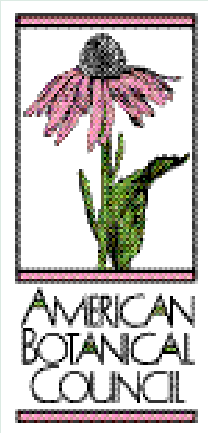
Over a decade ago, I was invited to write an editorial for a medical journal on the topic of herbs and phytomedicines with adequate clinical evidence of safety and efficacy to warrant consideration for use in modern conventional medical practice. Due to the inclusion of Asian ginseng, because of its observed "adaptogenic" properties, I received a comment from one of the journal's "expert" peer reviewers that the terms "adaptogen" and "adaptogenic" were not recognized by Western pharmacology and medicine. Alas, that may be true—not because they don't exist, but because of the previously narrow scope of vision of many conventionally trained physicians (and medical journal editors).

This issue includes a review article on adaptogenic herbs and their pharmacology, a topic we have wanted to address in these pages for a decade or more. Dr. Alexander Panossian of the Swedish Herbal Institute (a forprofit company that manufactures various clinically tested phytomedicines) and Prof. Bert Wagner, one of Europe's most famous experts in phytomedicinal research, have co-authored this review, which is based on numerous previous articles they have authored on this compelling subject. And, as their article shows, there is an expanding body of pharmacological data supporting the adaptogenic effects of various herbs and herbal extracts, so much so that it is probable that they will be increasingly used in clinical medicine, and not merely as self-selected dietary supplements by a growing body of health-conscious consumers. Which herbs? Please see the article beginning on page 52.

There's another subject about which we have wanted to publish for over a decade—the herbs of the fabled Silk Road. In this issue, we highlight pu-erh tea from the Yunnan province of China, and the route it traveled into the Tibetan Plateau on the Tea Horse Road. Selena Ahmed and Michael Freeman have contributed an engaging article on the history of the this ancient trade route, with stunning photographs (by Freeman) and information from their new book. Pu-erh tea is considered the most sought-after and valuable tea in all of China, with considerably high economic value.

The quality of herbal ingredients and products remains of paramount concern to us and many, many others. In this area, access to reliable analytical methods to ensure botanical identity is imperative. As part of our continued series of articles on quality control and Good Manufacturing Practices-related issues, Kathy Sharpless of the U.S. National Institute of Standards and Technology (NIST) and colleagues, including our good friend and ABC Advisory Board member Dr. Joe Betz at the Office of Dietary Supplements at the National Institutes of Health, provide an update on the various Standard Reference Materials (SRMs) that NIST has produced to calibrate laboratory analytical equipment and help validate analytical methods—all of which is designed to improve the quality of analyses of botanical dietary ingredients. The federal government's funding of a program to help improve the reliability of analytical testing of botanical ingredients in dietary supplements is an example of how far the herbal movement has come in the past 30-plus years.

Also, this issue contains our annual Herb Market Report, which we produce in association with our colleagues at the *Nutrition Business Journal* and the market research firm SPINS. Once again, in 2010, sales of herbal dietary supplements rose in the United States, this time by an estimated 3.3 percent—a fairly good indicator of how consumers continue to vote with their dollars for natural medicine, even in a down-cycle economy. This is further evidence of the increasingly significant role that herbal products continue to play in selfcare and, eventually, will play in integrated healthcare. And finally, we carry a guest editorial from two of Europe's leading herbal experts, Michael McIntyre and our Advisory Board member Simon Mills, on the recent decision by the British government to license herbalists. Our sincere congratulations to our friends and colleagues in the United Kingdom for finally receiving such official recognition! Herbs and herbal medicine are fast becoming an important part of contemporary and future selfcare and healthcare, the world over!



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features

32 **Pu-erh Tea and the Southwest Silk Road: An Ancient Quest for Well-Being**

By Selena Ahmed, PhD, and Michael Freeman

Starting in the 7th century, a network of caravan routes collectively known as the Southwest Silk Road were carved through forests and mountains from China's Yunnan and Sichuan provinces to Tibet, Nepal, India, and Burma in order to facilitate the exchange of tea and other natural resources beyond their native habitats. In this beautifully illustrated feature, authors Selena Ahmed and Michael Freeman weave together the history of this important ancient trade route and one of the most culturally significant resources that traversed it: Pu-erh tea. Ahmed and Freeman discuss the journey's effect on the tea, its healing properties in Tibetan medicine, and more, accompanied by Freeman's lush photographs of tea-leaf picking and fermentation, as well as the Tibetan landscape.

44 **Development of Standard Reference Materials for the Analysis of Dietary Supplements: The Story Continues**

By Katherine E. Sharpless, PhD, Lane C. Sander, PhD, Stephen A. Wise, PhD, Agnes Nguyen Pho, and Joseph M. Betz, PhD

In 2004, *HerbalGram* published an article addressing the collaboration among the National Institute of Standards and Technology (NIST), the National Institutes of Health (NIH) Office of Dietary Supplements (ODS), and the US Food and Drug Administration (FDA) in creating Standard Reference Materials (SRMs) to be used in the calibration of analytical equipment used to test the identity of herbal and other dietary ingredients in dietary supplement products. In this issue, the authors follow up their initial report with regulatory developments, an overview of the first suite of SRMs, as well as a breakdown of SRMs established in the time since for herbs such as saw palmetto and bitter orange.

52 **Adaptogens: A Review of their History, Biological Activity, and Clinical Benefits**

By Alexander Panossian, PhD, Dr.Sci., and Hildebert Wagner, PhD

Today, the term *adaptogen* is widely used by many herbalists although it has yet to gain prominence in mainstream pharmacology. Adaptogenic plants—such as Asian ginseng, ashwagandha, rhodiola, and schisandra—elicit in an organism a state of nonspecifically raised resistance, allowing them to counteract stressor signals and to adapt to exceptional strain. In other words, they act as "vaccines" to stress. Authors Alexander Panossian and Hildebert Wagner outline the origins of adaptogen research in the USSR more than 60 years ago, and elaborate on contemporary scientific research on adaptogens' mechanisms of action, potential indications, and clinical efficacy.

Flax *Linum usitatissimum* Photo ©2011 Steven Foster

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Photo ©2011 Michael Freeman.

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ABC Assumes Full Ownership and Management of HerbMed® and HerbMedPro™ Databases from Alternative Medicine Foundation

On January 1, 2011, the American Botanical Council (ABC) assumed full ownership and management of the dynamic, interactive database HerbMed® and its enhanced professional version HerbMedPro™. ABC has had intellectual property rights to the herbal database HerbMed since February 2008, when the founder and director of the database, Jacqueline (Jackie) C. Wootton, MEd, decided she wanted to retire from her then current responsibilities and explore new avenues of interest.[1]

Selected herb records in HerbMed (www.herbmed.org) are available for free to the public and HerbMedPro (http://cms.herbalgram.org/herbmedpro/index.html) is available through licensing to libraries and organizations, and has long been a benefit of membership to all ABC members at the Academic Level and higher.

ADOPT-AN-HERB HerbMedPro™ PROGRAM

Jackie Wootton is a former professor of sociology at Leeds Metropolitan University in the United Kingdom (1985-1992), and staff trainer for 10 years at the pioneer distance-learning institution The Open University, also in the UK. She moved to the United States in 1992 where she worked for 2 years designing and developing information resources for the Office of Alternative Medicine, the predecessor of the National Center for Complementary and Alternative Medicine (NCCAM) at the National Institutes of Health (NIH). She also served as informatics project director at the Rosenthal Center for Complementary and Alternative Medicine at Columbia University and on NIH Clinical Center research projects. In 1998, she co-founded the Alternative Medicine Foundation, a nonprofit organization of which she was president and executive director until September 2010. During this time she initiated work on HerbMed and developed HerbMedPro. More information on the differences between HerbMed and HerbMedPro can be found in an earlier issue of *HerbalGram*.[2]

Long recognized as a significant research tool, HerbMedPro has been available as licensed electronic content from ABC and as a benefit of membership in ABC for the past decade. ABC was pleased and honored when Wootton approached its management about taking over the database upon her retirement.

"ABC is pleased and honored that Jackie Wootton has had suffi-

cient trust and confidence in ABC to continue HerbMed and HerbMedPro in the tradition of objectivity and high quality that she created and maintained since her creation of these two unique databases," said ABC Founder and Executive Director Mark Blumenthal.

"ABC will continue to bring additional resources to these databases to help expand them and increase their availability to the international herbal medicine community and other parties that have an interest in the robust and growing body of scientific and clinical research on herbs and related beneficial plants," he added.

Longtime ABC employee Gayle Engels and ABC's IT consultant, Eric Valdez (of Corsair USA, LLC), have worked with Wootton over the past 3 years to learn the intricacies of the database and prepare it for conversion to the ABC content management system. Engels has taken over as director of the HerbMed database and is eagerly working with HerbMed compilers, Jayaraman Mohanasundaram, MD, PhD; Robin Dunn, MS; and Robyn Urbach, MS; to update the existing herb records and add new ones (see sidebar), as well as expanding additional features of the database, such as the sections for Contemporary Mixtures, Traditional Formulas, and Special Collections.

In order to be added to HerbMed, a Contemporary Mixture must have published research on the mixture itself, not just on the components, although the Contemporary Mixture record will link to the components' records. Currently, there is 1 Contemporary Mixture posted in HerbMed: the top-selling herbal nonprescription medication in Germany known as Sinupret®. Traditional Formulas are those that have a long history of use and published research, such as the traditional Ayurvedic formula Triphala, which consists of 3 traditional fruits: *amalaki* or amla (*Phyllanthus emblica*, Euphorbiaceae), *bibbitaki* or belleric myrobalan (*Terminalia bellerica*, Combretaceae), and *haritaki* or chebulic myrobalan (*Terminalia chebula*, Combretaceae). Special Collections will provide information for specific health issues (such as diabetes and heart disease), modalities (such as Ayurvedic, traditional Chinese, or Native American medicine), and socio-demographic groupings (such as women or children). Thus far in 2011, 1 collection has been added to HerbMed—Women's Health: Menopause.

One of the fundamental characteristics that makes HerbMedPro and the underlying HerbMed database different from other electronic herbal resources is that it is built incrementally via the compilation of data by experts and automatic compilation of data from multiple resources such as the US National Library of Medicines database, PubMed. This requires the expert compilers to research the literature from multiple online published sources, to categorize the data, and to briefly summarize each item and hyperlink it to the source data.[3]

As one might imagine, this is a time-consuming and costly procedure. In order to maintain and expand the database, ABC initiated Adopt-an-Herb, a program designed to help fund the improvement and protection of the database. Through this program, companies "adopt" one or more specific herbs which helps prioritize the updating of the 240 existing herb records and the addition of new ones.[4] Adopting companies are recognized by ABC on its Adopt-an-Herb page (abc.herbalgram.org/site/PageServer?pagename=Adopt_an_Herb) and HerbMed records for adopted herbs are made available on both ABC's and the adopters' sites.

HERBMEDPRO ADDITIONS AND UPDATES
(May 2010 — March 2011)

New Herb Records

Common Name	Latin Binomial
Açaí	*Euterpe oleracea*
Chia	*Salvia hispanica*
Cowslip*	*Primula veris*
European vervain*	*Verbena officinalis*
Grape	*Vitis vinifera*
Hemp, marijuana	*Cannabis sativa*
Sorrel*	*Rumex acetosa*
Soy	*Glycine max*
Umckaloabo	*Pelargonium sidoides*
Yohimbe	*Pausinystalia johimbe*

Updated Herb Records

Common Name	Latin Binomial
Andrographis	*Andrographis paniculata*
Arnica†	*Arnica montana*
Bacopa	*Bacopa monnieri*
Chocolate, cocoa†	*Theobroma cacao*
Elderberry	*Sambucus nigra*
Fennel	*Foeniculum vulgare*
Gentian	*Gentiana* spp.
Ginkgo	*Ginkgo biloba*
Hibiscus†	*Hibiscus* spp.
Neem†	*Azadirachta indica*
Sceletium†	*Sceletium tortuosum*
Tea tree†	*Melaleuca alternifolia*
Tribulus	*Tribulus terrestris*

New Contemporary Mixture
Sinupret® – Record contains only studies done on the proprietary mixture; there are links to component herb records with research done on the specific herb.

New Collections
Women's Health: Menopause – Contains links to herb records associated with the amelioration of menopausal symptoms.

*Components in Sinupret®
†Adopted herbs are checked monthly and updated as new published research warrants.

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ABC Announces Recipients of Annual Duke, Farnsworth, and Tyler Excellence Awards

The American Botanical Council held its 6th Annual ABCelebration ceremony on March 10, 2011, in Anaheim, CA. As in previous years, ABC's event took place in conjunction with the Natural Products Expo West trade show and Nutracon scientific conference.

In attendance were over 250 guests representing ABC's Sponsor Members and other supporters. In addition to the awards detailed below, Drake Sadler, co-founder and chairman of the Board of Traditional Medicinals, provided an eloquent analogy of the important role that ABC—and its Founder/Executive Director, Mark Blumenthal—has played and continues to play in the evolution of the natural products community.

The sponsors for the 6th Annual American Botanical Council Celebration and Awards Ceremony were the following companies and organizations: the law firm of Amin Talati, Alkemists Pharmaceuticals, ChromaDex, EuroPharma, Horphag Research, Indena USA, Inc., Natural Factors, New Chapter Inc., New Hope Natural Media, PlusPharma, RFI Ingredients, Traditional Medicinals, and the United Natural Products Alliance.

ABC presented the ABC James A. Duke Excellence in Botanical Literature Award to Aviva Romm, MD, for her new book *Botanical Medicine for Women's Health*. The ABC Norman R. Farnsworth Excellence in Botanical Research Award was presented to Professor A. Douglas Kinghorn, PhD, of Ohio State University. Finally, the ABC Varro E. Tyler Commercial Investment in Phytomedicinal Research Award was presented to New Chapter Inc., a producer of a unique line of dietary supplements.

"ABC is honored to be able to present this year's awards to these highly-deserving recipients," said Blumenthal. "Consistent with ABC's nonprofit educational mission, ABC is recognizing excellence in achievement in the various fields in which these recipients operate."

"The process of choosing these awardees was exceptionally challenging, as there were many highly skilled and accomplished nominees," Blumenthal continued. "This is the result of the robust and diverse world of botanical medicine. There are numerous people in many parts of the world who are doing great work—in writing and publishing, in academic phytomedicinal research, and in the corporate world where pharmacological and clinical research and production of high-quality herbal products is becoming increasingly common." (Phytomedicine is the science and practice of researching and employing herbal extracts and related substances for their therapeutic qualities.)

Attendees at the American Botanical Celebration reception. Photo ©2011 ABC

ABC's James A. Duke Excellence in Botanical Literature Award

This year's James A. Duke Excellence in Botanical Literature Award was given to Aviva Romm, MD, for her new book *Botanical Medicine for Women's Health*. The book was published by Churchill Livingstone, an imprint of Elsevier Inc., in St. Louis, MO, in 2010.

This award—created in 2006 in honor of noted economic botanist and author, James A. Duke, PhD—is given annually to a book or book service that provides a significant contribution to literature in the fields of botany, taxonomy, ethnobotany, phytomedicine, or other disciplines related to the vast field of medicinal plants. Dr. Duke is also a co-founding member of the ABC Board of Trustees.

Botanical Medicine for Women's Health is a comprehensive resource of medical and herbal interventions related to women's health issues, as well as health conditions organized chronologically by female lifecycle.[1] The book, a blend of traditional and modern scientific data on botanical medicine, contains detailed plant profiles that include principle uses, clinical indications, and safety information on the most commonly used botanicals for women's health.[1]

"I was pleased to select it, as appealing to me as it is—and, I anticipate, to the general herbal reading public. *Botanical Medicine for Women's Health* is as intellectually well-founded and needed as it is outstanding among its genre. And it is simply good reading," said Dr. Duke. "It has an appropriate mix, to my taste, of folklore and modern and recent scientific evidence. I liked it best of the several others that were close runner-ups."

Firmly rooted in traditional herbalism, Dr. Romm's book contains up-to-date, evidence-based information on over 150 botanicals for over 35 different conditions, including coverage of fertility, menstrual health, and more.[1] It includes appendices on common botanical names, botanical medicine resources, detailed plant illustrations and photographs

that facilitate visual herb identification and substance composition, dose reference charts, and information on adverse effects/drug interactions.[1] Dr. Romm demonstrates her experience as an herbalist, physician, and midwife—along with the contributions of over 30 experts with practical experience as clinicians—in this integrated approach to the blending of conventional medical and botanical treatments.

"Given the patterns of herb purchasing and use, the single most important herbal demographic is women," said ABC Board of Trustees President, Steven Foster. "Dr. Romm's *Botanical Medicine for Women's Health* bridges the gap between an advocacy approach and an authoritative treatment of the subject [of women's health]. She combines the empirical traditional observations of the botanical practitioner and herbalist with the detailed scientific nuance of a medical doctor," he said. "The wisdom, limitations, and possibilities of divergent worlds usually separated by a gulf are bridged by her grasp of both worlds. Under Aviva Romm's guidance, the result is an authoritative-yet-accessible collaborative effort with other knowledgeable, respected experts, which seamlessly blends a rare and welcome balance of tradition and science."

James A. Duke Award recipient Aviva Romm, MD.

Dr. Romm is a recognized expert in women's health, women's and pediatric botanical medicine, and midwifery.[2] She practiced as an herbalist and homebirth midwife for over 20 years before becoming a physician, and was one of the first certified professional midwives in the United States.[2] Other books written by Dr. Romm include *The Natural Pregnancy Book* (10 Speed Press, 2003), *Naturally Healthy Babies and Children* (10 Speed Press, 2003), *ADHD Alternatives* (Storey Publishing, 2000; with her husband Tracy Romm, EdD), and *Natural Healing After Birth: The Complete Guide to Postpartum Wellness* (Healing Arts Press, 2002).

"It is a tremendous honor to have *Botanical Medicine for Women's Health* selected for such an auspicious award," said Dr. Romm.

"The greatest gift is that the selectors are herbalists and authors I hold in such high regard. Their recognition of the quality and value of this work, which was a labor of over 8 years, including through my medical education, is deeply gratifying," she said. "Women's health and herbal medicine have gone hand in hand since time immemorial. On behalf of women and healthcare providers seeking natural approaches to common women's health concerns and alternatives to reliance on medical and surgical interventions, I am grateful that this award will continue to raise awareness about the textbook and help to reinforce the important role of herbal medicines for women's health conditions."

Dr. Romm was honored with the Internal Medicine Award for "outstanding academic achievement and community service" upon graduating from the Yale School of Medicine. During her time as a member of the Yale Integrative Medicine advisory board, she was active in the formulation of Yale's first integrative medicine curriculum.

She served as an expert on botanical medicine for pregnancy, lactation, and pediatrics for the revised edition of the *American Herbal Products Association's Botanical Safety Handbook* (in press).[2] She also served as the President of the American Herbalists Guild (AHG) for over a decade and as the Medical Director for American Herbal Pharmacopoeia (AHP).[2]

Dr. Romm, who is presently working toward the completion of her residency in Family Medicine in the Cambridge Health Alliance and at Tufts University in Boston, MA, has already contributed so much to the botanical community as a teacher and through her contributions to the establishment of standards for botanical medicine.

Additionally, Dr. Romm is the director of Herbal Medicine for Women, as well as Pediatrics for Parents, the latter of which provides parents with resources to nurture their children's wellness more naturally.[2] Dr. Romm's books are beacons for women in any stage of life, and also for healthcare providers, including herbalists, midwives, and more. Her written contributions have also appeared in celebrated medical journals and textbooks on integrative medicine.[2] Other than botanical medicine for women and children, her areas of research include mind-body medicine, evidence-based maternity care, and the impact of environment on health.[2]

ABC's Norman R. Farnsworth Excellence in Botanical Research Award

This year's recipient of the Norman R. Farnsworth Excellence in Botanical Research Award is Prof. A. Douglas Kinghorn, PhD, the Jack L. Beal Professor and Chair in Natural Products Chemistry and Pharmacognosy in the College of Pharmacy at Ohio State University. (Pharmacognosy is the study of drugs of natural origin, e.g., from plants.) Dr. Kinghorn has spent many years researching the isolation, characterization, and biological evaluation of natural products of higher plants of tropical and temperate origin, and is an expert in plant-based sweeteners such as the herb stevia (*Stevia rebaudiana,* Asteraceae).[3]

The award is named for ABC's co-founding Board of Trustees member Prof. Norman R. Farnsworth, PhD, research professor of pharmacognosy and senior university scholar at the College of Pharmacy at the University of Illinois at Chicago. ABC presents this award each year to a person or institution that has made significant contributions to botanical and/or pharmacognostic research.

Dr. Kinghorn received both his PhD in pharmacognosy in 1975 and his DSc (higher doctorate) in pharmacy in 1990 from the University of London.[3] His postdoctoral training was conducted at both the University of Mississippi (1975-1976) and at the University of Illinois at Chicago (1976-1977).[3] Dr. Kinghorn has specialized in work on antimicrobials, botanical dietary supplements, cancer chemopreventive agents, cancer chemotherapeutic agents, and noncariogenic sweeteners/sweetness modifiers.[3,4] Since Dr. Kinghorn concluded his research on sweet compounds such as stevia glycosides a few years ago, he has researched the potential cancer chemopreventive principles and the biologically active principles of botanicals such as licorice (*Glycyrrhiza* spp., Fabaceae), mangosteen (*Garcinia mangostana,* Clusiaceae), noni (*Morinda citrifolia,* Rubiaceae), açaí (*Euterpe oleracea,* Arecaceae), and baobab (*Adansonia digitata,* Malvaceae). Dr. Kinghorn's research has been independently supported by the US National Institutes of Health

Douglas Kinghorn, recipient of the Norman R. Farnsworth Award.

(NIH) and by private industry since 1980.[3] He currently serves as principal investigator of a collaborative multi-institutional program project award from the US National Cancer Institute in Maryland directed toward the discovery of naturally occurring anticancer agents.[3]

"It's obvious that Doug Kinghorn has contributed as much, if not more, than any medicinal plant scientist on the scene today related to the chemistry and pharmacology of many botanicals," said Dr. Farnsworth. "I can think of only one or two other people that might come close. Also, his pioneering work with plant-derived sweeteners is extensive over a long period of time."

Dr. Kinghorn's vast contribution to botanical literature comprises 6 books—including his 2002 book on stevia, *Stevia: The genus stevia* (Taylor and Francis, 2002)—and the more than 450 research articles, book chapters, and reviews he has written or co-authored.[3] He has shared his extensive knowledge and research at seminars and scientific meetings in more than 30 different countries around the globe.[3]

Dr. Kinghorn is presently distinguished as editor-in-chief of the *Journal of Natural Products* (co-published by the American Chemical Society and the American Society of Pharmacognosy) in addition to his role as series editor-in-chief for the book series *Progress in the Chemistry of Organic Natural Products* (Springer-Verlag), and his service to the advisory boards of a number of notable publications on organic chemistry, pharmacy, cancer, and natural products.[3] He also currently sits on the Monographs – Dietary Supplements Expert Committee of the United States Pharmacopeia (USP). His past honors and achievements include presidency of the American Society of Pharmacognosy and the Society for Economic Botany, as well as serving as chair of the Dietary Supplements – Botanicals Expert Committee of the USP. In 2010, Dr. Kinghorn was the recipient of the Norman R. Farnsworth Research Achievement Award of the American Society of Pharmacognosy.[3]

"It is a very great pleasure to accept the 2010 Norman R. Farnsworth Excellence in Botanical Research Award from the American Botanical Council," said Dr. Kinghorn. "I very much admire the purpose and effectiveness of ABC, and the effective role that Mark Blumenthal plays as a spokesperson. I would like to thank Mark and the Board of Trustees for honoring me in this manner." Dr. Kinghorn said he is pleased to be joining the 5 biomedical scientists of high caliber who have previously been given this "prestigious international annual award" from ABC. "It is especially meaningful for me that this particular award is named after Dr. Norm Farnsworth," said Dr. Kinghorn, "since he was my postdoctoral mentor at the University of Illinois."

Dr. Kinghorn was appointed by Dr. Farnsworth to his first faculty position as an assistant professor at the College of Pharmacy at the University of Illinois at Chicago (UIC) in 1977, and they worked closely together until Dr. Kinghorn left to take his present position at Ohio State in 2004. "Norm has always been a constant source of inspiration," said Dr. Kinghorn. "Along with many other past and present colleagues, I owe him a great deal."

ABC's Varro E. Tyler Commercial Investment in Phytomedicinal Research Award

This year's Varro E. Tyler Commercial Investment in Phytomedicinal Research Award goes to New Chapter Inc., a manufacturer and distributor of premium whole-food and organic dietary supplements, probiotics, vitamins, minerals, herbal therapeutics, fish oil, and mushrooms. New Chapter is the first American company to receive this research award.*

The award was named after the late Prof. Varro E. Tyler, PhD, former dean of the College of Pharmacy and Pharmaceutical Sciences at Purdue University and vice-president of Academic Affairs at Purdue. Dr. Tyler was a leading authority in botanical medicines, the principal author of numerous editions of the leading textbook on pharmacognosy formerly used in most colleges of pharmacy in the United States, and an early Trustee of ABC.

New Chapter was founded in 1982 by Paul and Barbi Schulick, who were driven by one mission: "To deliver the Wisdom of Nature to those seeking natural wellness."[5] Their business was relocated in 1986 to Brattleboro, VT, and has remained there ever since. The Schulicks were committed to promoting the benefits of plants in their unadulterated form in the creation of their herbal products.[5-6] The company uses the healing sustenance of herbs and whole foods in its supplements, including the first line of whole food probiotic nutrients blended with herbal extracts.[6] New Chapter sources organic ingredients and cultivates them at Luna Nueva, its Biodynamic blue ring ginger farm nestled in the rainforests of Costa Rica.[6]

"The founding vision and mission of New Chapter is to marry the ancient tradition of herbal medicine with the technological genius of modern science," said founder Paul Schulick. "New Chapter is

Tom Newmark and Paul Schulick from New Chapter Inc., with ABC Executive Director Mark Blumenthal, accepting the Varro E. Tyler Award.
Photo ©2011 ABC

*Editor's Note: In bestowing this award, ABC is not endorsing the company or its products but rather acknowledging that company's impressive commitment to phytomedicinal research.

extremely inspired by Dr. Tyler and what this award signifies. It equally belongs in the hands of those scientists who've had the courage and wisdom to appreciate the vast potential herbs have to help heal both humankind and the planet."

New Chapter has sought to uncover the full scope of the beneficial effects of its leading products through sponsored research agreements with some of the leading academic research institutions in the country, such as Cornell University, Columbia University, and the University of Texas M. D. Anderson Cancer Center.[7] The majority of this research is aimed at increasing awareness over the role of inflammation, and the maintenance of normal breast and prostate health.[7] Though initiated almost 8 years ago, some of these research projects have been completed only recently and are ready for publication. Other research projects, according to New Chapter, are making significant progress and will contribute to fundamental new knowledge in areas critical to human health and well-being (e.g., examination of the links and interrelationships among obesity, inflammation, and breast health in postmenopausal women).[7] New Chapter has established a policy that each major new product it develops will have appropriate preclinical and clinical research behind it, supporting the formula's mechanism of action and/or the overall intended health benefit.

Thomas M. Newmark, college friend of New Chapter cofounder Paul Schulick, was asked to join the New Chapter team in 1999, after which the company experienced immense growth and product innovation.[5] Today, Newmark is the executive chairman of New Chapter.

In an e-mail to ABC, Newmark said he was humbled by the tribute and the honor of even being considered for the award. "Professor Tyler inspired the herbal industry to scientifically validate the health benefits of herbal preparations," said Newmark. "Not only does such science give consumers much-needed confidence, but it's a fulfillment of our sacred obligation to defend the integrity of herbal medicine. That the American Botanical Council believes we have, in any way, lived up to that obligation is deeply gratifying, and accepting the Varro E. Tyler Commercial Investment in Phytomedicinal Research Award will be a great moment in our company's history."

Robert A. Newman, PhD, chief science officer of New Chapter, and founder and former co-director of the Pharmaceutical Development Center and Analytical Center at M. D. Anderson Cancer Center in Houston, Texas, thanked ABC on behalf of the company and especially New Chapter's Science and Innovation Team. Dr. Newman recently retired from M. D. Anderson after 24 years, where he also held the positions professor of pharmacology and medicine in the Department of Experimental Therapeutics, and D. B. Lane Professor for Leukemia Research.

"All of us at New Chapter are thrilled and also humbled in being honored with this year's Varro E. Tyler Award," said Dr. Newman. "Our belief in using the finest herbal ingredients available coupled with investments in preclinical and clinical investigations of the health benefits of our supplements are our pledge and commitment to consumers and ourselves that we are delivering the very best innovative and beneficial supplement products possible. Receipt of this award represents a significant milestone in the history of our company and recognition of our research efforts is deeply appreciated."

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Impact of WHO's Upcoming Traditional Medicine Classification

The World Health Organization's (WHO) recently announced International Classification of Traditional Medicine (ICTM) could bring greater respect and more widespread recognition to traditional medicine* systems across the world. However, some parties are claiming that it also represents a failure by WHO to achieve greater global inclusiveness and that it could result in oversimplification of the complex nature of the world's many unique traditional medicine systems.

With the goal of easing and encouraging the use of traditional medicine in clinical, epidemiological, and statistical settings, WHO's ICTM will provide a harmonized traditional medicine evidence base with stated terminologies and classifications for diagnoses and interventions.[1] In a recent press release, WHO said the ICTM is in part a response to traditional medicine classification and terminology tools remaining sparse while worldwide usage of traditional medicine increases.

"Currently, the data collection practices for [traditional medicine] are frequently not integrated within national or international health information systems," said M. Meri Robinson Nicol, PhD, a technical officer in WHO's Department of Health Statistics and Informatics (e-mail, February 15, 2011). Dr. Robinson said that this lack of integration hinders quality data collection on many aspects of traditional medicine interventions, which in turn means that insurance and billing procedures for traditional medicine are not always integrated into general service procedures. "This is an issue, as TM should be included in international health statistics," she added.

Joining other significant activities, such as the 1978 Alma Alta Declaration and the recent 2008 Beijing Declaration,[2] the ICTM further illustrates WHO's efforts in aiding traditional medicine's globalization and integration into worldwide healthcare. The classification will initially include information on practices and customs in China, Japan, and the Republic of Korea. These countries are part of WHO's Western Pacific Region, which produced its own International Standard Terminologies on Traditional Medicine in 2008.[3] The ICTM is currently being drafted and WHO hopes for it to be completed in time for approval voting at the May 2014 World Health General Assembly.

WHO expects the ICTM to produce data that can be used to evaluate objectively traditional medicine's benefits, safety, use, spending, and trends; as well as to enable the study of traditional medicine's role in disease prevention and treatment. Additionally, according to WHO, one accepted classification system will allow all countries throughout the world to base their monitoring of traditional medicine on the same set of data.

According to Dr. Robinson, WHO and various partners will begin creating the ICTM by recording all traditional medicine terminology in ontology software (e.g., Protégé) "to precisely describe the content of each term, which will allow for the most appropriate knowledge representation and possible multilingual equivalents." This record will be organized into a modular structure that groups certain practices, such as East Asian/Chinese-based traditional medicine, homeopathy, and Ayurveda.

As a next step, the team will link from the ICTM to the current WHO International Classification of Diseases (ICD), using a common terminology base when possible, such as infectious disease names and common signs and symptoms. As when drafting and revising other WHO International Classifications, WHO and its ICTM partners will use an interactive, web-based platform called iCAT, (International Collaborative Authoring Tool). "This system is set up to accommodate for the parameters, or characteristics of traditional medicine identified by selected and national experts as critical for the description and identification of TM diagnoses and TM interventions," said Dr. Robinson. Traditional medicine experts will be able to input diagnostic and intervention information from around the world. "This, in turn, allows for broader-based input, as it is not required that each expert personally attend each meeting, and experts may continue to work between meetings to make proposal[s] for the initial draft content," said Dr. Robinson.

ICTM's Potential Impact

"The ICTM may have wide impact on both traditional and allopathic practitioners, as well as hospital administrators, insurance companies, and policy makers," said Ryan Abbott, director of research and project management for Nova Worldwide Consulting and a former member of WHO's traditional medicine team (e-mail, January 8, 2011). Abbott noted that this impact will likely be greater in countries such as the United States where no comparable domestic classifications exist, as opposed to some Asian countries that already have standardized, domestic versions of traditional medicine disease classifications.

"The ICTM may have a legitimizing effect for traditional healthcare practitioners and practices that are still looked down upon by allopathic providers," Abbott continued. "This initiative potentially represents an important step toward greater integration of traditional and allopathic medicine."

ICTM will join similar WHO classifications, such as the ICD,[4] which are meant to provide a consensual, meaningful, and useful classification framework and language for governments, healthcare providers, and consumers.[5] The ICD, for example, is used to "classify diseases and other health problems recorded on many types of health and vital records, including death certificates and health records."[6] These informational records are stored and retrieved for clinical, epidemiological, and quality uses, and are also used by countries around the world to form their mortality and morbidity statistics.

Additional impacts of the ICTM, according to Abbott, might include greater insurance reimbursement for traditional providers and services and the creation of a more scientific approach to traditional medicine by having answers to such questions as how many patients have particular traditional diseases, which receive a certain therapy, what are their outcomes, etc. "It may also help generate data on drug-herb interactions, which is an area where data is sorely lacking," he continued. "Better data in this area may help patients avoid adverse effects, and may also improve conventional reluctance on the part of physicians to combine [conventional pharmaceutical] drugs and herbs."

While the potential positive effects of the ICTM are broad, the potential for challenges and negative effects exist as well. "Traditional medical practices tend to be characterized by a highly individualized approach to treatment, which may be difficult to reduce into simple or standardized terms," said Abbott. Regional Director of WHO's Western Pacific Region, Shin Young-Soo, MD, PhD, reflected this sentiment in a recent speech at an ICTM meeting held in Manila, Philippines, saying the task "poses a formidable challenge."[3]

Dr. Robinson of WHO recognizes that the ICTM framework is—like

*Traditional medicine refers to the practice of historical and indigenous systems of medicine and is distinguished from modern conventional, mainstream, orthodox, standard-practice, or sometimes, "allopathic" medicine, which is sometimes referred to erroneously within the conventional medical profession as "traditional medicine."

the ICD—based on the idea that each diagnosis must have a title, that there will be certain signs and symptoms associated with this, such as criteria for diagnosis, body parts, systems, or functions that might be affected, risk factors, and more. "Within this framework, we can expand as necessary to include the intricacies of each healthcare system, and ensure adequate representation of each," she said.

Additional integration challenges and disadvantages, according to Abbott, include the difficulty inherent in translating traditional medical concepts into terminology with which the mainstream medical community can understand and work, and the possibility that integrated traditional medicine will face some of the same problems as mainstream medicine, such as the modern role of billing and insurance that some consider to be a constraint on clinical practice and physician autonomy. Others are concerned about the effect that an ICTM might have on the intellectual property rights of the people who originated such traditional medicine practices. As voiced in an article on one of India's leading intellectual property blogs, WHO's next step should be creating an international benefit-sharing protocol.

WHO Globally Inclusive?

Some are claiming that WHO has done too little to communicate this initiative with all involved parties. After discussing the ICTM with colleagues in Asia and Africa, Gerry Bodeker, EdD, found that "no one in the field knows much about it." Bodeker is a senior clinical lecturer in public health at Oxford University, chair of the Oxford-based Global Initiative For Traditional Systems (GIFTS) of Health, and co-editor of the 2005 *WHO Global Atlas of Traditional, Complementary and Alternative Medicine*.

"WHO, as a UN agency made up of member states, is more appropriately expected to consult with member states about core initiatives that will affect states—rather than take a lead on its own," he said. "None of the African, South Asian, and [South East] Asian policymakers or researchers with whom I discussed this had heard anything from WHO about it" (e-mail, January 21, 2011).

In response to claims that WHO did not adequately reach out to appropriate parties, Dr. Robinson said: "WHO did contact a wide variety of Member States to gauge interest in developing an [ICTM]. A great number of national representatives attended both the WHO Congress (Nov, 2008) and the WHO Working Group Meeting (May 2009) to discuss the priorities and feasibility of each."

The US National Center for Complementary and Alternative Medicine (NCCAM), a WHO traditional medicine collaborating center, was contacted by WHO in regards to the ICTM. "NCCAM has been aware of this project and we have discussed various aspects of it with WHO representatives," said NCCAM's Deputy Director Jack Killen, MD (e-mail, February 28, 2011). "We have offered input and advice to WHO on plans for the project. We have not participated in two meetings which have taken place to date." According to Dr. Killen, because the preliminary version of the ICTM focuses on traditional medicine in China, Japan, and South Korea, it will likely have little effect on CAM practice, research, or policy in the United States. If successful, however, it could have an impact on terminology and related aspects of clinical research design, he noted.

A further concern Bodeker pointed out is that the ICTM's initial East Asian focus might result in the extension of such a framework to all traditional medicine systems, many of which are based on different concepts. The parties with whom he discussed the ICTM expressed "a wish for broad-based inter-regional consultation on (a) the desirability for an [international classification] in the first place; (b) appropriate region and tradition-based approaches to classification; (c) partnerships with experts already working in the field outside East Asia."

According to Dr. Robinson, the selection of practices that originated in China, Japan, and Korea "was based on the facts that these practices were both widely around the world, and that there was a significant amount of Member State interest and support for this area of work. If there is interest in and support for other TM systems, such as has been expressed for Ayurveda, Traditional Mongolian Medicine, and others, we would be happy to work on these in the future, as well."

—Lindsay Stafford

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NSF and NPA in Conflict over Standards for Natural Personal Care Products

On February 10, 2011, NSF International announced that it would be working with NATRUE (The International Natural and Organic Cosmetic Association) to "develop the first American national standard for natural personal care products."[1] NSF is a nonprofit organization that sets standards and monitors the quality of drinking water, water filters, dietary supplements, and other consumer goods.

Four days later, the Natural Products Association (NPA), an industry trade association whose NPA Natural Seal was established in 2008, responded with a press release refuting NSF's claim of having the "first" standard. In the release, NPA Executive Director and CEO, John Gay, said, "The NPA is here to help the consumer, not confuse them. A second seal with different standards does no service to natural products customers, retailers, or manufacturers."[2]

According to Jane Wilson, NSF International director of standards, "The 'American National Standard' terminology can only be used in conjunction with standards developed by ANSI [American National Standards Institute]-accredited standards development organizations. While NPA has developed a standard for its association members, the NPA standard is not recognized as an American National Standard" (e-mail, March 24, 2011).

"We did not like what the [NSF] release seemed to imply: that there wasn't a standard in the US," said Gay. "That was disturbing, to see the phrasing. More the problem is that they were announcing a second seal coming into the market" (oral communication, March 22, 2011). A second seal, he said, will create consumer confusion.

The Natural Products Association is a trade organization that was founded in 1936 as the National Health Food Association, and was later known as the National Nutritional Foods Association.[3] It currently represents thousands of independent and chain health and natural foods stores, and the suppliers, distributors, and brokers who sell to them. Its mission is "to advocate for the rights of consumers to have access to products that will maintain and improve their health, and for the rights of retailers and suppliers to sell these products."[3]

Founded in 1944, NSF International is a tax-exempt, nonprofit organization.[4] It creates standards for a breadth of elements and products, including air, water, food, dietary supplements, and toys.[4] Last year, NSF International and ANSI (a nonprofit headquartered in Washington, DC) debuted the NSF/ANSI 305 standard for "personal care products containing organic ingredients."[5]

"As a result of the launch of NSF/ANSI 305 Personal Care Products Containing Organic Ingredients, NSF entered into a partnership with NATRUE," said Wilson. "This partnership includes the harmonization of criteria for personal care products containing organic ingredients as well as development of a natural personal care product standard for the North American market that can be harmonized with NATRUE criteria." NATRUE is a nonprofit organization located in Belgium with several international manufacturers as members.

"This partnership will facilitate the acceptance of 'natural' personal care product claims in both the North American and European markets," she added.

"Is there a need for another one as far as the consumer is concerned?" asked Gay. "You can turn your product into—what's the phrase?—a Girl Scout sash?"

According to Gay, a single US standard for natural products is in the consumer's best interest, so that she or he does not have to find, consult, and analyze more than one source to determine which "natural" certification is up to par; the consumer "can go to one website and see the science behind the seal."

According to Wilson, the first draft of the NSF natural personal care products standard will have its foundation in NATRUE's natural personal care products certification criteria, which does not allow synthetic colors or fragrances, genetically modified or petroleum-based ingredients, or animal testing.[6] Beyond that, she said, "The standards committee will utilize the consensus process to further develop the draft standard. The formal balloting and public comment process will determine the criteria in the final standard. Requirements such as the acceptable substances and percentage of conforming product line will be determined by the standards committee."

"Honestly, we don't know what the NSF standard will look like," said Cara Welch, PhD, NPA's vice-president of scientific and regulatory affairs. "The NPA has set a high bar for what should be [considered] natural."

NPA certification criteria for natural personal care products requires that products be a minimum of 95% natural in composition, and defines a natural ingredient as "a renewable resource found in nature (flora, fauna, mineral), with absolutely no petroleum compounds."[7] In 2010, NPA removed artificial fragrances from its list of acceptable ingredients.[8]

Dr. Welch said that the current cost of NPA natural personal care product certification is $500 per product for NPA members, and $1,250 per product for non-members. In both cases, the cost covers administrative and audit fees, and the seal is valid for 2 years before re-certification is needed. Wilson said costs for NSF International natural personal care product certification "will be determined by individual certification bodies."

More information about NPA and NSF International's natural

personal care standards is available at the following websites:

NPA: www.npainfo.org/clientuploads/naturalSeal/The%20Natural%20Standard%20091710v01%20kh.pdf

NSF:www.nsf.org/business/newsroom/press_releases/documents/natrue_faq.pdf

—Ashley Lindstrom

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Phytopharm Returns *Hoodia Gordonii* Rights to South African R&D Company

Just months after affirming its continued dedication to bringing a *Hoodia gordonii*-based product to market,[1] UK-based Phytopharm has dropped the South African succulent from its research portfolio.[2] In a November 2010 decision, the company returned all development and commercialization rights to South Africa's Council for Scientific and Industrial Research (CSIR).

From 1998, Phytopharm had been leasing an exclusive *H. gordonii* (Asclepiadaceae) patent from CSIR, one of Africa's leading research and development institutions.[3] Under this contract, Phytopharm had the rights to isolate, extract, and synthesize an appetite-suppressing *H. gordonii* compound—the oxypregnane steroidal glycoside named P57—on which CSIR originated the patent in 1995.[2,3,4]

But this ended with Phytopharm and CSIR's recent cooperation agreement, which states that P57's commercialization process will now "be led by CSIR in collaboration with national and regional stakeholders."[5] In exchange for sharing its development, agriculture/horticulture, and regulatory expertise with CSIR, Phytopharm will receive an undisclosed amount of whatever profits CSIR might generate from P57 (J. Dineen, e-mail, February 17, 2011). It will not be involved in any further research activities.

Phytopharm's CEO has told the media that the company's decision was based on a "corporate decision to exit the functional foods business." This shift decreases the company's focus on plant-based ingredients and products and increases focus on its pharmaceutical portfolio, particularly Cogane™, a product being studied for the treatment of Parkinson's Disease.

"Since the termination of the agreement with Unilever," said company spokesperson John Dineen, "Phytopharm repeatedly made clear that hoodia was no longer a priority and that resources would be directed towards their pharma pipeline. The company conducted negotiations, did not come to a suitable agreement with any parties, and subsequently decided that the best way forward for hoodia was to return the rights to CSIR."

According to CSIR's Media Relations Manager, Tendani Tsedu, the center recently started an internal review of *H. gordonii* clinical data and also applied for additional funding in order to hire external experts to assist with the review (e-mail, March 14, 2011). "Detailed review of all data will be subject to the necessary funding being obtained," said Tsedu. If the review is completed, involved parties will then advise CSIR on its options for developing *H. gordonii*-based products.[5] Johan Hattingh, CSIR's group manager of intellectual property and technology transfer, said in a press release, "The challenges must not be underestimated and the development of an effective hoodia-based product will need scientific innovation and substantial investment in order for it to be successful."[5]

Hattingh's statement reflects Phytopharm's challenging history with P57. After gaining patent rights from CSIR, in 2002 Phytopharm partnered with Pfizer (New York, NY), the world's largest biomedical and pharmaceutic company, to produce a weight-loss *H. gordonii* drug.[4] But a year later, Pfizer stopped these operations, reportedly due to a merger with Pharmacia and the resulting closure of its Natureceuticals group.[3]

In 2004, Phytopharm teamed up with Unilever (Rotterdam, Netherlands), a global manufacturer of food, home care, and personal care products, to develop an *H. gordonii*-based functional food product.[4] But after investing a reported $40 million in the project, Unilever terminated the agreement in 2008 after its research concluded that P57 failed to meet the company's high standards for safety and efficacy.

Amidst these 2 canceled partnerships with big-name developers, Phytopharm continued to reaffirm its strong belief in *H. gordonii*. After the recent patent transfer to CSIR, it is claiming that *H. gordonii* is an interesting product with promise, and Phytopharm CEO Tim Sharpington stressed to NutraIngredients.com that he thinks solid formulations (as opposed to liquid formulations) would be most successful.[2,6]

But, as discussed in a 2009 *HerbalGram* article, some toxicity and efficacy issues might be unavoidable.[4] Because P57 is a highly isolated compound, it could likely be more toxic than a part of the whole plant or a pressed *H. gordonii* juice or powder. Also, the various growing conditions of cultivated *H. gordonii*—the only form of the plant allowed for export and import—might result in a lower level of triterpenes, which can decrease efficacy. According to Phytopharm, potential issues surrounding cultivated *H. gordonii* played no role in its transfer decision.

The indigenous San people of southern Africa developed the original knowledge of the plant's appetite-suppressing potential, using it for generations to help calm the hunger pains of men on long hunting expeditions.[4] After obtaining and sharing the patents on P57, CSIR and Phytopharm were accused of biopiracy. CSIR then signed an agreement with the San people that gives them 6% of royalties from the sale of *H. gordonii*-containing products and gave them 8% of all milestone payments that CSIR received from Phytopharm.

"The initial reaction was disappointment," said Roger Chennells, the San's attorney (e-mail, February 28, 2011). "The San thought that [Phytopharm] would take the product to market, and that the benefits (royalties) would begin to flow."

Chennells said that, based on discussions the San had with CSIR, "it is clear that the scientific data on the hoodia shows a very powerful product, and not one that has lacked potential or potency. It, however, requires a careful strategy to take it forward."

According to Chennells, the San are hoping that CSIR and its partners receive funding to do the necessary base line analysis research in order to target and place *H. gordonii* successfully in the market. "This will require further efficacy and safety tests, which might take another 2 or 3 years," said Chennells, noting that this would bring "a solid flow of benefits" for South Africa and the San. In late December of 2010, Chennells told SciDev.net that the San have received about $73,000 from the agreement with CSIR and are happy with the arrangement.[6]

Chennells added that the San have a new benefit sharing agreement concerning *Sceletium* spp. (Aizoaceae), whose mood-enhancing properties are patented and is currently in the final stages of trials. The San recently approached the South Africa government for assistance in extending the benefit-sharing requirements of the Biodiversity Act (under the Conference for Biological Diversity) to *H. gordonii, Sceletium*, and several other South African plants. This would require companies selling such products to engage with the San and negotiate a fair and workable compensation for the traditional knowledge-based component of the product.

—Lindsay Stafford

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UK Herbalists to be Licensed

By Michael McIntyre and Simon Mills

February 16, 2011 will be a historic date in the story of herbal medicine. On this day, the United Kingdom's Secretary of State for Health, Andrew Lansley, announced in a written statement to Parliament that all UK practitioners prescribing herbal medicines are to be statutorily regulated through the Health Professions Council. This marks the first time that the UK government has found a way to license herbal practices in this country.

How did we get here? Is this a positive development? Many of us UK herbalists have long relished our independence from orthodox medicine and the whole industrial-reductionist world, so that we could work with nature to support human resilience. Being part of the "system" was probably not why we chose to work in the field of herbal medicine.

The answer lies in the encroachment of European legislation onto our lives, particularly in the default position of herbal remedies as medicines. For years, herbal practitioners in the United Kingdom have prospered outside statutory law, protected by a UK citizen's common law rights to choose the healthcare option he or she prefers. And—until this year—these rights have remained. (The famous Act of Parliament of King Henry VIII in 1542 augmented these rights as an instruction to physicians and surgeons to stop encroaching on ordinary people's use of herbs for their health.)

Throughout history, herbal products have enjoyed various exceptions from the laws that apply to medicines. Herbal products used for therapeutic purposes, however, *are* classified as medicines by default, under both UK and EU law. A longstanding campaign by the European Commission (EC) to regulate the sector of herbal medicine finally concluded with the EU Traditional Herbal Medicinal Products Directive 2004/24/EC (THMPD), which will go into full effect beginning May 1, 2011.[1] With this legislation, the common law rights of UK citizens to choose herbal medicines for their own use was finally and dramatically curtailed.

For over 40 years, herbal medicines in the United Kingdom have been available by sale over-the-counter (OTC) or through prescriptions by herbal practitioners to their individual patients courtesy of Sections 12.2 and 12.1, respectively, of the 1968 UK Medicines Act.[2] Under Section 12.2 of this Act, herbal medicines sold OTC have been exempt from medicines licensing. After April 30, 2011, however, the THMPD will have effectively done away with these exemptions, as it requires all herbal medicines sold OTC to hold a traditional herbal registration (THR), granted on the basis of 30 years of safe use, 15 years of which must be demonstrated within the European Union. In addition, THRs will be granted only to herbal medicinal products that have undergone the same extensive quality assurance testing as required of conventional medicines. These tests include long-term stability trials and the identification of chemical markers throughout the manufacturing process.

Not surprisingly, the approval of THR applications has been slow. As of January, 2011, the UK Medicines and Healthcare products Regulatory Agency (MHRA) had recorded 187 THR applications, of which 84 have been granted. The MHRA also reported that only 32 individual herbs were represented in these registered products, and only 35 other herbs present in pending applications. Of all applications, 32 were for combination products, of which 13 have been granted.[3] Illustrating the difficulty faced by these combination products, the MHRA has advised herbal manufacturers seeking THR to limit the number of herbs in each product due to the difficulty in providing the necessary quality assurance data with more complex mixtures containing several herbs.

For the handful of OTC herbal medicines that have obtained THR, medicinal claims must be based on established traditional use only, and these are limited to mild and self-limiting conditions (i.e., relieving minor symptoms). Clearly, a long road must be travelled before registered THMPD products can meet these stringent requirements!

Impact on Herbal Practitioners

The pending implementation of the THMPD has also posed significant implications for UK herbal practitioners. Herbalists are permitted to supply to their patients herbal medicines that are made up on their own premises based on Section 12.1 of the 1968 Medicines Act. Because they supply herbs on a one-to-one basis, i.e., from a practitioner to a client, they are neither placing products on the market nor engaged in the manufacture of medicinal products. Therefore, unlike Section 12.2, the THMPD does not affect the exemption of licensing of herbal medicines prescribed by herbal practitioners to their patients on this individual basis.

However, since 1968, UK herbalists have also employed Section 12.2 of the 1968 Medicines Act as the legal basis for the supply of all manufactured or finished medicines (e.g., herbal tablets) made for them to supply to individual patients. But THMPD will repeal Section 12.2, meaning that this essential route of supply of herbal medicines will no longer be available to herbalists or their patients.

In the decades since 1968, many practitioners had also come to rely on third-party prescription services specifically set up to supply their patients directly with herbal prescriptions that they had written. The introduction of the THMPD similarly threatened to remove this facility. The sale of finished products forms a key part of the income of suppliers of herbal tinctures and extracts and the additional potential loss of this business imperilled the entire sector.

The loss of these supply lines to the public was the major reason why the majority of UK herbalists have campaigned for statutory regulation. According to Article 5.1 of Directive 2001/83/EC, the main EU medicines legislation, "authorised health professionals" can commission the manufacture and supply of medicines made up for the benefit of individual patients (so long as there is no similar licensed medicine on the market). In the United Kingdom this is called the "specials arrangement." The recent granting of statutory regulation to UK herbalists will make them "authorised health professionals," and thus enable them to have medicines manufactured and supplied for individual patients by third-party manufacturers as "specials." Through this route, complex herbal products, including the formulated mixtures used in traditional Chinese, Indian, and other systems of healthcare will continue to be available to the public, and not dependent on the limited compounding facilities of individual practitioners.

The Long Road to Statutory Regulation

The Secretary of State made his announcement at a compelling time—just weeks before the April 30, 2011 full-enforcement deadline. In his statement, Lansley explained that his measures "would ensure that practitioners would meet specified registration standards" giving practitioners and consumers continued access to unlicensed manufactured herbal medicines to meet individual patient needs after the introduction of new EU legislation on May 1st of this year.

The Minister's statement is the result of years of discussion about the recognition of herbal practitioners in the UK, whose very basis for existence has been threatened at various times throughout the last 150 years. In 1886, when an amendment to the Medical Acts proposed to restrict the practice of medicine to qualified physicians, herbalists successfully campaigned against the Bill, which was subsequently withdrawn.

In 1923, the National Association of Medical Herbalists lobbied lawmakers for a Medical Herbalists Registration Bill, which would finally grant them legal status. Over 130 Members of Parliament (MPs) signed the Private Members' Bill, which enjoyed an unopposed first reading. But the hopes of herbalists were dashed when the Government refused to make time for the Bill to progress. The passage of the Pharmacy Act in the Second World War was another threat narrowly averted.

When the new National Health System (NHS) was launched by the Minister of Health, Aneurin Bevan, in 1945, herbalists initially sought inclusion within the structure of NHS. However, Bevan declared that herbalists could be incorporated into the NHS only if they were regulated by and subordinate to the medical profession. These terms would have undoubtedly spelled the end of independent herbal practice and the herbalists chose to stay outside the NHS.

The thalidomide tragedy of the early 1960s saw the birth of thousands of children afflicted by severe physical deformities caused by this drug, which was widely prescribed to pregnant women even though it lacked proper testing. Faced with a huge public outcry about the lack of proper control over drugs, the government rushed in legislation requiring the testing and licensing of all medicines. Herbal medicines were caught up in this and the early draft of the 1968 Medicines Act left no scope for licensing them, other than as patentable pharmaceutical drugs. Faced with the end of herbal practice in the United Kingdom, the herbal community campaigned for special provisions for herbal medicines, and in this they were supported by the members of the public, who wrote thousands of letters to MPs. Thus, when the 1968 Medicines Act passed into law, it carried a special herbal provision (the aforementioned Section 12, which permits herbal medicines to be sold OTC and prescribed by practitioners exempt from licensing). There was, however, one major flaw within this legislation: nowhere did it give any definition of who could be considered a qualified herbalist. Anyone could be an herbal practitioner by virtue of hanging out a shingle and just claiming to be so.

In the light of this anomaly and under a growing threat of EU medicines legislation impacting the 1968 herbal provisions, leading to another major scare in the 1990s, the herbal profession began working with the Department of Health (DH) to explore how regulation of herbal medicine practitioners could be achieved.* This process was greatly accelerated by a seminal report in 2000 from the influential House of Lords Science and Technology Committee on Complementary Medicine that called for the statutory regulation of herbalists. A year later, the government agreed that this regulation should go ahead and launched 2 committees headed by independent chairs, one to look at the regulation of herbalists and the other to focus on acupuncturists. The process was generously supported by Prince Charles, the Prince of Wales, and his Foundation for Integrated Medicine.

The 2 committees published their reports in 2003 and the following year, the DH undertook a public consultation on the statutory regulation of herbal practitioners. The results of this consultation, published in 2005, showed a 98% opinion in favor of statutory regulation.[4] The consultation also published a timetable for such statutory regulation, but a general election and a public call for better medical regulation in the wake of murders by the rogue doctor Harold Shipman brought considerable delay. The newly elected Labour administration put the herbal regulation case on hold while it commissioned an overview of the regulation of all healthcare workers, from doctors to hospital porters. This process took many months to complete, and in the meantime, the government decided that there should be another DH Committee under the chairmanship of Professor Michael Pittilo to advise on how best to regulate herbal medicine, Traditional Chinese Medicine (TCM), and acupuncture.

The Pittilo report, outlining specific measures to bring about the regulation, was published in 2008. In 2009, the government commissioned a second public consultation on this subject. Such consultations usually attract about 40-60 responses; this one elicited an extraordinary public response with over 6,500 replies. More than 10 years after the House of Lords called for the statutory regulation of herbalists, the government finally decided that statutory regulation of herbalists should go ahead. Once all the devolved administrations† had agreed to this, the announcement was made by the Secretary of State for Health on February 16, 2011. Published concurrently with the announcement, detailed results of the 2009 public consultation showed a massive majority (85% of the responses) in favor of statutory regulation.[5]

Conclusion

There are thousands of published papers on the potential benefits of herbal medicines and herbs can offer inexpensive, safe, and effective approaches for many common complaints. The thousands of patients who consult herbalists every year can now be assured in the standards of training and practice of the practitioners they see. It may have taken government a decade to make the decision, but this administration should be congratulated for a move that ensures herbal treatments remain available.

Statutory regulation was opposed by many orthodox doctors, including the Royal College of Physicians. They argued that giving statutory regulation to herbalists would confer a spurious validity on treatments without proof of efficacy. But in the end, the government sided in favor of the patient's right to choose and a less top-down, dictatorial, and more open-minded interpretation of medicine. As the Health Secretary himself remarked in his statement to Parliament, "I am pleased to say that this decision marks a significant milestone. I am confident that this is the right decision, which will benefit both practitioners and the public who use herbal medicines."

Note from co-author, Simon Mills:

These important recent developments for herbal medicine should not pass without acknowledgement of the extraordinary work by my co-author, Michael McIntyre. From the mid-1990s, he has taken on leadership of herbal practitioners, including those from Western, Chinese, Indian, and other traditions. He led the setting up of the European Herbal and Traditional Medicine Practitioners Association (www.ehtpa.eu), and through this, has spearheaded the work of 8 professional groups. He has taken criticism from all sides for his strong commitment to the future of herbal practice in an increasingly hostile European context. Let the preceding report be a testament to his work and its incredible contribution to our lives!

*For example, in 1994, the United Kingdom signed up to the main EU Medicines Directive and had it not been for a major public campaign, this would have been the end of special exemption from licensing for herbal medicines.
† Scotland, Wales, and Northern Ireland

Michael McIntyre is a graduate of Oxford University and has been an herbal practitioner since 1980. He is currently Chairman of the European Herbal and Traditional Medicine Practitioners Association (EHTPA), a post he has held since 1993. McIntyre is the former President of the National Institute of Medical Herbalists and is a Doctor at Middlesex University, where he is also a visiting professor. He is a Fellow of the Register of Chinese Herbal Medicine, as well as a member of the British Acupuncture Council and the Council of the College of Medicine. He writes, broadcasts, and lectures widely on herbal medicine.

Simon Mills is a Cambridge University medical sciences graduate who has been an herbal practitioner in the United Kingdom since 1977. He has led the National Institute of Medical Herbalists, the College of Practitioners of Phytotherapy, and the British Herbal Medicine Association. He is the co-author of 2 classic herb textbooks with Kerry Bone: Principles and Practice of Phytotherapy *(Churchill-Livingstone, 2000) and* Essential Guide to Herbal Safety *(Churchill-Livingstone, 2005), which was awarded the American Botanical Council's James A. Duke Excellence in Botanical Literature Award in 2005. He also co-produced the 1996 edition of the* British Herbal Pharmacopoeia. *He founded the first master's degree program in herbal medicine in the United States at Tai Sophia Institute for the Healing Arts. He has been a professional member of the Herbal Medicines Advisory Committee, the first UK Government committee in this area, and is also Secretary of the European Scientific Cooperative on Phytotherapy, the lead European body working to ensure quality, safety and efficacy for herbal medicinal products with the European Medicines Agency.*

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Growth in Herbal Medicine Scientific and Clinical Literature from 1977 to 2007

Reviewed: Hung S-K, Ernst E. Herbal medicine: an overview of the literature from three decades. *J Diet Suppl*. 2010;7(3):217-226.

Using focused search terms and limits, the authors identified all published articles on herbal medicine appearing between 1977 and 2007 in any language in the Medline/PubMed database at the US National Library of Medicine. The number of English-language articles on all topics on Medline has dramatically risen during this time, while the number of articles in other languages has fallen. The same was found by these authors to be true for herbal articles. After English, the most articles were in Chinese. The next 3 most common languages were German, Russian, and Japanese, each used in many fewer articles.

Articles published during the sample years 1977, 1987, 1997, and 2007 were further analyzed. For each, the number of herbal medicine articles in any language was compared with the number in each of the 5 most popular languages. Also, for each of these years, the number of systematic reviews (SRs), reviews, clinical controlled trials (CCTs), randomized controlled trials (RCTs), and case reports in any language were calculated.

CCTs and RCTs in any language were identified along with the herbal medicine they investigated in order to determine the herbal medicines most often tested in CCTs and RCTs. Finally, full-text copies of the first 20 English-language RCTs in PubMed results for each sample year were scored for quality on the Jadad scale, the most widely accepted rating scale for determining the quality of the design of clinical trials. For years when there were not 20 RCTs published, the search was extended chronologically until the quota was filled.

Over the 30-year study period, the number of herbal medicine articles published rose from 739 in 1977 to 6,364 in 2007. The largest numbers were reviews and RCTs. CCTs were least frequently reported, rising from 6 in 1977 to 35 in 2007, with only 70 in total for all 4 sample years. English dominated linguistically with over 75% of all articles in the sample years. Chinese, the second most popular language, accounted for 18%.

For each of the 3 decades surveyed, the most frequently studied herbal medicine in CCTs and in RCTs, and the most frequently studied in each of the 5 most popular languages, was determined. Between 1977 and 1987, guar gum (from the bean of *Cyamopsis tetragonoloba*, Fabaceae) was most studied overall, in 7 of 29 CCTs and 16 of 123 RCTs. Between 1988 and 1997, evening primrose (*Oenothera biennis*, Onagraceae) oil took the lead in CCTs with 9 of 40, while standardized extract of the leaf of ginkgo (*Ginkgo biloba*, Ginkgoaceae) led in RCTs with 31 of 512. From 1998 to 2007, ginseng (not further specified, presumably of the genus *Panax* in the family Araliaceae) had the most CCTs with 11 of 67. Ginkgo again held sway in RCTs with 106 of 2,430. Over the entire 30 years studied, most reports on CCTs in English concerned evening primrose oil and guar gum, with 18 of 337 each, while the most RCTs reported in English were on ginkgo (107/1,873). Ginkgo also predominated in RCTs reported in Chinese (10/1,037) and German (19/89), but Russian-language RCTs most often concerned garlic (*Allium sativum*, Liliaceae; 3/11), while those in Japanese most often reported on *sairei-to*, a traditional kampo and Chinese medicine comprising 12 herbs (2/5). Reports on CCTs in Chinese most often concerned tripterygium (*Tripterygium wilfordii*, Celastraceae; 2/49). Those in German were most often on ginkgo extract (5/31); those in Russian, on leuzea (*Leuzea carthamoides*, Asteraceae, syn. *Rhaponticum carthamoides*); while each of 4 CCTs reported in Japanese concerned a different herbal medicine.

To find 20 RCTs in each of the sample years, the search for 1977 was extended into 1986; for 1987, 1990; and for 1997, 1998. The year 2007 saw 20 or more RCTs published. The shorter successive search periods needed to reach 20 RCTs to confirm the rising number of RCTs throughout the study period. Mean Jadad scores also rose steadily, from 1.9 (standard deviation [SD] 0.85) in 1977 to 2.6 (SD 0.94) in 2007. Between 1977 and 1997, the mean difference reached statistical significance at 1.00 (P=0.014), with a mean score in 1997 of 2.9 (SD 1.07). While similar results have been reported by others investigating, e.g., RCTs in Traditional Chinese Medicine journals or RCTs on most commonly used herbs, the average quality of RCTs on herbal medicines is still rather poor, according to this review. (This appears to conflict with the conclusions of an independent Swiss study in 2007 which found that, in general, the methodological and reporting quality of trials of Western herbal medicine was on average superior to trials of conventional medicine. Although, in both groups a clear majority of studies was of inadequate or uncertain quality.[1]) No sample year had an average of 3.0 in Jadad scores. Whether this is better or worse than the average quality of RCTs on conventional medicines is an issue that should not affect the increasing quality of herbal RCTs seen in this study. Use of the herbal medicine-specific Consolidated Standard of Reporting Trials (CONSORT) checklist for reporting RCTs might further improve herbal RCTs as the original CONSORT has been reported to do in conventional medicine studies. (The primary distinction in the CONSORT guidelines for RCTs for conventional medicines and herbal RCTs relates to the recommendation for more fully detailed descriptions of herbal preparations used in herbal RCTs.[2])

The main limitation of this article is that, regardless of the comprehensive search terms and limits used, results in Medline depend on how articles are indexed, and there is apparently room for error. For this study, when the search was limited to CCTs, not all articles returned were CCTs. Indexing errors or omissions could have led to errors in all of the data obtained.

—Mariann Garner-Wizard

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German Chaste Tree Extract Shows Improvement of PMS Symptoms

Reviewed: Ma L, Lin S, Chen R, Zhang Y, Chen F, Wang X. Evaluating therapeutic effect in symptoms of moderate-to-severe premenstrual syndrome with *Vitex agnus-castus* (BNO 1095) in Chinese women. *Aust NZ J Obstet Gynaecol.* 2010;50(2):189-193.

Premenstrual Syndrome (PMS) has been estimated to have a prevalence ranging from 30-87% in women of reproductive age. It can be described as a range of physical symptoms—such as abdominal cramps, breast fullness and tenderness, water retention, pelvic and back pain, chest pain, change in appetite—to emotional symptoms that include anxiety, depression, mood swings, irritability, fatigue, and tension.

The purpose of this prospective, randomized, double-blind, placebo-controlled trial was to investigate the degree of efficacy of chaste tree (*Vitex agnus-castus*, Verbenaceae) berry extract's ability to relieve 17 different symptoms associated with PMS. Previous studies have shown that various chaste tree extract preparations are effective at reducing and eliminating PMS symptoms. Chaste tree extracts have also been shown to have a dopaminergic effect in animal and clinical trials.[1] The study was conducted at the Gynecological Endocrinology and Women's Health Center of Peking Union Medical College Hospital in Beijing, China between February 2005 to January 2007.

This trial included 67 women with moderate to severe PMS, ages 21-44 years. Inclusion criteria included an increased score of at least 16 points on the Premenstrual Syndrome Diary (PMSD) in the luteal phase (7 days before menses) compared with the follicular phase (day 3 to day 9 of the menstrual cycle). The average PMSD score must have been at least 20 in the follicular phase and/or more than 15 points during days 6-19 of the cycle, which should be the symptom-free days. The PMSD was used as a self-assessment tool prior to and during the trial to chart premenstrual symptoms according to severity, negative mood effects, water retention, appetite, pain, and insomnia (0=absent to 3=severe). A 36-item questionnaire called the Premenstrual Tension Syndrome Self-Rating Scale (PMTS) was also used as a self-assessment tool by the subjects at the first and second visits with a sum score of ≥18 as part of the inclusion criteria.

The chaste tree extract used for the study was BNO 1095 (Bionorica AG; Neumarkt, Germany), which contained 4.0 mg of a proprietary dry extract (70% ethanol) in tablet form, derived from 28 to 44 mg of dried chaste tree fruit. This extract is contained in Cyclopret®, and the identical formulation is sold as Agnucaston® or Cyclodynon® in European and Asian countries. The subjects were given either 1 tablet of BNO 1095 (33 subjects) or 1 tablet of an identical-looking placebo (34 subjects) daily for 3 menstrual cycles.

Completed data were available for 64 of the subjects (3 subjects withdrew including 1 in the treatment group due to a prolonged menstrual period). Comparisons were made between scores from baseline and the third treatment cycle. The treatment group experienced reduction percentages in 17 symptoms from 80.1% to 92.46%. The improved symptoms ranged from pain to depression, headache, tension-irritability, and anxiety-nervousness. The reduction percentage lowered, but remained above 80%, for breast tenderness, fatigue, and abdominal bloating.

The placebo group had a percentage reduction of 48.95% to 73.7%, mostly in different symptoms from the treatment group (P=0.042). Abdominal cramping, change in appetite, pain, and lower-backache symptoms improved most with placebo. Symptoms including anxiety-nervousness, tension-irritability, crying, and depression were less improved than other symptoms in the chaste tree group.

Treatment differences were significantly better than placebo for 16 symptoms. Reduction percentages were highest in the luteal phase of the third menstrual cycle in the active group compared to placebo ($P<0.05$), with the exception of abdominal cramping ($P=0.17$). There was no significant difference in serum prolactin levels between the groups ($P=0.942$). There was also no significant difference in serum prolactin levels at the end of the third cycle compared to baseline between the 2 groups ($P=0.952$ vs. $P=0.726$).

Chaste tree extract tablets were found to reduce symptoms in almost all of the PMSD test categories more than placebo. In a previous study using BNO 1095 (Agnucaston), irritability, breast tenderness, swelling, food cravings, and cramps were reduced by at least 50%.[2]

These results are consistent with research on other chaste tree extracts which have shown benefit for PMS symptoms. In one trial 42% of the subjects in the chaste tree group (fruit extract ZE 440 [made by Zeller AG; Romanshorn, Switzerland]: 60% ethanol m/m, extract ratio 6-12:1; standardized for casticin; one 20 mg tablet once daily) had a complete absence of all PMS symptoms by the end of the trial, 51% had a decrease in their symptoms, and 1% experienced an increase in their symptoms.[3] In a similar study using ZE 440, the authors found symptoms that were the most improved by the use of chaste tree were irritability, mood alteration, anger, headache, and breast fullness compared to the placebo.[4]

In conclusion, there is consistent evidence that the Bionorica chaste tree berry extract BNO 1095 exhibits improvement on PMS symptoms. The most improved symptoms in the trial were pain symptoms and emotional negative-effect symptoms. However, all symptoms were improved in the chaste tree group more than in the placebo group except abdominal cramping. Further research with a longer duration and a larger test population would benefit the evaluation of the BNO 1095 chaste tree extract for PMS.

—Erin Miner

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Lavender Essential Oil and Povidone-Iodine Are Similarly Effective Treatments for Episiotomy Wound Healing

Reviewed: Vakilian K, Atarha M, Bekhradi R, Chaman R. Healing advantages of lavender essential oil during episiotomy recovery: a clinical trial. *Complement Ther Clin Pract*. Feb 2011;17(1):50-53. doi:10.1016/j.ctcp.2010.05.006.

Episiotomy is a perineal incision that is performed to prevent vaginal lacerations during childbirth, i.e. when there is difficulty in vaginal delivery. Antiseptic sitz baths are routinely used in postpartum episiotomy wound care, and povidone-iodine topical antiseptics are used in particular in Iran.* Spanish lavender (*Lavandula stoechas*, Lamiaceae) has a long history of traditional medicinal use. Constituents of lavender (*Lavandula* spp.) essential oil have anti-inflammatory, antifungal, and antibacterial effects, including activity against gram-negative and gram-positive bacteria, as well as pathogenic fungi. Two clinical trials have found that lavender oil added to bathwater reduces postpartum perineal discomfort.[1,2] The purpose of this randomized, controlled clinical trial was to examine the effect of lavender (species not stated) essential oil baths compared to povidone-iodine treatment on episiotomy wound healing.

The study was conducted by researchers at Barij Essence Pharmaceutical Co. (Delijan, Iran), Arak University of Medical Sciences (Tehran, Iran), and Shahrood University of Medical Sciences (Shahrood, Iran). Lavender essential oil was extracted from fresh flowers and inflorescences collected immediately before blooming and diluted with olive oil to produce a 1.5% lavender essential oil product. The researchers enrolled 120 subjects, including primiparous (experiencing their first births) women with singleton (one offspring) pregnancies who had received mediolateral episiotomies (where the incision is made diagonally from the median) during spontaneous vaginal deliveries. None of the subjects had allergies or chronic diseases.

The researchers used computerized block randomization to divide the subjects into 2 groups: lavender oil (n=60) and control (n=60). The control group received povidone-iodine antiseptic (exact treatment protocol not discussed). The lavender oil group took sitz baths with 5-7 drops lavender essential oil in 4 L of water twice daily for 10 days. On day 10 after childbirth, the subjects came to Taleghani clinic (location not stated) for an episiotomy evaluation by a trained, blinded midwife. The evaluation included an assessment of 6 criteria: pain (assessed via a visual analogue scale), edema (cm), redness (mm), dehiscence (wound opening), number of sutures, and infection.

The authors did not discuss study withdrawals. There were no significant differences between the groups in age, occupation, education, duration of the first and second stages of labor, number of pregnancies, and newborn weight. At 10 days, there was no significant difference between the groups in pain, with 17 subjects in the control group and 25 subjects in the lavender oil group reporting no pain (P=0.063). However, more subjects in the control group reported severe pain compared to the lavender oil group (18 vs. 8, respectively). None of the lavender oil subjects showed edema greater than 2 cm, while 7 control group subjects did. There were also no significant differences in edema, cleaved suture, or dehiscence.

Redness was significantly reduced in the lavender oil group compared to the control group. After 10 days, 13 control group subjects and 31 lavender oil group subjects had no redness (P=0.001), and 28 subjects in the control group and 8 subjects in the lavender oil group showed redness greater than 7 mm (the greatest level measured). The researchers report no complications, with the exception of "a little irritation" in 2 subjects (treatment group not stated). There were 5 subjects with mild infections treated by antibiotics (control: n=2, lavender oil: n=3).

The authors conclude that lavender essential oil is "a suitable therapy for postpartum episiotomy wound care." The results show that subjects using lavender oil sitz baths had a similar experience to those using povidone-iodine antiseptics in treating postpartum episiotomy pain and edema and preventing infection, though lavender oil was more effective in treating redness. The authors suggest future clinical trials with larger subject samples and careful follow-up to confirm these results.

—Marissa Oppel-Sutter, MS

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* A peer reviewer of this article for *HerbalGram* notes that episiotomy is an "antiquated process that should not be done routinely and is reserved for when there is difficulty with vaginal delivery." Further, povidone iodine is rarely used in the United States for post-episiotomy care. Thus, for a study to be relevant for birth practitioners in the US, the lavender would have to be compared to post-episiotomy care in US hospitals.

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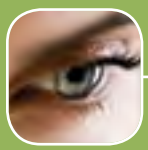

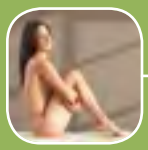

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Ginger as Adjunct for Chemotherapy-Induced Nausea in Young

Reviewed: Pillai AK, Sharma KK, Gupta YK, Bakhshi S. Anti-emetic effect of ginger powder versus placebo as an add-on therapy in children and young adults receiving high emetogenic chemotherapy. *Pediatr Blood Cancer*. February 2011;56(2):234-238.

Ginger (*Zingiber officinale*, Zingiberaceae) root has been used around the world throughout history to treat stomach ailments, including nausea.[1] A common, unpleasant, adverse side effect of cancer treatment is chemotherapy-induced nausea and vomiting (CINV). In this clinical trial, the researchers set out to evaluate ginger root powder as a supplement to the antiemetic, intravenous pharmaceuticals ondansetron and dexamethasone. As the researchers mention that ginger successfully reduces CINV in adults in previous studies,[2] they investigate the potential for ginger to alleviate CINV in children and young adults.

The trial took place at the Dr. B.R. Ambedkar Institute Rotary Cancer Hospital of the All India Institute of Medical Sciences in New Delhi, India. Children and young adults aged 8-21 years old and between 20 and 60 kg body weight were selected for this randomized, double-blind, placebo-controlled trial. Participating patients were newly diagnosed with bone sarcomas and undergoing chemotherapy with the emetogenic cancer drugs cisplatin and doxorubicin at 40 and 25 mg/m^2/day, respectively, for a 3-day cycle. All patients also received the intravenous antiemetics ondansetron and dexamethasone at 4-8 mg/day for the initial 3 days of chemotherapy. Patients also being treated with radiotherapy or the antiemetic aprepitant were excluded from the trial.

A computer randomly grouped chemotherapy cycles of patients into either experimental or control groups, allowing for patients to receive either experimental treatment or control at any cycle. Treatments consisted of capsules containing the experimental ginger root powder or starch powder as a control (both supplied by Tulsi Ayurvedics & Research Pvt. Ltd. in Varanasi, India). Patients received capsules for days 1-3 of the chemotherapy cycle, and those weighing between 20 and 40 kg were given a total dosage of 1,000 mg/day in the form of 6 capsules of 167 mg of experimental treatment or control. The dosage was 2,000 mg/day for those patients weighing between 40-60 kg with 5 capsules containing 400 mg of either experimental treatment or control. The researchers mention that the capsules and dosages were well tolerated by patients, and no adverse effects were observed or reported.

The researchers required patients to keep a diary of the incidence and severity of nausea and vomiting according to the

Ginger *Zingiber officinale*. Photo ©2011 Steven Foster

Edmonton's Symptom Assessment Scale (ESAS) from 1-10 days in the chemotherapy cycle, with acute CINV occurring on days 1-4 and delayed CINV occurring from days 5-10 of the cycle.

Thirty patients finished the study in the placebo-control group, and 27 in the experimental (ginger) group. Three patients taking the experimental treatment either did not adhere to the study's requirements or could not swallow the capsules and were excluded. From a baseline score of 0 for nausea and vomiting in both groups, acute nausea occurred more frequently in the placebo group at 93.3% of chemotherapy cycles, as opposed to 55.6% of cycles in the ginger group (P=0.003). Acute moderate-severe vomiting was also reduced in the ginger group at 33.33%, as compared to 76.7% in the placebo group (P=0.002). Moderate-to-severe delayed nausea was also significantly less in the ginger group, occurring in 25.9% of cycles, as compared with 73.3% of the placebo group cycles (P<0.001).

The authors conclude that this study shows ginger root capsules as a successful additive therapy for CINV in patients already receiving the antiemetic drugs ondansetron and dexamethasone. They also assert that their study determines an effective dosage of ginger root for children and young adults. The data provided in this study strongly support both of these conclusions.

This study is uncomplicated, well-designed, and provides robust data supporting the use of ginger root capsules in treating CINV; however, some minor issues with the study are apparent. First, no details about the ginger root capsule preparation or plant sourcing are provided. Also, the authors make no effort to control for taste or odor. Although the test material is encapsulated, ginger root has a potent aroma and taste that may have been detected by certain patients or administrators.

There is an additional minor flaw that the authors themselves mention; the randomization was focused on chemotherapy cycle, not patient. This potentially allowed for the same patient to receive both ginger root powder and the placebo during the cycles analyzed for the study. Thus, adverse effects were not observed because patients may not have been taking the ginger root capsules for a long enough time for effects to present. Also, no accounting was made for a clearing-out period in patients randomly taking the treatment before or after the placebo.

Despite these reservations, this study strongly supports the use of ginger root in treating CINV in cancer patients, particularly in children and young adults. This research also opens the door to future studies in patients with varying cancer and chemotherapy treatments, and especially to long-term use of ginger root in cancer patients.

—Amy C. Keller, PhD

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Pu-erh Tea and the Southwest Silk Road an ancient quest for well-being

By Selena Ahmed, PhD, and Michael Freeman
Photographs by Michael Freeman

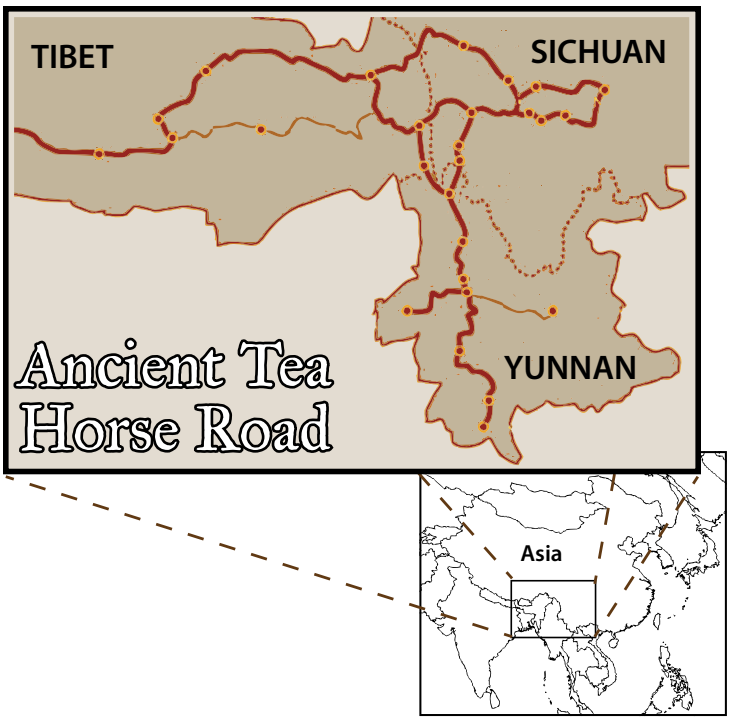
Horses and mules still ply a southern section of the road leading towards Burma from Heshun, an old village close to Tengchong, passing under a stand of old banyan trees. Photo ©2011 Michael Freeman

During the 7th century CE,

Tibet's power and influence rose suddenly and brought the Tibetan kingdom into contact with a drink that would soon become central to its people's diet: tea (*Camellia sinensis*, Theaceae).[1] The Tibetan medicine system values tea for providing the body with *dangs-ma* (essential nutrients) that nourish the vital and physical energies, and in turn create the body's structure and maintain well-being. Tea was first received in Tibet by Buddhist lamas and aristocrats, before eventually becoming a drink of the common people. By the end of the Tang Dynasty (618 - 907 CE), Tibetans and nomadic groups north and west of the Chinese border had adopted the practice of drinking tea.[2] Today, such tea is often referred to as pu-erh tea.

However, because of the extreme altitudes and temperatures of the Tibetan territory, pu-erh tea has remained an imported item from tropical and sub-tropical areas. Starting in the 7th century, a network of caravan routes collectively known as the Southwest Silk Road (*Xi'nan Sichouzhilu*) or Tea Horse Road (*Chama Dao*) were carved through forests and mountains from China's Yunnan and Sichuan provinces to Tibet, Nepal, India, and Burma in order to facilitate the exchange of tea and other natural resources beyond their native habitats.[3] Some of these caravan routes revitalized more ancient migration, trade, and military routes. The Southwest Silk Road became one of the most important trade routes of the ancient world including for promoting well-being through the exchange of medicinal natural resources. Over the course of up to 3,000 kilometers, tea oxidized and fermented during the trade journey as it interacted with temperature fluctuations, moisture, and microorganisms. The flavor and health benefits of tea transformed to the rich and probiotic characteristics that are unique to oxidized and post-fermented pu-erh tea.

Pu-erh (pu'er) tea refers to processed leaves and buds from the broad-leaf variety of the tea plant (*C. sinensis* var. *assamica*) native to the Upper Mekong River Region.[4] This area is the motherland of the tea plant and covers parts of the Yunnan Province[5] and neighboring areas of China, Laos, Vietnam, Myanmar, and India. Numerous indigenous groups in the native tea-growing area have produced and consumed pu-erh for centuries as a tonic, beverage,



and food for its well-being and stimulant properties. Among these socio-linguistic groups are the Bulang (Blang), Wa, Akha (Hani), Lahu, Yao, Hmong (Miao), Jinuo, De'ang, and Dai. The Pu people—who are ancestors of the Bulang, Wa, and De'ang—are considered the first cultivators of the tea plant and have a cultivation history of over 1,700 years.[6,7]

Pu-erh tea is thought to have developed from a medicine that was sourced from forests to a food and beverage from managed landscapes. The earliest known documentation of tea is in the 3rd and 4th centuries, when the poet Liu Kun mentioned the medicinal use of tea in the Jiangsu Province of China.[2] Tea consumption was also mentioned during this period in the Sichuan Province where it was taken in the form of gruel. Buddhist monks helped disseminate the practice of drinking pu-erh and other teas throughout China, southeast Asia, and Japan. They cultivated tea plants in their monastery gardens and used it as an aid for extended meditation. Monks also prepared tea as a tonic to treat a range of health conditions of local communities and strengthen, balance, and cleanse the body. As a traditional healing product, pu-erh is valued to strengthen the immune system, improve circulation, balance the body's hot and cold levels, detoxify blood, treat rheumatism and stones, remedy headaches, and reduce swelling and soft tissue. Pu-erh has several mental well-being health claims such as invigorating the mind and relieving stress. It is also prized for providing nutrition, aiding digestion, and weight control. Additionally, pu-erh is consumed as a social beverage and for cultural continuity.[4]

Pu-erh Production

The leaves of pu-erh are sourced from tea plants growing in montane forests, indigenous agro-ecosystems, and terrace plantations in the native tea-growing area.[8] Tea plants in forests and indigenous agro-ecosystems such as agro-forests (known as "ancient teagardens" in Yunnan) grow as trees of several meters tall in plant species-rich environments without the use of chemical fertilizers, pesticides, and herbicides. The abundant biodiversity and cultural practices involved in tea production by multiple socio-linguistic groups in this area contribute to diverse *terroir* and to a product with wide-ranging organoleptic properties.[4] Alternatively, tea plants in terrace plantations are usually pruned to waist-high shrubs in monoculture systems that rely on chemical input for management of pests, disease, and fertilization.

Pu-erh may be processed as a green or post-fermented black tea of either loose or compressed leaves. Following harvest, leaves are processed into a loose green tea (*san cha* or "scattered tea") that is the raw material, pressed green pu-erh (*sheng bing* or "raw cake"), aged pressed green pu-erh (*lao bing* or "old cake"), and pressed black pu-erh (*shu bing* or "cooked cake"). Similar to some other artisan-processed green teas, harvested leaves are withered and pan-fried to remove moisture and deactivate enzymes responsible for oxidation.[9] Leaves are then hand-rolled to disrupt cell walls to further remove moisture and shape the final product. The heated and rolled leaves are spread to dry on bamboo mats to prevent degradation and to capture the "taste

As pu-erh journeyed on the backs of human porters, mules, horses, and yaks from the tea mountains of Yunnan to the Tibetan Plateau along the Southwest Silk Road, it oxidized and fermented through interactions with moisture and temperature fluctuations and its flavor gradually transformed.

Zhanglang, a Bulang village close to the Burmese border in Xishuangbanna, surrounded by its carefully maintained agro-forests that grow high-quality pu'erh tea. Photo ©2011 Michael Freeman

Bulang women in a household in Laomange village prepare the afternoon meal in the kitchen, which is part of the open-plan interior, raised on stilts above the sloping ground of the hillside. Photo ©2011 Michael Freeman

of the sun" (*tai yang wei*). Unlike other green teas, the heat-processing step is less complete for green pu-erh, and consequently pu-erh has a distinct oxidation profile with age.[4] For ease of transport and storage, loose pu-erh leaves have traditionally been compressed as bricks, cakes, logs, or various nest and gourd shapes in bamboo or stone molds.

As pu-erh journeyed on the backs of human porters, mules, horses, and yaks from the teamountains of Yunnan to the Tibetan Plateau along the Southwest Silk Road, it oxidized and fermented through interactions with moisture and temperature fluctuations and its flavor gradually transformed. The characteristics of such weathered pu-erh have come to be highly valued. Connoisseurs attempt to optimally age pu-erh by storing pressed green pu-erh in clay jars, bamboo wrapping and baskets, caves, and underground pits.[4] Weathered pu-erh can also be mimicked by microbial food-processing technology (*hou fa jiao*, "post-fermentation," "cooking," or "ripening"). This controlled post-fermentation involves heap-fermenting loose green pu-erh for several hours to days as it interacts with fungi, yeasts, and bacteria. Leaves may intentionally be inoculated with selected micro-organisms such as *Aspergillus* spp. (Trichocomaceae).[10]

Tea Trade on the Southwest Silk Road

Tea cultivation spread where climatic conditions allowed, while the practice of drinking tea reached far beyond.[1] Tibet, Mongolia, and other neighboring areas of China's north and western frontiers generated significant demand for tea for its stimulant, nutritional, and medicinal properties, and thus drove its production and trade. However, tea was only one side of the trade equation. The other was China's continuing search for warhorses for mobility and protection against invaders, and to maintain control over the empire. Tea and horses became inseparable as China used tea as a political tool for the procurement of warhorses, the formation of alliances, the negotiation of treaties, the security of its borders, and the creation of an empire. Historian Rossabi describes how China's dynastic courts exchanged tea to acquire warhorses from neighboring territories to the north and west.[11] These horses had to be paid for, and by the middle of the 1st century CE, when China lost its monopoly on silk, it turned to procuring warhorses through the trade of tea. The state promoted the exchange of warhorses for tea, and under the Song Dynasty (960 – 1279 CE) took control over the trade via the Tea Tax Bureau and the Tea and Horse Trading Office.

Merchants became prominent in the exchange of tea as political relations between China and its neighbors shifted.

Tea developed as a key commodity during the Ming Dynasty (1368-1744 CE) on the Southwest Silk Road.[3] Two principal roads of the Southwest Silk Road begin in the tea mountains of southern Yunnan and the area of Sichuan around Ya'an. A network of smaller trails connect to these 2 principal roads leading towards Tibet, meeting at the trading town of Mangkham near the Mekong, and continuing west to Lhasa. Abundant natural resources were exchanged on the various branches of the Southwest Silk Road over the course of 2 millennia, including precious metals and stones, herbs, tea, spices, fruit, nuts, grain, tobacco, opium, incense, dyes, shell, silk, cotton, horses, lumber, butter, and wildlife products. The Southwest Silk Road historically linked to the Maritime Silk Road and the Northern Overland Silk Route, creating an immense and integrated network between the East and the West. Tea reaching India from Yunnan further made its way on a trade network extending through Eurasia. The earliest textual record of the Southwest Silk Road is found in the Han envoy Zhang Qian's exploration in the western regions in the late 2nd century BCE, where he mentioned a trade route other than the Silk Road connecting southwest China with India.[3]

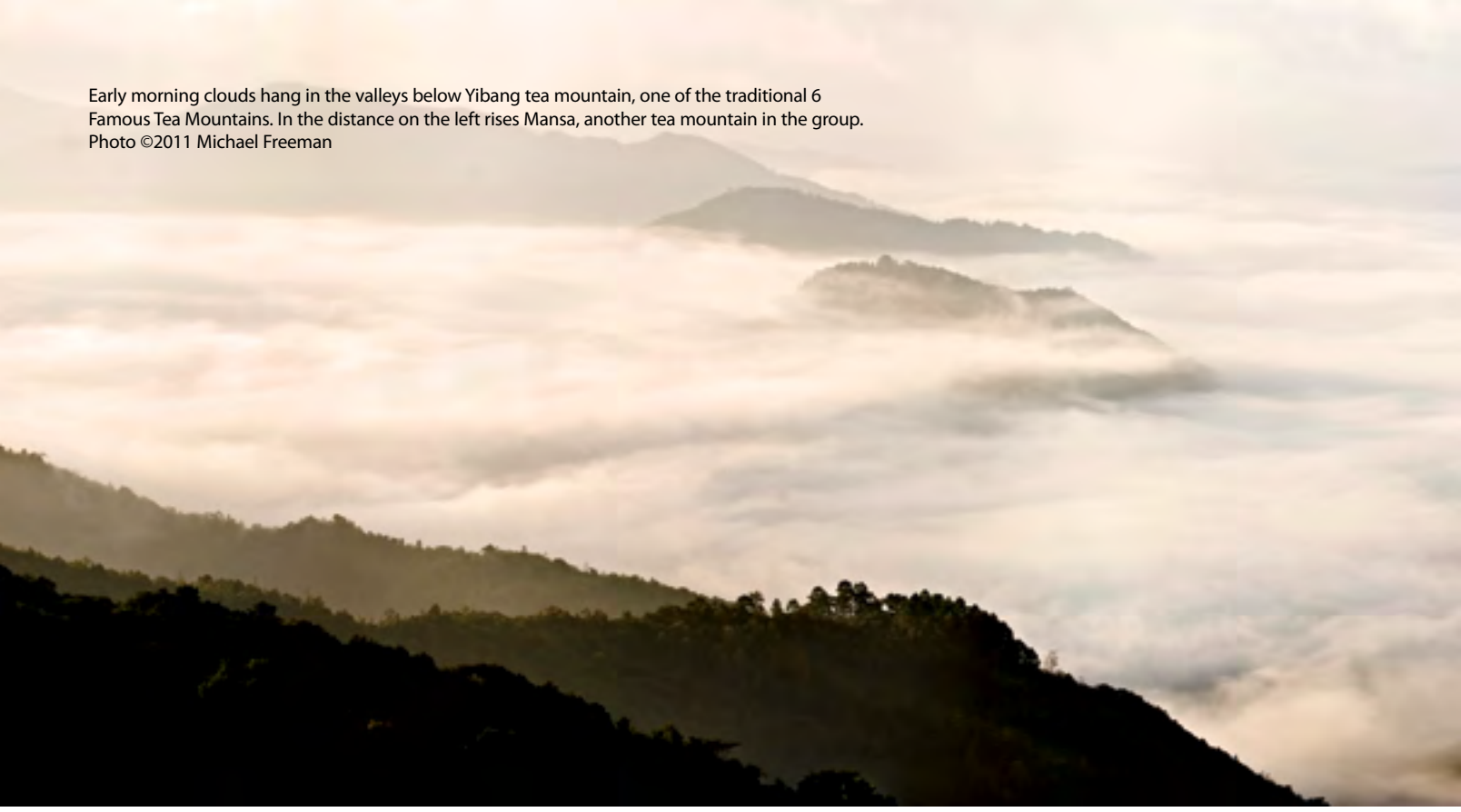
The trade of pu-erh on the Southwest Silk Road continued into the 20th century, but declined naturally as horses ceased to have a major military use, and as roads were paved for more efficient transport. During the middle of the 20th century there was one last burst of activity, as the road and the horse caravans became the commodity lifeline for western China, which was cut off by the Japanese armies advancing from the east. The Chinese communist collective era that followed 1949 brought final closure to the trade.[1]

Consumption of Pu-erh in the Tibetan Plateau

Tibetans initially drank tea as a healing tonic and acquired a yearning for its well-being and stimulant properties when tea became more attainable during the Song Dynasty. Tea enhanced their livelihoods in a harsh environment and supplemented the nutritional deficiencies of a high-fat dairy diet. The extreme altitudes of the Tibetan plateau simultaneously create oxidative stress for life and limit the cultivation of fruits and vegetables.[12] Tibetan inhabitants have adapted to these severe environmental conditions through their agro-pastoralist livelihood strategies, which came to include the consumption of *bod ja,* or butter tea, as a dietary staple.[12] Tibetans traditionally prepare butter tea with *ghee* (clarified butter) from the *di* (female yak) and salt and

A family in Hanpi prepare butter tea by churning, for guests. Etiquette demands that each person's tea bowl is constantly refilled after each sip and so is never left empty.
Photo ©2011 Michael Freeman

April tea-picking on Bulangshan, where the Akha ethnic group maintain some of the most highly regarded Pu-erh tea gardens.
Photo ©2011 Michael Freeman



Early morning clouds hang in the valleys below Yibang tea mountain, one of the traditional 6 Famous Tea Mountains. In the distance on the left rises Mansa, another tea mountain in the group. Photo ©2011 Michael Freeman

consume it along with *tsampa* (roasted barley flour; *Hordeum vulgare*, Poaceae). Butter tea plays a multi-functional role in livelihoods of the Tibetan territory as a ritual object, stimulant, and source of nutrition and medicine. It is regarded to meet the nutritional needs often fulfilled by the consumption of meat and produce.

Farming and grazing at high altitudes of the Tibetan Plateau are strenuous tasks that cause imbalances in the body's constitution from cold winds, wet ground, and vigorous physical activity. Joint pain and blood circulation diseases are especially associated with strenuous grazing and agricultural work that require excessive effort because of the low productivity of the land.[14] Pu-erh tea prepared with butter thus became a staple food and the ultimate energy drink for Tibetans, as described by the writer Frederick Spencer Chapman in 1940:

> "The leaves are boiled for several hours, then the infusion is poured into a section of hollow bamboo, where it is churned up with a plunger, together with a handful of salt, a pinch of soda, and a good lump of butter—usually rancid. The result is a purplish liquid of unusual taste for tea, but as soup excellent."[13]

Preparation of butter tea involves brewing approximately 8 grams of pu-erh in 80mL of water and then churning the hot infusion with 4-8 tablespoons of butter and several pinches of salt. The tea leaves are most often infused several times. The number of infusions, brewing duration, leaf and butter amount, and water temperature used in preparing butter tea varies with production variables of tea and drinker preferences. In some Tibetan communities, butter tea infusions are distributed in a hierarchical order. The most elder or senior drinkers are offered the first serving and the youngest or least senior drinkers receive the last infusions. Studies have found that the method of preparing tea through multiple infusions results in variation of the phytochemical profile of tea.[4]

Tibetans may consume 2-4 bowls of butter tea at each of their daily meals and around 6-16 cups per day.[14] After several bowls of butter tea at a single sitting, they mix and eat a small amount remaining in their cups with finely-ground roasted barley. Butter tea has become so esteemed by Tibetan communities that it is incorporated into Buddhist ceremonies as a sacred offering and represents hospitality. Tibetan communities continue to consume butter tea, and for some individuals, particularly the elder generations, this traditional practice persists for all daily meals.[14]

Pu-erh Tea in Tibetan Medicine and Health

Butter tea in the Tibetan medicine system is valued for providing the body with *dangs-ma* (essential nutrients) that nourish the vital and physical energies.[14] Tibetan medicine has deep roots in Buddhist philosophy. It was brought to Tibet—concurrently with Buddhism—from India, where it derived from the Ayurvedic system of healing.[15] The Buddha spread medical knowledge in his manifestation as the Medicine Buddha. Monks, physician-saints, and lama-doctors carried on this tradition in Tibet and modified it to reflect the habitat and resources of their surrounding landscape, including shamanic pre-Buddhist practices. They continued to develop the system with additional study and exchange with surrounding communities in India, Nepal, Yunnan, Sichuan, and Mongolia. The Dalai Lamas, who emerged as spiritual leaders in Tibet by the 16th century, supported the study and spread of medical healing knowledge through personal study and by creating medical schools. The first medical schools were created in monasteries serviced by monks and lama-doctors. These are regarded as the beginning of the public-health system in Tibet.[16]

Health and well-being in Tibetan medicine are perceived as the balance and interaction of the body's 7 energies, 3 humors, and 3 excrements. Disease is perceived as the pathological mani-

Bulang women from Mang Jing village make a ritual collection of leaves in one of the mountain's agro-forest tea gardens. Photo ©2011 Michael Freeman

festation resulting from excess or weakness in the body's 7 energies, 3 humors, and 3 excrements. Such an imbalanced state can result from both mental and physiological processes, including physical and spiritual. Disease in Tibetan medicine is classified as either hot or cold. Disease is also classified as (1) dependent disease caused by past *karma*; (2) imaginary disease caused by demons; (3) absolute disease of the present life; and (4) ostensible disease. Absolute disease of the present life may be caused by improper diet and behavioral patterns.[15]

At the physiological level, essential nutrients from ingested food and beverage are regarded as the most influential of all the 7 substances that may create imbalance of the body's energies, humors, and excrements. Tibetan medicine regards nutrition from food and beverage to be ultimately the source of the blood, muscle, fat, bone, marrow, and regenerative fluid making up the body. Thus, the careful selection of foods and their combination is crucial for maintaining well-being and preventing illness. The Tibetan medical text *The Four Tantras* contains 3 chapters that address dietary principles for health maintenance and healing. Tibetan medical practice emphasizes the combination of foods and warns against certain food combinations that are regarded as poisonous. Each food strongly influences the different humors, and may negate the good qualities of each other, or the combined effect may be deleterious to the body. Excess of particular foods is believed to cause blockage of the vital channels of the body that create circulatory problems. A balanced and moderate diet is viewed as essential in keeping open the body's channels and varies based on an individual's typology.[15]

According to Tibetan medicine, the consumption of pu-erh—in synergy with other traditional foods—creates a perfect balance in the body and strengthens the body's blood, muscle, fat, bone, marrow, and regenerative fluid, and creates energy. It was found especially advisable for bile disorders caused by physical exercise, injury, hot and sour diet, indigestion, anger, and evil spirits. The combination of butter and tea is regarded to give greater mind-body balance than either item individually. While the indigenous Tibetan territory has hundreds of endemic medicinal plants of its own, pu-erh tea provided the Tibetan diet with what was believed to be an ideal balance. It did not contain the potency of many indigenous plants that would disrupt the balance of the body if consumed frequently. When tea was unavailable or inaccessible, Tibetans had no recourse but to substitute tea with local plants.[14]

Various health claims of the components of butter tea and roasted barley flour, or *bod ja* and *tsampa*, have been supported by laboratory studies. Yak butter contains approximately 80% fat, of which 2.5% is classified as conjugated linoleic acids. These compounds improve bone mineralization activity and have pharmacologically been shown to have anti-carcinogenic and anti-diabetic properties. Salt is a dietary mineral crucial for human life for its role in regulating water balance. It is valued locally to counterbalance the diuretic properties of tea. Barley is a rich source of fiber, vitamins, and minerals including magnesium, phosphorus, potassium, and selenium, plus the carotenoids lutein and zeaxanthin.

Like other teas, pu-erh is a source of dietary polyphenols. These phytochemicals are inversely associated with the incidence of chronic disease.[17,18] The antioxidant attributes from the catechin compounds in tea are regarded to provide an adaptive strategy to cope and buffer the stress of high altitude, and also aided in the digestion of fat. Caffeine, the key central nervous system stimulant methylxanthine in tea, further provides energy for grazing, farming, meditating, trekking, pilgrimage, and other

daily activities. During the processing of black teas, catechins undergo oxidation to form the oxidized high molecular weight components bisflavanol, theaflavin, and thearubigin.[9] Other compounds in tea include the methylxanthines theobromine and theophylline, amino acids, and their derivatives, such as theanine, plus proanthocyanidins, gallic acid, quinic esters of gallic, coumaric and caffeic acids, and free sugars.[21] Variations of these phytochemicals depend on genetic, environmental, processing, storage, and preparation factors. Several *in vitro* and animal studies have supported the notion that tea has a range of health-protective effects including anti-oxidative, anti-inflammatory, neuroprotective, anticancer, immune-enhancing, anti-

Bulang women from Mang Jing village make a ritual collection of leaves in one of the mountain's agro-forest tea gardens. Photo ©2011 Michael Freeman

microbial, antiviral, antidiabetic, anti-obesity, and anti-atherosclerotic activities.[14,17,18]

The processing of black pu-erhs results in a difference in phytochemical profile from other black tea types because of the deactivation of leaf enzymes during the heat application step of pu-erh and because of the associated microorganisms involved in fermentation. The microorganisms in black pu-erh oxidize polyphenols more completely than the enzymatic oxidation of other black teas and create fermentation-derived compounds known as statins.[19,20] Statins are a group of hydroxymethylglutaryl-coenzyme A reductase inhibitors which reduce low-density lipoprotein cholesterol levels in humans and prevent cardiovascular disease. Prescription synthetic statin drugs are widely sold by the pharmaceutical industry. Black pu-erh teas are natural fermentation-derived sources of statins that are found in other natural products such as oyster mushrooms (*Pleurotus ostreatus*, Tricholomataceae) and red yeast rice (*Monascus purpureus*, Monascaceae). The level of statins in black pu-erhs increases with fermentation and varies depending on the microorganism strains involved in the fermentation process. [20]

The weathered and post-fermented pu-erhs traditionally consumed by Tibetan communities have probiotic health claims that make them distinct from other tea types because of their associated microorganisms. Probiotics are live organisms that

Akha women sort dried tea leaves by picking out those that have yellowed by receiving too much heat during the pan-frying. These rejects will not be wasted; they are mixed with fodder for the village animals.
Photo ©2011 Michael Freeman

Tibetan medicine has deep roots in Buddhist philosophy. It was brought to Tibet—concurrently with Buddhism—from India, where it derived from the Ayurvedic system of healing.

can have a beneficial effect on the host's health by restoring the balance of microflora of the gastrointestinal, respiratory, and urinary tracts, and displacing potential pathogens via competitive exclusion or production of antimicrobial agents.[22,23] Studies have demonstrated probiotics to be effective in treating diarrhea, upper respiratory tract infections, atopic eczema, and some inflammatory conditions.[23,24] However, investigations on the health-related properties of post-fermented pu-erh tea are sparse and warrant further study, particularly since teas, as traditional conventional foods, do not undergo the testing and approval process required for pharmaceutical drugs. Studies are needed to understand the efficacy of different microorganism strains associated with pu-erh teas and how this varies depending on single versus multiple strains and the synergy of microorganisms with other tea constituents.

Pu-erh Tea and the Southwest Silk Road at Present

Today, Pu-erh tea and the Southwest Silk Road have new and very different lives.[1] The market for pu-erh tea boomed in the early years of this century, reaching a peak in 2007, with active buyers—particularly from Hong Kong, Taiwan, and Guangzhou—demanding pu-erh from indigenous agro-ecosystems without the use of chemical input. As the market peaked, aged individual *bing* (the discus-shaped compressed pu-erh cake) from an agro-forest was fetching as much as 300,000 RMB (roughly $44,000 US dollars) at auction. The pu-erh market resembled that of fine wine for investment, attracting the less scrupulous dealers, with practices such as false labeling and inferior product masquerading as the best. The bubble burst, leaving pu-erh with a damaged reputation.[8] However, demand for high-quality pu-erh from indigenous agro-forests remains strong, and its unique characteristics keep it prominent in the overall spread of teas internationally.

The traditional links between tea mountains of Yunnan and Sichuan and tea consumers in the indigenous Tibetan territory were broken for the most part after 1949 during China's Collective Era as land and resources were nationalized.[1] The quality of tea arriving in Tibetan communities has declined in many cases since the caravans stopped running and the urban and global demand for high-quality pu-erhs redirected these resources to those willing to pay the highest price premiums. Tibetan communities now generally rely on low-quality pu-erh sold at local village stores by outside entrepreneurs. This is likely manifesting itself in a decline in the health-related properties of pu-erh, exacerbated by the increased use of pesticides, hormones, fluoride, chemical fertilizers, and herbicides from poor production practices of terrace plantations.

Butter-tea diets of the Tibetan Plateau are transitioning because of political and socio-economic influences. The traditional Buddhist medical and philosophical frameworks that encouraged

the consumption of tea for well-being are weakening in the face of exogenous influences. The consumption of butter tea is giving way among the younger generations to soft drinks, instant noodles, and refined rice in an echo of globalization trends elsewhere. Some elders maintain that these new foods are unable to provide the *rlung* (vital energy) and *dangs-ma* (essential nutrients) provided by butter-tea diets. As the Southwest Silk Road, or Tea Horse Road, acquires an historical presence, it is easy to forget its vital and practical former role of maintaining community health.

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Award-winning photographer and author Michael Freeman has made a specialty of documentary reportage on Asia over the last 3 decades, for the Smithsonian Magazine, Time-Life, *the* Sunday Times Magazine, *and* GEO*, among many others. He has produced more than 30 books on Asian subjects as diverse as the ancient Cambodian temple complex at Angkor Wat, other sacred places, contemporary Chinese design, and ethnic minorities. He lives in London.*

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Saw Palmetto *Serenoa repens*. Photo ©2011 Steven Foster

Green Tea *Camellia sinensis*. Photo ©2011 Steven Foster

Development of Standard Reference Materials for the Analysis of Dietary Supplements: THE STORY CONTINUES

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In 2004, we published an article in *HerbalGram* that described a then-recent collaboration among the following agencies of the United States government: the National Institute of Standards and Technology (NIST), the National Institutes of Health (NIH) Office of Dietary Supplements (ODS), and the Food and Drug Administration (FDA).[1] This article provides an update of this program, which is directed at production of Standard Reference Materials (SRMs) which can be used in support of the Dietary Supplement Health and Education Act of 1994[2] and requirements imposed by the new current Good Manufacturing Practices (cGMPs) for the manufacture of dietary supplements published by the FDA. The new cGMPs were issued in June of 2007, with a phase-in period staggered over 3 years.[3] As of June 2010, all companies, including those with fewer than 20 employees, have been required to comply with the new cGMPs.

Among other things, the cGMPs require dietary supplement manufacturers to establish specifications to evaluate the identity, purity, strength, and composition of ingredients used in their products; to set limits on contaminants (e.g., pesticides, bacteria, toxic elements) and adulterants; and to evaluate their finished products. The cGMPs require that manufacturers follow processes for selection and use of appropriate analytical methods and reference materials. Manufacturers must verify that the methods are appropriate for their intended use, then use those methods to determine whether their specifications are being met. The first SRM developed in this program was issued in 2006. By the end of 2010, there were 23 dietary supplement-related SRMs available from NIST.

Cranberry *Vaccinium macrocarpon*. Photo ©2011 Steven Foster

Between 2008 and 2009, sales of herbal dietary supplements in all channels of trade in the US increased by almost 5%, totaling more than $5 billion in 2009.[4] This represents about 20% of the US's entire $24 billion dietary supplement industry, which includes non-botanical dietary supplements, such as vitamin and mineral supplements.[5] The increase in sales in a difficult down-cycle economy is somewhat surprising, but it is possible that people are "stocking up on pills that they think can spare them expensive doctor visits."[6] With increasing sales and more than half of the US population reporting that they take dietary supplements,[7] it is important to maintain the quality and safety of these products.

Because of a recognized lack of publicly available, validated analytical methods for dietary supplements—and a dearth of reference materials for validation of analytical methods—ODS was mandated by Congress to fund development of analytical methods and reference materials for dietary supplements.[8] Since the ODS program was established, 16 Official Methods of Analysis for dietary supplements have been published by AOAC International, and 3 more are in press. In addition, about 150 papers describing supplement analytical methods, most of which are not funded by ODS, have been published in the *Journal of AOAC International* since 2002.[9] This growth in publications can be taken as an indicator of the formation of a community that understands the importance of developing accurate analytical methods for measurement of ingredients in dietary supplements.

"Analytical methods" are used to measure the amount of an element or chemical compound in something—to measure iron in spinach, for example. "Reference materials" are homogeneous substances that can be used for calibration of an instrument or for assessing whether or not an analytical method is working properly. A certified reference material (CRM) is a reference material that is provided with a Certificate of Analysis, which, in the case of the dietary supplement materials being discussed here, is a document that shows the chemical composition of the material (e.g., calcium or vitamin C content). CRMs from NIST are known as SRMs. A Certificate of Analysis for an SRM contains a description of the material, its intended use, an expiration date, storage and handling recommendations, description of the analytical methods used for characterization, and certified values. Depending on their intended use, SRMs can be used to calibrate an instrument or to determine whether an analytical method is working properly. (A single CRM cannot be used for both calibration and quality control.) If an analyst measures the CRM and obtains a result that agrees with the certified value (within the uncertainty limits of the certified value), he/she can have confidence in the method of analysis and that results for similar samples being analyzed will be accurate.[10] The use of SRMs as quality control samples has been demonstrated to improve the quality of analytical results.[11-13]

The natural-matrix dietary supplement SRMs being produced

The natural-matrix dietary supplement SRMs being produced by NIST are not intended to be used to confirm botanical identity or to represent what a "good" dietary supplement product should look like, and the existence of such a material does not imply that the botanical in question is either safe or effective for use as a dietary supplement.

by NIST are not intended to be used to confirm botanical identity or to represent what a "good" dietary supplement product should look like, and the existence of such a material does not imply that the botanical in question is either safe or effective for use as a dietary supplement. NIST's dietary supplement SRMs are intended for the same purposes as NIST's other natural-matrix SRMs, namely: (1) to validate the reliability and precision of new analytical methods, and (2) to provide quality control for routine analyses whereby the SRM is analyzed at appropriate regular intervals as part of a laboratory's quality assurance protocol or a company's good manufacturing practices (GMPs). Natural-matrix SRMs that are similar to the other samples being analyzed by the laboratory can be used to validate the complete analytical process including extraction, isolation of the analytes of interest from the matrix, and separation and detection.

NIST's SRMs and the industry's use of them fit into a larger measurement (metrology) picture. NIST is a non-regulatory agency within the US Department of Commerce and is responsible for building the foundation for measurements in the US; these measurements support national and international commerce.[14] In the case of dietary supplements, this foundation is established by assigning values to concentrations of active and/or marker compounds and toxic elements (e.g., arsenic, cadmium, lead, and mercury) in dietary supplement SRMs. (Quantifiable levels of pesticides in the SRMs that have been issued so far have not been found. If and when they are detected in future SRMs, values will be assigned.) Manufacturers measuring these analytes in their products can link their results—make them traceable—to the SRMs maintained by NIST.[15]

NIST participates in intercomparisons among other nations' National Metrology Institutes (NMIs) to ensure that results traceable to the CRMs produced by NMIs throughout the world are equivalent. For example, if NIST and other NMIs have proven their abilities to measure cadmium in a plant material in one of these intercomparisons and make this capability available to analytical chemists in their respective countries through a CRM, laboratories within that country that are measuring cadmium and analyzing the CRM as a control—and obtaining the correct result—should all be accurately measuring cadmium in their products.[16]

NIST assigns certified values to SRMs in 3 ways: (1) using a single primary method with confirmation by other methods; (2) using 2 or more independent, critically evaluated methods; or (3) using 1 method at NIST and different methods by outside collaborating laboratories.[17] In cases where NIST has not made measurements, in which NIST made measurements using only a single analytical technique, or in which there is less confidence in the value for a technical reason, reference or information values may be assigned rather than certified values.

The First Suite of Dietary Supplement SRMs

Because of safety concerns, our initial efforts focused on ephedra (*Ephedra sinica*, Ephedraceae) as the dietary supplement of highest priority for reference material development. (This effort commenced prior to FDA's ban of ephedra in dietary supplements which went into effect April 12, 2004.) In the US dietary supplement marketplace, ephedra was used in weight-loss and sports nutrition products. Because of the different analytical challenges presented by the various product formulations, NIST developed 5 ephedra-containing SRMs consisting of: ground and sieved plant material (SRM 3240 *Ephedra sinica*, Aerial Parts); a natural extract (SRM 3241*Ephedra sinica*, Native Extract); the extract used to prepare SRM 3241, fortified to contain nominally 8% total ephedrine alkaloids (SRM 3242 *Ephedra sinica*, Commercial Extract); and 2 "finished product" materials containing ephedra—one a mixture of solid oral dosage forms that were available in the marketplace at that time (SRM 3243 Ephedra-Containing Solid Oral Dosage Form) and the other a mixture of chocolate-flavored protein drink mixes (SRM 3244 Ephedra-Containing Protein Powder).[18] The plant and extract materials in this suite of ephedra SRMs were all prepared from the same source plant material, for which a voucher specimen was obtained. Herbarium sheets are deposited at the Missouri Botanical Garden and are available through its website.[19]

Ginkgo *Ginkgo biloba*. Photo ©2011 Steven Foster

Cranberry *Vaccinium macrocarpon*. Photo ©2011 Steven Foster

The suite of ephedra SRMs has served as the model for the other botanical dietary supplement materials in NIST's portfolio; i.e., most of the other suites also consist of plant material, an extract, and a finished product. A plant material can be difficult to analyze because compounds of interest may be incorporated in the plant's cell walls, and there are many, many other compounds present from which the analyte of interest must be isolated. An extract may simply require dissolution in a suitable solvent (e.g., water or alcohol). Finished products, while often containing extracts, may be difficult to analyze because of interferences from other ingredients present in mixed-botanical products.

After packaging, samples were selected for analysis, including testing to assess bottle-to-bottle homogeneity. For the suite of ephedra SRMs, the ephedra alkaloids were the primary focus.[20] A chromatographic profile or "fingerprint" of the ephedrine alkaloids as well as other plant constituents is provided for use as a reference, and the Missouri Botanical Garden performed microscopy. NIST also determined caffeine, synephrine (see "Bitter Orange-Containing Reference Materials," on page 48), and toxic elements (i.e., arsenic, cadmium, mercury, and lead) in some of these materials. Collaborating laboratories provided results for these analytes as well as for the nutritional composition (fat, protein, carbohydrate, individual amino acids, vitamins, and minerals) of the protein powder.

(Note: Because of concerns about the use of ephedra-containing products in production of methamphetamine, sale of the ephedra SRMs was discontinued at the end of 2010.)

Ginkgo-Containing Reference Materials

The concentrated extract of the leaves of ginkgo (*Ginkgo biloba*, Ginkgoaceae) is largely used today by consumers to prevent or treat memory loss, Alzheimer's, and other forms of dementia.[21] NIST's suite of ginkgo-containing materials consists of SRM 3246 *Ginkgo biloba* (Leaves), SRM 3247 *Ginkgo biloba* Extract, and SRM 3248 Ginkgo-Containing Tablets.[22] All 3 of these materials are linked to a common source. Unlike most of the "finished product" SRMs, SRM 3248 consists of a single type of tablets with no other botanical ingredients. Values in these materials were assigned for ginkgolides (terpene lactones), flavonols, cadmium, lead, and mercury.[23] A thin-layer chromatogram is provided for the ginkgolides and flavonols, as well as for ginkgolic acid.

Saw Palmetto-Containing Reference Materials

The suite of saw palmetto-containing materials consists of SRM 3250 *Serenoa repens* (Saw Palmetto) Fruit and SRM 3251 *Serenoa repens* Extract. These 2 SRMs were not prepared from the same raw material. Because most finished dietary supplement products labeled as containing saw palmetto (*Serenoa repens*, Palmaceae) contain either dried, ground "berries" or a saw palmetto extract by itself or mixed with other oils, a "finished product" SRM was not prepared. Saw palmetto products are typically used to improve urinary parameters and prostate function, particularly as a treatment for symptoms of benign prostatic hyperplasia.[24] The 2 SRMs have been characterized for their phytosterols and fatty acid content, including both free fatty acids and those occurring as triglycerides.[25] Values for beta-carotene have also been assigned in the extract.

Green Tea-Containing Reference Materials

Green tea (*Camellia sinensis*, Theaceae) can be consumed as a beverage and in dietary supplements. Green tea products have been used to prevent or treat various cancers, to increase mental alertness, and in weight-loss regimens.[26] The green tea SRM suite consists of SRM 3254 *Camellia sinensis* (Green Tea) Leaves, SRM 3255 *Camellia sinensis* (Green Tea) Extract, and SRM 3256 Green Tea-Containing Solid Oral Dosage Form. Values are assigned for catechins, theanine,[27] and caffeine in these materials.

Bitter Orange-Containing Reference Materials

Green Tea *Camellia sinensis*. Photo ©2011 Steven Foster

Bitter Orange *Citrus aurantium*. Photo ©2011 Steven Foster

Perilla *Perilla frutescens*. Photo ©2011 Steven Foster

After ephedra-containing products were removed from the marketplace, many manufacturers used bitter orange as a replacement in their products. Although *Citrus aurantium* (Rutaceae) is known as bitter orange, bitter orange in the dietary supplement industry is often a mixture of different immature citrus fruits that are combined in proportions to provide a target concentration of synephrine.* SRM 3258 Bitter Orange (Fruit) consists of such a mixture. SRM 3259 Bitter Orange Extract is an extract of immature citrus fruits that provides a nominal synephrine concentration of 6%. SRM 3260 Bitter Orange-Containing Solid Oral Dosage Form is a mixture of ground tablets and capsules' contents. These materials have been characterized for the citrus alkaloids[28] as well as toxic elements.[23]

Vaccinium Berry-Containing Reference Materials

Berries are traditional foods that are also used as ingredients in dietary supplements. This suite consists of 7 different materials, some of which are characterized for nutrients as well as organic acids.[29] All materials will be characterized for anthocyanins and/or anthocyanidins with fingerprints provided for procyanidins in the future. These materials are SRM 3281 Cranberry (Fruit), SRM 3282 Low-Calorie Cranberry Juice Cocktail, SRM 3283 Cranberry Extract, SRM 3284 Cranberry-Containing Solid Oral Dosage Form, SRM 3285 Mixed Berry-Containing Solid Oral Dosage Form (i.e., bilberry [*Vaccinium myrtillus*, Ericaceae], blueberry [*V. corymbosum*], and cranberry [*V. macrocarpon*]), SRM 3287 Blueberry (Fruit), and SRM 3291 Bilberry Extract. These materials are currently characterized for organic acids. Because of their use as traditional foods, the blueberries, cranberries, and cranberry juice are characterized for sugars and nutrient elements (e.g., calcium, iron, sodium, etc.). The blueberries are also characterized for fiber, 2 water-soluble vitamins, amino acids, and other nutrients.

Reference Materials for Omega-3 and Omega-6 Fatty Acid Measurement

Health effects of omega-3 and omega-6 fatty acids are increasingly being studied, and dietary supplement products that contain these materials are very popular. The oils of flax (*Linum usitatissimum*, Linaceae), borage (*Borago officinalis*, Boraginaceae), evening primrose (*Oenothera biennis,* Onagraceae), and perilla (*Perilla frutescens*, Lamiaceae) contain such fatty acids.

*Bitter orange's primary protoalkaloidal constituent is *p*-synephrine. Although *p*-synephrine is similar in structure to *m*-synephrine—which does not naturally occur in bitter orange—their pharmacological activities are different.[28,34] Some bitter orange products may be adulterated with a synthetic form of synephrine. In the Certificates of Analysis for bitter orange oral dosage, extract, and plant products, the distinction is not designated.

Borage *Borago officinalis*. Photo ©2011 Steven Foster

Bilberry *Vaccinium myrtillus*. Photo ©2011 Steven Foster

SRM 3274 Botanical Oils Containing Omega-3 and Omega-6 Fatty Acids (Flax, Borage, Evening Primrose, Perilla) consists of ampoules of the 4 individual oils with values assigned for fatty acids. A comparison of selected fatty acid concentrations in these 4 oils is provided in reference.[30] SRM 3275 Fish Oils Containing Omega-3 and Omega-6 Fatty Acids consists of 3 individual oils: a concentrate high in docosahexaenoic acid (DHA), anchovy oil high in DHA and eicosapentaenoic acid (EPA), and a concentrate containing 60% long-chain omega-3 fatty acids. SRM 1588c Organics in Fish Oil, expected to be available later this year, is menhaden oil that will have values assigned for contaminants such as pesticides, polychlorinated biphenyl congeners (PBCs), and brominated flame retardants as well as fatty acids.

Non-Botanical Dietary Supplement Reference Materials

A number of other non-botanical dietary supplement SRMs have been prepared as part of this program. SRM 3280 Multivitamin/Multielement Tablets has values assigned for 13 vitamins, 2 carotenoids, and 24 elements.[31] We are currently in the process of assigning values for 4 additional elements and vitamin B_{12} in this material. SRM 3278 Tocopherols in Edible Oils is a mixture of oils (sunflower [*Helianthus annuus*, Asteraceae], soy [*Glycine max*, Fabaceae], canola [*Brassica* spp., Brassicaceae], safflower [*Carthamus tinctorius*, Asteraceae]) that were combined to provide similar levels of gamma- and alpha-tocopherol. Delta-, gamma-, and alpha-tocopherol are naturally occurring in edible oils but one form typically predominates in each type of oil; beta-tocopherol is also sometimes present but at very low levels. Four oils were blended to give comparable levels of all three of the main tocopherols so that the SRM can be used for quality assurance of tocopherol measurements in all types of oils.

Reference Materials Currently in Preparation

St. John's wort (*Hypericum perforatum*, Clusiaceae) has been used for a number of indications, including "melancholia," since medieval times.[32] This suite of SRMs consists of SRM 3262 *Hypericum perforatum* (St. John's Wort) Aerial Parts, SRM 3263 *Hypericum perforatum* (St. John's Wort) Carbon Dioxide Extract, SRM 3264 *Hypericum perforatum* (St. John's Wort) Methanol Extract, and SRM 3265 St. John's Wort-Containing Tablets. Scientific studies have attempted to determine which compounds in St. John's wort might be responsible for its biological activity, with the focus on hyperforin and hypericin. Hyperforin is concentrated in a supercritical fluid carbon dioxide extraction, and hypericin is concentrated in the methanol extract, thus the 2 different extract SRMs will provide quality assurance for measurement of both types of products. Values will be assigned for hyperforin, hypericin, pseudohypericin, and toxic elements in these SRMs, which are expected to be available in 2011.

Blueberry *Vaccinium corymbosum*. Photo ©2011 Steven Foster

Suites of SRMs for soy, kudzu (*Pueraria montana,* syn. *P. lobata*, Fabaceae), red clover (*Trifolium pratense*, Fabaceae), and American black cohosh (*Actaea racemosa*, Ranunculaceae; syn. *Cimicifuga racemosa*) are currently being characterized; with plans for production of SRMs for eleuthero (*Eleutherococcus senticosus*, Araliaceae), Asian ginseng (*Panax ginseng,* Araliaceae), pomegranate (*Punica granatum*, Punicaceae), turmeric (*Curcuma longa*, Zingiberaceae), and yohimbe (*Pausinystalia johimbe*, Rubiaceae). (National Research Council Canada, the NMI in Canada, is preparing CRMs of American ginseng [*P. quinquefolius*].) SRMs for iodine and iodate in table salt and calcium in supplements are also being planned. In addition, NIST is beginning production of solutions containing compounds of interest to the dietary supplement community: selected catechins, flavonols, ginsenosides, isoflavones, organic acids, and terpene glycosides. These materials can be used for instrument calibration.

Analytical Quality Assurance

SRMs can be used by dietary supplement manufacturers to build a quality assurance program in compliance with GMPs, by researchers for verifying the accuracy of their analyses, and by the FDA for monitoring marketed products and for enforcement actions when necessary. For measurement of toxic and nutrient elements, a broad range of SRMs (and CRMs in general) are available for matrices ranging from calibration solutions to botanicals to soils and sediments. For active and marker compounds, the range is more limited, but it continues to expand.

While the use of SRMs has been shown to improve the quality of analytical results, participation in a quality assurance or proficiency testing program can be similarly effective.[11-13] NIST has conducted quality assurance programs for the measurement of contaminants in environmental samples and micronutrients in human serum for more than 20 years. Participants in these programs have improved the comparability of their between-laboratory results as well as their own within-laboratory precision. NIST and NIH-ODS recently established a quality assurance program for the analysis of dietary supplements with the expectation of helping labs that measure dietary supplements to realize these same goals.[33]

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Schisandra *Schisandra chinensis*. Photo ©2011 Steven Foster

ADAPTOGENS

A Review of their History, Biological Activity, and Clinical Benefits

By Alexander Panossian, PhD and Hildebert Wagner, PhD

Eleuthero *Eleutherococcus senticosus*. Photo ©2011 Steven Foster

Introduction

The term *adaptogen* was introduced into scientific literature by Russian toxicologist Nikolay Lazarev in 1957 to refer to substances that increase the "state of non-specific resistance" in stress.[1,2] His concept was based on Hans Selye's theory of stress and general adaptation syndrome,[3] which has 3 phases: alarm phase, phase of resistance, and phase of exhaustion (Figure 1).*

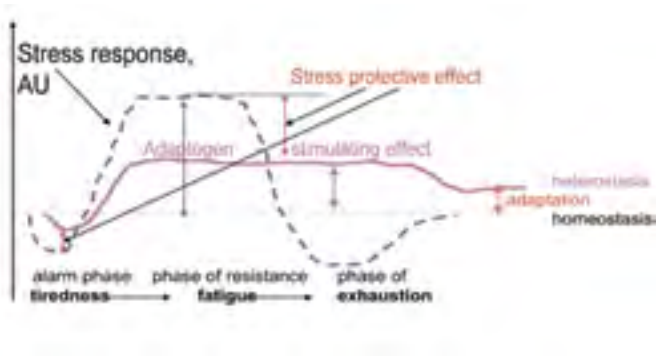


Figure 1. Adaptogens increase the state of nonspecific resistance in stress and decrease sensitivity to stressors—which results in *stress protection*—and prolong the phase of resistance (*stimulatory effect*). Instead of exhaustion, a higher level of equilibrium (the homeostasis) is attained—the heterostasis. The higher the equilibrium is, the better the adaptation to stress. Thus, the stimulating and anti-fatigue effect of adaptogens has been documented in both animals and humans.[4,5]

Later, another Soviet scientist, pharmacologist Israel Brekhman, postulated that adaptogens must be safe and normalize body functions irrespective of the nature of stressors.[6,7]

Other definitions of adaptogens are also associated with physiological conditions:

- Adaptogenic substances are stated to have the capacity to normalize body functions and strengthen systems compromised by stress. They are reported to have a protective effect on health against a wide variety of environmental assaults and emotional conditions.[8]
- Adaptogens are innocuous agents, nonspecifically increasing resistance against physically, chemically, biologically, and psychologically noxious factors ("stressors"), normalizing effect independent of the nature of pathologic state.[6,7]
- Adaptogens are substances that elicit in an organism a state of nonspecifically raised resistance, allowing them to counteract stressor signals and to adapt to exceptional strain.[9]

As a pharmacotherapeutic group, adaptogens were recently defined as herbal preparations that increased attention and endurance in fatigue, and reduced stress-induced impairments and disorders related to the neuro-endocrine and immune systems.[5,10] This definition was based on evidence obtained from clinical trials, which authors evaluated in accordance with the European Medicines Agency Assessment Scale and the Jadad scale—a recognized, evidence-based, validated grading rationale for clinical trials. Today, the term *adaptogen* is widely used by many herbalists although it has yet to gain prominence in mainstream pharmacology.

In this context, the pharmacological profile of various adaptogenic plants might be different from plant to plant, but what is common for true adaptogens is their ability to increase the state of non-specific resistance and to be safe in long-term use in the appropriate dose level.[4,5,9-16] The term *adaptogen* is often applied to plants (Table 1) even when the criteria of an adaptogen have not been met, such as the important and significant general adaptive effect on stress involving the whole organism and its main functions.[16] Indeed, systematic pharmacological assessment of traditionally used tonics (possible adaptogens) show that some of them do not meet criteria common for adaptogens by definition.[17]

Table 1. Plants Mentioned in Literature as Adaptogens*

Alstonia scholaris Apocynaceae	*Emblica officinalis* Myrsinaceae	*Piper longum* Piperaceae
Anacyclus pyrethrum Asteraceae	*Eucommia ulmoides* Eucommiaceae	*Ptychopetalum olacoides,* Olacaceae
Aralia mandshurica Araliaceae	*Evolvulus alsinoides* Convulvulaceae	*Rhaponticum carthamoides* Asteraceae
Argyreia nervosa Convolvulaceae	*Gentiana pedicellata* Gentianaceae	*Rhodiola heterodonta* Crassulaceae
Asparagus racemosus Liliaceae	*Glycyrrhiza glabra* Fabaceae	*Rhodiola rosea* Crassulaceae
Bacopa monnieri Scrophulariaceae	*Heteropterys aphrodisiaca* Malpighiaceae	*Schisandra chinensis* Schisandraceae
Bryonia alba Cucurbitaceae	*Hippophae rhamnoides* Elaeagnaceae	*Scutellaria baicalensis* Lamiaceae
Caesalpinia bonduc Fabaceae	*Hoppea dichoroma Gentianaceae*	*Serratula inermis* Asteraceae
Centella asiatica Apiaceae	*Hypericum perforatum* Hypericaceae	*Sida cordifolia* Malvaceae
Chlorophytum borivilianum, Liliaceae	*Lepidium peruvianum* Brassicaceae	*Silene italica* & *S.* spp. Caryophyllaceae
Cicer arietinum Fabaceae	*Melilotus officinalis* Fabaceae	*Sterculia plantanifolia* Malvaceae
Codonopsis pilosula Campanulaceae	*Morus alba* Moraceae	*Sutherlandia frutescens* Fabaceae
Convolvulus pluricaulis Convulvulaceae	*Nelumbo nucifera* Nymphaeaceae	*Terminalia chebula* Combretaceae
Curculigo orchioides Hypoxidaceae	*Ocimum sanctum* Lamiaceae	*Tinospora cordifolia* Menispermaceae
Dioscorea deltoide Dioscoreaceae	*Panax ginseng* Araliaceae	*Trichilia catigua* Meliaceae
Drypetes roxburghii Putranjivaceae	*Panax pseudoginseng* Araliaceae	*Trichopus zeylanicus* Dioscoreaceae
Echinopanax elatumi Araliaceae	*Paullinia cupana* Sapindaceae	*Turnera diffusa* Turneraceae
Eleutherococcus senticosus, Araliaceae	*Pfaffia paniculata* Amaranthaceae	*Withania somnifera* Solanaceae

*This table includes plants which do and do not meet the formal definition of adaptogen.

*For this review, the authors used original full-text Russian articles published from 1943. The word adaptogen is not found in any publication before 1958, even in N.V. Lazarev's comprehensive book *Evolution of Pharmacology* (1947) or any of his or I.I. Brekhman's publications (or conference abstracts) pre-1958. The first study on nonspecific resistance (adaptogenic) activity of a synthetic drug Dibazol was published in 1956 (and a conference abstract in 1947), but with no mention of "adaptogen" or "adaptogenic activity." Earlier studies on schisandra were initiated and published in 1943-47; they discussed its stimulating activity.

It is not easy to find true scientific information about adaptogens on the Internet, since original scientific data and articles are significantly diluted by the plethora of pseudo-scientific compilations,[18-28] deliberately used by opponents of adaptogens in order to criticize and discredit the entire adaptogenic concept and the large body of research that has been conducted during the last 50 years.

In this review, the authors have attempted to summarize the research on adaptogens from the very beginning to the present time, with particular concentration on their evidence-based pharmacological and clinical effects and the molecular mechanisms of action.

History of Research on Adaptogens

The history of modern scientific research on adaptogens begins with World War II, with the enhanced need to increase stamina, endurance, and performance of soldiers, pilots, sailors, and civilians engaged in production of weapons and war material.

For example, the first scientific studies on the stimulating and tonic effects of schisandra (*Schisandra chinensis*, Schisandraceae) were published in Soviet World War II-era military journals (Figure 2).[13]

Apparently, the Russian interest in *S. chinensis* (known as *limonnik* in Russian) arises from ethnopharmacological investigations by V.L. Komarov (1895) and V. Arsenyev (1903-1907) in far-eastern Siberia and northern Manchuria. The berries and seeds were determined to have been used by Nanai hunters (a native people of far-eastern Siberia and Chinese Manchuria, who are also known as Goldis or Samagir) as a tonic; to reduce thirst, hunger and exhaustion; and to improve night-time vision.[13]

In the early 1960s, the study of adaptogens developed into a field of biomedicinal research in its own right in the former USSR. The extent of the research carried out was enormous, with over 1,000 studies published in the USSR until 1982. Most of these studies concerned extracts or isolates prepared from eleuthero (*Eleutherococcus senticosus*, Araliaceae; formerly referred to as "Siberian ginseng" in the United States) root, schisandra berry, Asian ginseng (*Panax ginseng*, Araliaceae) root, and golden root (*Rhodiola rosea*, Crassulaceae) root.[6, 7, 12-14, 29, 30]

Extensive research revealed that adaptogens possessed stimulatory effects, and on this basis, adaptogens achieved recognition in the official medicine of Russia in the early 1960s. Adaptogens were determined to be useful in the Soviet space exploration program as well as Arctic and Antarctic expeditions, Olympic games, chess competitions, in the nuclear energy industry, and many other stressful situations and conditions in the former USSR.

However, all these studies were published in Russian-language journals; thus, they are relatively difficult to access. Several review articles on adaptogens published in English in the 1980s and 1990s by Brekhman and Dardimov (1968[6]); Farnsworth et al. (1985[29]); Wagner et al. (1994[9], 1995[11]); Panossian et al. (1999[4,31]); and Davydov and Krikorian (2000[32]) increased to some extent professional attention to adaptogens. This professional interest particularly occurred in Indian and Chinese scientists who were researching medicinal plants such as the traditional Ayurvedic tonic ashwagandha (*Withania somnifera,* Solanaceae) and the

Figure 2. Title pages of scientific journals where the first articles on *S. chinensis* were published. The main goal of these studies was formulated in the resolution No. 4654-p of the People's Commissars Council of the USSR.

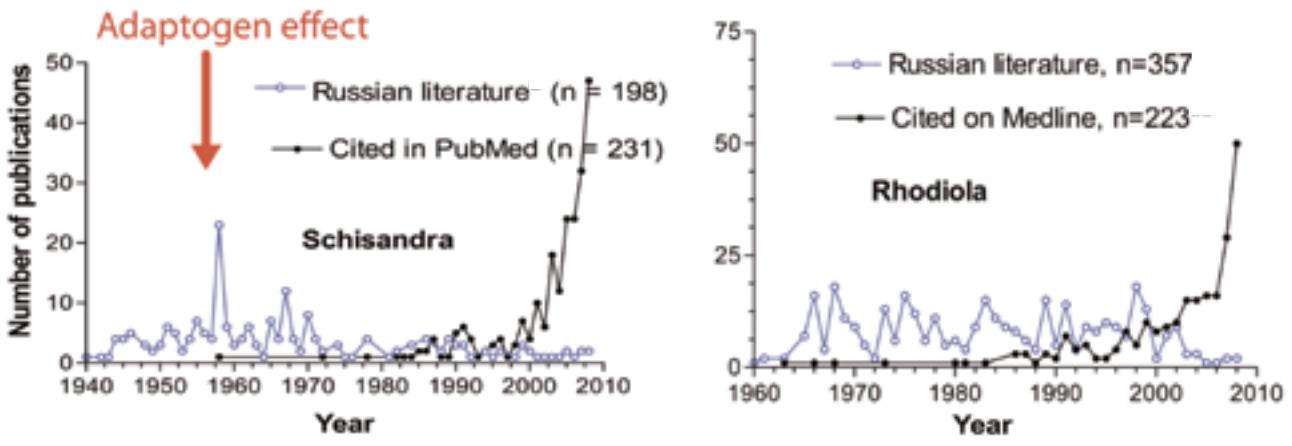


Figure 3. The number of publications on rhodiola and schisandra in USSR/Russia and worldwide since 1940.

revered Asian (also known as Chinese) ginseng (*P. ginseng*). Each plant is used in its respective traditional medicinal system as a tonic and nourishing agent for fatigue and deficiency of *prana* (the life vital energy, activating body and mind in Ayurveda) and *qi* (vital energy in Traditional Chinese Medicine [TCM]) and *jing* (essence or the state of health and lifespan in TCM), respectively. Figure 3 reflects the significant growth and interest in adaptogen research since 1940, the growth in the past few decades—due in part to the impact of the Swedish Herbal Institute and its contribution of controlled clinical trials of adaptogens[33-40]—and studies on elucidation of molecular mechanisms of their action.[15,41-46.]

Some of the most interesting developments are pharmacological studies that clearly indicate that certain adaptogenic substances can activate the protective mechanisms of cells, which is linked to an increase in survival rate both *in vitro* and *in vivo*.[41-47] These studies have so far been directed at the regulation of molecular chaperones (Heat Shock Proteins), such as Hsp70[45,46] and other key stress mediators.[15]

Schisandra *Schisandra chinensis*. Photo ©2011 Steven Foster

Possible Indications for Use for Adaptogens and the Level of Scientific Evidence

The normal therapeutic medical paradigm—one drug for one disease—is not appropriate for adaptogens as they can have numerous pharmacological effects and indications. Tables 2 and 3 show their pharmacological profiles, which are different, but similar in terms of their stress-protective action. Therefore, all of these pharmacological effects can be combined into the groups associated with stimulating and stress-protective effects in the central nervous system (CNS) and vegetative nervous systems, the endocrine system, and the immune system, comprising by definition the parts of a neuroendocrine-immune complex-stress-system.

Apparently, stimulating (acute/single dose effect) and tonic (effect of repeated/multiple administration) effects of adaptogens are actually consequences of their stress-protective activity.

The CNS-stimulating and tonic effects of adaptogens are well documented in numerous publications and reviews.[14] In contrast to conventional stimulants, such as sympathomimetics (e.g., ephedrine, fenfluramine, phentermine, prolintane) and general tonics, the adaptogens do not possess addiction, tolerance, and abuse potentials; they do not impair mental function; and they do not lead to psychotic symptoms in long-term use (see Table 4). Their clinical and pharmacological effects are due

Table 2. Pharmacological Profile of Adaptogens: Summary of *In Vitro* and *In Vivo* Studies (Adapted from Panossian & Wikman, 2010[5])

System	Effect	Rhodiola	Eleuthero	Schisandra	Ginseng	Withania
Stress-system: Anti-stress/ stress-mimetic/ stress-protective effect	CNS-stimulating: enhancing of physical performance, cognitive performance (learning and memory)	+	+	+	+	+
	Neuroprotective	+		+	+	
	Hepatoprotective		+	+		
	Cardioprotective	+		+		+
	Gastroprotective		+	+		
	Oxidative stress/ Radioprotective	+	+	+	+	+
	Anti-atherosclerosis		+	+	+	
	Vasodilatatory/hypo-tensive/aphrodisiac			+	+	
	Wound healing			+	+	
	Antihyperglycemic		+		+	
	Anti-inflammatory/ allergy	+	+	+	+	+
	Immunotropic	+	+	+		+
	Antiviral	+	+			
	Antibacterial	+	+			
	Anti-tumor	+	+	+	+	
	Antimetastatic		+			
	Life-span increasing	+	+	+	+	
	Endocrine normalizing	+	+			+
	Antidepressive	+				
	Anxiolytic	+	+			
	Antihypoxic					
	Antitoxic		+			

Table 3. Pharmacological Profile of Adaptogens: Clinical Efficacy in Humans

	Pathophysiological condition	Rhodiola	Eleuthero	Schisandra	Ginseng	Withania
Neuro-endocrine system	Physical fatigue	+	+	+	+	+
	Mental fatigue (declining attention)	+	+	+	+	+
	Stress-induced chronic fatigue	+	+		+	
	Astheno-depressive syndrome	+		+		
	Depression	+				
	Anxiety					+
	Neurosis	+	+	+	+	
	Schizophrenia			+		
	Visual function/vision in darkness		+	+		
	Cognitive functions in Alzheimer's disease				+	
Immune system	Anti-inflammatory effect		+	+		
	Common cold, influenza		+	+	+	
	Pneumonia		+	+		
	Gastric dysfunctions, gastritis, stomach and duodenal ulcers			+		
	Chemotherapy-induced immuno -suppression			+		
	Radiation induced disorders			+		
	Wounds			+		
Cardio-vascular and endocrine systems	Hypertension and heart ischemia		+	+		
	Hypotension			+	+	
	Cardiotonia			+		
	Atherosclerosis		+			
	Diabetes		+			
Stress-system	Reduction of toxicity of chemicals		+			
	Total sickness rate in severe climatic conditions		+			
	Quality of life		+	+	+	

Table 4. The Differences in Properties Between Adaptogens and Other Stimulants (Adapted from Panossian & Wikman, 2010[5]).

Characteristic	Stimulants	Adaptogens
1. Recovery process after exhaustive physical load	Low	High
2. Energy depletion	Yes	No
3. Performance in stress	-	Increased
4. Survival in stress	-	Increased
5. Quality of arousal	Poor	Good
6. Addiction potential	Yes	No
7. Adverse effects	Yes	Rare
8. DNA/RNA and protein synthesis	Decreased	Increased

to a different mode of action. Their stimulating effect is more pronounced against a background of fatigue and stress.

The most important characteristics of adaptogens, such as stress-protection and a stimulatory effect, are common to all adaptogens. However, the effects may differ under various circumstances (Tables 2 and 3) as has been documented in a number of clinical studies (Table 5) and reviews. One such review[29] focused on over 35 clinical trials on *E. senticosus* in healthy human subjects (ca. 6,000 subjects, ages 19 to 72), which were performed in normal and stressful conditions (e.g., high-temperature environment, forced work periods, loud noise conditions, motion sickness, varying degrees of deafness, heavy physical burden, hypertension, mountain rescuers under forced conditions, athletes, deep-sea divers, intense mental work and physical work, and factory workers under extreme working conditions). There was an improvement of the physical and mental work capacities in all cases. In addition, over 35 studies have focused on the effect of *E. senticosus* on more than 2,200 patients with a pathology. The studies included patients with atherosclerosis, acute pyelonephritis, diabetes, hypertension, trauma, neuroses, rheumatic heart disease, chronic bronchitis, insomnia, cancer, and several other ailments. In most cases, a moderate improvement relative to the initial conditions was observed.[7] The extracts were well-tolerated and no adverse effects were observed.

However, the most convincing evidence of the efficacy of adaptogens were found in studies related to their neuro-protective effects, effects on cognitive functions and mental performance in fatigue,[10] and on their efficacy in asthenia and depression.[5,10,33-40] The evidence suggests that adaptogens may be beneficial on neurodegenerative disorders.

Adaptogens in Fatigue, Effect on Cognitive Functions

In total, more than 30 publications on the clinical efficacy of various *R. rosea* preparations can be found in the US National Library of Medicine's PubMed database. The majority of these studies are

Ashwagandha *Withania somnifera*. Photo ©2011 Steven Foster

of varying methodological rigor and concern cognitive functions and mental performance under fatigue (Table 5).

The clinical trials using *S. chinensis* (13 studies) and *E. senticosus* (11 studies) on mental performance in humans have been the subject of a recent review.[10] A systematic review showed that adaptogens have a significant, beneficial, and specific effect on stress-induced symptoms under fatigue.[10] It was observed that *R. rosea*, in particular, significantly reduced symptoms of fatigue and improved attention after 4 weeks of repeated administration.[39] Moreover, studies on healthy volunteers receiving single and repeated doses of the proprietary SHR-5® extract (*R. rosea* root; Swedish Herbal Institute; Gothenberg, Sweden) have demonstrated an anti-fatigue effect and improvement in cognitive functions during fatigue and in stressful conditions.[33,34] Thus, one may conclude that repeated administration of *R. rosea* extract (SHR-5) exerts an anti-fatigue effect on healthy subjects and burnout patients expressing fatigue syndrome. This in turn increases the patient's mental performance and ability to concentrate.

Adaptogens in Asthenia and Psychiatric Disorders[5]

In general, the clinical studies carried out in the USSR are the most questionable and poorly documented, as standardi-

Table 5. Selected Clinical Trials of Adaptogens Related to Their Effects on CNS. (Adapted from Panossian & Wikman, 2010;[5] Panossian & Wikman, 2009[10])

Pathophysiological condition: Pharmacological activity or effect recorded	Adaptogen	Reference***	Study design[a]	Quality in Jadad's Score	Classification of evidence level[b]
Physical fatigue	Rhodiola	DeBock, 2004	R,PC,DB,CO	2	Ib
	Rhodiola	Earnst, 2004	R,PC,DB	1	IIa
	Rhodiola	Tuzov, 1968	OL	0	IIb
	Rhodiola	Lapaev, 1982	PC	1	III
Adults physical and cognitive deficiency	Rhodiola	Fintelman, 2007	OL	0	III
Stimulating effect: Rhodiola can improve mental performance after single dose administration	Rhodiola	Zotova, 1965	PC	1	IIb
	Rhodiola	Marina, 1994	OL	0	III
	Rhodiola	Komar, 1981	PC	1	IIa
Mental fatigue: Rhodiola can improve attention in cognitive function in fatigue after single and repeated administration	Rhodiola	Olsson, 2009	R,PC,DB	5	Ib
	Rhodiola	Darbinyan, 2000	R,PC,DB,CO	4	Ib
	Rhodiola	Spasov, 2000	R,PC,DB	3	Ib
	Rhodiola	Shevtsov, 2003	R,PC,DB	3	Ib
Fatigue syndrome: Rhodiola has anti-fatigue effect in physical, emotional, and mental exhaustion	Rhodiola	Olsson, 2009	R,PC,DB	5	Ib
	Schisandra	Berdishev, 1995	PC,CO, OL	1	IIa
Chronic fatigue syndrome	Eleutherococcus	Hertz, 2004	R,PC,DB	5	Ib
Mild depression: Rhodiola has an anti-depressive effect	Rhodiola	Darbinyan, 2007	R,PC,DB	5	Ib
	Rhodiola	Brychenko, 1987**	OL,C**	0	
	Schisandra	Staritsina, 1946	OL	0	IIb
Astheno-depressive syndrome and neurosis (stress-induced mild depression)	Rhodiola	Krasik, 1970	OL,UC	0	
	Rhodiola	Mikhailova, 1983	OL	0	
	Rhodiola	Mesheryakova, 1975	OL	0	
	Rhodiola	Saratikov, 1965*	OL	0	
	Rhodiola	Kaliko, 1966	PC,SB	1	IIa
	Schisandra	Zakharov, 1956	OL	0	
	Schisandra	Leman, 1952	OL	0	
	Schisandra	Rossijskij, 1952	OL	0	
Anxiety: improvement anxiety symptoms	Rhodiola	Bystritsky, 2008	OL	0	
Schizophrenia	Schisandra	Romas,1958-62	OL	0	
	Schisandra	Zakharova, 1948	OL	0	
	Schisandra	Lastovetskiy, 1963	OL	0	

[a] R - randomized; OL- open label; PC - placebo-controlled; UC - uncontrolled; CO - crossover; DB - double blind; SB - single blind.
[b] According to the World Health Organization (WHO), US Food and Drug Administration (FDA), and European Medicines Agency (EMEA): Ia - meta-analyses of randomized and controlled studies; Ib - evidence from at least one randomized study with control ; IIa - evidence from at least one well-performed study with control group; IIb - evidence from at least one well-performed quasi-experimental study; III - evidence from well-performed non-experimental descriptive studies as well as comparative studies, correlation studies, and case-studies; and IV - evidence from expert committee reports or appraisals and/or clinical experiences by prominent authorities.[38]
* - mixed patient population, sick/healthy subjects.
** - adjuvant therapy with antidepressants, control group – tricyclic antidepressants.
*** - Reference on the first author of publication mentioned in reviews[5,10]

zed psychological measures were not used in the earlier studies. Indeed, some of them did not use randomization or blinding of subjects. However, the main problem in assessment of these studies is that the Soviet diagnostic criteria were different from commonly used criteria in the rest of the world. The diagnostic criteria used in the USSR prior to 1990 for schizophrenia was particularly idiosyncratic, overused, and misapplied to other conditions. The diagnoses of asthenia and neuroasthenia include a very heterogeneous group of patients with mixed psychological and physical disorders, making the studies more difficult to interpret. Nevertheless, despite numerous shortcomings that reduced the quality of evidence obtained in the early clinical studies in the USSR, this scientific evidence provides important information about the efficacy and safety of adaptogens in the treatment of psychiatric disorders (Table 5). For example, encouraging results from a randomized, double-blind, placebo-controlled study exist for use of SHR-5 rhodiola extract in mild-to-moderate depression.[38]

Active Principles and Molecular Mechanisms of Action of Selected Adaptogens

The phenolic compounds include phenylpropanoids and phenylethane derivatives such as salidroside (rhodioloside), rosavin, syringin, triandrin, tyrosol, and lignans such as eleutheroside E and schisandrin B. They are structurally similar to the catecholamines—the mediators of the sympathoadrenal system (SAS) involved in activation of the stress system in the early stages of stress response. The tetracyclic triterpenoids, such as cucurbitacin R diglucoside, ginsenosides, and phytosterol-glycosides (e.g., eleutheroside A, sitoindosides, daucosterol) structurally resemble the corticosteroids that act as stress hormones involved in protective inactivation of the stress system. Salidroside—the primary active principle of rhodiola extracts—was found to have neuroprotective activity, which reduced stress-induced impairments and disorders related to the neuro-endocrine and immune systems. A number of these findings might raise the possibility of potential therapeutic applications of salidroside in preventing and treating cerebral ischemic and neurodegenerative diseases. Tyrosol—another active principle of rhodiola extract—increases phosphorylation of nitric oxide synthase eNOS and Forkhead box O (FOXO) transcription factor FOXO3a, which are key molecular targets involved in this mechanism. Furthermore, tyrosol has recently been shown to induce the expression of the longevity protein SIRT1.[49]

Administration of the amino acid tyrosine, which is a common precursor of biosynthesis of tyrosol, salidroside, and catecholamines (Figure 4), alleviates both stress-induced depletion of brain catecholamines (norepinephrine and dopamine in the alarm phase of stress syndrome) and reduces fatigue, as noted in animal task performances.[50] A number of clinical studies suggest that supplementation of tyrosine might improve stress-induced (e.g., cold, noise, anxiety, and fatigue) accuracy of mental performance.[51]

Indeed, schisandrin B has a similar pharmacological profile associated with stress-protective activity. Apparently, the neuroprotective effect of schisandrin B[52,53] is associated with the expression of heat shock proteins Hsp70.[54-58] Schisandrin B stimulates the expression of Hsp70 in normal cells, which is associated with the enhancement of mitochondrial glutathione status, antioxidant activity, adenosine triphosphate (ATP) generation, mitigation of age-related impairments in mitochondrial antioxidant status and functional ability in various tissues, enhancement in cognitive functions, and an increase in the survival of aging in rodents.[58,59]

The stress-protective effect of adaptogens has been demonstrated on simple organisms and on isolated cells.[41,43,47] Thus, there may be an association with regulation and homeostasis of the neuro-endocrine-immune complex. In addition, there may also be a connection with more evolutionary, conservative mechanisms of regulation in cellular homeostasis and the adaptive/defense response to external stressors. Such a defense system is apparently common for all cells and living organisms and probably includes heat shock proteins among the number of key mediators of innate nonspecific resistance to stressors.

The same mechanism can be found in stress tolerance and lifespan extension, which makes them parallel phenomena. Therefore, it is not surprising that adaptogens prolong the lifespan of the

Eleuthero *Eleutherococcus senticosus.* Photo ©2011 Steven Foster

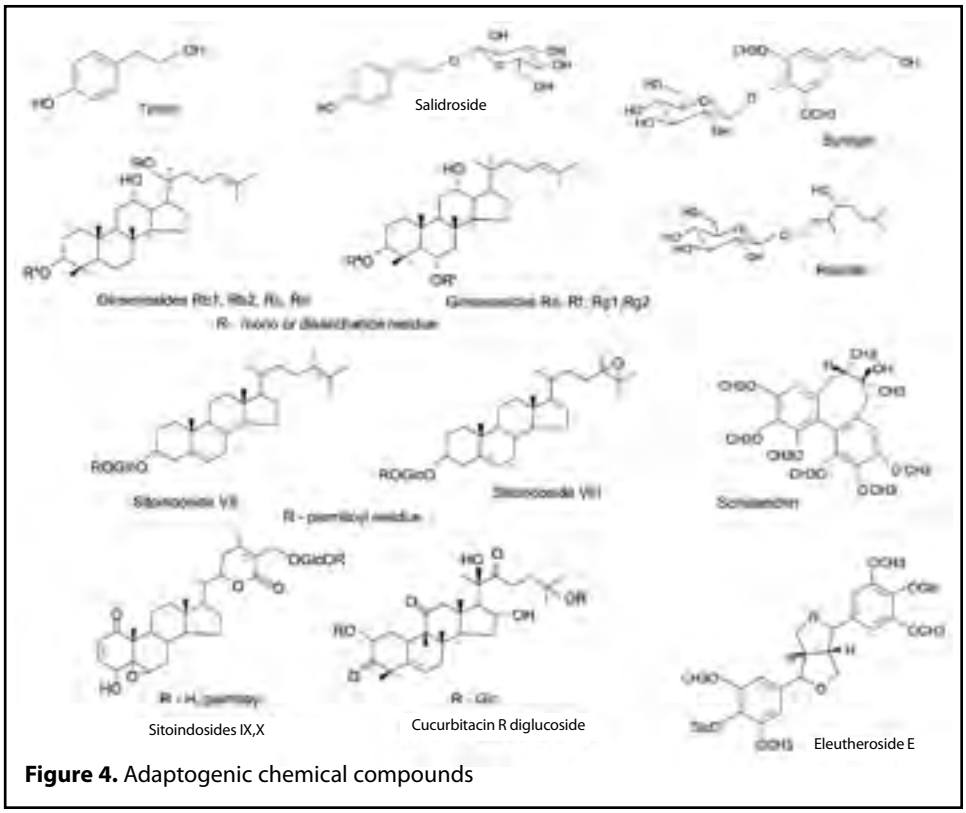


Figure 4. Adaptogenic chemical compounds

nematode *Caenorhabditis elegans*[42] and *Drosophila melanogaster*[59] in a dose-dependent manner.

The beneficial stress-protective activity of adaptogens was associated with the hypothalamic-pituitary-adrenal axis and the regulation of key mediators of the stress response common to all cells, such as the following:

- Heat shock proteins Hsp70 and Hsp16, which are molecular chaperones involved in stress-induced cytoprotection and in adaptation of repeated exposure to an initial stressor;[43, 45,46]
- Stress-activated c-Jun N-terminal protein kinase 1 (JNK1);[15]
- FOXO transcription factor DAF-16;[42]
- HPA-axis, including cortisol and glucocorticoid receptors (GRs);[15]
- Beta-endorphine;[5]
- NO[15]
- The biosynthesis of ATP, thus inducing an alteration in energy source.[5]

A hypothetical molecular mechanism of action of adaptogens is outlined in Figure 5.[5,10]

Typically, a cell is in one of the following states:

- balance (dynamic equilibrium—homeostasis);
- functioning under stressful conditions (threatened homeostasis—imbalance);
- the state of adaptation (tolerance) to stress (i.e., state of nonspecific resistance to stress; heterostasis—or homeostasis with a higher level of equilibrium); or
- the state of apoptosis (normally programmed cell death).

The upper panel in Figure 5 shows that mitochondria generate aggressive oxygen-containing radicals that can damage native or repair proteins by distorting their 3-D structure, so that they can no longer fulfill their functions in the cell.

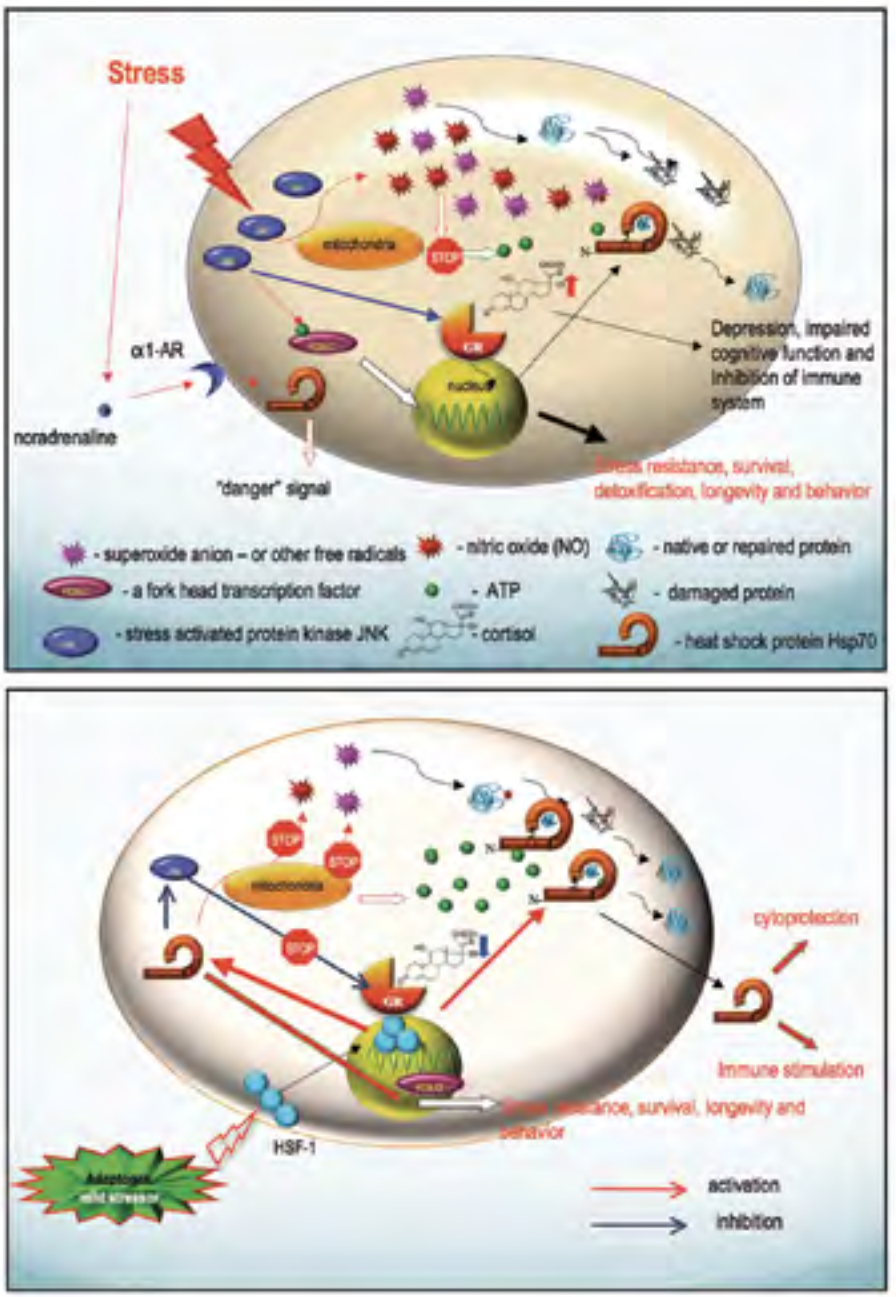
There are many "players" involved in the regulation of homeostasis at both the cellular level and the organism level, such as:

- the stress hormone cortisol (a molecule that is secreted from glands and regulates the functions of organs and systems of the organism);
- GRs that modulate/regulate cortisol secretion (feedback regulation);
- NO, an intracellular signaling molecule that mediates stress response and modulates stress-induced activation of hormonal, nervous, and immune systems;
- FOXO, a Forkhead protein that controls the synthesis of proteins involved in stress resistance, cell survival, and longevity. When it is in the cytoplasm of the cell, DNA produces proteins involved in growth and development of cells, when FOXO is translocated into the nucleus and binds to DNA. The cell starts to produce other proteins that are involved in resistance to stress and increases survival and longevity.

Under stress (e.g., infection, cold, heat, radiation, physical load, emotional stress), an external stress signal activates a cascade of "signalling" proteins/enzymes including JNK, a stress-activated enzyme that plays important roles in the regulation of a diverse array of cellular functions such as neuronal development, activation of the immune system, and programmed cell death (apoptosis). The functions of JNK are as follows:

- To increase the formation of aggressive radicals and NO,

Figure 5. A simplified schematic showing the hypothetical molecular mechanism of the proprietary phytomedicinal combination ADAPT-232® (containing extracts of *R. rosea, S. chinensis,* and *E. senticosus*; Swedish Herbal Institute) as it induces stress resistance (adaptation to stress) and enhances cognitive functions and, possibly, longevity. (Adapted from References 5 and 10)



which in turn suppresses the generation of energy-providing molecules, e.g., ATP. As a result of lack of energy, many proteins cannot function properly, several functions are suppressed, and the first symptoms of fatigue and exhaustion are observed. ATP is also required for the normal functioning of heat shock proteins (e.g., Hsp70), which are produced as a defense response to stress and assist in the repair of misfolded and damaged proteins.

- To regulate a diverse array of cellular functions, including neuronal development, activation of immune system, and programmed cell death (apoptosis).
- To suppress GRs such that the feedback inhibition of cortisol secretion ceases to function and levels of circulatory cortisol increase. The cortisol inhibits the immune system, and has anti-inflammatory effects on the body. It is also required to protect the organism from over-reaction/over-activation in response to stress. However, chronically high levels of cortisol are associated with depression, chronic fatigue, and impaired cognitive function, such as decreased attention and learning ability.
- To activate translocation of FOXO to the nucleus and initiates the synthesis of proteins that confer stress-resistance and increased longevity.

Asian Ginseng *Panax ginseng.*
Photo ©2011 Steven Foster

The lower panel in Figure 5 shows that adaptogen preparations, such as ADAPT-232, decrease inducible NO, cortisol, and JNK under stress and stimulate/activate the expression of Hsp70 and p-FOXO1.

The stimulation of Hsp70 biosynthesis is a key point in the mechanism of action of adaptogens since the heat shock protein is responsible for the following actions:

- enhances the repair of damaged proteins;
- inhibits the stress-induced expression of NO genes and, since the reduced levels of inducible NO cannot suppress the formation of energy providing molecules, ATP is increased to normal levels in the adapted cell;
- inhibits JNK and consequently apoptotic deaths and suppression of immune system via activation of GRs and other mechanisms. Normal GR function and normal ATP levels are associated with the anti-fatigue and anti-depressive effects of adaptogens and with normal cognitive function (good attention, memory, and learning);
- is probably associated with the effect of adaptogens on the phosphorylation of FOXO and its translocation into the nucleus of isolated cells (i.e., human monocytes) or simple organisms (i.e., DAF-16 in *C. elegans* and, consequently, with increased resistance to stress and increased lifespan).

In summary, ADAPT-232 works like a stress vaccine (stress-mimetic) by activating stress-induced self-defense mechanisms in order to adapt the cell and organism to mitigate stress-induced harmful effects.

It seems that activation of Hsp70 expression is a key point in the mode of action of adaptogens. Studies demonstrate that adaptogens induce an increase of serum Hsp72 in animals. This induction is considered a defense response to stress, which increases tolerance to stress in a combination of physical and emotional stresses. This data suggest that increased tolerance to adaptogen-induced stress is associated with its stimulation of expression of circulating serum Hsp72.[45,46] In fact, Hsp72 expression and release is a known mediator of the stress response involved in repairing proteins during physical load. The working hypothesis of this research is that adaptogens adapt (or make less sensitive) the organism to stress. Thus, adaptogens act like low molecular weight "vaccines" or stress-mimetics, which induce mild activation of the stress system in order to cope with more severe stress. The adaptogens act as challengers and mild stressors (stress-mimetics). This gives rise to adaptive and stress-protective effects, which are mainly associated with the hypothalamic-pituitary-adrenal (HPA) axis, a part of the stress system that also contributes to the nervous, cardiovascular, immune, gastrointestinal, and endocrine systems.

The antidepressive effect of *R. rosea*[38,44] may be associated with parts of the stress system (e.g., secretion of cortisol and the JNK-mediated effects on the glucocorticoid receptors).[15]

Conclusions and Perspectives

Recent pharmacological studies of some adaptogens give a rationale to their effects at the molecular level. Research demonstrates that the beneficial stress-protective effect of adaptogens is related to the regulation of homeostasis via several mechanisms of action, which are associated with the HPA axis and the regulation of key mediators of the stress response, such as molecular chaperones (e.g., Hsp70), stress-activated JNK1, FOXO transcription factor, cortisol, and NO.[5,10]

In summary, adaptogens may be regarded as a novel pharmacological category of anti-fatigue agents that perform the following functions:

- induce increased attention and endurance in situations of

decreased performance caused by fatigue and/or sensation of weakness;
- reduce stress-induced impairments and disorders related to the function of stress (neuro-endocrine and immune) systems.

Adaptogens have not only specific therapeutic effects in some stress-induced and stress-related disorders, but may also have an impact on the quality of life of patients when implemented as adjuvants in the standard therapy of many chronic diseases and pathological conditions (e.g., post-surgery recovery, asthenia, congestive heart failure, chronic obstructive pulmonary disease). Adaptogens may also have potential use in age-related disorders, such as neurodegenerative diseases and cardiovascular diseases. Thus, elderly people may be able to maintain their health status on a normal level, improve their quality of life, and possibly increase longevity. However, further research is needed to evaluate the efficacy of adaptogens as geriatric agents and to elucidate molecular mechanisms of action of these complex herbal extracts and their active principles.

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Herb Sales Continue Growth – Up 3.3% in 2010

By Mark Blumenthal, Ashley Lindstrom, Mary Ellen Lynch, and Patrick Rea

The herbal dietary supplement (DS) market increased in sales in the United States in 2010 over 2009, continuing a steady growth trend since 2003 despite the continued relatively weak economic conditions in the United States and elsewhere in the world. Total herb DS sales in all channels of retail trade increased by an estimated 3.3 percent according to the *Nutrition Business Journal* (NBJ), which, along with SPINS, a market research firm specializing in natural product sales, collaborated with the American Botanical Council to produce this annual report in *HerbalGram*. Although the rate of growth is less than the 4.8% growth rate from 2008 to 2009, this increase perpetuates the trend of positive growth for herbal DS during 9 of the past 11 years (per Table 1).

In the Mainstream Food, Drug, and Mass Market (FDM) channel (drugstores, grocery stores, mass market retailers, et al., but not including Wal-Mart), the degree of increase varies depending on the source of the sales information. Total single-ingredient herbal DS sales in the FDM channel rose by 6.1%, according to Symphony IRI (Table 2), and SPINS FDM powered by Nielsen, a leading provider of market information (data not included in tables), calculated an increase of 4.8%. However, unlike IRI, the SPINS/Nielsen FDM data-collection parameters include combination herbal dietary supplements, with primary ingredients chosen to represent certain products (per the discussion of horehound below).

As an example of the complexity of any analysis of this segment, NBJ's analysis for the total sales of herbal DS in the mainstream/FDM channel (including *estimated* sales in buyers' clubs and convenience stores, including Wal-Mart, Sam's Club, Costco, et al.) shows that herbal DS sales grew at a higher rate than those reported by IRI or SPINS/Nielsen, i.e., an NBJ-calculated increase of 6.6%, from an estimated $878 million in 2009 to $936 million in 2010.

Per Table 3, SPINS has calculated that total herb DS sales in the Natural Products channel *decreased* by an estimated 0.6% (not including sales in Whole Foods Markets). NBJ, using that SPINS information supplemented with estimated sales from GNC and Whole Foods Market, calculates a total *increase* of 2% for the Natural channel, with total sales increasing from an estimated $1.631 billion in 2009 to $1.663 billion in 2010 (Table 4).

The increase in overall herbal DS sales is also reflected in other channels of trade, e.g., the Direct Sales channel (including mail order, Internet, MLM [multi-level marketing], etc.) where sales increased in 2010 by an estimated 3% according to aggregated market data compiled by NBJ, from $2.525 billion in 2009 to $2.601 billion in 2010 (Table 4).

In all previous years since *HerbalGram* began to report on herb sales in the FDM market in the 1990s, the data were derived from reports provided by Information Resources, Inc., a Chicago market research firm now known as Symphony IRI. This year, for the first time, the Herb Market Report was also able to access FDM sales data from SPINS powered by Nielsen via the ABC collaboration with SPINS. Both SPINS FDM and Symphony IRI FDM sales exhibit an upward trend, though that trend varies in degree of magnitude, as noted previously. Again this underscores the ongoing and significant challenge

This popularity of food-based herbs is indicative of the fact that many popular herbal supplements are not exotic or arcane medicinal ingredients but have been used for centuries (and millennia) as foods and spices.

Table 1. Total Estimated Herb Sales in All Channels, 2000—2010

Year	$ Total Sales (millions)	%Increase (-decrease)
2000	4,230	2.9%
2001	4,356	3.0%
2002	4,238	-2.7%
2003	4,146	-2.2%
2004	4,290	3.5%
2005	4,381	2.1%
2006	4,561	4.1%
2007	4,759	4.3%
2008	4,800	0.9%
2009	5,030	4.8%
2010	5,200	3.3%

Source: *Nutrition Business Journal*, www.nutritionbusinessjournal.com

NBJ primary research includes surveys of supplement manufacturers, distributors, MLM firms, mail order, Internet and raw material & ingredient supply companies, as well as numerous interviews with major retailers (Wal-Mart, Costco, etc.), manufacturers, suppliers, and industry experts. Secondary sources include Information Resources Inc., SPINS, ACNielsen, Natural Foods Merchandiser, Insight, The Hartman Group, company data, and other published material.

Table 2: The 20 Top-Selling Herbal Dietary Supplements in the Food, Drug, and Mass Market Channel in the United States for 2010 (per IRI)*

Herb	Latin Name	US Dollar Sales	% Change 2009
1. Cranberry	*Vaccinium macrocarpon*	$35,806,000	15.30
2. Saw Palmetto	*Serenoa repens*	$18,839,780	0.16
3. Soy	*Glycine max*	$16,984,640	-13.42
4. Garlic	*Allium sativum*	$16,976,220	-3.71
5. Ginkgo	*Ginkgo biloba*	$15,017,010	-5.69
6. Echinacea	*Echinacea* spp.	$12,822,940	-20.71
7. Milk Thistle	*Silybum marianum*	$11,266,790	1.22
8. Black Cohosh root	*Actaea racemosa*†	$9,303,047	14.34
9. St. John's Wort	*Hypericum perforatum*	$8,871,864	1.48
10. Ginseng‡	*Panax ginseng*	$7,283,017	-10.11
11. Green Tea	*Camellia sinensis*	$5,722,702	-14.67
12. Evening Primrose	*Oenothera biennis*	$4,819,210	13.05
13. Valerian Root	*Valeriana officinalis*	$4,463,080	7.31
14. Horny Goat Weed	*Epimedium* spp.	$2,858,055	1.27
15. Bilberry	*Vaccinium myrtillus*	$1,784,932	-9.95
16. Grape seed	*Vitis vinifera*	$1,418,028	-20.37
17. Ginger	*Zingiber officinale*	$1,386,897	17.14
18. Elderberry	*Sambucus nigra*	$928,639	-49.46
19. Aloe vera	*Aloe vera*	$633,021	-2.13
20. Yohimbe	*Pausinystalia johimbe*	$487,874	-3.42
Subtotal top 20 herbs		$177,673,746	
Subtotal all other herbs		$178,251,554	
Total Herb Sales (including those not shown):		**$355,925,300**	**6.09**

*Source: SymphonyIRI Group, FDM Market Sales Data for Herbal Supplements, 52 weeks ending December 26, 2010.
† Synonym: *Cimicifuga racemosa*
‡ It is not clear from the IRI data whether this figure also includes the sales of American ginseng root products (made from *Panax quinquefolius*), the sales of which are not as high as sales from supplements made from Asian ginseng (*P. ginseng*).

of collecting and deciphering herbal product sales information.

"SPINS is focused on meeting the information needs of the Natural and Health & Wellness Industry and uses an internal team of Natural Product Experts to insure detail coding of ingredients to support those needs," said Kerry Watson, SPINS coding library manager (e-mail communication, April 26, 2011). "The information provided to *HerbalGram* for use in this analysis is limited to botanical-based supplements and does not reflect sales of food and beverages."

Of interest is the actual determination of herbs that are in the top 20 in sales as compiled by Symphony IRI and SPINS FDM powered by Nielsen. While it is understandable and predictable that the rankings and inclusion of herbs would vary in the Natural channel compared to the FDM channel (as noted elsewhere in this article), it is noteworthy to see "Horehound" (*Marrubium vulgare,* Lamiaceae) as the top-selling individual herbal DS in the SPINS FDM rankings—reportedly generating $68.0M in sales in 2010! This raises the question as to whether ABC should be

Table 3: The 20 Top-Selling Botanical Dietary Supplements in the Natural and Health Foods Channel in the United States in 2010 (per SPINS)*

Herb	Latin Name	US Dollar Sales	% Change 2009
1. Flaxseed and/or Oil	*Linum usitatissimum*	$22,340,631	0.4
2. Grass (Wheat or Barley)	*Triticum aestivum* or *Hordeum vulgare*	$14,822,264	13.5
3. Aloe	*Aloe vera*	$11,695,785	6.7
4. Turmeric	*Curcuma longa*	$11,279,651	10.6
5. Stevia	*Stevia rebaudiana*	$9,623,772	11.8
6. Milk Thistle	*Silybum marianum*	$8,696,590	-5.6
7. Spirulina Blue-Green Algae	*Arthrospira* spp.	$7,606,111	1.8
8. Saw Palmetto	*Serenoa repens*	$6,628,008	-0.3
9. Elderberry	*Sambucus nigra*	$6,051,174	-12.4
10. Echinacea	*Echinacea* spp.	$5,847,305	-12.4
11. Açaí	*Euterpe oleracea*	$5,406,461	-49.8
12. Garlic	*Allium sativum*	$5,180,238	-5.4
13. Cranberry	*Vaccinium macrocarpon*	$4,642,277	4.2
14. Valerian	*Valeriana officinalis*	$4,635,283	-0.1
15. Chlorophyll/Chlorella	*Chlorophytum arundinaceum/Chlorella vulgaris*	$4,360,585	11.2
16. Echinacea-Goldenseal Combination	*Echinacea* spp. and *Hydrastis canadensis*	$4,349,005	-11.3
17. Ginkgo	*Ginkgo biloba*	$4,265,635	-5.8
18. Hemp Products	*Cannabis* spp.	$4,127,604	10.4
19. Resveratrol	*Vitis vinifera* or *Polygonum cuspidatum*	$4,108,504	11.3
20. Oregano Oil	*Origanum vulgare*	$4,091,221	-11.0
Subtotal top 20 herbs		$149,758,104	
Subtotal all other herbs		$126,004,944	
Total Herb Sales (including those not shown):		**$275,763,048**	**-0.6**

*Source: SPINScan Natural, 52 weeks ending December 25, 2010. Does not include Whole Foods Market.

Table 4. Herb Sales by Channel for 2009 & 2010

Channel Sales $mil	2009	2010	% Increase (-decrease)
Mass Market*	878	936	6.6%
Natural & Health Food†	1,631	1,663	2.0%
Direct Sales‡	2,525	2,601	3.0%
Total	5,034	5,200	3.3%

Source: *Nutrition Business Journal*, www.nutritionbusinessjournal.com

* Mass Market includes food/grocery, drug, mass merchandise, club and convenience stores, including Wal-Mart, Costco, etc.

† Natural & Health Food include supplement and specialty retail outlets, including Whole Foods Market, GNC, sports nutrition stores, etc.

‡ Direct Sales include Mail Order (including catalogs), direct mail and direct response TV and radio; practitioners representing conventional and alternative practitioners selling to their patients, including ethnic herbals and herb shops; Multilevel (MLM) or network marketing representing firms like Advocare, Herbalife, Nature's Sunshine, NuSkin (Pharmanex), Nutrilite (Amway/Quixtar), Shaklee, etc.

stating that horehound is one of the top-selling herbs in the United States, a statement that would probably be met with considerable curiosity, if not skepticism, by many market veterans.

Horehound has never been listed as a top-selling herbal supplement in any previous *HerbalGram* Herb Market Report in either the FDM channel (as measured by IRI) or the Natural Products channel. Digging deeper, SPINS revealed that this herb is the primary ingredient in several Ricola® cough or throat drops, which are sold as dietary supplements. According to 2008 and 2009 SPINS FDM powered by Nielsen data, within their data-collection parameters, horehound sales—which include the Ricola products for which SPINS assigned horehound as a primary ingredient, and other dietary supplement products for which SPINS identified horehound as the main (or only) ingredient—have been significant and showing a trend of growth, bringing in a total of $58.7M in 2008 and $64.7M in 2009.

Horehound is a well-known folk remedy for sore throats, but there has been little modern research on this herb and ABC is unaware of any published clinical trials supporting its efficacy for cough or for soothing a sore throat.

It is worth noting that the top-20 best-selling herbal supplements in the mainstream/FDM and Natural Products channels (per Table 2) include many traditional and conventional food items; there are at least 8 foods in the FDM channel; in sales ranking, these include cranberry, soy, garlic, green tea, ginger, bilberry, grape seed, and elderberry. There are at least 10 food herbs in the Natural channel (i.e., depending on how one evaluates some of these ingredients as foods); in ranking of sales, these include flaxseed, wheat or barley grass, turmeric, spirulina algae, elderberry, açaí, garlic, cranberry, chlorophyll, and oregano oil (Table 3). This popularity of food-based herbs is indicative of the fact that many popular herbal supplements are not exotic or arcane medicinal ingredients but have been used for centuries (and millennia) as foods and spices (e.g., garlic, ginger, oregano, turmeric). (Note: In some Asian countries, e.g., China and Korea, cultivated ginseng root, appearing annually as a top-seller in the FDM channel but not in the Natural channel, is frequently eaten as a food item and is a popular everyday beverage for millions of people.)

Further, the top-ranking sales of single herbal DS in both the FDM and Natural Products channels represents a long-noted trend of consumer interest in many of the more well-researched herbs which have become relatively well known due to a growing body of scientific and clinical research conducted on them. These include the following, as noted in order of ranking for sales in the FDM channel (Table 2): cranberry, saw palmetto, garlic, ginkgo, echinacea, milk thistle, black cohosh, Asian ginseng, green tea, etc.

Changes in 2010

Probably the greatest change in herb sales in the United States in 2010 compared to the 2009 market is the fact that by 2010, the worldwide concern prevalent in 2009 about potential pandemics related to infections from the H1N1 flu virus abated—to the point that public health discussions on this topic were noticeably absent. Thus, the spikes in sales in herbs that are perceived to be useful to prevent or treat symptoms of any type of flu based on traditional use and/or modern research did not occur. The sharp increases in 2009 sales for echinacea and elderberry supplements, for example, did not continue in 2010 and these 2 herbs actually experienced a predictable drop in sales as they reset to levels that would be consistent prior to H1N1 concerns. Sales for echinacea supplements dropped 20.7% in FDM and 12.4% in the Natural Products channel while elderberry sales decreased 49.5% in FDM and 12.4% in the Natural Products channel (Tables 2 and 3).

Hemp supplements have made their debut in the top-20 in the Natural Products channel, according to SPINS—a potential harbinger for future trends in other channels. "Hemp products" now rank 18th in sales in this channel, with over $4 million in total sales (Whole Foods Market sales not included), up over 10% from 2009. The growing popularity of hempseed (from nonpsychoactive *Cannabis sativa*, Cannabaceae) as a high-protein, high omega-3 fatty acid-containing food item has undoubtedly migrated to growing consumer awareness of the potential nutritional benefits of hempseed oil sold as a DS in soft-gelatin capsules. When the growing popularity of this ingredient will migrate to the mainstream FDM channel remains to be seen.

As noted in Table 5, estimates for sales of single herbal DS in all channels of trade increased by 3.9% in 2010 over 2009, according to NBJ. This compares to a larger increase of 9.5% in 2009 over 2008. Sales of combination formulations (usually marketed for a specific function or benefit, e.g., maintaining normal cholesterol levels, normal blood sugar levels, urinary tract health, etc.) increased 2.1% in 2010 compared to 2009, the first increase in sales of combinations since 2007.

In sum, the herb market in 2010 maintained the robust growth seen in recent years, reflecting increasing consumer interest in good nutrition and natural lifestyles.

Table 5. Herb Sales by Category in All Channels: Singles (Monopreparations) vs. Combinations

	2008		2009		2010	
	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth
Total Single Herbs	3,104	1.9%	3,399	9.5%	3,531	3.9%
Total Combination Herbs	1,696	-0.9%	1,635	-3.6%	1,669	2.1%
Total Herbs	**4,800**	0.9%	**5,034**	4.9%	**5,200**	3.3%

Source: *Nutrition Business Journal*, www.nutritionbusinessjournal.com

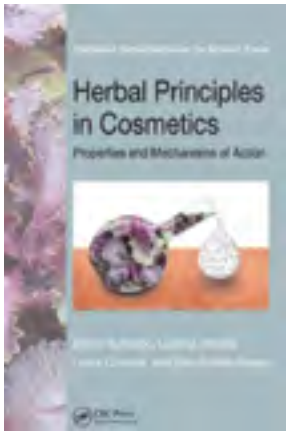
Book Reviews

Herbal Principles in Cosmetics: Properties and Mechanisms of Action by Bruno Burlando, Luisella Verotta, Laura Cornara, and Elisa Bottini-Massa. Boca Raton, FL: CRC Press; 2010. Hardcover; 426 pages. ISBN 9781439812136. $149.95.

The Italian authors of *Herbal Principles in Cosmetics* comprise university professors, experts in cell physiology, botanical research, ethnopharmacology, and cosmetic science. The majority of the book is focused on strictly scientific information covering more than 70 plants, supported with full research citations.

The book begins with a useful overview of the structure and function of the skin, including thorough descriptions of the layers of the skin. Within these pages, the authors cover skin disorders and the mechanisms involved, defining common complaints such as acne, eczema, psoriasis, fungal and bacterial infections, inflammation, vitiligo, hair loss, and skin aging.

Chapter 2 is most useful, as it addresses the dermatologic and cosmetic uses of the individual botanical compounds of lipids, essential oils, saponins, retinoids, phenols, flavonoids, alkaloids, and much more. The chapter provides cosmetic chemists, especially those without an extensive botanical background, a shortcut to the activities of functional constituents.



Chapter 3 pays brief but relevant homage to the historic roots of herbal ingredients in cosmetic care. These 11 pages explore the history of cosmetic preparations—from simple formulas to complex pharmaceutical preparations aimed at therapeutic effects—and take on the functionality of cosmeceuticals. Most of this credible chapter is dedicated to botanical delivery systems and individual ingredients for surfactants, thickeners, penetration enhancers, preservatives, and the effects of irritating ingredients that are best avoided.

Chapter 3 and the 320 pages that follow are dedicated to 70 monographs on individual botanicals, including mushrooms, lichens, and algae, with 1 exception for methlyxanthines as a class of ingredients. There are 32 small-color plates identifying the most common of the plants discussed, and black-and-white photos accompany each monograph for broad identification. The layout of this section follows a template for each plant, noting *Features* (description, early origins, historic uses, habitat and native region); *Constituents* (individual compounds and functional groups such as flavonoids, resins, waxes, etc.); *Properties* (the largest of the sections, focused on functionality, effects on a broad range of body systems, and research); *Dermatologic and Cosmetic Use* (uses related to skincare products, sometimes categorizing functionality such as for psoriasis, hair loss or cellulite); and lastly, *Side Effects and Toxicity* (contraindications, physiological problems, or external skin reactions).

The *Properties* segment sometimes moves far afield from references to skin application, with the authors discussing all aspects of research, occasionally unrelated to cosmetic care or product development—such as a specific plant being useful as a laxative, nervine, liver tonic, digestive, or antitumoral aid. In some cases, more than 3 pages are spent on this type of information, with as little as 2 sentences relegated to the relative dermatologic and cosmetic uses.

This book is curiously lacking in coverage of the most basic cosmetic herbs that have significant skin

research, as well as a long history of use, such as calendula (*Calendula officinalis,* Asteraceae) flower, lavender (*Lavandula angustifolia,* Lamiaceae) flower and/or its essential oil, or sea buckthorn (*Hippophae rhamnoides,* Elaeagnaceae) seed oil, though some are mentioned in passing. Asian ginseng (*Panax ginseng,* Araliaceae) root is mentioned only as a source of saponins, making it an expensive surfactant—the context in which it is discussed. However, the book does cover other noteworthy plants with cosmetic relevance such as gotu kola (*Centella asiatica,* Apiaceae) herb, aloe (*Aloe vera,* Liliaceae) gel, chamomile (*Matricaria recutita,* Asteraceae) flower and its essential oil, pomegranate (*Punica granatum,* Punicaceae) fruit, neem (*Azadirachta indica,* Meliaceae) (seeds, leaves, flowers, bark are all mentioned; dermatologically, the bark, leaves, and pressed oil from the seeds), linden (*Tilia cordata,* Tiliaceae) flower, rosemary (*Rosmarinus officinalis,* Lamiaceae) leaf and/or essential oil, sweetbriar (*Rosa rubiginosa,* syn. *R. canina, R. moschata*, Rosaceae) fixed oil pressed from seed, horse chestnut (*Aesculus hippocastanum,* Hippocastanaceae) seed extract, European elder (*Sambucus nigra,* Caprifoliaceae) fruit, and others.

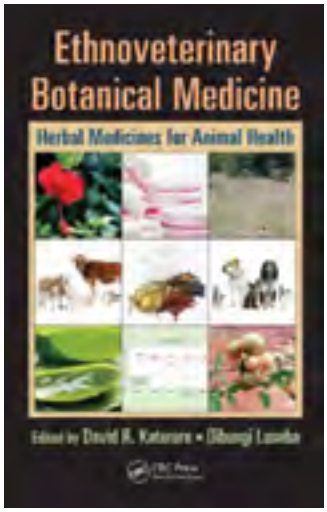
There is also coverage of some very obscure plants, such as sausage tree (*Kigelia africana, Bignoniaceae*) fruit (for skincare, but bark and leaves are used medicinally), sacha inchi (*Plukenetia volubilis,* Euphorbiaceae) seeds (also known as Inca peanut), *mafura* (*Trichilia emetica,* Meliaceae) seeds for skin (but leaves and bark are mentioned for medicinal use), purple tephrosia (*Tephrosia purpurea,* Fabaceae) seeds (root used medicinally), and others. It is admirable that new plants are being researched, but the fact that they are rare on the commercial market also implies they may not be readily available, and subsequently not easy to include in formulations.

The discussion of DNA repair focuses mostly on apoptosis and free radical scavenging; while this is useful for overall health, it is not always tied to uses for skincare or defined whether it is for internal or external use. Though there are 5 references to how specific plants are helpful for DNA, there is little mention of the most current spotlight of cosmetic research—tying the use of botanicals for DNA repair of the skin into slowing the aging process.

This comprehensive book is imperative for formulators, cosmetic chemists, researchers, and the botanical esthetician, and it fills many gaps left within previous tomes on this subject. It is somewhat disappointing that the book is less centered on cosmetic uses within the materia medica than the title suggests, though it is still quite useful and thoroughly researched, with each chapter meticulously referenced, in some cases with over 60 citations per plant.

—Mindy Green, MS
Owner, Green Scentsations, LLC
Associate Editor, American Herb Association Newsletter
Blaine, MN

Ethnoveterinary Botanical Medicine: Herbal Medicines for Animal Health by David Katerere and Dibungi Luseba (eds). Boca Raton, FL: CRC Press; 2010. Hardcover; 434 pages. ISBN 9781420045604. $139.95.



Veterinary botanical medicine has the potential to help one cause of world poverty. Nearly 70% of the world's rural poor depend on livestock as a critical part of their livelihood. Most of the poor cannot afford conventional veterinary care, which is often unavailable in remote areas. However, the use of botanical medicine is increasing due to the availability of local knowledge, because it is less costly, and because medicinal plants can be grown locally. It is also relatively easy to educate livestock owners in the uses of botanical medicine.

Most chapters in this book address this situation. The first 4 chapters cover economical protocols for the general testing of herbs. Testing for safety and efficacy is covered (including use of brine shrimp rather than mice for cytotoxicity studies). Herbal research methodology is included. Faster, less expensive (than currently used) methods of extraction, isolation of active compounds, and analysis of some are presented. Withdrawal periods for meat, milk, and egg products, as well as considerations for reactions or other problems of companion animals (pets) versus food species (livestock) are also discussed.

The rest of the book consists mostly of tables of herbs from various worldwide regions with conditions and diseases for which they are used as treatment, and discussions of the herbs incorporating hundreds of references. The tables—which include camels, cattle, and/or rabbits in the species—are especially helpful, since it is difficult to find this information elsewhere, and it is of importance for the purpose of this book. Unlike Wynn and Fougere's *Veterinary Herbal Medicine* (Elsevier, 2007), most tables in this book do not have doses or preparation methods.

One of the most useful chapters is the one on herbal medicine for dairy cattle in India, which has a detailed table of Indian herbs used for 21 conditions in dairy cattle (with preparation method and dose). It also includes a method for rapid assessment of local ethnoveterinary health traditions, and how to disseminate the information to rural areas. This method uses no concurrent lab or clinical studies, and relies instead on databases and materia medica to assess treatments. As a result, this method is faster and more affordable. India already has a wider use of herbal medicine than any other country except China, and so the country is more accepting of this approach than the United States would be.

The chapter on Southeast Asia has a list of 15 herbs and also includes their preparation methods and doses. In addition, it indicates there is support for their use by many governments in this area, especially for anthelminthics (agents which help expel and/or kill intestinal worms). The chapter on West African herbs has preparation methods and doses for a number of the herbs listed. (These are mostly herbs used to treat protozoan diseases, and, like their conventional counterparts, are usually more toxic than treatments for other problems.) Finally, the chapter on Chinese medicine also lists 22 Chinese herbs, with doses for domestic animals—including camels, rabbits, and birds. This chapter notes that many valuable texts and papers are written in Chinese but not translated, so they are not available to most of the rest of the world. (Three books by veterinarians, published

in the US, help fill that gap somewhat: *Clinical Handbook of Chinese Veterinary Medicine* (Herbal Medicine Press, 2006), *Veterinary Applications of Chinese Herbal Formulas* (Herbal Medicine Press, 2011 [in press]), and *Xie's Chinese Veterinary Herbology* (Blackwell, 2010).

In contrast, the chapter on herbal use in the European Union (EU), using the Netherlands as a case study, is a good illustration of attitudes found in the EU and the US. It includes a table of herbs used by farmers there, without doses. The study of herbal medicine in general is not popular within big universities, including the sole veterinary school in the Netherlands. Instead, studies are performed mainly by the Institute for Ethnobotany and Zoopharmacognosy. In 2006, the Dutch Ministry of Agriculture, Nature, and Food Quality began a project to develop phytotherapy as a tool to reduce or prevent disease in food animals. Their conclusion: Some herbs are useful but need more study. One sees this statement in most review articles in PubMed.

The 2 chapters on North American herbs are disappointing. One discusses 8 herbs and mentions 6 others, but only with respect to humans, rats, and mice. It gives the LD50 (lethal dose in which 50% of the tested population dies) of 5 herbs in rats and/or mice, and the rat dose for one, common mullein (*Verbascum thapsus,* Scrophulariaceae). The reader is referred to an online discussion of American Indian healing philosophy, which is a description of the spiritual side and not useful for animals. The other chapter emphasizes the use of various echinacea (*Echinacea* spp., Asteraceae) species in swine, cattle, poultry, horses, and dogs, with doses for some. It also gives a summary of research conducted on 5 other herbs, 2 of which are toxic to horses. There are over 250 herbs used by Native Americans, and one would expect more to be discussed. The large number of references somewhat makes up for this.

The last chapter is confusing. It has a number of factual errors which are not referenced. It states that veterinary medicine seems more accepting of Complementary and Alternative Medicine (CAM) than human medicine, and claims the American Veterinary Medical Association (AVMA) spearheaded the founding of the Veterinary Botanical Medical Association (VBMA). The AVMA has nothing to do with the VBMA, and veterinary CAM in general is under attack in the United States, with veterinarians being denied credit by RACE (a sub-committee of the American Association of State Veterinary Boards) for continuing-education sessions in botanical medicine which were previously acceptable.

There is also a misjudgment between the uses of non-poisonous homeopathic preparations, such as arnica (*Arnica montana,* Asteraceae), with their poisonous herbal origin. The popular Bach flower remedy, Rescue® Remedy* (Bach Flower Remedies Ltd.), is termed homeopathic, but classical homeopaths would disagree. A discussion of canine cognitive syndrome analyzed Rescue Remedy and a long list of nutritional supplements, rather than concentrating on phytomedicine. Animals are reported to be particularly prone to acute (rather than chronic) mycotoxicosis. The chapter also labels Ayurveda and homeopathy as "mysticism." This makes the discussion of potential problems with phytotherapy suspect.

In general, this book is a good source for lists of herbs used in third-world countries all over the globe. It would be improved by a listing of North American Native American herbs, and the herbs in the German Commission E monographs. It can be used to help set up botanical-based programs in animal health for impoverished countries. However, to do so, one also needs a veterinary herbal manual with preparation methods and doses.

—Nancy Scanlan, DVM, MSFP
Executive Director, American Holistic Veterinary Medical Association
Abingdon, MD

*Rescue® Remedy is a combination of 5 "flower essences": dilutions of star of Bethlehem (*Orithogalum umbellatum*, Liliaceae), rock rose (*Helianthemum nummularium*, Cistaceae), cherry plum (*Prunus cerasifera*, Rosaceae), impatiens (*Impatiens gladulifera*, Balsaminaceae), and clematis (*Clematis vitalba*, Ranunculaceae).

Herbal Contraindications and Drug Interactions plus Herbal Adjuncts with Medicines, expanded 4th ed by Francis Brinker. Sandy, Oregon: Eclectic Medical Publications; 2010. Softcover; 598 pages. ISBN: 978-1-888483-14-7. $68.70.

It is almost axiomatic in modern medical and public health thinking that with the steadily increasing growth of the use of herbs and other dietary supplements in the United States and almost all other countries around the world—particularly the developed or industrialized countries—there is a significant segment of the population that uses *both* conventional medicines *and* herbal preparations. This increased concomitant use, at least in theory, would suggest a rise in herb-drug interactions (HDIs), most of which are usually presumed to have an adverse effect on the consumer/patient.

Add to this the plethora of publications in the past decade or more in which medical researchers have published papers warning of impending HDIs based solely on results of *in vitro* research, such data being of arguably questionable relevance to actual human biochemistry or pharmacology. And not to be forgotten are all those formerly dire predictions of adverse HDIs based on purely theoretical or speculative considerations (e.g., echinacea [*Echinacea* spp., Asteraceae] aerial and/or root preparations used with hepatotoxic drugs).

Since 1997, probably the most responsible compiler and communicator of an evidence-based approach to HDIs has been Francis Brinker, a naturopath by training, and probably one of America's clearest voices for rational phytotherapy, i.e., the practice of herbal medicine based both on modern research as well as the robust body of empirical knowledge, particularly that gleaned from the tradition of Eclectic Medicine of the late 1800s and early 1900s. Previous versions of this book provided clinicians, researchers, herbalists, etc, with a ranking of the available evidence on a wide range of HDIs, i.e., is the interaction merely proposed or is it documented, i.e., based on one of the levels of evidence provided by Dr. Brinker. And, if it is proposed, is it based on theory and/or speculation owing to the pharmacology of the herb and the drug? Or, perhaps, is it based on results from an *in vitro* study? Or, is the documented interaction based on a single case report in the literature, or a controlled clinical trial? And so on. Instead of merely listing speculated or reported interactions, Dr. Brinker has always dug down into the literature to document the source of the information according to a hierarchy of evidence.

Now this most-welcome 4th edition greatly expands on the previous (*Herb Contraindications & Drug Interactions, 3rd. ed.*) with the addition of a new layer of clinically-relevant information, as the expanded title suggests ("…*plus Herbal Adjuncts*

with Medicines). Dr. Brinker is probably the first author I can recall having read who reminds the reader that some interactions can actually have a beneficial effect, i.e., mitigating the adverse effects of a conventional medicine. Such a beneficial interaction includes silymarin-rich extracts of milk thistle (*Silybum marianum,* Asteraceae) seeds to mitigate the adverse effects of hepatotoxic medications. Another beneficial interaction can be the enhancement of a drug's action, e.g., extracts of devil's claw (*Harpagophytum procumbens,* Pedialaceae) tuber to enhance outcomes and/or reduce use of analgesics or NSAIDs (non-steroidal anti-inflammatory drugs) for osteoarthritis or rheumatic conditions.

There are many in the herbal medicine and growing integrative medicine community who have a markedly different view on the effects herbal preparations can have on a person who is already using conventional pharmaceutical drugs. Instead of focusing only on the adverse effect an herb may have on the efficacy of a drug (which is the normal mindset of a conventionally-trained health professional), the herbalist and/or integrative practitioner may also see the same situation in reverse; that is, why not look at the potential benefits of combining herbs with drugs? And, to his credit, Dr. Brinker provides in a new 30-page Appendix E ("Herbals as Potential Complementary Adjuncts with Medicines") a compelling aggregation of examples where using herbs with conventional medications may be a responsible and beneficial option. Subsections of this appendix include Potentially Beneficial Combinations of Herbals with Drugs, Herbal Aids for Modifying Substance Abuse, Complementing Treatment of Inflammations, Enhancing Chemotherapy and Chemoprevention or Reducing the Adverse Effects, Herbals for Preventing and Healing Radiation Adverse Effects and/or Enhancing Radiotherapy or Photodynamic Therapy, Herbal and Anti-infection Agents.

The first 50-plus% of the book, "Herbal Agents" contains a list of 321 herbs and the evidence-based listing of the types of interactions which are known or believed to be associated with them. (Additional herbs are included in the appendices.) The main section follows the same format that Dr. Brinker has created in the previous editions of this book, but significantly more information (e.g., over 1,600 new reference citations) has been added since the 3rd edition, published in 2001, much of such additional information having been added to the online complement to the 3rd edition, at the publisher's website (below).

The various appendices (i.e., in addition to the new E, already noted above) provide significant value: Herbals to be Used with Caution (A); Herbal-Drug Interactions (B); Herbals Contraindicated for Mothers and Children (C); and Vitamin/Mineral/Drug Interactions (D).

As he did for years until the publication of the present volume, the author will post free updates to this book on the publisher's website, www.eclecticherb.com/emp.

I have relied on Dr. Brinker's 3rd edition and its online updates for much of my research and writing over the past decade, even though numerous HDI books have been published by other authors. Despite some valuable data in other publications (Mitchell Stargrove and Jonathan Treasure's recent tome is quite detailed, impressive and useful, i.e., for a limited number of botanicals), it is Dr. Brinker whom I consider the dean of the HDI compilation and critical assessment in the current literature. Now that a decade's worth of information is available in one volume, I know that this will become one of my closest dog-eared bibliographic allies in the coming months and years.

—Mark Blumenthal
Founder and Executive Director,
American Botanical Council
Editor-in-Chief, *HerbalGram*
Austin, TX

African Herbal Pharmacopoeia by Brendler T, Eloff JN, Gurib-Fakim A, Phillips LD. Port Luis, Republic of Mauritius: Association for African Medicinal Plants Standards; 2010. Softcover; 289 pages. ISBN # 978-99903-89-09-8. $125.00. Available in ABC's online catalog #B583.

Africa has been and continues to be a significant source of medicinal and aromatic plants for the world's food, drug, herb, dietary supplement, and cosmetics markets, and in the past decade numerous African plant materials have established a strong international market presence. People around the world enjoy Africa's culinary contributions. These include the peanut (*Arachis hypogaea*, Fabaceae), yam (*Dioscorea* spp., Dioscoreaceae), watermelon (*Citrullus lanatus*, Cucurbitaceae), okra (*Abelmoschus esculentus*, Malvaceae), and many other foods and flavors including coffee (*Coffea* spp., Rubiaceae). In North America, there is little recognition of the many contributions that Africa has made to modern culture, i.e., perhaps beyond the domain of a few ethnobotanists, pharmacognosists, and a growing number of people in the herb and dietary supplement industry.

In recent years, many African medicinal herbs have become increasingly popular in the United States and elsewhere as dietary supplements, food supplements, natural health products, therapeutic goods, traditional medicines, and even conventional drugs—i.e., depending on the regulatory system of the particular country. These herbs include the following: the formerly popular and controversial diet aid hoodia (*Hoodia gordonii*, Asclepiadaceae), the antioxidant red tea rooibos (*Aspalathus linearis*, Fabaceae), the anti-malarial cryptolepis (*Cryptolepis sanguinolenta*, Asclepiadaceae), the 5-hydroxy-L-tryptophan-containing griffonia (*Griffonia simplicifolia*, Fabaceae), anti-inflammatory and analgesic devil's claw (*Harpagophytum procumbens*, Pedialiaceae), sausage tree (*Kigelia africana*, Bignoniaceae), the anti-tonsillitis and anti-bronchitis umckaloabo (*Pelargonium sidoides*, Geraniaceae), the difficult-to-sustain prostate aid pygeum (*Prunus africana*, Rosaceae; syn. *Pygeum africanum*), the anti-depressive and mood-enhancing sceletium (*Sceletium tortuosum*, Aizoaceae), and many others.

With this increased popularity comes an inevitable need for enhanced quality

control for the raw materials, including tests for identity and potential accidental or intentional adulterants. Numerous books have been written in the past 30 years describing the various ethnobotanical uses of many African medicinal plants, and, more recently, as more of the plants are being made into phytomedicines subjected to modern scientific scrutiny including a few controlled clinical trials, books are including references to such research. But to this reviewer's knowledge, this is the first collegial and interdisciplinary effort to compile information in a pharmacopeial format in an attempt to provide the increasingly interested herb community with a reliable, authoritative compendium of standards and analytical methods.

In fact, the authors/editors note in the foreword that there have been several previous attempts to develop an African herbal pharmacopeia. However, such attempts were not successful for several reasons: (1) The attempts were based on limited regional plants; (2) plant selections were somewhat random; (3) the attempts were made by academic researchers with little or no input from growers, producers, and others in the emerging medicinal plant industry.

The authors of *African Herbal Pharmacopoeia* are well-equipped for the task. Brendler is a co-author associated with the German group which translated a version of the German Commission E Monographs (not the American Botanical Council's version in 1998), which was later modified into the first and later editions of the *PDR for Herbal Medicines*. Professor Eloff is leader of the Phytomedicine Programme at the University of Pretoria in South Africa, while the Mauritian scientist Dr. Gurib-Fakim is an expert on the botany, chemistry, and pharmacology of plants of Africa and the Indian Ocean. And Mr. Phillips has vast experience in the development of regional and global trade of medicinal plants, particularly indigenously used plants from developing countries. These editors worked for more than 6 years with more than 30 African medicinal plant experts who contributed to and/or reviewed the various entries.

The book is written and published under the auspices of the Association for African Medicinal Plants Standards (AAMPS), a nonprofit group developed for the purpose of creating this book, the first step toward establishing uniform and widely accepted standards for these plants.

The AHP covers 51 of what the editors consider Africa's most important medicinal plants. Curiously, one of Africa's key medicinal plants, yohimbe bark (*Pausinystalia johimbe*, Rubiaceae) is not included, and African herbaphiles will no doubt find at least one of their favorite plants missing, but such is the fate of a volume like this; it is limited to what the editors/publisher can appropriately cover. And, to be fair, the editors employed a rational process for determining the plant entries, using a number of selection criteria, the aim being to create a set which appropriately represents native/indigenous plants from all regions of sub-Saharan Africa. The 51 plants include those that are already commercially relevant—internationally or nationally—or contain the potential to be so, as well as sustainably collected or cultivated plants, and plants that are considered relatively safe, etc. The plants included herein were whittled down from a lot of 120 nominated species (of which yohimbe was one). Presumably, some day, a second, expanded edition will become available. The editors do note that they are planning an online version which will contain inevitable new research.

Each monograph spans about 4 to 5 pages. The format includes the obvious information on nomenclature, botanical description, distribution, ethnobotany, chemistry, quality control markers and test methods, pharmacology, safety data, therapeutic information, market data (information not regularly found in a pharmacopeia), regulatory status in various countries, future prospects for the development, references, and much more.

Graphics include color photos of the plants as well as thin-layer chromatography plates, plus black-and-white images of chemical structures, high-performance liquid chromatography profiles, near infrared spectroscopy, distribution maps, and more. The high-quality printing is on coated paper; the book is intended for long-term use in the library or the laboratory.

A small weakness of the book is the inconsistency in the family names in some of the monographs. For example, *Griffonia* is listed as being in the Leguminosae family, which is accurate if one were to choose the more outdated nomenclature, while Fabaceae is becoming the more preferred term. *Cyclopia* spp. is also listed as being in the Leguminosae family, while *Cajanus cajan* is noted as in the Fabaceae. Clearly, this occurs when various monographs are assigned to different editors, either without imposition of a style-sheet or at least a managing editor knowledgeable enough with the subject matter to be able to make appropriate edits for the sake of consistency (although one of the editors assures me that the book's nomenclature was decided to conform with the International Plant Names Index, one of the most "widely accepted standards"). However, despite this somewhat arcane nomenclatural glitch, this book provides an excellent resource for industry, academia, and government regulators, and any others who intend to research the 51 plants covered by this first edition.

—Mark Blumenthal
Founder and Executive Director,
American Botanical Council
Editor-in-Chief, *HerbalGram*
Austin, TX

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Randall Sheldon Alberte 1947–2010

Randall Sheldon Alberte, PhD, a respected researcher, teacher, scientist, inventor, author, and biotechnologist, passed away on October 4, 2010, after a long struggle with cancer. He was 63.[1]

Known as "Randy" to those close to him, Dr. Alberte was born on June 7, 1947, in Newark, NJ. Dr. Alberte's professional years were enlivened by his toggling amongst an array of careers, such as start-up biotechnology, academic research, teaching, writing, consulting, and within the realms of government and defense contract management, specializing in research and development.

Dr. Alberte's colleague, economic botanist and author James Duke, PhD, said he was "flattered to consider him a mentor and confidante, someone to criticize some of my overly exuberant, far-fetched ideas" (email, March 9, 2011). Described by Dr. Duke as "lean, wiry, and vivacious," Dr. Alberte was not only noted for being a vigorous scientist, he was also considered by many to possess a likeable personality. "I always found him engaging," Dr. Duke said, "a man who seemed to share my flakier concepts, although they probably originated *de novo* in him, and I listened."

According to Tom Newmark, the executive chairman of New Chapter Inc., "he was also funny, charming, and honest" (email, March 10, 2011). Newmark, who said he "adored the man," called Dr. Alberte "a passionate scientist, reporting to the National Academy [of Sciences] on behalf of his research department with the [United States] Armed Services."

Dr. Alberte received his BA in biology from Gettysburg College and his PhD in botany and biochemistry from Duke University. His post-doctoral training was conducted at the University of California, Los Angeles (UCLA). He started out at HerbalScience Group, LLC, in Naples, FL, as a consultant in 2006 and quickly worked his way up to managing director of research and development**,** then to chief scientific officer, which was the position he held at the time of his death. At that time, he was also working as a consultant for NutraTherapeutics in Tampa. A predominant part of Dr. Alberte's career at HerbalScience was researching and developing products such as botanical immune enhancers and flu remedies, especially using the herb elderberry (*Sambucus nigra*, Caprifoliaceae).[2]

"Dr. Alberte was a gentleman and a kind-hearted person with a quick wit, and in addition to all of that, he was a truly outstanding scientist as well," said Robert A. Newman, PhD, chief science officer of New Chapter, and founder and former co-director of the Pharmaceutical Development Center and Analytical Center at M. D. Anderson Cancer Center in Houston, Texas (e-mail, March 14, 2011). "I especially appreciated Randy's science," Dr. Newman said. "It can best be described as 'elegant' in that its logic and novelty led to an unprecedented depth of understanding of natural products such as elderberry. This, in turn, has provided us with meaningful contributions to human health and wellness for which he will be remembered."

Dr. Alberte was the founding director of biotechnology at Florida Gulf Coast University (FGCU) in Fort Meyers, FL, where he was a professor from 2003 to 2006. He held numerous other directorships, fellowships, and consultancies, including serving as a senior fellow at the Center for the Study of Evolution and the Origins of Life at UCLA in the late 1980s. He was designated an Andrew W. Mellon Foundation Fellow at the University of Chicago, and an National Institutes of Health Post-doctoral Fellow at UCLA, where he was also granted a National Science Foundation Energy-Related Fellowship.

Throughout his careers at both UCLA and the University of Chicago, Dr. Alberte was a doctoral and post-doctoral mentor to numerous students. One of these former students, William Dennison, PhD, said in a tribute blog post written after Dr. Alberte's death that "[Randy] fostered camaraderie within the graduate student cohort, and this has provided friends and colleagues for life."[3]

At the time of his death, Dr. Alberte had authored 155 publications, many in journals such as *Plant Physiology*. In more recent years, Dr. Alberte published numerous articles in journals such as *Phytochemistry* and *Pharmacokinetics* that dealt with the pharmacokinetic analysis of certain herbs, including stinging nettle (*Urtica dioica*, Urticaceae) and elderberry. He was also the primary or sole inventor on nearly 100 patents, both issued and pending. Many of these patents involved the extractions and extraction process of botanical compounds such as from turmeric (*Curcuma longa,* Zingiberaceae), cranberry (*Vaccinium macrocarpon*, Ericaceae), and stinging nettle.

During his tenure at HerbalScience, Dr. Alberte worked alongside many prominent botanical scientists and chemical engineers toward the creation of modern technologies used for the extraction of "batch-reliable, evidence-based, and functional" ingredients from botanical sources.[4] "He and his company [HerbalScience] had unique methods for extracting many of the phytochemicals needed to combat a given ailment," said Dr. Duke.

"He didn't guess—he probed, he tested, and he was a disciplined, exacting researcher," said Newmark. "I admired him greatly, and the herbal community lost a brilliant friend with his passing."

Dr. Alberte is survived by his sister, Franka Alberte Ralph.

—Christina Korpik

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Thomas DeBaggio 1942–2011

Tom DeBaggio, a writer and expert herb grower, died February 21, 2011, at the age of 69. He had early onset Alzheimer's disease.[1]

DeBaggio was well known among the general public as the writer of 2 popular books on Alzheimer's that bravely describe his tumultuous experience living with the disease: *Losing My Mind: An Intimate Look at Life with Alzheimer's* (Free Press, 2003) and *When It Gets Dark: An Enlightened Reflection on Life with Alzheimer's* (Free Press, 2007). He also touched thousands who listened to his interviews on mainstream programs, such as National Public Radio's *All Things Considered*, and *The Oprah Winfrey Show*. DeBaggio said he did these things "to break through the sense of shame and silence Alzheimer's has engendered."[2]

To the herbal community, DeBaggio was known and respected for his work with plants—especially rosemary (*Rosmarinus officinalis*, Lamiaceae), lavender (*Lavandula angustifolia*, Lamiaceae), and basil (*Ocimum basilicum*, Lamiaceae). In 1975, he founded DeBaggio's Herb Farm and Nursery, which has grown into a large and frequently visited facility in Chantilly, VA, that grows 100,000 plants and vegetables each year.[3]

DeBaggio arrived at this botanical endeavor as an unemployed newspaper journalist. "He didn't have a job and he needed to feed the family, so he started growing plants for us to eat," said son and owner of DeBaggio Herb Farm, Francesco DeBaggio (oral communication, March 10, 2011).

DeBaggio then began to sell individually potted tomato plants for 25 cents each, and soon expanded to a 5-foot by 10-foot lean-to on the side of the house to store the plants. A few years later, the backyard contained 8 small greenhouses and, eventually, the business evolved into what it is today. "He was pretty proud of it," said Francesco. "It was a hell of a lot of work."

"Although he first started growing herbs seriously to provide income for his family, he was totally won over with them," said friend and herbalist Susan Belsinger. "His passion for herbs was his daily work; sometimes fiery, always adamant and thought-provoking, joyous and real" (e-mail, March 13, 2011).

Throughout these years, DeBaggio hungered for the best and most accurate information he could get. He frequented the library to research herbs and also used his journalistic skills to engage with scientists. As a result, DeBaggio's Herb Farm stands apart from many other such herb and plant outlets by focusing on high quality and quantity of variations.

"He was not just a happy-go-lucky, fly-by-night grower," said Belsinger. "He researched, studied, read, and questioned all things herbal in order to be informed. That was the perfectionist in him. His greenhouses were always very tidy, clean, and orderly. His plants were primo, top-quality."

DeBaggio often consulted Arthur Tucker, PhD—a research professor at Delaware State University and co-director of the Claude E. Phillips Herbarium—for information and additional reading suggestions. "This approach is contrary to about 99% of the growers with whom I have had contact," said Dr. Tucker, referring to his experience with many people who call him, hoping for a miracle after having trusted an anonymous nursery or web page, which often results in planting the wrong plants or the plants dying (e-mail, March 9, 2011).

DeBaggio authored and co-authored several herb books, including *The Encyclopedia of Herbs: A Comprehensive Reference to Herbs of Flavor and Fragrance* (Timber Press, 2009), *Growing Herbs from Seed, Cutting & Root* (Interweave Press, 1994), and *Basil: an Herb Lover's Guide* (Interweave Press, 1996).[4] His interest in writing about herbs was natural: "He wanted to be sure that the correct information was put out there," said his son Francesco. "Just like a good journalist would."

The Encyclopedia of Herbs, which DeBaggio wrote with Dr. Tucker, is considered by many herbalists and botanists to be the authoritative guide on herbs. The final volumes of *The Encyclopedia*'s precursor, the *Big Book of Herbs*, were delivered to DeBaggio during the beginning stages of his early onset Alzheimer's. "Unfortunately, he was not fully aware of what we had accomplished," said Dr. Tucker.

During the earlier stages of the book's creation, DeBaggio and Dr. Tucker made a good team, their differences often proving complementary. Always a writer, DeBaggio helped to "translate" Dr. Tucker's scientific words into "English." "I trusted Tom to rewrite sections," said Dr. Tucker, "but my caveat was that he not change the facts in the process. Of course, I would be untruthful if I implied that this was one-sided, but we were able to critique each other and still remain friends, I guess because of mutual respect. I have that relationship with only a few people outside of my family, and I will miss Tom."

DeBaggio loved rosemary and spent a considerable part of his life developing new varieties: "Madalene Hill" rosemary, "Lottie DeBaggio" rosemary, and Golden Rain "Joyce DeBaggio" rosemary, named after his wife. [1,4] Due to this work, DeBaggio was referred to as the best "rosemaryologist" in America, as well as "Mr. Rosemary." According to Belsinger, he also developed an early purple lavender named for Dr. Tucker, a short and sweet "Susan Belsinger" lavender, and a purple splashed-leaf basil named "Painted Holly" after Holly Shimizu, the executive director of the US Botanic Garden in Washington, DC.

Belsinger, who is also a writer for *The Herb Companion*, coauthored *Basil: an Herb Lover's Guide* with DeBaggio. Through their collaboration, she came to know his standout personality, wonderful sense of humor, and strong work ethic. DeBaggio was also an herbal mentor to Belsinger and many others, always there to answer questions and provide advice.

At the age of 57, DeBaggio was diagnosed with Alzheimer's disease. "He didn't just accept the disease and quietly stay at home," said Belsinger. "Instead, he decided to use himself as a spokesperson and an example for all of the world to see. He was brave and courageous to show this painful private side of his life."

"His impact, was enormous," continued Belsinger. "Tom grew plants and converted thousands of Washingtonians, Virginians, and Marylanders—not to mention herbal pilgrims from across the nation—into herb growers. He educated us, entertained us, lifted the level of plant quality throughout the herb industry, and gave us wonderful new plants. He was an experienced plantsman, however, that is not what I remember him for the most. First and foremost, I think of Tom DeBaggio as a writer."

One outlet in which DeBaggio united his love for writing and love for herbs was in his "Ol' Peeps" column of the farm's seasonal catalog. In the Fall of 1999, not long after he was diagnosed with Alzheimer's, DeBaggio wrote in one of his last Ol' Peeps entries: "There are few things in life as tasty as basil, as worthwhile to have in the garden as rosemary, and as sweet as the aroma of lavender, but even they need to be renewed periodically and it is that process on which Francesco, Joyce, and the men and women who work with us have now embarked. Although I must bow out in time, I intend to hang around as long as I can and work as hard as I ever have to grow the finest plants possible. I may not be as visible in the greenhouse in the days to come but I will be there in person frequently and in spirit forever."[5]

DeBaggio is survived by his wife, Joyce, son, Francesco, and sister, Mary Ann Lovett.[4]

—Lindsay Stafford

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Ariipaea Salmon 1953–2011

On March 20, 2011, Ariipaea Salmon died at his home on Santo Island in the Republic of Vanuatu. Known to his friends and associates as Paea (*Pie-uh*), he died of heart failure after suffering from cardiovascular disease for several years. He was 57 years of age.

Ariipaea was a prince in the Tahitian royal family—the great-grandson of Pomare V, the last King of Tahiti, and his wife Joanna Salmon—and spent his childhood and teen years in that country. At age 5, Paea suffered a debilitating disease of unknown origin, from which he nearly died. He attributed his recovery to a regimen of herbal remedies administered by his grandmother. This experience profoundly influenced Paea, causing him to delve into the world of medicinal plants. At age 13, he underwent ritual circumcision, and a few years later began the process of receiving traditional Polynesian tattoos that eventually covered most of his lower body. Unlike many of his contemporaries, Paea embraced traditional modes of dress and living. Wrapped in a *pareu* (a traditional wraparound skirt-like garment) and sporting long, flowing hair, he looked like a chief from ancient times.

Paea was a key figure in bringing the drinking of kava (*Piper methysticum*, Piperaceae) back to Tahitian culture after it had been banned by missionaries. He traversed the South Pacific in his early adult years, living in Tonga, Samoa, Fiji, and on other islands, eventually settling in Vanuatu. The father of 11 children, Ariipaea lived with his wife, Nicole, and their 5 children: Ariitaimai, Heiariki, Puaita, Queenie, and Meera.

In 1995, I set off to Vanuatu to explore kava. I was directed to the remote island of Pentecost, and told to seek out a warrior-looking man with tattooed legs. Upon my arrival at the grassy Lonorore air strip on the western Pentecost coast, I saw that man, and our travels—which spanned a period of 10 years—began. In Paea's company, I gained extensive knowledge of the medicinal plants of the islands, and about cultural customs and ceremonies. Paea and I worked together in the kava trade, and subsequently with tamanu oil (*Calophyllum inophyllum*, Guttiferae). Paea lived larger than life, had an infectious smile, and seemed to be an endless fountain of giant schemes and dreams. Paea was also thoroughly irascible, an inveterate cadger, loud, bombastic, very generous, and terrible at managing money. As a friend he was loving, confidential, and fiercely loyal. And the man could party like the devil himself.

Paea was a true island man. He embraced traditional Polynesian wisdom, and knew hundreds of plants and their uses for medicines, building, cordage, and decoration. He expressed a keen desire to establish enterprises that would lift island people from poverty, and focused his energies on the medicinal plant trade. He became involved in the South Pacific sandalwood trade in his early 20s, and subsequently traded in kava, noni, vanilla, and tamanu oil. Paea spoke French, English, Tahitian, and Bislama (a pidgin language widely spoken in Vanuatu), and was most in his element when directing large projects. He inspired hundreds of farmers in Vanuatu to establish noni plantations, and was responsible for the revival of dozens of Vanuatu vanilla plantations.

In 1994 and 1995, Paea conducted a survey of cultivated kava on several islands in Vanuatu, and concluded that the tiny island nation possessed a huge amount of kava ready for trade. For several years after, Paea was a leader in the Vanuatu kava trade, and traveled to the US several times to attend natural products expositions.

In the late 1990s, Ariipaea brought traditional firewalking from Tahiti to Vanuatu, and, over the course of several years, conducted a series of massive, elaborate firewalks according to the methods he was taught in his training as a Tahua—a keeper of the fire. I had the opportunity to participate in, and help to lead, six of those firewalks, and they were splendid events. At the largest of them all, we brought together more than 1,000 as a fundraiser for south Pentecost Island's tsunami-devastated Baie Martelli, which was something of a "home village" to both Paea and myself. At the firewalks, Paea demonstrated awesome skill, as he marched solo out into gigantic, roaring furnaces of red-hot stones with fire holes all around. At one firewalk, he even coaxed the Prime Minister of Vanuatu to shed his shoes and stride across the fire pit, to great applause.

Ariipaea made a big impression wherever he went. At trade shows he was a one-man event, attracting hundreds to his company. As a father and family man he was kind, loving, and deeply devoted. He attracted children like the Pied Piper. As a friend, he was affectionate and delightful. And in tribal scenes, when Paea walked into a village, onto a beach, or into a ceremony, everybody knew he was there. Even in death, Paea has all of us who knew him talking and sharing stories. I have no doubt that long after Paea's body has been burned outdoors, on a pyre on Santo Island, we will continue to share tales about him for years to come. I, for one, will miss him dearly. Blessings to you, Paea.

—Chris Kilham
Founder, Medicine Hunter Inc.

May 7-9: 11th China International Nutrition and Health Industry Expo. Beijing, China. With more than 800 exhibitors, this event is the largest gathering in China of health industry members. It offers attendees the opportunity to meet and network with an international group of distributors, dealers, agents, importers and exporters, and buyers. In addition to the trade show, the expo features an international awards ceremony, a health industry forum, and a medical technology seminar. More information is available at: www.jianbohui.com/en/index.html.

May 9-11: 8th Annual Nutrition and Health Conference. San Francisco, CA. Presented by the Arizona Center for Integrative Medicine, this conference is attended by many US health professionals interested in nutrition, including researchers, clinicians, educators, and chefs. The event focuses on the relationship between nutrition and disease and health, and enables attendees to better advise patients on nutritional interventions for certain conditions. It features lectures and seminars given by the industry's top leaders, such as Andrew Weil, MD, Fredi Kronenberg, PhD, and Dean Ornish, MD, as well as discussions on a range of topics, including anti-inflammatory diets, food's influence on mood, and food as medicine. More information is available at: www.nutritionandhealthconf.org/index.html.

May 24-27: 8th Annual Meeting of the Natural Health Products Research Society. Montreal, Canada. An international showcase of natural products research, this is the first time the conference will be a joint meeting of 4 Canadian research societies. Attendees include professionals from academia, government, and the numerous health industries. With the theme of "Multidisciplinary Approaches to Modern Therapeutics," the conference will feature discussions on topics such as natural health products regulation, product development, medicinal plant products, clinical methodology and epidemiology, and advances with a variety of dietary supplements. More information is available at: www.nhprs.ca/?q=node/10.

May 26-28: BioFach China 2011. Shanghai, China. This leading organic trade fair features more than 10,000 consumer visitors, more than 350 exhibitors, and 15 local and international organic certifiers. Attendees can listen to conference discussions on Chinese organic policy, trends of global organic markets, analysis and expansion of the organic sales market, the healthy life and natural cosmetics market, and technologies and standards for organic production. Consumers attending the event are offered a consumer-specific education program. More information is available at: www.biofach-china.com/en/.

June 4-6: Medicines from the Earth Herb Symposium. Black Mountain, NC. Highlights of this annual event include a keynote address given by ABC's Mark Blumenthal and James Duke, who will perform some of his original songs; intensive workshops on menopause, field botany, and natural therapies integrated with chemotherapy drugs; and a farm tour. Additional speakers include Cascade Anderson Geller, Chris Kilham, and David Winston. With a newly expanded exhibit area, attendees can experience a variety of booths, food and medicine making demonstrations, music, and herbal food and beverages. More information is available at: www.botanicalmedicine.org/conferences/me2011/me2011genl.htm.

June 9-12: Food as Medicine: Professional Nutrition Training Program. Washington, DC. Presented by the Center for Mind Body Medicine, this event focuses on teaching health professionals how to integrate nutrition into clinical practice, medical education, and community health. Its curriculum covers a variety of topics, including sustainable nutrition, understanding core imbalances, digestive healing, mindful eating, complementing cancer care, laboratory assessment, and cooking for health. Continuing education units (CEUs) and scholarships are offered. More information is available at: www.cmbm.org/holistic_medicine_PROFESSIONAL_TRAINING_EDUCATION/food_as_medicine_description.php.

July 9-13: 52nd Annual Meeting of the Society for Economic Botany. St. Louis, MO. This year's event, which serves as the joint meeting of 4 botanical organizations, takes on the theme of "healing the planet." It features discussions on the history of botany, conservation of the world's tropical forests, outcomes of graduate student-designed curricula, medicinal plants and the legend of Richard E. Schultes, and more. Several workshops and field trips are also offered. More information is available at: www.2011.botanyconference.org/.

July 17-20: 2nd Annual Conference of the American Council for Medicinally Active Plants. Huntsville, AL. Aiming to encourage the exchange of scientific information on medicinally active plants, this conference features field tours, exhibits, and plenary, concurrent, and poster sessions. Discussions will focus on the topics of agronomy, phytochemistry, genetics, ethnobotany, biochemistry, biotechnology/molecular biology, post-harvest processing/handling, marketing and legislative issues, and manufacturing techniques. More information is available at: www.acmap.org/conference2011.html.

July 19-22: 14th Annual NBJ Summit. Dana Point, CA. This annual event of the *Nutrition Business Journal* is a mix of fun activities, such as a golf tournament and cocktail party, and interesting discussions on the health and nutrition industries. Topics of focus include the state of the industry, scientific challenges, the future of wellness, and the growth of nutrition industry marketers, manufacturers, and ingredient suppliers. Dara Torres, an Olympic medal-winning swimmer, will give the event's closing keynote address. More information is available at: www.nbjsummit.com.

More calendar listings at
www.HerbalGram.org
See "News" Tab

In this department of *HerbalGram*, we list resources such as publications, organizations, seminars, and networking opportunities for our readers. A listing in this section does not constitute any endorsement or approval by *HerbalGram*, ABC, or its Advisory Board.

Conservation Biology For All, an authoritative yet consumer friendly text on conservation science, was recently made available online for free. Written by an international group of conservation biology experts, the book covers a variety of conservation topics, including tropical deforestation, species extinction and endangerment, ecosystem services, fragmentation, invasive species, climate change, overexploitation, and biodiversity. This book—which originally cost about $110—received enthusiastic reviews from several ecology journals for being well written, "packed with information," and including "most emerging issues that come under the umbrella of conservation biology today." Aiming to honor fully the title of the book, Oxford University Press and the book's editors decided to make the book available for free online in order to increase its access and impact. Available at: www.mongabay.com/conservation-biology-for-all.html.

The *NIH Extramural Nexus* now includes a blog that will be updated frequently in order to increase understanding and encourage communication in the research community. As a publication of the National Institutes of Health (NIH), the *Nexus* provides information on NIH grant policies and activities. The new blog is written by NIH Director for Extramural Research, Sally Rockey, and aims to inform its readers on NIH perspectives and policies, address some of the extramural community's concerns, and welcome and respond to comments from all readers. Interested parties can subscribe to the blog—titled "Rock Talk"—through RSS, list serve, or Twitter. Available at: http://nexus.od.nih.gov/.

NCCAM Integrative Medicine Research Lecture Series is currently available on the website of the US National Center for Complementary and Alternative Medicine (NCCAM). NCCAM displays recent and past lecture information, including date, speaker, and topic, and also links to a video of each lecture on NIH's Center for Information Technology webpage. These lectures discuss a variety of topics relating to current CAM research, practices, and approaches, as well as perspectives on the ever-evolving CAM discipline. A recent lecture, for example, featured a Washington, DC science and political journalist speaking on the topic of scientists' understanding of the public. Available at: http://nccam.nih.gov/research/consultservice/lecture.htm?nav=upd.

Dried Botanical Identification Tool, which aims to enable proper identification of dried botanicals by trained professionals and laypersons, is now online. The tool's different features, which are all available on its website, include an interactive key, fact sheets listed by botanical species name, a terminology glossary, and an image gallery. Users are recommended to begin with the interactive key, which helps to narrow down possible matches through selection of identification features and feature states based on tangible attributes, such as shape, size, texture, and plant part. While this key uses common terminology, such as "football-shaped," the fact sheets feature scientific, botanical terminology. Laypersons can successfully utilize the fact sheets by referring to the glossary of terms. Each fact sheet includes botanical information, a detailed description of usage and varying appearances, nativity and distribution information, and a variety of color photos of the plant's different parts. Available at: http://itp.lucidcentral.org/id/dried-botanical/.

The Office of Dietary Supplements (ODS) of the National Institutes of Health (NIH) has recently implemented changes to its website and introduced a variety of new multimedia features in order to increase ease of use by consumers. The newly redesigned website now features a "Health Information" tab to assist consumers by providing consumer-focused dietary supplement fact sheets, answers to frequently asked questions, and tips on how to research health information on the internet. This tab also features consumer protection information from the US Food and Drug Administration and Federal Trade Commission, as well as nutrient recommendations and an online daily reference intake tool. ODS has also developed a mobile phone application, "My Dietary Supplements" (or myDS), for the Apple iPhone and iPad. This free app enables users to track their use of herbs, vitamins, minerals, and other supplements so that they can accurately inform their healthcare practitioners of what products they are taking and/or remember supplement details when shopping. ODS also has a new newsletter, *The Scoop*, which focuses on providing information for consumers who use or are curious about dietary supplements. Topics discussed in a recent issue of *The Scoop* include vitamin C and the common cold, vitamin B12 injections (note: B12 injections are not dietary supplements), and the process of purchasing and taking herbal products. Available at: http://ods.od.nih.gov/.

Publications

American Herb Association Quarterly Newsletter: $20/yr. AHA, P.O. Box 1673, Nevada City, CA 95959.

Australian Journal of Medical Herbalism: Quarterly publication of the National Herbalists Association of Australia (founded in 1920). Deals with all aspects of Medical Herbalism, including latest medicinal plant research findings. Regular features include Australian medicinal plants, conferences, conference reports, book reviews, rare books, case studies, and medicinal plant reviews. AUD/$95 plus AUD/$15 if required by airmail. National Herbalists Association of Australia, 33 Reserve Street, Annandale, NSW 2038, Australia.

Medical Herbalism: Subtitled "A Clinical Newsletter for the Herbal Practitioner." Edited by Paul Bergner. $36/yr, $60/2 yrs. Canada $39/yr. Overseas $45/yr. Sample/$6. Medical Herbalism, P.O. Box 20512, Boulder, CO 81308.

Other

American College of Healthcare Sciences, ACHS.edu is the only accredited, fully online college offering degrees, diplomas, and career-training certificates in complementary alternative medicine. ACHS is committed to exceptional online education and is recognized as an industry leader in holistic health education worldwide. Visit www.achs.edu, call (800) 488-8839, or stop by the College campus located at 5940 SW Hood Ave., Portland OR 97239.

Get Certified with ABC's Herbal Information Course. This self-paced online course is designed to help retail employees and multi-level distributors communicate knowledgeably with customers about herbs and dietary supplements. After successfully completing the course, you'll receive an Herbal Information Specialist Certificate and a window decal announcing "Herbal Information Specialist On Staff." Renewable annually. $69.95 Bulk pricing available. www.nutrilearn.com.

Interns, get hands-on experience before you graduate! If you're a future pharmacist or dietitian, you can choose a rotation through ABC's internship program. You'll get a comprehensive introduction to phytomedicines, researching the medicinal, culinary and cosmetic uses of herbs, answering ABC members' questions, working with medicinal plants in ABC's 2.5 acres of herbal gardens, and preparing herbal salves, tinctures or meals. For more information, call 512-926-4900 or e-mail education@herbalgram.org.

Plant Lovers Journey to the Patagonia. Join Rosemary Gladstar and Dr. Richard Liebmann March 1-12, 2011. Summer herbal adventure in Argentina and Chile. Email richardliebmann@gmail.com.

Stock Photography that doesn't look like Stock: Steven Foster Group, Inc. Photography, Consulting, Publications. Specializing in medicinal and aromatic plants, along with the places they grow, our stock photo files include more than 120,000 images shot around the world for over 30 years. Contact us at our location in the heart of the Ozarks in Eureka Springs, Arkansas. Visit our website: www.Stevenfoster.com or email: sfoster@Stevenfoster.com.

Considering supplying herbal products in Europe? Ann Godsell Regulatory can offer consulting advice on regulatory strategy, and data requirements. Services for dossier preparation & submission also available. For more information email regulatoryinfo@anngregulatory.eu.

Educate your prospects and clients about what you do—why you are the best choice. Caring, flat fee, revisions included, fast turnaround. Call now for free consultation. 860-451-8143. triciastuart@ct.metrocast.net.

In our two-year clinical herbalist training program we focus on Chinese, Native American, Ayurvedic and European materia medica, clinical protocols and skills, case histories, differential diagnosis, and much more. The next two-year Herbalist's Training Program will begin in September, 2011. The class will be held in Washington, NJ and on-line via live webcast. If you have a high-speed internet connection you will be able to participate in this unique course. For over 29 years this program has been educating Herbalists, MD's, Nurses, ND's, DC's and other health professionals in the art and science of clinical herbal medicine. For more information about the course please visit www.herbalstudies.org, email dwherbal.office@verizon.net, or call 908-835-0822.

Herbal Teleclasses for Children (Ages 8-100). First Thursday of each month at 8 pm EST. $5.00 per child. Parent attends free! Visit www.herbal-educator.com for details.

Junior Herbalist Course for Children (ages 8-14) Twelve lessons in PDF format. Perfect curriculum for parents, herbalists, herb farms or ecotourism centers. Visit www.herbaleducator.com or call Donna at 571-933-3022.

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- **EDUCATES** consumers, healthcare professionals, researchers, educators, industry and the media on the safe and effective use of medicinal plants
- **ADVOCATES** responsible herbal production and use
- **ADVISES** the media on emerging herbal science
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