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Number 86 | May – July 2010

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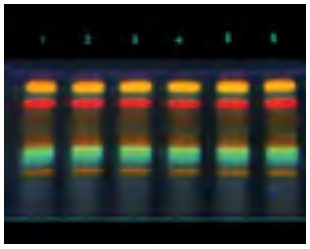

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Açaí

Euterpe oleracea

Family: Arecaceae

Introduction

Açaí (pronounced AH-sigh-EE, *Euterpe oleracea*), a palm tree native to Brazil, Colombia, and Suriname,[1,2] is most abundant in the eastern Amazonian estuary floodplains of the Brazilian state of Pará.[3,4] The açaí palm is a tall, multi-stemmed tree that typically reaches heights of 40-60 feet.[4] Açaí has long, pinnate leaves at the top of each stem and small brown or purple flowers that are both male and female.[5] Each palm produces about 4 to 8 bunches of edible fruit per year, or 20 to 40 pounds of fruit.[4,5] This fruit is a round, dark purple berry about ½ inch in diameter, and each bunch can weigh anywhere between 3 and 6 pounds.[4] The fruit can be harvested throughout the year but is best during the dry season between July and December.[3-5] Each berry contains a single large seed, surrounded by a thin fibrous layer, green lipid layer, and a purple skin similar to a grape skin. Açaí pulp is considered to have high antioxidant content and dense nutritional properties of omega essential fatty acids, protein, calcium, and fiber.

History and Cultural Significance

The Standardized Common Name of *E. oleracea* is cabbage palm, according to the US herbal industry.[6] However, since the commercially desirable part of the plant is the berry, and the juice of the berry is called açaí, this is the plant's most widely-known name.[1] The word *açaí* is the European corruption of the Tupian word *ïwasa'i*, meaning "fruit that cries or expels water."[7] (The Tupi-speaking people have inhabited Brazil dating back to the 1500s.[8])

As for the plant's Latin binomial, the genus *Euterpe* may be so named due to the tree's graceful growth habit. In Greek mythology, Euterpe was the daughter of Mnemosyne and Zeus and one of the muses of music, song, and dance.[9] The species name, *oleracea*, refers to having the nature of herbs for cookery, i.e., being edible.[10]

Ethnobotanists have estimated that the native tribes in the Amazon have at least 22 different uses for the açaí palm.[5] Tribes in the Brazilian Amazon forest eat the palm hearts, use the fruit to make pulp, ink, and dye, and create thatched roofs using the mature palm fronds. The remainder of the felled palm is urinated on to attract beetles (*Rhynchopohorus* spp.), which lay eggs that produce pounds of larvae. These larvae are an important source of both protein and fat in the native diet. The tribes also sell the fruit and palm hearts in the cities and towns along the river.

The Amazonian tribes also have many medicinal uses for the palm. In the Peruvian Amazon, a strong tea (decoction) made by simmering the roots is used to treat ailments ranging from malaria, diabetes, jaundice, hair loss, hemorrhages, and anemia to liver and kidney diseases, dysmenorrhea (painful menstruation), and muscle pain,[5] although scientific studies to support these and other traditional uses are lacking. Additionally, the Saramaccan Maroon communities have traditionally placed young, unfolded leaves around a baby's neck for general health or growth promotion and to ward off evil.[11] The fruit seeds were crushed and prepared as an infusion as a deterrent for fevers,[5,12] or crushed to prepare a dark green oil used for scrofula (a tuberculous infection of lymph glands on the neck).[12] The açaí berry was discovered to be a natural antioxidant and cholesterol controller by the *uwishin*, medicine men and women of the Shuar people of Eastern Ecuador.[13] They also found it helped to build the immune system, fight infections like schistosomiasis, protect the heart, and control prostate enlargement. It was also used an as antibiotic to fight *Staphylococcus aureus* and as an energy booster for hunting and increased libido.[13] The grated fruit rind is infused and used topically for skin ulcers.[5,12] The oil of the fruit is used to treat diarrhea.[1,2,5]

Açaí *Euterpe oleracea* Photo ©2010 Andrew Henderson

The current main preparation of açaí in its native habitat is as a fruit pulp. The thick, purple fruit pulp is often eaten as porridge by combining with fish, cassava meal (manioc, *Manihot esculenta*, Euphorbiaceae), guarana (*Paullinia cupana*, Sapindaceae), or with tapioca and sugar. The açai pulp is also sweetened with sugar and used in ice cream and liquor, as well as other desserts.[5,12]

Açaí juice is prepared by soaking the fruit in water to soften it and then manually or mechanically removing the skin and flesh with a small blender. Commercial

Continued on page 2

production of açaí pulp is performed in a similar manner, by softening the fruits in a luke-warm water bath for about 30 minutes and processing with stainless steel industrial equipment. The açai fruit pulp is pasteurized in many cases, especially when it is destined for export.

Modern Research

Although several *in vitro* and animal studies have been conducted, few human clinical trials have been performed to support the antioxidant and other claimed properties of the açaí berry.

One recent human study evaluated the pharmacokinetics of anthocyanins (the deep purple pigments in the fruits) and antioxidant effects of clarified açaí juice and açaí pulp after human consumption via blood and urine samples.[14] (Pharmacokinetics is the process of how substances are absorbed, metabolized and excreted in the body.) When looking at the concentration of anthocyanins in the pulp and juice before consumption, the authors found that the anthocyanin concentration may be lower in clarified açaí juices due to the removal of anthocyanins that are trapped inside the insoluble matrix. In blood samples taken after consumption, the anthocyanin concentration was significantly higher from consuming the açaí fruit pulp versus the clarified açaí juice. (This suggests that the anthocyanins trapped in the matrix had been released within the intestinal tract and were available for absorption.) The antioxidant capacity and activities were also significantly higher for the pulp, but the concentration of polyphenolics was not high enough to reduce reactive oxygen species (ROS), i.e., the free radicals that contain the oxygen atom.[14]

In a pilot human trial with 10 slightly overweight but healthy adult men and women, each participant consumed 100 grams of açaí frozen fruit pulp (Sambazon®, San Clemente, CA) twice daily for 1 month.[15] Researchers measured participants' baseline fasting plasma glucose, plasma insulin levels, lipid levels (total cholesterol, HDL, LDL, triglycerides), high sensitivity C-reactive protein, and blood pressure. After 30 days of consuming this proprietary açaí, participants' fasting glucose, insulin, total cholesterol, and LDL (bad cholesterol) were significantly reduced compared to the baseline. In addition, post-prandial (between meals) increases in blood glucose levels were significantly reduced. (The trial was funded by Sambazon, Inc., and has not yet been published.)

Future Outlook

Açaí's international popularity is continuing to grow; sales topped $100 million in the United States in 2008.[16] The United States is the major importer of açaí, where it is sold in many natural products such as fruit drinks, capsules and tablets, energy bars, and granola.[5]

The "açaí boom" over the last 2 decades has become an important part of the Brazilian Amazon's economy. Increased demand for açaí has led to proposed projects for planting approximately 5 billion more açaí trees over the next 10 years.[5] Some think this will cause what is called a "green deforestation." According to Alfredo Homma, an agronomist with the Brazilian Institute for Agricultural Research, "They don't bring down all the trees and leave the area deforested. They bring down diverse forests and replace them with one single culture—açaí."[17]

Açaí is considered to be a good candidate for sustainable farming. While the majority of açai has been harvested according to conventional methods, the US company Sambazon established USDA organic certification for the açai palm in 2003 and has also implemented Fair Trade certification.

A longer profile of açaí will be made available on the ABC website in the Healthy Ingredients database. HG

—Gayle Engels

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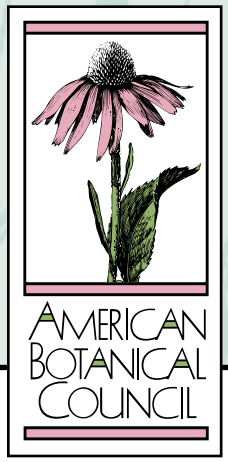

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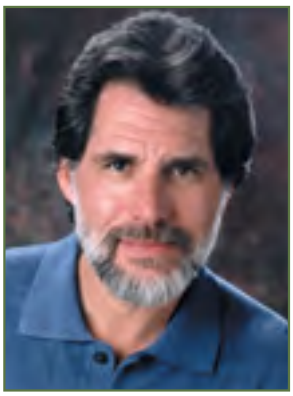

Many systems of indigenous and traditional medicine employ plants based on a notion of the "doctrine of signatures," the idea that a plant's color or shape suggests a medicinal application or bodily organ for which it might have therapeutic value. In his article on the doctrine of signatures in *HerbalGram* issue 78, Brad Bennett, PhD, wrote that such correspondences were based on empirical observations over time.[1] Such traditional uses are not limited to plants but are also the rationale for how people have employed animal parts medicinally.

As the American Botanical Council's primary focus is education of responsible medicinal plant use, research, conservation, etc., *HerbalGram* articles have only rarely broached the topic of medicinally-used animal species. Medicinal use and conservation of endangered animals is a growing concern and has been increasingly covered in the American and international media. *National Geographic* magazine devoted a pictorial spread earlier this year to the issue of wildlife trafficking.[2] Recent news coverage of threatened animals and their medicinal use has also stemmed from the Convention on International Trade in Endangered Species' (CITES) 15th meeting of the Conference of the Parties, held in March 2010 in Doha, Qatar.

This issue's cover story focuses on zootherapy (medicinal use of animals and products derived from them) and efforts to replace the medicinal use of some endangered animal species with botanical alternatives. Written by *HerbalGram* Managing Editor Courtney Cavaliere, the article gives special attention to 4 medicinally-used animals: tigers, rhinoceroses, bears, and turtles and tortoises. As she reports, substitution of endangered animal ingredients with botanical and other alternatives is one method that has been used in the past to help aid in preserving threatened animal species—and such efforts could potentially be further promoted to help maintain biodiversity.

This issue also contains ABC's annual herb market report, usually one of our most-cited articles. It profiles the 20 top-selling botanical supplements in both the mass market and natural and health foods channels, as well as general herbal supplement sales trends. Data gathered from various market research firms indicate strong growth in herbal supplement sales during 2009. This growth occurred in all market channels and confirms earlier predictions that herb sales might rise during the economic downturn—compelling empirical evidence of consumers' interest in natural methods of self-care.

One of the herbs singled out in the market report for its remarkable sales growth in 2009 is açaí—the subject of this issue's herb profile. Açaí products are increasingly lining the shelves of grocery and natural products stores. Although very few clinical trials have been performed to validate the suggested health benefits of açaí consumption, *in vitro* and animal studies, as well as traditional use, suggest potential beneficial activity. Like many in the natural products sector, we anticipate the publication of well-controlled clinical trials to help document açaí's potential health benefits.

Finally, we feature an article by Matt Cimino, PhD, examining the emerging technology of verifying herb identity through DNA-testing—a technique arguably offering some benefits over other methods for botanical identification (e.g., microscopy, chemical analysis). Although there is an appropriate place for other methods, as more dietary supplement and herbal companies increase their quality control and quality assurance protocols to conform with good manufacturing practices, DNA-testing could become an increasingly relied-upon resource of the industry.

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Two African white rhinoceroses grazing in Meru National Park, Kenya, Africa. Photo ©2010 Photographer: Duncan Willetts; Source: International Fund for Animal Welfare

features

Chinese peony *Paeonia lactiflora* Photo ©2010 Steven Foster

departments

On the Cover

Replacing Animal-Based Remedies with Plants. See page 34. Top photo: A wild, 13-year-old tiger within Bandhavgarh National Park, Madhya Pradesh, India. Photo ©2010 Photographer: Aniruddha Mookerjee; Source: International Fund for Animal Welfare.
Bottom photo: Flowering Qunice *Chaenomeles speciosa.* Photo ©2010 Steven Foster

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ABC Welcomes 11 New Advisory Board Members

In February 2010, the American Botanical Council's (ABC) Advisory Board grew by 11 new members. Joining the 70 existing members, the new members will aid ABC in a variety of tasks, which include serving as expert sources and peer reviewers for *HerbalGram,* HerbalEGram, and HerbClip articles. Included on the list are cancer researchers, natural product developers, medical and naturopathic physicians, editors, and a medicinal plant conservationist, among others.

Bharat (Bart) B. Aggarwal, PhD, is a leading cancer researcher with significant experience studying the role of curcuminoids from the popular spice turmeric (*Curcuma longa,* Zingiberaceae) in multiple types of cancer. Since 1989, he has been a biochemistry professor of cancer medicine and chief of the Cytokine Research Section at The University of Texas M. D. Anderson Cancer Center, where he is also the Ransom Horne, Jr. Distinguished Professor of Cancer Research. Dr. Aggarwal serves as an editorial board member of numerous scientific journals and has published more than 500 research and review articles in peer reviewed publications. He has received numerous awards throughout his career.

Lise Alschuler, ND, is an expert in naturopathic oncology, integrated healthcare, and botanical medicine, with 15 years of clinical practice experience. Dr. Alschuler has also served as director, chair, and professor of a variety of medical centers, natural health organizations, and educational institutions. She has researched the effect of complementary and alternative medicine and integrated care on patients with pancreatic, prostate, and other cancers, and she has written 2 editions of an integrative cancer care guide book, as well as other book chapters and journal and news articles. Dr. Alschuler was named one of Seattle's best doctors in *Seattle* magazine in 2000.

Paula N. Brown serves as the director of applied research in biosciences at the British Columbia Institute of Technology, where she established a multi-disciplinary research facility that supports the natural health and food products industry. Brown currently writes the "Quality Focus" column for the trade publication *Nutraceuticals World*. She is also a member of Health Canada's Natural Health Products Directorate Program Advisory Committee and serves on grant review committees for the National Center for Complementary and Alternative Medicine (NCCAM). She has directed 2 full collaborative studies on ginseng (*Panax* spp., Araliaceae) and goldenseal (*Hydrastis canadensis,* Ranunculaceae), and she also co-founded the Natural Health Products Research Society of Canada in 2003 with other research colleagues.

Veronika Butterweck, PhD, is an associate professor at the University of Florida's College of Pharmacy and holds the Debbie and Sylvia DeSantis Term Professorship of Natural Products. Her research focuses on the interaction between herbal medicines and conventional drugs, as well as the development of new therapeutic strategies based on herbal medicines, particularly those that treat anxiety, depression, and diabetes. She has written and co-written 4 books and numerous scientific articles, is an editor for the respected medicinal plant research journal *Planta Medica*, and is a member of the Expert Committee on Dietary Supplements/Botanicals of the US Pharmacopeia (USP).

Amanda McQuade Crawford, a consultant medical herbalist, is internationally recognized as an educator in herbal medicine and integrative health. Crawford currently serves as an adjunct professor at the Massachusetts College of Pharmacy, where she lectures within its Masters program of Applied Natural Products, and she is also a distinguished lecturer at Tai Sophia Institute. She helped found the American Herbalists Guild, has written 3 books on natural and herbal health for women, and has contributed to several other botanical-related books. Crawford also writes about traditional indications for the American Herbal Pharmacopoeia's botanical monographs, and she has recently hosted the TV series *What A Relief* for the holistic-focused cable channel Veria.com.

Daniel Fabricant, PhD, is the vice president and chief officer of scientific and regulatory affairs for the Natural Products Association (NPA), an industry trade group. At NPA, Dr. Fabricant works with staff to develop and implement policies and appropriate responses to government initiatives that directly affect the natural products community, and he is also responsible for developing strategy, senior leadership, management, and financial

oversight of the organization's scientific and regulatory programs. Dr. Fabricant also serves as an adjunct professor at the University of Illinois at Chicago. He is on various editorial boards and National Institutes of Health study sections and has published numerous articles in scientific journals.

Danna J. Leaman, PhD, is a conservation biologist who specializes in medicinal plants. She is currently a research associate with the Canadian Museum of Nature and chair of the executive board of the FairWild Foundation, which promotes the sustainable wild collection of medicinal plants and other sources of natural product ingredients. Dr. Leaman works extensively with the International Union for Conservation of Nature (IUCN), of which she is a member of its Species Survival Commission, as well as the commission's steering committee. She also serves as chair of IUCN's Medicinal Plant Specialist Group and deputy chair of the Plant Conservation Sub-Committee.

Robert Rountree, MD, is a practitioner of family medicine, nutrition, medical herbology, and mind-body therapy in Boulder, Colorado. Specializing in integrative and nutritional medicine, Dr. Rountree has co-written 7 books, including *Clinical Botanical Medicine*, 2nd Edition (Mary Ann Liebert, Inc., 2009), and authored articles appearing in numerous popular health magazines. He is the medical editor for *Delicious! Living* and a technical editor for *Alternative and Complementary Therapies* and the *Journal of the American Nutraceutical Association*. He is also the medical director for Xymogen Professional Products.

Michael S. Tempesta, PhD, longtime natural products chemist and co-founder of Shaman Pharmaceuticals, has more than 30 years of research and development experience with marine and plant-derived natural products. Dr. Tempesta has published more than 100 papers and book chapters, founded and currently works with 3 natural product companies, and is treasurer of the International Organization for Chemistry in Development. He has led research efforts in the study of medicinal plants from African and South American rainforests and, following knowledge of the Amazon indigenous people, he and one of his graduate students isolated and extracted crofelemer, an antidiarrheal compound from the latex of the *Sangre de Drago* (Blood of the Dragon, *Croton lechleri, Euphorbiaceae*) tree. Dr. Tempesta currently focuses on the discovery and development of natural products useful in pharmaceutical, cosmetic, dietary supplement, and herbal areas.

Eric L. Yarnell, ND, is chief medical officer at Northwest Naturopathic Urology, a staff physician at Bastyr Integrative Oncology Research Center, and supervising physician at the Bastyr Center for Natural Health. He also co-founded the Botanical Medicine Academy, a specialty board for practitioners who use herbs. Dr. Yarnell has published over 100 articles, as well as authored or co-authored several books, the most recent of which is *Clinical Botanical Medicine*, 2nd Edition. He is also an assistant professor in the botanical medicine department at Bastyr University. He is a co-founder and chief financial officer of Healing Mountain Publishing, Inc., a publisher of natural medicine textbooks, and vice president of Heron Botanicals, Inc., which provides whole plant extracts to healthcare providers.

Former ABC Board of Trustees member John Weeks, who edits and publishes *The Integrator Blog News & Report*, also joins the Advisory Board. HG

—Lindsay Stafford

ABC's 2010 Botanical Excellence Awards

The 5th Annual American Botanical Council (ABC) Celebration and Awards Ceremony took place March 11, 2010, in Anaheim, California, as part of the Natural Products Expo West trade show and Nutracon scientific conference. ABC's awards honor individuals and companies who influence the present and future of the herbal medicine movement.

5TH ANNUAL AMERICAN BOTANICAL Celebration

ABC's executive director, Mark Blumenthal, opening the awards ceremony of the 5th Annual ABCelebration in Anaheim, California. Photo ©2010 ABC

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

The 2010 James A. Duke Excellence in Botanical Literature Award was given to Lucia Tongiorgi Tomasi, PhD, and Tony Willis for their book *An Oak Spring Herbaria: Herbs and Herbals from the Fourteenth to the Nineteenth Centuries: A Selection of the Rare Books, Manuscripts and Works of Art in the Collection of Rachel Lambert Mellon*.[1] The book was published by the Oak Spring Garden Library in Upperville, Virginia in 2009.

This award, created in 2006 in honor of ABC co-founding Board of Trustees member 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.

An Oak Spring Herbaria features 63 black-and-white and color scans of herbal paintings and other plant art ranging from the 14th to 19th centuries—all selected from the library's extensive collection. The book also contains a richly-detailed history of the early origins of herbal art and literature, as well as the development of herbals and their uses.

"Every once in a while, a book arrives that changes whatever plans I may have had for the day. So it is with *An Oak Spring Herbaria*, an extraordinary work," said ABC Board of Trustees President Steven Foster (e-mail, March 4, 2010). "I love the fact that it included illustrated American herbals of note. When the book arrived, I stopped what I was doing and thumbed through it leaf by leaf."

Dr. Tomasi is a professor of art history at the University of Pisa in Italy, and Willis has worked at the Oak Spring Garden Library as a librarian for almost 30 years.

"I think it's absolutely amazing to receive this award on behalf of the library and Mrs. Mellon's collection," said Willis (oral communication, March 3, 2010). "We are surprised and so grateful!"

Dr. Tomasi, likewise, expressed her appreciation for the award, which she says recognizes her 20 years of work. "We are so happy to have had the honor to have contributed to the world this extraordinary artistic and scientific treasure stored at Oak Spring Garden

Library (Mrs. Rachel Mellon Foundation)," she said (e-mail, March 8, 2010).

An Oak Spring Herbaria is the 4th volume in a series about Rachel Mellon's private collection of rare books and drawings concerning plants and gardening. Other volumes in the series include *An Oak Spring Sylva* (1990), *An Oak Spring Pomona* (1990), and *An Oak Spring Flora* (1997).

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

The 2010 Norman R. Farnsworth Excellence in Botanical Research Award was presented to Rudolf Bauer, PhD, head of the Institute of Pharmaceutical Sciences and of the Department of Pharmacognosy at the University of Graz in Austria. He has spent many years researching echinacea (*Echinaceae* spp., Asteraceae): its active compounds, constituents, pharmacology, quality control, standardization, and safety.

The award is named for ABC co-founding Board of Trustees member Prof. Norman R. Farnsworth, PhD. ABC presents this award each year to a person or institution who has made significant contributions to botanical and/or pharmacognostic research.

Dr. Bauer received his PhD in pharmaceutical biology in 1984 from the University of Munich. He wrote a landmark book on echinacea[2] (with co-author Hildebert Wagner, PhD) in 1990, and he co-wrote a groundbreaking paper on echinacea authentication in 1987.[3] Recently, he's helped elucidate the mechanisms of action for some of echinacea's constituents (alkamides) while helping train the next generation of pharmacologists through his teaching.

Dr. Bauer has published

From left to right, Mark Blumenthal; Wolfgang Aulenbacher, US CEO of Bionorica; Tony Willis, librarian of Oak Spring Garden Library; and Steven Foster, President of the ABC Board of Trustees.
Photo ©2010 ABC


Rudolf Bauer

250 scientific publications, served as editor and co-editor of several books, and has been a member of the editorial and review boards of several scientific journals. He is a past co-editor of the international journal *Planta Medica*, and he has served as the Society for Medicinal Plant Research's president (2002–2007) and vice-president (1998–2002 and 2007–2009).

Mark Blumenthal discussing the accomplishments of ABC over the past year with attendees of the 5th Annual ABCelebration. Photo ©2010 ABC

"I feel very much honored and happy to receive this award," said Dr. Bauer (oral communication, March 5, 2010). "I've known Dr. Farnsworth for 30 years and feel very proud. He is the leading figure in the field, he's an outstanding scientist, and he's also a character with an outstanding personality as well. It is wonderful to have my work appreciated in this way and encourages me to continue it."

"I've known Rudy Bauer since he was a student, and I've followed his career closely," said Prof. Farnsworth (oral communication, March 4, 2010). "I was pleased he was given this award based on his research on the pharmacology and phytochemistry of medicinal plants."

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

The 2010 Varro E. Tyler Commercial Investment in Phytomedicinal Research Award was given to Bionorica AG, a manufacturer and clinical researcher of herbal remedies, with phytomedicinal products sold in 40 countries.

The award was named after the late Varro E. Tyler, PhD, former dean of the College of Academic Affairs at Purdue University. Dr. Tyler was a leading authority in botanical medicines and a Trustee of ABC.

Founded in 1933, Bionorica AG's headquarters and herb extraction and manufacturing plant are located in Neumarkt, Germany, with many additional laboratories that focus on quality in various other locations.[4] (Bionorica products are distributed in the United States through Bionorica LLC in San Clemente, CA).

BIONORICA®
The phytolution company

Bionorica takes an approach to creating clinically-proven health products that it calls "phytoneering." This process includes finding plants with the strongest healing properties, controlling production from the research stage to extraction and development of finished product, as well as performing clinical research to determine the efficacy and safety of its products.

Bionorica has produced more than 450 published chemical, pharmacological, and clinical trials on its line of phytomedicines. The company manufactures Sinupret®, a 5-herb combination for sinus health. Sinupret is the top-selling herbal remedy in Germany, and it was the most popular cough and cold remedy chosen by self-selection and self-medication in Germany in 2006, 2007, and 2008. In 2009, ABC published an extensive product-specific monograph summarizing the pharmacological and clinical trials on Sinupret (available at ABC's website, www.herbalgram.org).

In addition to Sinupret, Bionorica produces numerous clinically tested phytomedicines: Menopret® (previously called Klimadynon®), a respected extract of black cohosh (*Actaea racemosa* syn. *Cimicifuga racemosa,* Ranunculaceae) used for menopausal relief; an extract of chaste tree (*Vitex agnus-castus*, Verbenaceae) berries used for menstrual irregularities; Asalixx™, a willow (*Salix* spp., Salicaceae) bark extract, for low back pain, joint pain, and chronic conditions; and others.

"We are very pleased to receive this award from ABC," said Michael Popp, third generation CEO of Bionorica, in a press release.[5]

"Bionorica has an outstanding reputation for excellent management of herbs from the time they go into the ground to the time they go into the bottle," said Mary Hardy, MD, medical director of Simms/Mann-UCLA Center for Integrative Oncology (oral communication, March 4, 2010).

"Bionorica has one of the most outstanding phytochemical labs I've ever seen," she continued. "Their research covers the gamut from botany to human clinical trials. I would like to see their year-long safety study on black cohosh become a model for the industry." HG

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

—Kelly E. Lindner

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HerbMedPro™ — Using the Dynamic Updates Feature

By Jacqueline C. Wootton, MEd

In an ideal world, the staff of HerbMedPro (HMP) would keep the HMP database fully updated all the time. We are continually adding new herbs to the database and updating existing herb records, but this is an intensive process. To keep HMP totally updated would require a massive number of compilers working relentlessly. Instead, we provide users with a powerful key feature for automatic updating, named Dynamic Updates. Search terms are provided to automatically pull up all the most recent publications for any specific category of research and information for each herb from the PubMed database, enabling continuous, up-to-date coverage for users.

Basically, Dynamic Updates provides a precomputed search string that is automatically plugged into the PubMed search screen. PubMed, the online interface for the US National Library of Medicine's MEDLINE database, is limited. It cannot provide exhaustive information on herbal research, and the HMP team of expert compilers does not rely on PubMed alone when compiling a new herb record or identifying the relevant literature for a full update; they also use a range of other research and empirical resources. PubMed is, however, still a vast and important resource and provides an effective tool for quick, live updates—particularly as a temporary solution until HMP staff members are able to perform more exhaustive updating.

To access the Dynamic Updates feature within HMP, the user can go to the specific herb record of choice. For instance, a user may be interested in reviewing relevant information on red clover (*Trifolium pratense*, Fabaceae). Scrolling down to **History of Record** on the herb page reveals that the herb record was compiled in September 2009 and that there has been no update yet. Now, scrolling down the list of categories to **Dynamic Updates** and clicking on PubMed Searches shows a list of 15 subcategories:

Trifolium or "red clover" and Analytical Chemistry;
Trifolium or "red clover" and Animal Studies;
Trifolium or "red clover" and Case Reports;
Trifolium or "red clover" and Clinical Trials;
Trifolium or "red clover" and Drug Interactions;
Trifolium or "red clover" and Ethnobotanical Use;
Trifolium or "red clover" and Genetics;
Trifolium or "red clover" and *In Vitro* Studies;
Trifolium or "red clover" and Pharmacodynamics;
Trifolium or "red clover" and Pharmacokinetics;
Trifolium or "red clover" and Preparations & Formulary;
Trifolium or "red clover" and Reference Standards;
Trifolium or "red clover" and Safety & Toxicology;
Trifolium or "red clover" and Therapeutic Activity;
Trifolium or "red clover" and Tissue Culture.

If the user's main area of interest is clinical trials, clicking on "*Trifolium* or 'red clover' and Clinical Trials" will return the most recent publications relating to clinical trials from the PubMed database. The next step is to cross-check the search results with the current record in HMP. At the time of this writing, the live PubMed search found only one new trial.

The search terms used vary from herb to herb and the researcher/compiler experiments with different combinations of Latin and common names to optimize search results. Common names can sometimes bring up extraneous entries. But one recent anomaly was *Theobrama cacao* (Sterculiaceae), better known as cocoa or chocolate. It was found that searches were more productive when using the common name "chocolate" as the search term. Thus, it all depends on how PubMed translates the query, and our researchers have to find the best strategy for each herb through trial and error. The exact search string entered can be viewed in the *Search details* panel on the right of the PubMed results page.

Searches for St. John's wort (*Hypericum perforatum*, Clusiaceae) represent another example. One researcher found that fewer results are returned when searching with the string "*Hypericum perforatum*" than any other search. However, once the string "St. John's wort" is included, it does not matter whether the botanical name is entered or how it is entered; the same number of results is produced. *Hypericum perforatum* is one of the 20 herbs freely available on the public version, HerbMed (at: www.herbmed.org/Herbs/Herb121.htm).

HMP records appear to be displayed in monograph, categorized format. However, these displays are not static, and what the visitor sees is not the database. There is an underlying database structure of data fields and tables, rules, and relationships. The records seen on the screen are dynamically generated and ever-changing from this underlying resource, and this is why they can be automatically and instantly updated using live links—the unique and powerful Dynamic Updates feature. HG

Jacqueline Wootton, MEd, is president of the Alternative Medicine Foundation, Inc, Potomac, MD. She initiated and directs the HerbMed® interactive herbal database and developed the professional version, HerbMedPro, available worldwide by subscription or on license through the American Botanical Council.

HERBMEDPRO ADDITIONS AND UPDATES (September 2009-April 2010)

New Herb Records

Common Name	Latin Binomial
Bacopa	*Bacopa monnieri*

Updated Herb Records

Common Name	Latin Binomial
Licorice	*Glycyrrhiza glabra*
Black cohosh	*Actaea racemosa*
Echinacea purpurea	*Echinacea purpurea*
St. John's wort	*Hypericum perforatum*
Tea, green/black	*Camellia sinensis*
Chocolate	*Theobroma cacao*
Red clover	*Trifolium pratense*

ABC Co-Produces "Herbal Insights" Segments for *Healing Quest* PBS TV Series

The American Botanical Council (ABC) has teamed up with the producers of the popular public television series *Healing Quest* to create a segment on popular herbs and herb issues, titled "Herbal Insights."

ABC Founder and Executive Director Mark Blumenthal has co-created and recorded 7 "Herbal Insights" segments for *Healing Quest*. Episodes with those segments began airing in select markets in January 2010 and are scheduled to run throughout the year. *Healing Quest* is co-hosted by entertainment icon Olivia Newton-John and co-producers Judy Brooks and Roy Walkenhorst of Lightbridge Productions in Sonoma, California.

The first 7 "Herbal Insights" briefly profile the following popular herbs: chamomile (*Matricaria recutita,* Asteraceae), ginger (*Zingiber officinale,* Zingiberaceae), licorice (*Glycyrrhiza glabra,* Fabaceae), marshmallow (*Althaea officinalis,* Malvaceae), peppermint (*Mentha* x *piperita,* Lamiaceae), senna (*Senna alexandrina,* Fabaceae), and slippery elm (*Ulmus rubra,* Ulmaceae) bark.

"We are deeply grateful for the opportunity to work with the producers of *Healing Quest* to distribute these brief segments to public television audiences," said Blumenthal. "Being on public TV helps enhance ABC's nonprofit educational mission to educate the public about the traditional uses and modern research on herbs and medicinal plants."

Since its inception, *Healing Quest* has been the only weekly national TV series focused entirely on integrative health and natural approaches to optimum well-being. It frequently features interviews with noted leaders in the natural health and consciousness movements, including author Deepak Chopra, MD; integrative medicine pioneer Andrew Weil, MD; bestselling authors Marianne Williamson and Joan Borysenko, PhD; holistic pediatrician Alan Greene, MD; and others. Now in its seventh season, *Healing Quest* is cleared for broadcast on 140 public television (PBS) stations across the United States.

The show's underwriters include Traditional Medicinals, a manufacturer of medicinal herbal teas and related products; Bionorica, a German producer of clinically-tested phytomedicinal products; and RFI Ingredients, a supplier of herbs and other dietary ingredients for the food and dietary supplement industries. More information about *Healing Quest* is available at www.healingquest.tv/.

A schedule for the *Healing Quest* episodes containing the "Herbal Insights" segments is available on ABC's website (www.herbalgram.org). The schedule can be accessed via the link "ABC on the Air" on the News section of the website.

ABC is currently working with the producers of *Healing Quest* to initiate new "Herbal Insights" segments for 2011. HG

NCCAM's New Direction Emphasizes Real-World Research

Although the National Center for Complementary and Alternative Medicine (NCCAM) will not release its 2010 Strategic Plan until late this year, the center has revealed that its research goals will take a new direction.

As indicated by NCCAM Director Josephine Briggs, MD, NCCAM's future years will focus less on the large human clinical trials typical of its past and instead move more toward fundamental research.[1,2] And while the center plans to continue dedicating more than 50% of its research to human studies, the focus will shift toward effectiveness-based studies emphasizing interventions in real-world settings.[3] Dr. Briggs foresees this research adopting a "more holistic, patient-centered approach."

"All of us recognize that assessing how modalities work in real world settings is critical," said Dr. Briggs. As an example, she pointed to a new study that "is using existing data (including 5 years of insurance claims) to compare patients who use CAM providers to treat their back pain with those who do not. The study will evaluate back pain-related outcomes, quality of care, costs, and use of other services" (e-mail, February 1, 2010).

In addition to more real-world research, NCCAM is considering research on non-pharmacologic pain management to be particularly important.[4] Because NCCAM sees symptom management as an area of high promise, it will distance itself from, but not completely abandon, the study of possible cures and treatments for chronic diseases.[1]

"Pain conditions are the most common reason for CAM use, and they are some of the hardest to treat with conventional medical approaches," said Dr. Briggs.

In particular, NCCAM expects to support pain management-related research addressing the relationships between acupuncture or placebo analgesia and endogenous opioid pathways; engagement of major pathways of emotion regulation by meditative practices; and the importance of the practitioner-patient interaction, context effects, and the placebo response.[5]

In order to fund this new area of research, NCCAM will redirect funds from other investigator-initiated areas, including that of large herbal trials.[3] NCCAM usually spends 10% of its funding on these studies, but the center is "not currently planning to start any new large trials." According to Dr. Briggs, this doesn't mean NCCAM will desert its natural products portfolio.

"In the area of herbal products and other natural products, we need to build good basic science understanding of how these compounds work," she said. "Building the mechanistic understanding of herbals is really important. We're also quite interested in probiotics, which is an exciting area of research promise for NCCAM. We think these areas need further work before we do further large clinical trials of herbal supplements."

Input on Strategic Plan and NCCAM's Future

According to John Weeks, editor and publisher of *The Integrator Blog*, NCCAM's new direction would put the center more in line with the Congressional mandate that established it in 1998 and would help more CAM modalities become integrated into the general healthcare system.

"Focusing on large herbal RCTs [randomized-controlled trials] was never what Congress intended," Weeks said of the mandate (e-mail, January 21-February 7, 2010). "I believe Congress was wise in its direction. The focus was on looking at the value of the actual practices consumers are and were choosing—all of which are holistic and multi-agent, not single agent.

"I think looking at practices in which botanicals are a part of a whole person protocol is a much better direction than stand-alone efficacy trials," Weeks continued. "We would potentially gain information on what happens when herbs are part of the kinds of whole-person practices, which are typical of all integrative practitioners and often even in the self-care practice of consumers, rather than simply being used as drug substitutes."

Donald Marcus, MD, a longtime critic of NCCAM, is also pleased with the center's purported direction.[1] Dr. Marcus, an immunologist at Baylor College of Medicine, was quoted in the December 2009 issue of the journal *Nature* as saying: "I'm encouraged by Dr. Briggs' receptiveness to comments and criticisms and her commitment to altering the research priorities of NCCAM. The best thing they could do with the NCCAM is to dissolve it. But that's not going to happen."

"I think it is important that [NCCAM critics] are supportive of Dr. Briggs, because she is taking a scientific approach, and she should," said Steven Dentali, PhD, chief science officer of the American Herbal Products Association (AHPA; oral communication, January 25, 2010). "Nobody should have a problem if the right science is applied in the right way."

The *Nature* article published in December, titled "Centre turns away from healing herbs," stated that NCCAM's list of promising leads was "silent on herbal therapies;" however, a white paper released by NCCAM in 2009 regarding the center's 2010 Strategic Plan listed cranberry (*Vaccinium macrocarpon*, Ericaceae) and curcumin, a compound from turmeric (*Curcuma longa*,

"Building the mechanistic understanding of herbals is really important. We're also quite interested in probiotics, which is an exciting area of research promise for NCCAM. We think these areas need further work before we do further large clinical trials of herbal supplements."

Zingiberaceae), as promising research areas.[5] The remaining natural products include polyphenols and flavonoids, omega fatty acids, and probiotics.

"In my view, [NCCAM is] not walking away from botanicals; I think they're taking a sensible approach," said Dr. Dentali. Ending large herbal trials was an appropriate direction for NCCAM to take because that approach to research was overly narrow, he explained. "The clinical trials that NCCAM did were not properly informed by a basic knowledge of what these botanicals do. Just because [NCCAM] did a clinical trial that didn't find a benefit doesn't mean there isn't another benefit to be found."

According to Dr. Dentali, cranberry is a good herb to focus on because it has significant supporting research, and the curcumin product NCCAM is looking into is well-defined. Once botanicals' chemistry and mechanisms of action are examined in order to find a research approach that can be applied to any herb, it would be appropriate to conduct research on additional, specific herbs of interest, such as the use of dandelion (*Taraxacum officinale*, Asteraceae) leaf as a diuretic, he added.

The input of some CAM organizations on NCCAM's anticipated 2010 Strategic Plan signal that there is already support for some of the initiatives suggested by Dr. Briggs, especially the idea of conducting more outcomes-based research.[6]

The Integrated Healthcare Policy Consortium (IHPC), for instance, wrote that NCCAM should start funding outcomes-based research that gathers data on costs and other factors, which will facilitate the integration of CAM into mainstream healthcare delivery. The Academic Consortium for Complementary and Alternative Health Care (ACCAHC) stated that research should seek to understand the actual effectiveness experiences of consumers. And the American Holistic Medical Association (AHMA) expressed a preference for outcomes-based research over NCCAM's previous "reductionism-based" research.

Many of these groups also suggested that NCCAM adopt an increased focus on cost-effectiveness research and that at least half of NCCAM's advisory council consist of CAM practitioners, as stipulated in the Congressional mandate that created the center.[6,7]

"With our diverse portfolio of CAM modalities and diseases, it is challenging to have a council with the necessary mix of expertise, which is why we often include additional ad hoc members," said Dr. Briggs. "However, I believe our council is well composed and meets the specifications of its charter."

In February 2010, NCCAM announced the addition of 5 new advisory council members.[8] Three of those new members have CAM-related backgrounds: Adam Burke, PhD, a licensed acupuncturist and director of San Francisco State University's Institute for Holistic Health Studies; Susan Folkman, PhD, founding director of the Osher Center for Integrative Medicine at the University of California-San Francisco; and Janet Kahn, PhD, a long-time massage therapist and the executive director of IHPC, as well as faculty preceptor in the Fellowship in Complementary and Alternative and General Medicine at Harvard Medical School.

"Overall, [Dr.] Briggs appears to be striking a good balance in these appointments—2 with strong credibility in the conventional community, 2 with strong relationships and respect inside the licensed complementary healthcare fields, and one, Folkman, who has a good deal of respect in both," said Weeks.

The industry trade group Council for Responsible Nutrition (CRN) submitted comments regarding NCCAM's 2010 Strategic Plan in late 2009.[9] CRN suggested that NCCAM conduct shorter and more cost effective intervention strategies by using biomarkers as modifiable endpoints for both disease and "wellness." CRN also supports NCCAM research using multi-component CAM treatment approaches, subjects who are considered "at risk" and not diagnosed with a disease or condition, and comparisons of the safety, efficacy, and costs of CAM treatments with conventional medical approaches. It also called for NCCAM to create an appropriate research paradigm for studying nutrient and CAM-related questions and recommended that research projects or programs focused on a particular field be reviewed by experts in that field.

Dr. Dentali of AHPA echoed this suggestion, proposing that CAM practitioners work with natural products-oriented pharmacognosists in the design and guidance of NCCAM studies. And because botanicals are complex mixtures that don't always act like pure compounds, it is essential to include botanical experts in herbal trials, he said, adding that NCCAM has shown progress by hiring pharmacognosist Craig Hopp, PhD, and naturopathic physician Wendy Weber, ND, PhD, as extramural research program officers.

"You really do need expertise to do [the research] properly," said Dr. Dentali. HG

—Lindsay Stafford

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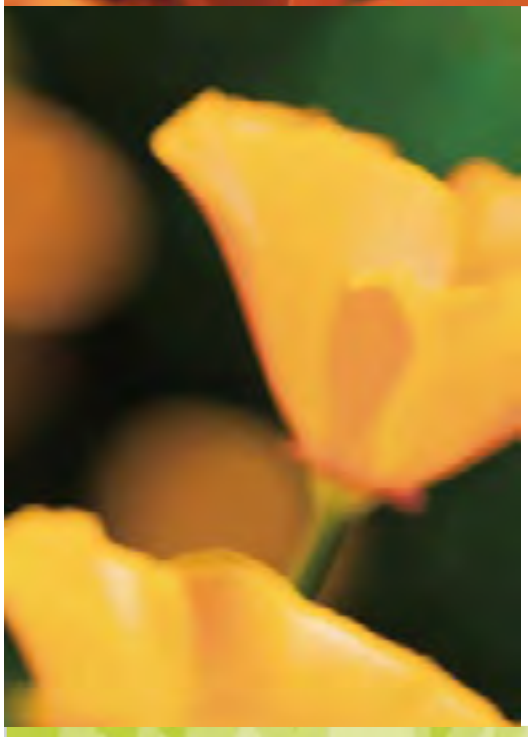

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Herbal and Traditional Medicine in Post-Earthquake Haiti

The earthquake that hit Haiti on January 12, 2010, killed an estimated 230,000 people, wounded many more, and left a reported one million homeless.[1] During the immense and ongoing recovery effort, individuals and organized groups have been incorporating natural and traditional medicine into their activities.

News reports immediately following the disaster documented displaced Haitians sitting in a field and boiling herbal remedies to use as infection preventatives, as well as people walking through the streets while sniffing crushed herbs, such as basil (*Ocimum basilicum,* Lamiaceae), to ward off the surrounding stench.[2,3] Reports also noted that Vodou* practitioners cared for the wounded and sick amidst the slow-moving pace of conventional medical aid.[4]

"Vodou medicine is very active today in treating patients, even those with broken bones or [collapsed] organs," said Max G. Beauvoir, PhD, founder of the Temple of Yehwe in Haiti (e-mail, January 25, 2010). The Temple of Yehwe aims to foster understanding of Vodou.[5]

Prior to the earthquake, conventional Western medicine was available in the capital of Port-au-Prince and other large cities, but such treatments were not easily accessible to the majority of the population, especially those living in rural areas.[6]

"Haitians fend for themselves," said Nicole Miller, a *mambo*, or Vodou priestess of the Temple of Yehwe (e-mail, January 27, 2010). "The Haitian people have been using herbal medicines for generations and will continue to do so. It is our tradition and has always been a safe and better way for healing—physically and spiritually."

"The innate use of traditional medicine will be a huge asset to any naturopathic medical relief effort in Haiti."

The system of traditional medicine commonly used in Haiti includes 3 main levels of practice, believed to work synergistically and with consideration to the connection between a person's mind, spirit, body, society, and universe. The most prevalent and "simple" level includes non-professionals, such as family members or close friends, who recommend herbs or infusions based on a moral responsibility to others. The middle level includes professional healers, such as *hugans* or *mambos* (Vodou priests and priestesses), who serve as guardians of ancestral knowledge and tradition, as well as *doktè-fèy* (leaf doctor), *fanm-chaj* (midwife), and *ganga* (healer). The highest level of expertise is referred to as a "masterly medical system" and is based upon a dynamic life energy force that can be tapped into by professionals to cure certain ailments. Professional healers use herbal baths, teas, infusions, and ointments in order to add to or detract from a patient's energy.

This complex system of traditional medicine is similar to customs practiced in some neighboring countries and islands, and it features contributions from African ancestors and indigenous groups. Treatment can vary depending upon the plant life of the region in which it is practiced. In some of these cultures, it is often considered essential to collect herbs from the wild only after proper respect has been given to the plant through dance, song, or monetary payment.

Though some research shows that Vodou-based herbal medicine can be used to treat illnesses, infection, pain, and other ailments,[7] the current body of research and documented information on Haitian traditional and Vodou medicine is sparse. According to American ethnobotanists writing in 1995, the religious, cultural, and political atmosphere in Haiti has made studying the country's enthnomedicine difficult.[8]

Some US-based natural medicine organizations began conducting relief efforts in Haiti in early 2010, using herbal treatments learned in their own training, as well as Haitian-inspired herbal remedies.

Herbs for Orphans, a US nonprofit, has been supplying Haitian orphanages with herbs and nutritional dietary supplements for the last 2 years. After the earthquake, the organization partnered with Common Ground Health Clinic in New Orleans, Louisiana to form Mutual Aid Disaster Relief (MADR), a network of individuals and organizations working to help the people of Haiti. As of February, MADR had sent 4 aid teams to Haiti, which have been working with foreign and Haitian medical professionals and volunteers.

One week after the earthquake, Thomas Easley, a registered herbalist and board member of Herbs for Orphans, flew to Haiti with 4 emergency medicine technicians on a private charter jet.

Other than dispensing some vitamins and using little bits of herbal salve and tinctures as anti-infection agents, he mainly relied on conventional emergency medicine products and treatments. At one temporary clinic, however, Easley used a Haitian herbal remedy to treat a man diagnosed with renal colic who was experiencing severe pain. With no more pain-killing pharmaceuticals left, Easley had the patient chew on some sour orange fruit juice mixed with crushed-up castor leaf (*Ricinus communis,* Euphorbiaceae), which a Haitian family let him collect from their garden a few days earlier (T. Easley, oral communication, February 18, 2010).

"He was out of pain in about 10 minutes," said Easley.

Easley left Haiti after 2 weeks, although other herbalists from MADR remained after his departure. He mentioned a desire to return to Haiti to visit local orphans and work on setting up a permanent herbal clinic and a mobile integrative clinic in rural Haiti. Some herbal products have been donated to Herbs for Orphans, though more could be used, especially anti-infectious herbs, he said.

The nonprofit Natural Doctors International (NDI), meanwhile, has joined with several naturopathic organizations and schools to form the Haiti Disaster Relief Committee. According to Sabine Thomas, ND, who has partnered with NDI to lead the relief effort, this group includes herbalists, naturopathic doctors, acupuncturists, medical physicians, and a security expert (oral and

*Though Western media often use the spelling "voodoo," Haitians commonly use the spelling "vodou" or "vodoun."

e-mail communication, January-March, 2010).

Dr. Thomas, whose parents are Haitian and who has family living in Haiti, traveled to Haiti in February to assess the needs of the Haitian people. During her 6-day trip, she met with several organizations currently in the country, including some Haitian-based groups and Ministry of Health members. Dr. Thomas also spoke with Dr. Beauvoir of the Temple of Yehwe, who is interested in collaborating with their relief effort, she said.

"The innate use of traditional medicine will be a huge asset to any naturopathic medical relief effort in Haiti," she said.

Dr. Thomas spent most of her time in Haiti in the outskirts of Port-au-Prince and traveled into the city center a few times. "From mile to mile to mile, it looked like the city of Port-au-Prince had been bombed," she said.

Based on her brief assessment, Dr. Thomas said that the medical needs have shifted from emergency treatment to general and physical medicine. Conditions such as mental health issues, insomnia, and post traumatic stress disorder (PTSD) are already setting in, and naturopathic physicians who address the mind, body, and spirit could aid in healing these types of multi-factorial conditions that arise in post-disaster settings, said Dr. Thomas.

Additionally, naturopathic doctors often specialize in preventative and chronic care and could address Haiti's high rate of diabetes and hypertension, which will be accelerated by the complete change in flora and nutrition after the earthquake, she continued.

Though NDI and its partner natural medicine groups could assist in these areas, it is imperative that the effort be structured and have an educated plan of action, she continued. Dr. Thomas reported her findings to the committee on March 15; any further updates were not available by press time.

For more information about these relief efforts, including how to donate or volunteer, please visit Herbs for Orphans' website (www.herbs4orphans.org) and NDI's website (www.ndimed.org). HG

—Lindsay Stafford

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Traveling Medicinal Herbman Garden Project

The Medicinal Herbman is not human, but he is alive. At his tallest height, he was just under 200 feet from the top of his head to the tip of his toes. And though he never stands, he is always stretching out his arms and legs as far as they will go, teaching people about his herbs.

A large garden of herbs arranged in the shape of a human body, the Medicinal Herbman is part of the Medicinal Herbman Café Project of Japanese landscape design team Earthscape.[1] The Herbman garden and an accompanying herbal café travel to different locations with the goal of teaching the public about healing plants.

In order to help illustrate herbs' healing properties, the Earthscape team designs Herbman's body as a map of herbs for treating specific bodily ailments. When the project visited the Echigo-Tsumari region of Japan, for example, *Geranium thunbergii* (Geraniaceae), which is thought to aid digestion, was planted in the stomach area and Chinese mugwort (*Artemisia argyi*, Asteraceae), which is thought to relieve shoulder stiffness, was planted in the shoulder area, said Nozomi Kobayashi, Earthscape's public relations director (e-mail, February 22, 2010). Earthscape obtains its information on herbs and their uses from traditional customs and botanical literature, Kobayashi added.

Medicinal Herbman Café Project in Echigo-Tsumari region of Japan. Photo ©2010 Shin Suzuki

Sometimes the herbs within Herbman's body are planted directly into the ground and other times they are planted into transportable containers, said Kobayashi, noting that the herbs are constantly changing so that a site-specific Herbman is "born" in each locale. Whenever possible, the team learns about herbs local to the region that the project is visiting and then incorporates these plants into Herbman and the café's drink and food menu. Other times, the team uses traditionally-used herbs from other areas of the world in an attempt to spread awareness and knowledge of herbal customs.

During 2009, the project's first fully-operational year, Earthscape featured the Medicinal Herbman Café Project in 3 different locations in Japan. At one of the stops, the team installed informational cards next to the herbs. These indicated the herbs' effects and also served as ordering cards, which people could take and exchange for corresponding herbal remedies at the project's café.[2]

The café also sells teas, drinks, and foods made from the herbs in Herbman's garden to further teach people about herbs' medicinal properties. Various herbal workshops are also held in the café, which is deconstructed and transformed into a container that holds the project as it travels from one location to another atop a large truck. The container is made from recycled material, mostly from an abandoned traditional folk house, and also features a line drawing of Japan's Echigo-Tsumari region. Landscape line drawings of future Herbman destinations will be layered on top. Though future locales have not been confirmed, Earthscape hopes to bring the Herbman project overseas this year and return to Tokyo in the fall, said Kobayashi.

The Herbman Café Project serves an additional purpose, one which actually inspired Earthscape to begin the project in the first place. From 2001 to 2003, the Earthscape designers built playgrounds for children living in impoverished agrarian communities in Pakistan and Nepal to improve their living and playing environments. During this time, the group learned about the peoples' herbal traditions and knowledge and became interested in the ways that herbs' effects can be channeled through the human body.

Earthscape decided to turn these experiences into the Medicinal Herbman Café Project in order to connect playground-building with the knowledge gained from the communities. The project would also provide a more sustainable income for playground construction than simply relying on personal donations.

All of the proceeds from the Herbman project's café are used to fund construction of playgrounds in the schoolyards of developing countries. So far, the Herbman project has enabled Earthscape to build a playground at a schoolyard in Thailand, said Kobayashi. According to the project's website: "Herbman keeps traveling, believing in a world where people and nature are healthy, and children are happy and have enough space to play. Herbman carries his trunk (the container) as he travels, bringing good health and giving dreams to children wherever he goes."

More information is available at www.mhcp.jp. HG

—Lindsay Stafford

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Chinese mugwort *Artemisia argyi*, which is thought to relieve shoulder stiffness, was planted in the shoulder area of the Medicinal Herbman in the Echigo-Tsumari region of Japan. Photo ©2010 Steven Foster

Concerns Over Use of African Herbs During the 2010 World Cup

This June, the games of the 2010 World Cup will begin in South Africa—which will mark the first time an African nation has hosted the tournament in its 80-year history. Held every 4 years and watched by billions, the World Cup is the "world championship" of football (soccer)* and is governed by the Fédération Internationale de Football Association (FIFA).[1]

In February of 2010, FIFA officials expressed concerns that some African herbs might enhance World Cup players' performance, thus providing them with an unfair advantage over other competitors.[2] At a pre-World Cup medical workshop, South African doctors informed FIFA's medical committee that some African plants could potentially boost players' energy, help heal their muscles at a faster speed, or provide them with other stimulant and diuretic benefits.

FIFA officials and team doctors have suggested that the use of some botanicals might go undetected by tests currently used in laboratories accredited by the World Anti-Doping Agency (WADA), an international and independent organization responsible for sports-related anti-doping activities like standards-setting, testing, and scientific research.[3] They have also mentioned that some plants might produce byproducts that are not currently included on WADA's list of banned substances.[2] Botanical or botanical-related substances currently on this list are ephedrine (from *Ephedra* spp., Ephedraceae), cannabis (*Cannabis sativa*, Cannabaceae), and cocaine (from coca; *Erythroxylum coca*, Erythroxylaceae).[4]

Still, according to Jiri Dvorak, MD, a member of FIFA's medical committee, FIFA has "absolutely no indication that players are using herbal medicines to enhance their performance" (oral communication, March 10, 2010). FIFA has held open discussions with the physicians of all teams and has received written support for the anti-doping declaration from all teams, said Dr. Dvorak. He additionally noted that the sport of soccer has a low incidence of positive doping tests, such as 0.42% in 2004 and 0.37% in 2005.[5]

Dr. Dvorak said that FIFA is undertaking a long-term strategy that will primarily focus on educational outreach. (FIFA's responsibilities do not include doping-related research and testing; such activities fall within WADA's domain.) FIFA is informing team physicians that they need to ensure that their players are aware of botanical substances that might result in positive doping tests, because they are ultimately responsible for what their players put into their bodies, said Dr. Dvorak.

FIFA has expressed its concerns to WADA, and WADA has been encouraging transnational programs that focus on traditional medicine usage. WADA can fund such programs as part of its science research grant program, according to Frédéric Donzé, WADA's senior manager of media relations (e-mail, March 9, 2010). WADA is also encouraging local entities to address the issue by conducting more research and properly educating their athletes on the risks associated with traditional medicine usage possibly resulting in positive doping results.

"This matter is one that is more efficiently addressed by national and local sports and anti-doping authorities that know the specificities of each region or country in terms of traditional medicines," said Donzé.

While difficult for sports organizations to identify and ban any poorly-known performance-enhancing substance, doing this with herbs can be even more complex, said Nigel Gericke, MD, a physician and botanist in South Africa (e-mail, March 14, 2010).

"The chemistry and pharmacology of many of the functional foods and medicinal plants of the world are not at all well-researched, and the net effect of complex polymolecular substances on sports performance is even less understood," said Dr. Gericke. "FIFA faces a monumental challenge to begin to understand the chemistry and pharmacology of polymolecular substances, and one would hope that FIFA, along with other global sporting bodies, will contribute ongoing funding for relevant analytical, pharmacological, and clinical research in the interests of

*Though known as soccer in the United States, the rest of the world refers to the sport as football.

enhancing and optimizing the well-being of sportspeople, and in the interests of fair competition in sport.

"As more analytical and pharmacological research is conducted on the functional foods and herbal remedies of the world, one can anticipate more substances to be added to the banned substances list," Dr. Gericke continued.

Concerns over herbal medicine usage during international sporting events are not new. During the 2008 Beijing Summer Olympics, for example, several news organizations reported that the Olympic organizing committee decided to not use herbal Traditional Chinese Medicine (TCM) to treat Olympic athletes in order to avoid potential doping problems.[6,7,8]

Additionally, the committee released a list of remedies containing banned substances 3 years before the Olympic Games began and updated this list in December of 2007. Included on the list were deer penis, turtle blood, and remedies made from the root of dong quai, or Chinese angelica (*Angelica sinensis*, Apiaceae). In May of 2008, China's State Food and Drug Administration required manufacturers of traditional medicines to include athlete caution statements on many products' labels, and Olympic officials also advised Chinese athletes to abstain from taking traditional herbal remedies. The media, however, reported that many athletes continued to use herbal remedies during the events, though no official research was conducted to document this and Chinese coaches claimed that most remedies had been replaced by protein and vitamin supplements.

From the moment in 2004 when FIFA announced South Africa as the location of the 2010 World Cup,[9] some began questioning the country's ability to handle the safety, logistical, and infrastructure issues associated with the event. Others argued that such speculation represented a bias against the African nation, and that FIFA's concerns over African medicinal plants discriminate against South Africa's non-Western customs.[10] But Dr. Dvorak disagrees.

"We don't see this as a discrimination at all," he said. "It has been brought up by the South African people. It is not FIFA discriminating against anybody—it is just an issue to discuss." Dr. Dvorak added that FIFA is aware that the use of herbal medicines is not an African-specific situation. HG

—Lindsay Stafford

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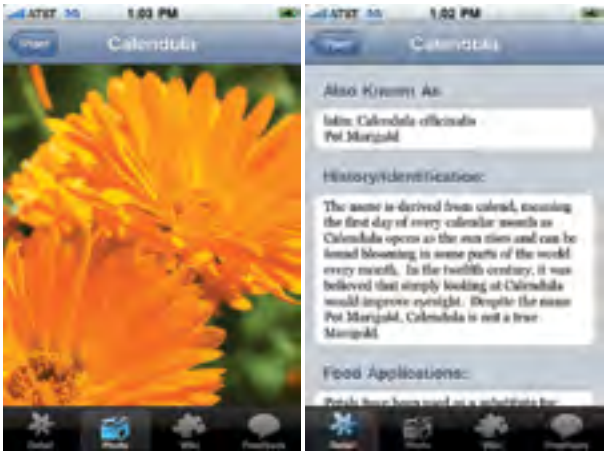
Herbal Apps for the iPhone® and iPod Touch®

These days there seems to be an iPhone® and iPod Touch® application, or "app," for just about everything—and herbal information is no exception. More than 100 herb-related apps are now available to consumers, including Herbs+, Herb Garden, Herbs & Spices, iPlant, Natural Cures, and Qpalm Herb.



iPlant's entry for **Calendula** (*Calendula officinalis)*. Photo ©2010 Jeff Lundgren

Jacob Teitelbaum, MD, medical director of the National Fibromyalgia and Fatigue Centers, began the free Natural Cures iPhone app in November 2008. He co-wrote the app's content with his wife Laurie Teitelbaum, a nutritionist, Nambudripad's Allergy Elimination Techniques (NAET) practitioner, and—as he described her—an "avid iPhoner."

"It was my wife's idea," said Dr. Teitelbaum (e-mail, January 31, 2010). "The goal is to make straightforward information available to the public in easy-to-understand language, and documented in the scientific literature. We accept no advertising and no money from pharmaceutical companies or natural product companies, to keep the information objective and very credible. We decided to make it free, as part of our goal of empowering the public with information."

As of January 2010, the app had been downloaded by approximately 750,000 people, according to Dr. Teitelbaum, and Natural Cures is regularly ranked among the top 25 free apps within the Health and Fitness category—often in the top 10.

The app notes herbal, nutritional, lifestyle, and other treatments for common health conditions, mainly found under an A-Z listing of those conditions. Some of the herbal recommendations include passionflower (*Passiflora incarnata,* Passifloraceae) and magnolia (*Magnolia officinalis,* Magnoliaceae) for anxiety; licorice (*Glycyrrhiza glabra*, Fabaceae) for adrenal exhaustion; and willow (*Salix alba*, Salicaceae), frankincense (*Boswellia serrata*, Burseraceae), and cherry (*Prunus avium*, Rosaceae) for arthritis. Dr. Teitelbaum plans to add a section containing information on his favorite 10 to 15 herbs soon. Natural Cures information is available free online at www.Vitality101.com for those without an iPhone or iPod Touch.[1]

Jeff Lundgren of Lundgren Consulting LLC., who specializes in software and Internet development, has had a personal interest in the outdoors and survivalist techniques for many years. This led him to develop iPlant, a $1.99 app that includes information on more than 300 commonly used herbs and plants, including their Latin and common names, history, culinary uses, medicinal properties and uses, and safety warnings.

"I've used herbs and plants in a personal capacity for years as an alternative and supplement to modern medicine," said Lundgren (e-mail, February 5, 2010). "The goal of the application was to share the love I have for herbs and plants with others via technology that I also enjoy using and developing."

The information found in iPlant has been collected from a variety of sources, including content provided personally from Lundgren's research.

According to Lundgren, iPlant has been downloaded thousands of times in the last year since its release for the iPhone and iPod Touch. Based on feedback, he believes that the app is primarily popular among laypersons and plant enthusiasts, not necessarily plant professionals.

The $2.99 Herbs & Spices app was created by software developer Ganesh Thambiran at BuzzLifeApps. With a degree in biology and a high interest in botany, Thambiran features 66 commonly used herbs and spices in his app, with each entry including such information as Latin and common names, health benefits, history, and traditional uses. The app mainly focuses on culinary herbs and is available in the following languages (in addition to English): Chinese, Japanese, Spanish, Russian, Italian, and German.

"I believe it's important to know about herbs and spices since we use them in our food," said Thambiran, adding that in addition to including more herbs and spices in the future, he also plans to eventually add more information on each herb, such as ORAC [Oxygen Radical Absorbance Capacity] values (e-mail, February 17, 2010).

Each listing appears beside a plant icon of the specific plant, while each individual entry includes a larger plant picture for easy identification. According to Thambiran, he took many of the herbal photos himself, while also outsourcing a few to photographers.

More information about this app is available at www.buzzlifeapps.com.

When choosing an herbal app, a useful resource is PC World's App Guide (www.pcworld.com), which includes reviews about technological products, software, and downloads. Over 100 apps match the search criteria "herbs."[2] The iTunes App store also offers valuable information, including user ratings and reviews. HG

Editor's Note: The information provided in this story is for educational purposes only and does not suggest that readers use applications as a substitute for the advice of a qualified healthcare professional. The American Botanical Council has not evaluated these products, nor does ABC endorse them or accept responsibility for the consequences of use or the content of these products.

—Kelly E. Lindner

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Hibiscus Tea Lowers Blood Pressure in Adults

Reviewed: McKay DL, Chen CY, Saltzman E, Blumberg JB. *Hibiscus sabdariffa* L. tea (tisane) lowers blood pressure in prehypertensive and mildly hypertensive adults. *J Nutr.* 2010;140(2):298-303.

Hibiscus (*Hibiscus sabdariffa*, Malvaceae) calyces are popular ingredients in herbal teas and other beverages. Pre-clinical studies have shown that hibiscus calyces (referred to as "flowers" in some studies) possess hypocholesterolemic effects, and clinical trials have demonstrated that hibiscus tea lowers blood pressure and lipid profiles.[1,2] The purpose of this study was to determine if hibiscus tea lowers the blood pressure of healthy adults who are at risk of developing high blood pressure.

The trial was conducted at Tufts University Health Sciences Campus and Tufts Medical Center (Boston, MA). The authors recruited non-smoking men and women, aged 30-70 years, from the greater Boston, Massachusetts area through advertisements, direct mailings, postings in clinics, and community health events. Between August 2005 and October 2007, researchers assessed the blood pressure of potential subjects at 2 separate baseline visits, 1 week apart. Subjects selected for the trial had systolic blood pressures (SBPs) in the range of 120-150 mm Hg and diastolic blood pressures (DBPs) below 95 mm Hg.

The subjects were randomized using a computer-generated randomization list stratified by gender and age to receive either hibiscus tea or a placebo with similar taste and appearance. These were to be consumed 3 times a day (720 ml/day) for 6 weeks. The subjects receiving hibiscus tea were instructed to infuse 1 bag containing 1.25 g hibiscus in 240 ml boiled water for 6 minutes. The subjects receiving the placebo were instructed to add 16-18 drops (1.2 ml) of the placebo concentrate to 240 ml of water. The placebo concentrate consisted of artificial cranberry and raspberry flavor concentrates and red food coloring and is used in commercial preparations to mimic the taste of hibiscus. The placebo beverage did not contain any of the anthocyanins found in the hibiscus tea, and its antioxidant capacity and levels of total phenols were significantly lower compared to the hibiscus tea. The subjects and study personnel, except for the dietician, were blinded to the treatment allocations and informed that the clinical study was examining a hibiscus beverage (without mentioning the word "tea").

The subjects returned once a week during the study period for blood pressure readings and data collection. At each weekly visit, the subjects' blood pressures were taken, following a 12-hour fast, using an automated device and a standardized protocol. The subjects were also asked about changes in health, as well as the use of prescription or over-the-counter drugs, caffeine, tobacco, and dietary supplements.

At baseline, there were no significant differences in the demographics or clinical characteristics between the 2 groups. There were also no significant differences between the 2 groups in regards to the subjects' dietary intakes of energy, macronutrients, micronutrients that affect blood pressure, alcohol, or caffeine during the study period. Out of 66 subjects who completed the trial, 1 subject in the placebo group was excluded from the data analysis due to the discovery of undisclosed peripheral vascular disease. The subjects' compliance with the treatment protocols was over 90%, as assessed by the study dietician's counts of unused tea bags and concentrates, as well as a daily diary chart completed by the subjects.

Following 6 weeks of treatment, the change in SBP, but not DBP, was significantly greater in the hibiscus tea group compared to the placebo group (P=0.030). The change in mean arterial pressure (MAP) was greater in the hibiscus tea group compared to the placebo group, but the difference was not statistically significant. In the hibiscus group, MAP, SBP, and DBP were all significantly lower compared to baseline values after 6 weeks of treatment (P=0.002, P=0.001, and P=0.013, respectively). There were no significant changes compared to baseline in the placebo group. In the hibiscus group, the reduction in SBP from baseline was much greater in subjects with higher baseline SBPs, and there was a statistically significant correlation between baseline SBP and change in SBP (r = -0.421, P=0.010).

The authors conclude: "Daily consumption of 3 servings of *H. sabdariffa* (hibiscus) tea, an amount readily incorporated into the diet, effectively lowered [blood pressure] in pre- and mildly hypertensive adults." The authors also state that the effects of hibiscus tea on blood pressure were greater than those reported in the Dietary Approaches to Stop Hypertension (DASH) and PREMIER clinical trials. They suggest future research on the effect on blood pressure of the combination of the DASH diet with daily hibiscus tea consumption. The authors note that the hibiscus flavonoids delphinidin-3-sambubioside and cyandin-3-sambubioside could be the active principles, but other phytochemicals may also be involved. Further research is needed to determine the chronic effects of hibiscus tea on blood pressure. Potential mechanisms of action include vasorelaxant, ACE-inhibitory, and diuretic effects, but further research is needed for confirmation. HG

—Marissa Oppel-Sutter

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Green Tea May Be Useful at Preventing Prostate Cancer

Reviewed: Johnson JJ, Bailey HH, Mukhtar H. Green tea polyphenols for prostate cancer chemoprevention: a translational perspective. *Phytomed*. 2010;17:3-13.

Every year nearly 200,000 men in the United States are diagnosed with prostate cancer, and around 29,000 men die from the disease. Worldwide, the highest rates of prostate cancer occur in "the West" (i.e., the United States, Canada, Australia, and Western Europe), and the lowest rates occur in Asia.

A variety of genetic and environmental factors are thought to contribute to the development of prostate cancer. Migratory studies have shown that Asian men who move to the United States and adopt a Western diet have a greater incidence of prostate cancer than do their native Asian counterparts. Many epidemiologists have therefore suggested that lifestyle and dietary factors play a role in the development of prostate cancer.

Asian populations are known to consume large quantities of green tea (*Camellia sinensis*, Theaceae). A major constituent of green tea—epigallocatechin-3-gallate (EGCG)—has been shown in cell culture models to decrease cell viability and to promote apoptosis in prostate cancer cell lines but not in noncancerous cell lines. In animal models, EGCG has been shown to delay the development and progression of prostate cancer.

The objective of the present study was to review the available data on the effects of green tea on prostate cancer chemoprevention.

Conflicting results have been observed in epidemiologic studies. Of 6 epidemiologic studies of green tea reviewed, the majority showed a significant decrease in the risk of developing prostate cancer with increasing intakes of green tea; however, other studies showed no significant decrease.

EGCG is the most abundant catechin in green tea and has been studied extensively. In preclinical studies, several mechanisms of action for the chemopreventive effects of EGCG have been observed. For example, EGCG has been shown to target inflammatory pathways (e.g., nuclear factor-kappa B and cyclooxygenase-2), MAP (mitogen-activated protein) kinases, insulin-like growth factor, androgen receptors, and detoxification enzymes. Preclinical pharmacokinetic studies of green tea have shown that the availability of green tea catechins (GTCs) is low (from 2% to 13%) after oral consumption. Many of these studies used a standardized pharmaceutical-grade preparation known as Polyphenon E® (200 mg of EGCG, 37 mg of epigallocatechin, and 31 mg of epicatechin per capsule; Mitsui Norin, Ltd.; Tokyo, Japan).

Thus far, 3 clinical trials on the role of different forms of green tea on the prevention (n = 1) or treatment (n = 2) of prostate cancer have been published.[1-3] Two of these trials were conducted in patients with hormone-refractory prostate cancer (advanced prostate cancer that has resulted in 3 consecutive prostate specific antigen [PSA] rises while the individual is still on hormone therapy). The patients were treated with green tea powder (1 g 6 times daily; n = 42) in the study by Jatoi et al[1] and with capsules of green tea extract (250 mg twice daily; n = 19) in the study by Choan et al.[2] Both studies showed little to no therapeutic effect, although one patient in the study by Jatoi et al had a significant decrease from baseline in his PSA level, although this effect was not sustained beyond 2 months.

Green Tea *Camellia sinensis*
Photo ©2010 Steven Foster

Bettuzzi et al[3] conducted a randomized clinical trial of the safety and efficacy of green tea in a chemoprevention trial in patients with prostatic intraepithelial neoplasia. Patients received either placebo (n = 30) or 600 mg GTCs (n = 30) daily (three 200-mg capsules); each capsule contained 5.5% epigallocatechin, 12.2% epicatechin, 51.9% EGCG, 6.1% epicatechin-3-gallate (a total of 75.7% GTCs), and <1% caffeine. After 1 year of treatment, 1 patient in the green tea group and 9 patients in the placebo group developed prostate cancer. The total PSA level was not "noticeably" different between the 2 groups of patients. A 2-year follow-up in a subset of these participants showed that the chemopreventive effect of green tea catechins was "long lasting." The authors conclude that the results of this clinical trial "are encouraging and provide rationale for additional clinical trials evaluating the efficacy of green tea polyphenols as a cancer chemoprevention agent."

A 2009 study of the effects of short-term supplementation with the active compounds in green tea (EGCG; Polyphenon E) on serum biomarkers in men with prostate cancer showed a significant reduction in serum levels of PSA, hepatocyte growth factor, and vascular endothelial growth factor, as well as no elevation in liver enzymes.[4]

According to the authors, it has become evident over time that standardized green tea polyphenols should be used, as opposed to green tea infusions, for interventional purposes to ensure the content of polyphenols being investigated. Evidence collected thus far on the effects of green tea polyphenols on prostate cancer prevention and treatment "suggests that green tea may be a promising agent for [prostate cancer] chemoprevention, and further clinical trials of participants at risk of [prostate cancer] or early stage [prostate cancer] are warranted." HG

—Brenda Milot, ELS

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Saffron Extract Shows Promise for Alzheimer's Disease in Comparative Trial

Reviewed: Akhondzadeh S, Sabet MS, Harirchian MH, et al. A 22-week, multicenter, randomized, double-blind controlled trial of *Crocus sativus* in the treatment of mild-to-moderate Alzheimer's disease. *Psychopharmacol.* 2010;207(4):637-643.

The most common form of dementia in elderly people is Alzheimer's disease. Alzheimer's causes progressive memory loss, impaired mental function, apathy, disorientation, and physical deterioration. Medications are available to relieve some symptoms, but the effectiveness of these medications is usually modest and temporary. The dried stigmas of saffron (*Crocus sativus*, Iridaceae) are used in Persian traditional medicine to treat dementia and depression. Animal and laboratory studies support the use of saffron to improve cognitive function, and an unpublished placebo-controlled trial in humans suggests saffron may be effective in people with Alzheimer's. The purpose of this clinical trial was to compare the efficacy of saffron and donepezil, a drug that is prescribed to treat Alzheimer's disease, in people with mild to moderate Alzheimer's.

This double-blind, randomized, controlled trial was conducted by researchers from Tehran University of Medical Sciences in Tehran, Iran. Men and women with mild to moderate Alzheimer's who were ≥ 55 years of age were enrolled in the study from 2007 to 2009. Subjects were required to be ambulatory and have adequate hearing and vision, and they must have had a history of cognitive decline for at least 6 months and a CT or MRI scan of the brain performed within the last year. No Alzheimer's medications, ginkgo (*Ginkgo biloba*, Ginkgoaceae), or saffron may have been used for at least 3 months prior to the study. Those with uncontrolled disease conditions or any psychiatric diagnosis other than Alzheimer's were excluded from the study.

The trial enrolled 54 subjects who were randomly allocated equally to the saffron group or to the donepezil group using a computer-generated code. Subjects in the saffron group received 15 mg saffron extract daily (1 capsule) for the first 4 weeks and 30 mg saffron extract daily (2 capsules) for an additional 18 weeks. The saffron extract (Green Plants of Life - IMPIRAN Co., Ltd.; Tehran, Iran) was prepared by extracting dried and milled stigmas with 80% ethanol at a 1:15 w/v ratio, followed by drying. The extract contained 0.13-0.15 mg safranal and 1.65-1.75 mg crocin per 15 mg. Subjects in the donepezil group received 5 mg donepezil (1 capsule) daily for the first 4 weeks and 10 mg donepezil (2 capsules) daily for an additional 18 weeks (Aricept®; Pfizer, Inc.; New York, NY). The saffron and donepezil capsules were identical in appearance.

The Alzheimer's Disease Assessment Scale-Cognitive Subscale and Clinical Dementia Rating Scale-Sums of Boxes were used to measure changes in cognitive performance and clinical profiles. These assessments were performed every 2 weeks. Brief physical examinations were performed and adverse events were collected at each clinic visit. Complete physical examinations and ECGs were conducted at baseline and after 8 weeks and 22 weeks.

The mean age of the participants was 72.7 years in the saffron group and 73.9 years in the donepezil group. There were no significant differences between the 2 groups for age, gender, education level, time since diagnosis, or scores on both rating scales. Of the 54 subjects who were randomized, 47 completed the study. In the saffron group, 1 subject withdrew consent, and 2 subjects were lost to follow-up. In the donepezil group, 1 subject withdrew consent, 2 subjects were lost to follow-up, and 1 subject discontinued for other reasons.

Scores on the Alzheimer's Disease Assessment Scale-Cognitive Subscale improved by 3.96 points in the saffron group and by 3.77 points in the donepezil group from baseline to 22 weeks. Scores on the Clinical Dementia Rating Scale-Sums of Boxes improved by 0.77 points in the saffron group and by 0.83 points in the donepe-

Saffron *Crocus sativus*
Photo ©2010 Steven Foster

zil group from baseline to 22 weeks. The improvement in scores for both assessments was not significantly different between the 2 groups. The changes in scores from baseline to 22 weeks were also not statistically significant for either scale in either group. adverse events were similar between the 2 groups with the exception of vomiting, which was reported more often in the donepezil group (P = 0.05). Other minor adverse events in both groups included dizziness, dry mouth, fatigue, and nausea. Also, one saffron user experienced hypomania. None of the subjects dropped out of the study because of adverse events.

In this study, saffron was not different from donepezil in improving scores on 2 assessments of Alzheimer's and resulted in less vomiting. The authors state that a 3-point change in the Alzheimer's Disease Assessment Scale-Cognitive Subscale score is clinically meaningful. Based on this, the improvement seen in both groups would be considered clinically meaningful. The authors do not explain what change in the Clinical Dementia Rating Scale-Sums of Boxes score would be clinically meaningful over a 22-week period. However, the authors conclude that this study "provides preliminary evidence of a possible therapeutic effect of saffron extract in the treatment of patients with mild-to-moderate Alzheimer's disease" and that saffron was safe and well tolerated during 22 weeks of treatment.

While the discussion section states that subjects in the saffron group experienced "statistically significant benefits in cognition after 22 weeks treatment," the results section states that no significant differences were observed for the change in scores at week 22 compared to baseline for the Alzheimer's Disease Assessment Scale-Cognitive Subscale (P = 0.85) or the Clinical Dementia Rating Scale-Sums of Boxes (P = 0.83). This discrepancy in interpretation of the statistical significance is puzzling.

According to one *HerbalGram* peer reviewer, this could be explained by the researchers' inadvertently leaving out the full results that they described in the statistical analysis section (i.e., leaving out the p values of the t–tests comparing mean changes for saffron and donepezil groups). The reviewer pointed out that the researchers gave p values for ANOVAs and Fisher Exact Tests, but not for the t-tests. The *HerbalGram* peer reviewer added that, as it stands, the conclusions are not supported by the results, and perhaps the best that can be said is that in this sample, saffron and donepezil were equally effective, but saffron was better tolerated. Should the journal publish a clarification of this omission, it would increase the significance of the findings in this groundbreaking study.

This study appears to be the first randomized, double-blind trial comparing the effects of saffron and an acetylcholinesterase-inhibiting drug in people with Alzheimer's. The authors of the study point out that the sample size was small and the duration of the study was relatively short for evaluation of Alzheimer's progression, yet the potentially beneficial effects of saffron on cognitive function observed in this study are consistent with the traditional use of saffron in Persian medicine and with findings from animal and laboratory studies. HG

—Heather S. Oliff, PhD

Study Finds Chamomile Effective in Treating Generalized Anxiety Disorder

Reviewed: Amsterdam JD, Li Y, Soeller I, Rockwell K, Mao JJ, Shults J. Randomized, double-blind, placebo-controlled trial of *Matricaria recutita* (Chamomile) extract therapy for generalized anxiety disorder. *J Clin Psychopharmacol.* 2009;29:378-382.

Generalized anxiety disorder (GAD) is a chronic disorder often treated with pharmaceuticals. These pharmaceuticals can produce unwanted adverse effects and dependence. Chamomile (*Matricaria recutita*, Asteraceae; syn. *Chamomilla recutita*) has long been used as a traditional herbal remedy for its relaxing and calming effects. Although there have been no controlled clinical trials evaluating chamomile's effect on people with GAD, the authors hypothesized that chamomile would have superior anxiolytic efficacy, yet a similar safety profile, when compared with placebo.

Fifty-seven patients (≥ 18 years of age) were referred by the Department of Family Medicine and Community Health outpatient clinic at the University of Pennsylvania Medical Center in Philadelphia for participation in this randomized, double-blind, placebo-controlled trial. These patients had a Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) Axis I diagnosis of GAD and a baseline total Hamilton Anxiety Rating (HAM-A) score ≥ 9. Patients with minor depression were not excluded if the depression was not a primary disorder. Patients were excluded if they had a diagnosis of major depressive disorder, bipolar disorder, panic disorder, phobic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, acute stress disorder, substance-induced anxiety disorder, psychosis, dementia, or substance abuse or dependence within the preceding 3 months. Participants were not allowed to use other anxiolytics, antidepressants, mood stabilizers, sedatives, or complementary and alternative medicine (CAM) remedies during the study.

Patients were randomized to receive either placebo (n = 29) containing lactose monohydrate (National Formulary) or pharmaceutical grade German chamomile extract (n = 28) standardized to contain 1.2% apigenin (Spectrum Pharmacy Products; New Brunswick, NJ).

Chamomile aroma was blinded by inserting a disk impregnated with 1 drop of chamomile oil (for placebo) or 1 drop of neutral oil (for chamomile) into the lid of each airtight medication container. Chamomile therapy was initiated at 220 mg/day for the first week and increased to 440 mg/day during the second week of therapy. Patients with ≤ 50% reduction in total HAM-A score (vs. baseline) were increased to 660 mg/day during week 3 and 880 mg/day during week 4 of therapy. Patients who continued to have ≤ 50% reduction in baseline HAM-A score were increased to 1100 mg/day during weeks 5 through 8 of therapy. To maintain blinding, patients in both treatment groups had increases in the number of capsules consumed each week when patients had ≤ 50% reduction in total HAM-A score vs. baseline. Dose reductions could occur at any time based upon tolerability of the material. Outcome measurements occurred at baseline and after 2, 4, 6, and 8 weeks of treatment.

There were no significant differences between treatment groups in any baseline variable. There was no significant difference between groups in the mean daily capsule intake.

Patients treated with chamomile had a significantly greater reduction over time in the mean total HAM-A score (primary outcome measure) compared with placebo-treated patients (P = 0.047; 57% and 38%, respectively). According to the authors, the study was not powered to detect small to moderate group differences in secondary outcomes, but rather to find trends. There were clinically meaningful improvements in the chamomile-treated patients according to the Beck Anxiety Inventory, Psychological General Well Being Index, and Clinical Global Impression Severity Score, and more chamomile-treated patients than placebo-treated patients showed improvement on most of these scales.

One patient in each group discontinued due to an adverse event (AE). The chamomile-treated patient discontinued due to stomach discomfort. There were 11 AEs in the chamomile group and 22 in the placebo group that were rated as possibly, probably, or definitely related to treatment (no significant differences between groups). The specific AEs were not listed or described. There was no increase in AEs at higher chamomile doses.

The authors conclude that chamomile was clinically meaningful and statistically superior to placebo in reducing total HAM-A scores in patients with mild to moderate GAD. The authors chose the starting dose of chamomile based on authoritative reviews. It is possible that higher daily doses would be more effective.

The dose-escalating design of the study is typical for studies that evaluate novel psychopharmaceuticals. It is also known that clinical trials of psychopharmaceuticals report a strong placebo effect. It is possible that a larger population size and longer duration of action would produce a more robust effect in favor of chamomile. The authors had a unique method of blinding the well-known smell of chamomile; it is unknown whether there has been prior testing to evaluate the effectiveness of essential oil-impregnated disks in masking placebo.

The researchers used careful methodology in the study design, presentation of findings, and rigorous statistical analysis. This is the first randomized, double-blind, placebo-controlled study to demonstrate that the use of chamomile can lead to modest improvement in symptoms of anxiety in patients with mild to moderate GAD. It also demonstrates safety and tolerability. Although the results are limited by the small size, variability in dosing regimen, and short duration of the study (8 weeks), the positive findings of efficacy support the use of chamomile as a complementary treatment in mild to moderate GAD and indicate the need for further studies. HG

—Heather S. Oliff, PhD

Turmeric Extract Comparable to Ibuprofen in Treating Knee Osteoarthritis Symptoms

Reviewed: Kuptniratsaikul V, Thanakhumtorn S, Chinswangwatanakul P, Wattanamongkonsil L, Thamlikitkul V. Efficacy and safety of *Curcuma domestica* extracts in patients with knee osteoarthritis. *J Altern Complement Med*. 2009;15(8):891-897.

Osteoarthritis (OA), a degenerative joint disorder, is a common cause of disability for both men and women. Nonsteroidal anti-inflammatory drugs (NSAIDs) are the most common form of treatment for relieving pain associated with OA, but they can cause serious adverse side effects that impact gastrointestinal, renal, and cardiac health. Curcumin present in turmeric (*Curcuma longa,* syn. *C. domestica*, Zingiberaceae) extracts has been reported to have anti-inflammatory and antioxidant properties. Researchers from Mahidol University in Bangkok, Thailand conducted a study to determine the efficacy and safety of a turmeric extract in reducing pain and improving function in patients with knee OA.

Conducted at Siriraj Hospital in Bangkok, from April 2005 to May 2006, the study included adult subjects who had primary knee OA according to the American Rheumatism Association criteria. To be included in the study, patients had to have knee pain and radiographic osteophytes, as well as at least 1 of the following characteristics: being older than 50 years of age, suffering from morning joint stiffness lasting less than 30 minutes, and/or experiencing crepitus (crackling in joints) on motion. Patients reporting a pain score of ≥ 5 of 10 in a numerical rating scale were recruited.

The patients were asked to discontinue their medications for knee OA 1 week before randomization. All patients were randomly allocated to receive either ibuprofen (400 mg twice daily) or turmeric extract (500 mg curcuminoids 4 times daily) for 6 weeks.

According to the authors, the turmeric extracts were produced by the Thai Government Pharmaceutical Organization under the Good Manufacturing Practices standard. Dried turmeric rhizomes were ground into powder. The turmeric powder was extracted with ethanol and then evaporated at low pressure to obtain ethanolic extracts containing oil and curcuminoids. The oil was then removed. Each capsule of extract contained 250 mg curcuminoids.

The patients were assessed every 2 weeks. The main outcomes were pain on level walking and pain on stair climbing, measured by a numerical rating scale, as well as knee functions assessed by the time spent on a 100-meter walk and going up and down 10 steps.

All patients had blood tests assessing complete blood count, liver function, and renal function at week 0 and week 6. At week 6, the patients' satisfaction with treatment was evaluated by a 5-category scale (high, moderate, little, same, or dissatisfaction).

Of 190 patients screened, 107 were selected for the study; 52 were randomly assigned to the curcuminoid group and 55 to the ibuprofen group. Of those, 45 patients in the curcuminoid group and 46 patients in the ibuprofen group completed the study. Most of the patients were overweight (average body mass index greater than 25) elderly women. The duration of symptoms before entering the trial was approximately 20 months. Half of the patients had bilateral knee OA. At baseline, the mean pain scores on level walking and on the stairs, as well as the time spent on the 100-meter walk and on the flight of stairs, were similar between the 2 groups.

The authors report that the mean scores of all outcomes in both groups at week 6 were significantly improved when compared with the baseline values. For example, from week 0 to week 6, the scores for pain on level walking dropped from 5.3 ± 2.3 to 2.7 ± 2.5 for the curcumin group and from 5.0 ± 1.9 to 3.1 ± 2.3 in the ibuprofen group. There was no significant difference in those parameters between the 2 groups, except that pain on stair climbing was less for those taking curcuminoids (P = 0.016). Also, the curcuminoid group seemed to spend less time on the 100-meter walk and going up and down a flight of stairs. No significant differences were found for adverse events between the 2 groups, with dyspepsia (stomach upset; curcuminoids 20.8%, ibuprofen 26.9%) most common. Interestingly, many patients in the curcuminoid extract group who experienced bloating symptoms and passing gas described these symptoms as beneficial gastrointestinal effects, whereas those in the ibuprofen group reported gastrointestinal irritation symptoms.

Regarding satisfaction, most patients rated themselves as having moderate to high satisfaction (91.1% in the curcuminoid group, 80.4% in the ibuprofen group). The patients' satisfaction with treatment was not statistically significantly different (P = 0.15) between the groups. The patients in the ibuprofen group had better compliance to the treatment regimen than those in the curcuminoid extract group (90.1% versus 82.8%, P = 0.001). This finding was attributed by the researchers to the fact that ibuprofen was given twice a day, whereas curcuminoid extract had to be taken 4 times a day.

These results suggest that curcuminoid extracts of turmeric might be as effective as ibuprofen in alleviating knee pain and improving knee functions, with a trend toward a greater effect in patients receiving curcumin extracts. However, the wide range of 95% confidence interval (CI) indicated that the study had an inadequate sample size; the proper sample size should be 70 patients per group. The authors recommend more studies with an adequate sample, a higher dose of ibuprofen in the comparison group, and a double-blind technique to demonstrate the efficacy of turmeric extracts in alleviating knee pain and improving knee function. HG

—Shari Henson

A wild, 13-year-old tiger within Bandhavgarh National Park, Madhya Pradesh, India. Photo ©2010 Photographer: Aniruddha Mookerjee; Source: International Fund for Animal Welfare

Medicinal Use of THREATENED ANIMAL SPECIES *and the Search for* Botanical ALTERNATIVES

By Courtney Cavaliere

Chinese cinnamon *Cinnamomum cassia,* which has been recommended as a potential herbal alternative to tiger bone. Photo ©2010 Steven Foster

Two African white rhinoceroses grazing in Meru National Park, Kenya, Africa. Photo ©2010 Photographer: Duncan Willetts; Source: International Fund for Animal Welfare

The Chinese calendar considers 2010 the "Year of the Tiger." As such, it may be an appropriate time to pay homage to the majestic animal's strength and beauty, while also lamenting its endangered status. Although long revered by many cultures, the tiger has also experienced a sad history of exploitation by humankind. Among other uses, various components of the tiger's body have served as ingredients within traditional medicine systems—and like many other animal species, the tiger continues to be a victim of medicinal demand.

Zootherapy, the use of animals and products derived from them in healing, has been practiced by most ancient cultures throughout the world, and it continues to be prevalent within many contemporary societies.[1,2] Within Traditional Chinese Medicine (TCM), more than 1,500 animal species have been identified as having therapeutic use.[3] At least 109 animals have reportedly been used for traditional medicine by India's different ethnic communities. In Northeast Brazil, at least 250 animal species are used medicinally.[1]

Animal-based remedies are important therapeutic resources within many cultures, and in some instances, the medicinal use of animal species has led to the development of pharmaceuticals for global markets. A component of snake venom, for example, served as the basis for angiotensin-converting enzyme (ACE) inhibitors, which help relax blood vessels and are used to treat high blood pressure and other conditions.[4] Several compounds of fish and amphibians have also served as important leads for biochemical research and drug development.

Not all animals are harmed when used as sources of medicinal ingredients. Remedies consisting of animals' fur, feathers, urine, excrement, or by-products are used within some cultures, and such medicinal ingredients can be collected without injuring or killing the animal.[3,5] The antler of the European red deer (*Cervus elaphus,* Cervidae), which has been widely traded and researched, can be harvested without any apparent adverse effects on the animal.[6]

More frequently, however, animal parts used in traditional medicines require the animal's death.[3,5] The killing of animals for medicinal use has significantly contributed to the rarity of certain animal species, and some societies continue to use endangered or threatened animals for medicinal purposes.[2,3,5,7,8] Although international trade of many rare species is regulated under the Convention on International Trade in Endangered Species (CITES), and use and trade of such species is often banned nationally through laws of individual countries, trafficking frequently continues through illegal channels.[8]

"Increasingly, animal parts are traded internationally—often because of local depletions but also because globalization means distance is no barrier," said Richard Thomas, PhD, communications coordinator for the wildlife trade monitoring network TRAFFIC (e-mail, December 4, 2009). "Some powerful national and international regulations certainly exist—CITES is potentially a very powerful Convention. However, the Convention rarely seems to impose the punitive measures at its disposal against those countries that fail to comply to its regulations." He added that, likewise, other laws meant to prevent wildlife trade are not sufficiently enforced. "Sometimes this is because of a lack of an appreciation of the seriousness of wildlife crime, as well as a lack of capacity amongst enforcement bodies to police the regulations adequately," he said.

The illegal trade of wildlife is estimated as being worth at least $6 billion (USD) per year, and it is also considered one of the fastest growing areas of international crime.[8] Demand for wildlife for medicinal and other uses has led poachers, particularly within impoverished countries, to continue trafficking threatened animal species and their parts. China is one of the main destinations for illegal wildlife, and demand from other Asian countries seems to be increasing. As wealth within Asian countries continues to rise, there are fears that increased purchasing power could put wildlife in even greater jeopardy.

In addition to depleting species, other problems have been associated with the use of some animal-based remedies. Whereas botanical therapies have been increasingly studied for their safety and effectiveness, far fewer studies of animal-based remedies have been conducted.[1,3,7] The supposed medicinal benefits of these species have thus rarely been scientifically verified; many remedies appear to be primarily based on folklore and superstition.[5,8] The suffering inflicted on medicinally-used animals—including the painful (and often lethal) capture, transport, and "harvesting" of animals' medicinal parts—also raises strong ethical concerns.[2,7,8] In addition, illness can be transferred from animals to humans, causing some concerns over the safety of animal-based therapies.[1,2,7]

In light of such factors, efforts have been made over the years to find and promote alternatives, particularly for those animals now considered endangered. Alternatives to endangered species used in TCM seem to be especially studied, undoubtedly due to the widespread use of TCM throughout the world and its reliance on so many animal species. In many cases, banning the use and trade of particular animals and promoting substitutes has had positive results. However, as the situations of the animals profiled below indicate, continued efforts in finding and promoting substitutes may be warranted, as may additional campaigns toward protecting animals with medicinal use.

Rehmannia *Rehmannia glutinosa,* which has been recommended as a potential herbal substitute for rhino horn and tortoise shell. Photo ©2010 Steven Foster

Tigers

Panthera tigris

Family: Felidae

A tiger from the Xiongsen Bear and Tiger Mountain Village, a tiger farm in Guilin, China. Photo ©2010 Save the Tiger Fund

One of the world's most beloved and iconic species is also one of its most endangered: the tiger. Tigers have been listed in Appendix I* of CITES since 1987. The world's population of wild tigers, which was approximately 100,000 a century ago, has fallen to an estimated 3,200 or fewer today, and a recent analysis indicates that tigers occupy a mere 7% of their historic range.[9] The main factors fueling the decline of tiger populations are loss and fragmentation of habitat, loss of available prey, and poaching of tigers in order to sell their parts for medicine, clothing, and decoration.[10]

Tiger bone has been used for centuries in TCM to treat conditions associated with bone and muscle pain, such as rheumatism and arthritis, as well as limb spasms, lower back pain, and chills.[11] Other parts of the tiger—including blood, tail, and eyes—have also sometimes been used for medicinal purposes.[10]

China's wild tiger populations were decimated to support the country's medicine industry; it is suspected that 50 or fewer tigers currently survive in the wild in China.[12] Tiger populations from other range states were also heavily poached to provide for tiger bone markets in China and elsewhere—severely reducing tiger populations in those areas as well.

"Until 1993, there were huge manufacturing industries in both China and South Korea that were making mass market medicines from tiger bone," said Judy Mills, moderator for the International Tiger Coalition and health security advisor for Conservation International (oral communication, August 18, 2009). According to Mills, these countries imported tiger skeletons and exported pills, wines, and tea balls made from tiger bone to international markets.

Mills explained that in 1993, CITES and the United States threatened trade sanctions against China and South Korea due to those countries' continued trade in tiger and rhino parts, which finally led the 2 countries to stop the manufacturing of these medicines, put bans into place to prevent sales of products claiming to contain tiger parts or derivatives, and remove tiger bone from their national pharmacopeias.

"This probably saved wild tigers," said Mills. "We might not have had one left today had it not been for those bans."

According to Mills, many TCM consumers were initially outraged at the loss of tiger bone medicines, but after a few years, the TCM community had largely accepted the ban. Many had even become actively involved in encouraging substitutions in place of endangered medicinal ingredients. Researchers for TRAFFIC conducted a survey in 2005 and 2006 of retail Chinese medicine shops and pharmacies to evaluate the effectiveness of China's 1993 ban.[12] They found that only 2.5% of 518 shops still claimed to stock tiger bone.

Bones from other animals, such as pigs or dogs, have often been promoted as substitutes to tiger bone.[10,13] According to Lixin Huang, president of the American College of Traditional Chinese Medicine (ACTCM), many herbal ingredients and formulas that are described as having a "warm function to improve circulation" can be used as replacements for tiger bone (oral communication, August 26, 2009).

A vat of tiger bone wine at Xiongsen Bear and Tiger Mountain Village, a tiger farm in Guilin, China. Photo ©2010 Save the Tiger Fund

*Species covered by CITES are listed in 3 Appendices, according to the degree of protection they need. Appendix I includes species threatened with extinction; trade in specimens of such species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction but in which trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species protected in a least one country, which has asked other CITES Parties for assistance in controlling trade.

White Mulberry *Morus alba*. Photo ©2010 Steven Foster

A survey of 301 practitioners certified in Chinese herbology was conducted in 2002 to obtain information about use of endangered species in TCM and possible replacements for those species, and that survey's results were profiled in the book *Mending the Web of Life*.[14] Fifty-three respondents to that survey provided recommendations for replacements for tiger bone, although there was little consensus. The most frequently cited substitution, with 12 citations, was *wu jia pi* (*Acanthopanax gracilistylus*, Araliaceae), an herb closely related to eleuthero (*Eleutherococcus senticosus*, Araliaceae; syn. *A. senticosus*), formerly sold in the United States as "Siberian ginseng."

Confiscated fresh tiger bones and a home-made gun, taken in Sumatra in May 2005. Photo ©2010 Fauna & Flora International

A study commissioned in 2001, meanwhile, by the Department for Environmental Food and Rural Affairs (DEFRA) and International Fund for Animal Welfare (IFAW) Charitable Trust, investigated plants with TCM properties and functions similar to tiger bone.[11] The study's authors found that tiger bone may possess some anti-inflammatory properties, and some of the investigated herbs also demonstrated potential anti-inflammatory actions.

That report, released in 2006, ultimately identified 15 herbs as potential alternatives to tiger bone: *Saposhnikovia divaricata* (Apiaceae) root, *Clematis chinensis* (Ranunculaceae) root and rhizome, *Angelica pubescens* (Apiaceae) root, *A. sinensis* root, *Ligusticum chuanxiong* (Apiaceae) rhizome, *Gentiana macrophylla* (Gentianaceae) root, *Epimedium sagittatum* (Berberidaceae) aerial parts, *Atractylodes lancea* or *A. chinensis* (Asteraceae) rhizome, *A. macrocephala* rhizome, *Cinnamomum cassia* (Lauraceae) bark, *C. cassia* twigs, *Morus alba* (Moraceae) young branches, *Taxillus chinensis* (Loranthaceae) stem and bark, *Spatholobus suberectus* (Fabaceae) root and stem, and *Chaenomeles speciosa* (Rosaceae) fruit.

The herbal company Mayway (Oakland, CA) is committed to supporting the preservation of endangered species and humane treatment of animals, for which the company discontinued the sale of products with tiger bone and bear bile many years ago. After joining WWF's Save the Tiger educational campaign in 2001, Mayway compiled a list of several of the company's botanical products with similar functions as those attributed to tiger bone for WWF's use in promoting substitutes to practitioners.[15] That list included such multi-herb products as Great Corydalis Teapills for pain due to acute injury and Yao Tong Pian tablets for strengthening sinews and bones and for pain due to chronic deficiency, obstruction, or acute injury.

But despite great strides in removing tiger bone from markets and identifying substitutes, illegal trafficking and other problems associated with tiger trade persist. In particular, tiger farms—facilities that typically masquerade as tiger conservation sites—threaten to counteract tiger preservation efforts and reinvigorate trade in tiger parts. Tigers are bred, caged, and offered as attractions to visitors at these "farms," while carcasses of dead tigers are often stored in giant freezers so that they can be sold if trade in tiger parts is reopened.[16,17]

A report submitted by China to CITES in 2007 noted that the population of farmed tigers throughout the country had reached 5,000 by the end of 2006, with more than 800 new cubs born every year.[18] "That means that China could have 6,000 to 7,000 tigers now in captivity," said Grace Ge Gabriel, Asia regional director of IFAW (oral communication, August 31, 2009).

The farms are backed by very powerful businessmen and investors who want trade in farmed tiger parts to be legalized. The idea was presented to CITES in 2007, but CITES member

Tigers cooling off in a pool at the Xiongsen Bear and Tiger Mountain Village, a tiger farm in Guilin, China. Photo ©2010 Save the Tiger Fund

nations decided that such trade should not be allowed. They further recommended that the number of tigers in these farms be reduced to levels more appropriate for conservation goals. According to Gabriel, further discussions regarding tiger farms have taken place in the years following that CITES meeting, but China and the few other countries that contain smaller-scale tiger farms have not made any efforts to limit or end tiger farming.

Moreover, some facilities in China have already begun manufacturing and selling tiger bone wine using the bodies of farmed tigers, despite China's ban and in violation of CITES.[17,19] The organization IFAW visited 5 of China's biggest tiger farms from 2005 to 2007, as well as a wine factory associated with one of the tiger farms.[17] According to a report released by IFAW, a manager of the wine factory claimed that hundreds of its wine containers held full tiger skeletons steeped in an alcoholic brew with medicinal herbs, and the investigators were shown a tiger skeleton within one of the wine vats.

In order to circumvent China's law against tiger trade, wine currently being produced from farmed tiger parts is not clearly labeled as "tiger bone wine."[17,19] It is packaged and sold, however, in ways that convey the endangered ingredient (such as in tiger-shaped bottles or under the name "bone protecting wine," which denotes the product as tiger bone wine through a play on words†). These wines are promoted as tonics, rather than as medicines, so that they do not require special regulatory permits.

According to Gabriel, wines promoted as tiger bone wine are sold at the tiger farms, in retail stores, in airports, and in other locations, as well as over the Internet. One wine factory manager told IFAW that as many as 100,000 bottles of that factory's tiger bone wine were sold in 2006 alone.[17]

Gabriel noted that one of the reasons tiger farms are able to sell these tonics is because they tap into long-held cultural beliefs regarding the medicinal effectiveness of tiger bone.

Mills likewise stated that, "Every Chinese person of every age knows tiger bone is supposed to be good for aches and pains and broken bones, so there is residual demand."

Such demand is evident from the results of a 2007 survey of 1,880 Chinese adults, in which 43% of respondents claimed to have used some product thought to contain tiger derivatives, and 90% of those consumers claimed to have used them after the 1993 ban was enacted—many claimed within the previous 2 years.[20] (In the same survey, however, 93% of respondents agreed that China's ban of tiger products must be maintained to protect wild tigers.)

If trade in farmed tiger parts is officially legalized in China, poaching of wild tigers is likely to increase. The International Tiger Coalition has pointed out that poaching is less costly than farming tigers, poachers could easily launder illegally obtained tiger parts by claiming that they are from farmed tigers, and demand is unlikely to be satisfied by farmed tigers alone.[21] Additionally, Asian consumers typically believe that medicines made from wild animals are more potent, which would further encourage poaching.[20,21]

Poaching of wild tigers may already be increasing. Gabriel said that she receives information on tiger poaching and confiscations practically every day. "In recent years, seizures of tiger parts from wild tigers have increased in frequency," she said. "According to the World Customs Organization, actual seizures of contraband only represent 10% of the actual trade."

In India, the bodies of 88 tigers killed by poachers were found in 2009—double the amount found the previous year.[19] Some of India's tiger reserves now have no tigers, and poaching is considered a likely cause.[22]

"If trade is reignited among more than a billion people in China, then those who can afford it will go for the wild tiger bone—and wild tigers will go very quickly," said Mills.

Legalized trade in farmed tiger parts would also likely cause practitioners and consumers to abandon use of tiger bone substitutes. "If the ban were lifted, there wouldn't be any incentive to look for alternatives," said Gabriel. "It would undermine conservation efforts for the past 20 years."

†The Chinese word for "protection" is a homophone of the word for "tiger."

Chinese Clematis *Clematis chinensis.* Photo ©2010 Steven Foster

An African white rhinoceros at Lake Nakuru National Park, Kenya, Africa. Photo ©2010 Photographer: Duncan Willetts; Source: International Fund for Animal Welfare

Chinese Salvia *Salvia miltiorrhiza*
Photo ©2010 Steven Foster

Rhinoceroses

African white (Ceratotherium simum), African black (Diceros bicornis), Indian (Rhinoceros unicornis), Javan (R. sondaicus), Sumatran (Dicerorhinus

Family: Rhinocerotidae

Like the tiger, the rhinoceros has had a long history of use in TCM, and rhino populations have suffered because of it. Fewer than 25,000 rhinoceroses currently survive in the wild,[23] and rhino species have been listed in either Appendix I or II of CITES since 1977.[24]

The horn of the rhinoceros is unique from that of other animals in that it is composed entirely of keratin, the same substance as hair and nails, with dense mineral deposits at its center.[25] Although many of the rhinoceros' body parts have been utilized in TCM, the animal's horn has been particularly prized as a medicinal ingredient. Rhino horn has been used for thousands of years in TCM to treat fever, convulsions, and hemorrhagic conditions.[11,13] It is also popularly used to relieve dizziness, build energy, nourish the blood, and cure laryngitis, among other uses.[26]

Asian rhinoceroses were once widely distributed throughout southern and southeast Asia, but overwhelming demand for rhino horn for TCM led to their sharp decline.[24] African rhino species have also been heavily poached, both for traditional medicinal use in Asia and for use in making traditional daggers in Yemen. Even after the rhinoceros' listing in CITES, poachers continued to decimate rhino populations during the 1980s and early 1990s, causing rhino numbers to reach their lowest levels in history.[27] As with tiger bone, some countries instituted their own bans on use and trade of rhino horn, including China in 1993.

TCM practitioners have therefore been encouraged for many years to substitute other ingredients in place of rhino horn. In the early 1990s, conservation groups encouraged substituting rhino horn with the horn of the saiga antelope (*Saiga tatarica,* Bovidae)—a well-intentioned plan that had disastrous results.[28] Over a million saiga antelopes roamed Russia and Kazakhstan in 1993, but fewer than 30,000 (mostly hornless females) remained by 2003 due to rampant poaching and use in TCM. After experiencing one of the most rapid and dramatic population crashes of any mammal, the saiga antelope was added to the Red List of critically endangered species in 2002, and TCM practitioners are now actively discouraged from using saiga antelope horn, as well. The horns of water buffalo and cows are now commonly promoted as alternatives to rhino horn.[13]

During the 1990s, Paul But, PhD, then a professor at the Chinese University of Hong Kong, performed experiments in rats to test the effectiveness of rhino horn and some of its alternatives.[8] His study found that rhino horn and high doses of water buffalo horn could reduce fever and counter toxins, as could a combination of herbs without any type of horn. In a 1993 paper, the Chinese Association of Medicine and Philosophy recommended *Rehmannia glutinosa* (Scrophulariaceae) and *Coptis chinensis* (Ranunculaceae) as acceptable botanical substitutes for rhino horn, based on Dr. But's study.[29]

The 2002 survey of herbal practitioners featured in *Mending the Web of Life*, mentioned earlier in this article, noted potential botanical replacements for rhino horn.[14] Of the 83 respondents who provided suggestions for replacing rhino horn, the second most cited suggestion (after water buffalo horn) was *sheng di huang* (*Rehmannia glutinosa*). Respondents also recommended *Uncaria rhynchophylla* (Rubiaceae) as a potential alterna-

The increased rate of rhino poaching could ultimately cause African rhino populations to crash to the same low levels of previous decades, if not lower.

Rangers from the Kenyan Wildlife Service in Africa with confiscated rhino horn. Photo ©2010 Photographer: Renaud Fulconis; Source: Save the Rhino International

tive for "clearing heat and arresting tremors"—a specific action assigned to rhino horn.

For the 2006 report commissioned by DEFRA and IFAW, also mentioned previously, both rhino horn and plants considered as having functions similar to rhino horn were investigated through assays.[11] Rhino horn did not demonstrate anti-bacterial or anti-inflammatory properties through testing, but most of the herbs selected as possible alternatives demonstrated some anti-bacterial activity and/or potential anti-inflammatory properties.

The report identified 9 potential botanical alternatives to rhino horn, based on tests conducted by the authors and evidence from published TCM and other scientific literature: *Rehmannia glutinosa* root, *Scrophularia ningpoensis* (Scrophulariaceae) root, *Paeonia suffruticosa* (Paeoniaceae) root, *P. veitchii* or *P. lactiflora* root, *Arnebia euchroma* (Boraginaceae) root, *Isatais indigotica* (Brassicaceae) root, *Lonicera japonica* (Caprifoliaceae) flower bud, *Forsythia suspensa* (Oleaceae) fruit, and *Salvia miltiorrhiza* (Lamiaceae) root.

After the early 1990s, some rhino populations—primarily African rhino species—grew substantially. White rhino populations increased from 7,095 in 1995 to 17,500 by the end of 2007, and black rhino populations increased from 2,410 in 1995 to 4,240 by the end of 2007.[27,30]

Left photo: **Forsythia** *Forsythia suspensa*. Photo ©2010 Steven Foster
Below photo: African white rhinoceroses. Photo ©2010 Photographer: Renaud Fulconis; Source: Save the Rhino International

Unfortunately, increased poaching within the last decade threatens to undo such progress. According to a 2007 report, the amount of rhino horn entering illegal trade from Africa has significantly increased since 2000.[27] That report noted that at least 664 rhino horns from Africa

Rhino horn and traditional Chinese medicine containing rhino horn. Photo ©2010 International Fund for Animal Welfare

were acquired with the intention of illicit trade during 2000-2005.

Moreover, in July of 2009, the International Union for Conservation of Nature (IUCN), WWF, and TRAFFIC released a new report indicating that rhino poaching has seemingly increased to its highest level in 15 years.[31] According to the report, the poaching stems from demand for rhino horn in Asia, and evidence indicates ongoing involvement of Vietnamese, Chinese, and Thai nationals in the illegal trafficking of rhino horn out of Africa. The report adds that Vietnam only recently became a major destination for illegally traded rhino horn, and research suggests that rhino horn is currently being promoted in that country for medical uses that go far beyond applications described in traditional literature. For instance, rhino horn appears to be used in Vietnam for treating a range of life-threatening illnesses, such as cancers.

According to Susie Ellis, PhD, executive director of the International Rhino Foundation (IRF), the increased rate of rhino poaching could ultimately cause African rhino populations to crash to the same low levels of previous decades, if not lower (oral communication, November 16, 2009). She stated that a number of factors appear to be contributing to the increased rhino poaching, including China's burgeoning economy and a rise in well-armed and highly organized poaching gangs. She added that there is a breakdown in the enforcement chain, which is enabling poachers to traffic rhino horn with little threat of punishment in African countries and allowing rhino horn to enter Asian markets despite bans on the ingredient. "People trying to conserve rhinos are having to physically move them in order to protect them," she said.

IRF and TRAFFIC are planning to initiate a study to better understand the present demand behind rhino poaching. According to Dr. Ellis, they plan to investigate where rhino horn is being trafficked, what it's being used for, and other factors relating to the current black market trade. "We need to know what's going on before we figure out how to solve the problem," said Dr. Ellis.

She added that rhino horn's long-standing reputation as an effective medicinal ingredient has made it particularly difficult to completely wipe out demand, despite the fact that there is little scientific basis for using rhino horn and that modern synthetic products for alleviating fevers, such as aspirin, acetaminophen and ibuprofen, are readily available. "We hope that people would use [modern alternatives] rather than a product that requires the sacrifice of these magnificent animals," said Dr. Ellis.

Bears

American black (Ursus americanus), Asiatic black (U. thibetanus), brown (U. arctos), polar (U. maritimus), sloth (Melursus ursinus), spectacled (Tremarctos ornatus), sun (Helarctos malayanus)

Family: Ursidae

Asiatic black bears Jasper (front) and Pooh at Animals Asia Foundation's sanctuary in China. Jasper spent 15 years in a crush cage being milked for bile. After months of surgery and rehabilitation, he has recovered to lead a healthy, happy life. Photo ©2010 Animals Asia Foundation

All eight of the world's bear species are listed in either Appendix I or II of CITES. Several bear species have experienced dramatic population declines over the past few decades, and some are considered to be in danger of extinction. Some of the main factors fueling losses of bear species include habitat loss and illegal or unmanaged hunting—for sport, fur, medicinal use, or other purposes.[32] The only bear species not hunted for its gallbladder, for use in traditional medicine, is the giant panda (*Ailuropoda melanoleuca*, Ursidae).‡

Bear bile has been an ingredient in TCM for thousands of years, used to treat fevers and inflammation, liver disorders, convulsions and spasms, ophthalmological disorders, and various other conditions.[33,34] It is sold in the form of pills and powders, ointments, lozenges, eye drops, hemorrhoid creams, wines, and teas.[34,35] Bear bile contains a relatively high amount of ursode-

‡Giant pandas do not produce UDCA, considered the main medicinal component of bear bile.

Coptis chinensis. Photo ©2010 Jasmine Oberste. www.chineseherbgarden.com

Top left photo: One of the first 9 bears rescued from a Chinese bear farm following exposure of the industry in 1994 by Animals Asia Foundation's Jill Robinson. Five of the bears are still living and were recently transferred to Animals Asia's Moon Bear Rescue Centre in Chengdu. Photo ©2010 Animals Asia Foundation

oxycholic acid (UDCA); this and other acids are considered the principle medicinal components of bear bile.[33] Modern pharmacological research has shown that bear bile has antimicrobial, anti-inflammatory, anti-hepatotoxic, anti-tumor, anti-convulsant, and other beneficial properties.

After realizing that the country's wild bear populations had become severely depleted, bear farms were established in China during the 1980s.[33,35] These farms, at which bile is extracted repeatedly from living, captive bears, were intended to provide a sustainable supply of medicinal bear bile and discourage further killing of wild bears. According to official government figures, approximately 7,000 bears are currently kept on farms in China. However, some non-governmental organizations (NGOs) suspect that the number is closer to 10,000, if not more. Additionally, nearly 4,000 bears are held on farms in Vietnam, where the practice is technically illegal. Around 1,400 bears are farmed in South Korea, where it is illegal to extract bile from living bears but bears can be raised for several years and then slaughtered for their gallbladders. Some bear farms have also been established in other Asian countries, such as Laos.

"We estimate that in Asia as a whole, there could be around 16,000 to 17,000 bears kept on farms," said Jill Robinson, founder and CEO of Animals Asia Foundation, a charity organization that helps to free bears from farms and relocate them to bear sanctuaries (e-mail, September 6, 2009).

Bears on Chinese and Vietnamese farms are typically kept in small cages with barely enough room to move.[35,36] Farmers extract bile by inserting catheters or hypodermic needles into the bears' gallbladders, or they carve a hole into the bears' abdomen and gallbladder, allowing the bile to drip out into basins under the bears' cages. Both the close confinement and bile extraction are clearly painful to the bears, as the animals often show signs of distress and resort to biting or banging their heads against their cages. Bears typically spend around 10 years trapped in these cages, many enduring daily bile extraction.

Above photo: Asiatic black bear at a farm in the Quang Ningh Province, Northern Vietnam. Photo ©2010 World Society for the Protection of Animals
Photo at left: **Gardenia** *Gardenia jasminoides*. Photo ©2010 Steven Foster

In addition to the suffering inflicted on the bears, the products produced from these farms pose serious health concerns to consumers. Bile taken from farmed bears is frequently contaminated by blood, urine, feces, and pus.[36] Further, bears that have been "milked" for their bile on such farms are likely to develop cancer. According to Robinson, "Captive bears that have never been milked for their bile almost never develop liver cancer unless they are very old, and even then, only about 10% develop it. But in previously farmed bears, we are seeing it at an alarming rate of about 35%—and we're seeing it in young bears rescued from the farms.

"Our vets have no doubt that cancer cells must be seeping into the bile that is later consumed by people around the world," she continued. "Surely it is time the Chinese government took this seriously. Other countries whose citizens take this bile should be asking some serious questions too."

The existence of bear farms has also not reduced poaching of wild bear populations. Wild bears continue to be killed for their gallbladders, and some bears are taken from the wild to restock bear farms.[36,37]

Bear bile products. Photo ©2010 Animals Asia Foundation

More humane and sustainable alternatives to bear bile are readily available. Gallbladders from cattle or pigs are often promoted as substitutes.[13] A synthetic version of UDCA is also widely available, used in Western medicine for dissolving gallstones.[33] It has been estimated that 100,000 kg of synthetic UDCA is consumed each year in China, Japan, and South Korea, and global consumption may be double this figure. Many herbal alternatives have also been identified.

In 1994, the Association of Chinese Medicine and Philosophy and EarthCare released a report identifying 54 herbs that could be used as alternatives to bear bile. According to Robinson, such herbs included chrysanthemum (*Dendranthema* x *grandiflorum*, Asteraceae), rhubarb (*Rheum* x *hybridum*, Polygonaceae), sage (*Salvia officinalis*, Lamiaceae), peony (*Paeonia officinalis*, Paeoniaceae), verbena (*Verbena officinalis*, Verbenaceae), and Japanese thistle (*Cirsium japonicum*, Asteraceae).

In the 2002 survey of herbal practitioners from *Mending the Web of Life*, 46 respondents recommended alternatives to bear bile.[14] One of the most frequently suggested alternatives, with 9 citations, was *xia ku cao* (*Prunella vulgaris*, Lamiaceae). Other botanicals were also recommended as replacements for specific actions of bear bile, including *Paeonia lactiflora* and *P. suffruticosa* for "clearing heat and alleviating spasms," *Ligusticum chuanxiong* for alleviating pain, and *Cassia obtusifolia* (Fabaceae) for benefiting the eyes.

The World Society for the Protection of Animals (WSPA) published a report in 2005 listing numerous herbs considered to have some of the same indications as bear bile.[38] For example, the report noted that, like bear bile, *Lobelia chinensis* (Campanulaceae) and *Hedyotis diffusa* (Rubiaceae) are used for "clearing heat and detoxifying," *Gentiana* spp. is used for "clearing liver fire," and *Lycium* spp. (Solanaceae) and *Ligustrum lucidum* (Oleaceae) are taken to "brighten eyesight through nourishing the liver." Since releasing that report, WSPA has been encouraging traditional medicine groups worldwide to support a statement saying that there are good herbal alternatives to bear bile.

"Seventy-one traditional Asian medicine associations from 8 countries have already expressed support for the statement," said WSPA Global Wildlife Programs Manager Chris Gee (e-mail, October 2009-January 2010). "These include 3 from within mainland China." He added that the Korean Association of Herbologists published a report promoting herbal alternatives to bear bile in October 2009.

The 2006 report commissioned by DEFRA and IFAW, mentioned previously, also investigated plants with TCM properties and functions similar to bear bile.[11] Seven herbs were identified

in the report as potential alternatives to bear bile: *Gardenia jasminoides* (Rubiaceae) fruit, *Scutellaria baicalensis* (Lamiaceae) root, *Coptis chinensis* rhizome, *Phellodendron amurense* (Rutaceae) bark, *Rheum palmatum* (Polygonaceae) root and rhizome, *Anemarrhena asphodelides* (Anthericaceae) rhizome, and *Andrographis paniculata* (Acanthaceae) aerial parts. Additionally, 2 Kampo prescriptions were proposed as possible bear bile alternatives: Orengedokuto and Dia-Orengedokuto (both of which contain combinations of the 7 above-listed herbs).

Recent research has particularly highlighted the potential of *Coptis* spp. to replace bear bile. According to an article published in the *Journal of Ethnobiology and Ethnomedicine* in 2009, extensive studies have shown that *Coptis* has many pharmacological actions, including antibacterial, antiviral, anti-inflammatory, anti-hypertensive, and cholesterol-lowering properties.[33] The herb is considered a promising potential drug candidate for treatment of liver injury, and *in vitro* studies indicate that extracts of it can suppress cancer cell lines.

According to Robinson, the lead investigator of the recent *Coptis* research, Prof. Yibin Feng of the University of Hong Kong, explained during a 2008 symposium how he and his colleagues have been comparing extracts from 2 species of *Coptis* against raw bear bile and purified active ingredients from bear bile. "The tests showed *Coptis* to be far more effective than bear bile at killing cancer cell lines," said Robinson. "These initial results are very exciting. Further tests are planned to compare *Coptis* and its extracts with bear bile for their effectiveness against a variety of liver conditions."

Robinson noted that Prof. Feng's research could ultimately assist in ending the bear bile industry. Some organizations, including Animals Asia Foundation and WSPA, have spent years lobbying to end bear farming and use of bear bile.

After years of lobbying and negotiations, Chinese authorities signed an agreement with Animals Asia Foundation in 2000, pledging to help end bear bile farms and rescue 500 bears. The Vietnamese government promised to help phase out bear bile farming in 2005, and it signed an agreement with Animals Asia Foundation in 2006 to help the organization rescue 200 bears. As of March 2010, Animals Asia Foundation had rescued 318 bears—266 from farms in China and 52 from Vietnam.

According to Robinson, many of China's worst bear farms have been shut down. The Chinese government claims that there are now 68 farms in the country, down from 480 in the 1990s. However, Animals Asia Foundation believes that the actual number of Chinese bear farms is higher. "In addition, many smaller farms have been consolidated into bigger ones, so the number of bears remains roughly the same or could even be increasing," she added.

Official figures in Vietnam indicate that the number of farmed bears has been decreasing, but Gee stated that such figures need further verification. WSPA has assisted in microchipping all bears in the country's bear farms, to ensure that no new bears enter the industry. WSPA has also been supporting Vietnam's Forest Protection Department in its efforts to monitor farms and punish those found breaking the law. "Progress does seem to be being made with owners of illegal bears being fined and confiscations of bears," said Gee.

"As the younger generation turns away from consuming bear bile, the industry looks for new ways to encourage them to take it."

Organizations such as Animals Asia Foundation and WSPA continue to lobby the governments of bear farming nations to permanently shut down the industry, as well as lead campaigns to increase global awareness of the issue. Animals Asia Foundation initiated a new campaign in February 2010, encouraging Chinese pharmacies to pledge to never stock and supply bear bile products in the future, and WSPA launched a new webpage in March 2010, encouraging US audiences to become involved in efforts against bear farming (see sidebar).

Robinson noted that bear farms persist due to lingering demand from older consumers and because of new marketing ploys by the industry. "It's mainly the older generation that is still using bear bile, and we're happy to see that the younger generation is far more aware of the suffering involved and they are rejecting it," she said. She added that the industry promotes bear bile as a cure-all and, increasingly, as the magic ingredient in products such as shampoo, toothpaste, and wine. "As the younger generation turns away from consuming bear bile, the industry looks for new ways to encourage them to take it."

Gee noted that changing the habits of consumers requires widespread support, including support from governments. "There is a need for authorities to come out and clearly support those good alternatives to bear bile," he stressed.

How TCM Purchases in Western Markets Can Impact Bear Farming Practices in Asia

American consumers and herbal practitioners may unintentionally be providing economic support to bear farming activities through their choice of TCM products. Many significant Chinese medicine manufacturers produce bear bile products as a small percentage of their product lines for domestic consumers. These companies sometimes also sell a range of other products within US markets.

The World Society for the Protection of Animals (WSPA) launched a new webpage in March 2010 to help US consumers and herbal practitioners find out whether the TCM products they purchase are produced by Chinese companies involved with bear farming. The webpage allows users to send customizable e-letters to US retailers of Chinese-made TCM products, asking them if their Chinese suppliers produce any bear bile products. These e-letters include a link through which contacted retailers can learn more about bear farming and obtain a template letter (in English or Chinese) that they can use when asking Chinese companies about their bear bile policies. Consumers and practitioners who send e-letters will be able to post retailers' responses to the webpage.

WSPA plans to acknowledge on its website those US retailers who agree to stop selling medicines produced by companies that manufacture bear bile medicines, and it will also include a list of Chinese companies that pledge to stop producing these products or claim to have never done so. Any companies found to violate such a pledge will also be identified on the website.

Through this campaign, WSPA hopes to illustrate to Chinese companies that participation in bear farming is detrimental to growth in Western markets. The webpage is available at: www.endbearfarming.org/tcmaction.

A young Asiatic black bear at a bear farm in Chengdu, central China. Photo ©2010 International Fund for Animal Welfare.

Tree Peony *Paeonia suffruticosa*. Photo ©2010 Steven Foster

Turtles & Tortoises

Numerous species from such Families as: Testudinidae, Bataguridae, Platysternidae, Trionychidae, Carettochelyidae, Chelidae, Dermochelyidae, and Cheloniidae

Above photo: A large green turtle on Melbourne Beach in Florida. Photo ©2010 Photographer: Richard Sobol; Source: International Fund for Animal Welfare
Photo at right: **Japanese honeysuckle** *Lonicera japonica.* Photo ©2010 Steven Foster

As of 2008, IUCN had reviewed the conservation status of over 1,300 of the world's reptiles, and the organization found that 62% of 212 evaluated species of turtles and tortoises are threatened or endangered.[39] Many turtle and tortoise species are listed in Appendix I or II of CITES, and most native Chinese species, in particular, have greatly declined in recent years.[40] A number of threats contribute to the continued decline of turtle and tortoise populations, including large-scale trade for food and medicinal preparations, collection for the pet industry, habitat loss, and pollution.

Turtles and tortoises have been used in the traditional medicinal practices of many cultures. Turtle meat is considered to have high nutritional value according to TCM, and turtle shell is used as an ingredient in many TCM formulas and preparations. In particular, the shell is often turned into a jelly after being boiled in water with herbal and other ingredients. These products are used to treat a variety of conditions, including erectile dysfunction and even some cancers.[40,41] According to the *Pharmacopoeia of the People's Republic of China*, the carapace and plastron from Chinese pond turtle (*Chinemys reevesii,* Bataguridae) is used to treat conditions of the skeletal, renal, and cardiovascular systems, as well as mental conditions, and the carapace of Chinese softshell turtle (*Pelodiscus sinensis,* Trionychidae) is used to reduce nodulations and relieve consumptive fever (A. Lee, e-mail, December 22, 2009). In fishing communities in Northeast Brazil, the fat of certain marine turtles has been used medicinally to treat rheumatism, earache, sore throat, and swelling.[5,42]

Large commercial turtle farms were established in China in the 1980s to meet rising demand for turtle products.[43] By 2002, there were nearly 1,500 large turtle and tortoise breeding facilities on record in China. A survey conducted that year of 684 of such farms found that they collectively raised more than 300 million of the 11 most commonly reared turtle species—all of which are on the IUCN Red List. Such data reflects the massive scale of turtle farming in China, particularly as many illegally operating farms are also known to exist in the county. Turtle farms are also found in other Asian countries.

Turtle jelly sold in Hong Kong. Photo ©2010 Photographer: Anders Rhodin; Source: Chelonian Research Foundation

Baby green turtles, recently hatched. The eggs were rescued from a female green turtle that was killed by poachers. Photo ©2010 Photographer: Errol Harris; Source: International Fund for Animal Welfare

Some countries are increasingly relying upon imported turtles to satisfy local demands for turtles as food, medicine, pets, and other purposes. From 2002-2005, more than 30 million live native turtles were legally exported from the United States alone.

Wild turtle and tortoise populations are negatively impacted by large-scale turtle farming, particularly as turtle farms are the primary purchasers of wild-caught turtles.[44] These farms need wild breeders both to increase their total stock and because successive generations of farmed turtles show decreased reproductive capabilities. Additionally, illegally obtained turtles can easily be laundered as farmed specimens, and the Chinese belief that wild animals are more potent encourages poaching as these animals fetch higher prices.

Surveys in Northeast Brazil, meanwhile, indicate that marine turtles used in traditional remedies are likewise included on the IUCN Red List, as well as Brazil's official list of endangered species.[5,42] Due to decreased numbers of these turtle species, some practitioners have reported that turtle-based remedies are now rarely used in Northeast Brazil. Others, however, have stated that many species are still captured and used for food and medicine.

Due to decreased turtle populations and concerns over sustainability, some efforts have been made to use or identify alternatives. Researchers have pointed out that many different animal species are sometimes used to treat particular diseases in Northeast Brazil, which enables adaptability when certain species become less available or accessible.[5] Traditional practitioners surveyed in this area have also said that some animal species can be replaced with plants or used in association with them to treat disease, and the green sea turtle (*Chelonia mydas,* Cheloniidae) was noted as being one such animal.

"The therapeutic properties of wild animals and plants and domestic or cultivated species overlap in many cases," said Romulo R. N. Alves, professor at the Universidade Estadual da Paraiba and author of zootherapy studies in Brazil (e-mail, December 2, 2009). "The substituted plant depends on the diseases treated," he continued, adding that he is not aware of which particular botanical species are used as substitutes for turtle.

In the 2002 survey of herbal practitioners from *Mending the Web of Life*, 116 respondents provided information on possible replacements for Asian tortoise in TCM.[14] The most commonly recommended alternative was freshwater turtle, although senior practitioners pointed out that freshwater turtle would *not* be a good substitute since they too are endangered. Seventeen respondents suggested *nu zhen zi* (*Ligustrum lucidum*, Oleaceae) as a potential replacement. Further, for particular actions of tortoise shell, senior practitioners recommended a combination of *Paeonia lactiflora* and *Rehmannia glutinosa* for "nourishing yin and anchoring yang," *Eucommia ulmoides* (Eucommiaceae) for benefiting kidneys and strengthening bones, and *Sanguisorba officinalis* (Rosaceae) for "cooling the blood and stopping yin deficient uterine bleeding."

Some researchers and herbalists have argued that there is no real benefit of turtle consumption at all. Researchers from China and California recently conducted a study into the nutritional value of 5 hard-shell turtle species to test some of TCM's claims.[41] After testing samples of the turtles' meat, fat, and shell, the researchers found that turtle shell and meat have lower fatty acid concentrations than other more readily available products, that amino acids found in turtle shell are difficult for humans to assimilate, and that turtles' selenium content is not as high as TCM indicates. They concluded that human consumption of turtles could be completely substituted by cheaper domestic animals, aquatic animals, or mineral supplements, which are widely available and affordable.

Chinese herbalist Lo Yan-Wo, who has served as president of the Association of Chinese Medicine and Philosophy, has likewise argued that the medicinal value of turtle is minimal and that the herbs used in turtle jellies are the most important ingredients.[40,45] He has stated that herbs are much cheaper, so many manufacturers and merchants add turtle simply to increase the price. According to Arthur Lee of the Chinese Medicine Council of Hong Kong, there is no unique formula for turtle jelly, but Chinese herbs commonly used in such products include *Smilax glabra* (Smilacaceae), *Rehmannia glutinosa*, *Artemisia scoparia* (Asteraceae), *Lonicera japonica*, and *Cannabis sativa* (Cannabaceae).

The use and trade of turtles has far-reaching consequences. Some countries are increasingly relying upon imported turtles to satisfy local demands for turtles as food, medicine, pets, and other purposes. From 2002-2005, more than 30 million live native turtles were legally exported from the United States alone.[39] Due to increased demands for freshwater turtles from Asia and South America, some US states have begun tightening their freshwater turtle harvesting rules—including Florida, which enacted the most restrictive turtle harvest rule in the United States in July 2009.[46]

Although promoting botanical alternatives to medicinally used turtle products might ease some pressures on turtle populations, it is important to bear in mind that alternatives would need to be overwhelmingly adopted for turtles' other uses, as well. Turtles and tortoises are used as a source of protein by many cultural groups, and they are often considered a delicacy.[47] According to Prof. Alves, "Many turtle zootherapeutical products are the result of hunting these animals for other purposes, and their subproducts are utilized for medicinal purposes."

Conclusion

The use of endangered species for medicinal purposes is often illegal and usually not supported by licensed practitioners. Lixin Huang of ACTCM stated that products containing endangered animal ingredients would not be prescribed by TCM doctors or licensed acupuncturists. She added that many of these products are not manufactured by legitimate companies but by merchants, and they may not actually include the endangered species that they claim to contain.

Greg Livingston, PhD, a Chinese medicine physician with a clinical practice in Hangzhou, stated that most medicinal products made from endangered animal species are not easily available to mainland Chinese consumers, and most consumers are probably not even interested in taking them: "but in Asia, the population is so huge that all it takes is a tiny minority to become a large problem" (e-mail, November 19, 2009).

The continued demand by some consumers throughout the world for medicines created from endangered wildlife helps to fuel continued black market trafficking and local poaching, while the interests of various farm owners and merchants continue to negatively affect wild populations of threatened species.

Stopping the trade of endangered animal species for medicinal use is not a simple task. To do so involves addressing the socio-economic conditions that contribute to poaching in impoverished countries, rigorously enhancing enforcement of wildlife trafficking laws, and educating large numbers of people about conservation issues. Additionally, animal rights are a low priority within many countries. "In China, there are hundreds of millions of poor people, so most people here are more concerned with just taking care of the basic needs of people and consider animal welfare secondary to this," explained Dr. Livingston.

Identifying substitutes for endangered and threatened animal species has had some positive results, but even this can prove challenging. In some countries where zootherapy is practiced, herbalists and consumers are not sufficiently aware of the threatened status of many animal species, so the importance of using substitutes is not realized. Additionally, research identifying substitutes to endangered animals is not always widely disseminated. There are also cultural beliefs regarding medicinal practice that can affect whether practitioners and consumers will accept proffered alternatives.

For instance, in TCM, domesticated animals are typically considered more appropriate substitutes to endangered animals than plants. "There is a big difference between animal and botanical substances," said Dr. Livingston. "Chinese medicine says '*xue rou you qing*,' which translates roughly as 'animal substances have an affinity for the human body.' These substances are easily absorbed, have strong effects, and can penetrate to a 'deeper' level of the body and thus affect physiological processes in a way that many botanical substances cannot."

Convincing TCM proponents in Asia to accept botanical alternatives to endangered animal species may therefore prove particularly challenging, although botanical alternatives may be more appropriate for other audiences. Bria Larson, development officer of ACTCM, explained that US consumers, for instance, are often more open to botanical alternatives, particularly since many are vegetarians or believe strongly in animal rights issues. "There needs to be both options," she said, noting that both animal and botanical alternatives are important for satisfying people of different cultural or personal belief systems (oral communication, September 1, 2009).

It is also imperative that the conservation status of suggested alternatives be monitored, lest the situation of the saiga antelope—formerly recommended as a replacement for rhino horn—be repeated. "In order to ensure the long-term abundance of Asian medicinal flora, we should definitely be researching how much can be produced sustainably before recommending it as an alternative," said Jasmine Rose Oberste, founder of Chinese Herb Garden, a nonprofit dedicated to ensuring the sustainability of Asian medicinal plants (e-mail, October 13, 2009).

"In order to ensure the long-term abundance of Asian medicinal flora, we should definitely be researching how much can be produced sustainably before recommending it as an alternative."

Additional research into the topic of medicinal endangered animal alternatives may be warranted, as may greater discussion of the needs for and challenges inherent to promoting substitutes. To this effect, the International Symposium for the Conservation of Endangered Species and TCM was held in Beijing in November 2009, sponsored by ACTCM and Animals Asia Foundation and held in conjunction with the World Federation of Chinese Medicine Societies' (WFCMS) annual herbal committee meeting. The event brought together over 250 herbal vendors, practitioners, researchers, government officials, and representatives from the fields of TCM and environmental conservation. Lecturers presented data on the threatened status of various medicinally used animal species, as well as information on alternatives to endangered species.

According to Larson, the response to the symposium was very positive, and the event was successful in bringing conservation and science advocates together with a receptive Chinese medicine audience (oral communication, December 8, 2009). She added that the event seemed to offer new insight to many attendees. Although the endangered status of certain high-profile animals seems to be widely acknowledged within the TCM community, the conservation status of other animals—such as certain turtle species or the saiga antelope—do not appear to be as well known.

A working group of experts dedicated to the theme of endangered species and TCM held their first meeting at the symposium. According to Larson, this group intends to ultimately expand research on conservation topics into herbal curricula in China, as well as engage in other outreach efforts and initiate new research projects. Additionally, it is hoped that WFCMS will establish a permanent subcommittee on endangered species. Larson explained that this appears to be a very real possibility, although the process to initiate and gain approval for such a subcommittee may take some time.

As more stakeholders adopt the cause of ending medicinal use of threatened animals and promoting alternatives, there may be

some hope in finding solutions to this crisis. "There's going to be more endangered and threatened species as our global environment continues to be stressed, so it's imperative that more research be done into conservation and substitutes for threatened species," said Larson (oral communication, September 1, 2009). HG

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Ensuring the Specific Identity and Quality of Herbal Products by THE POWER OF DNA

By Matthew Cimino, PhD

INTRODUCTION

The continued long-term success and growth of the herbal dietary supplement industry is dependent on adequate methods of plant identification that guarantee the proper authentication and characterization of botanical materials.[1] Botanical products and raw materials may be bought and sold repeatedly prior to arriving at their final destination on retail shelves. Suppliers of finished products rarely have the benefit of seeing the plants used in their products prior to harvest or monitoring the status of their derivative materials (e.g., dried plant parts, powdered materials, extracts, etc.) at every point in the production process. The normal flow of modern herbal trade contains varying degrees of uncertainty, which ultimately requires reliable methods of assuring the intrinsically linked attributes of identity and quality of plant materials used in herbal dietary ingredients and finished dietary supplement products.

The Good Manufacturing Practices (GMPs) guidelines issued in June 2007 by the US Food and Drug Administration (FDA) that are being phased in across the US supplement industry provide a strong incentive for validating and improving quality assurance (QA) and quality control (QC) methods, including those related to the specific identification of all ingredients used in supplement products. The predominant methods for botanical identity testing rely on morphological features or phytochemical profiles to characterize botanical substrates.[2,3] However, the adoption and integration of nucleotide sequence-based methods of botanical identification could significantly improve the available set of quality assurance tools for stakeholders in the herbal dietary supplement industry.

Identification using Morphology

Industry participants have long sought basic assurances from suppliers that exchanged goods and materials are properly identified and labeled in a manner that is useful for guaranteeing authenticity.[4] Historically, this was a process that could be performed by examining whole plants and/or plant parts that were essentially intact after harvest. An experienced botanist or trained herbalist could use macromorphological features to confirm the identity of the botanical merchandise. To the extent possible, this traditional approach remains in practice,[3] but changes in the type of botanical materials traded in international and domestic herbal commerce, a varying range of intermediate suppliers, and a decreasing population of herbal trade-related botanical taxonomists, have created a need for supplemental—and in some instances more precise—methods of identification.

The typical practicing taxonomist, such as those associated with university herbaria, natural history museums, botanical gardens, or public land stewardships, generally classify and apply names to plants with the assistance of reproductive characters, such as floral and fruit morphology.[5] A high quality scientific botanical specimen is one that includes the date and location of collection, the collector's name, and a representative sample of a plant's intact leaves, stems, flowers or fruits, and often roots that have been carefully arranged between sheets of herbarium paper, and felt, pressed, and dried soon after collection. In some cases, quality specimens include mature fruits, bark, or other organs and parts that are useful to differentiate the material from its closest relatives. This approach has been maintained for centuries because of its effectiveness for providing taxonomists with a means to reliably identify a specimen. However, within the world's herbarium collections, notable reserves of plant specimens are maintained that—although collected by experienced botanists—do not include adequate material critical for definitive taxonomic diagnosis. In any given herbarium, these specimens are generally classified to the extent possible (at the genus or family level) and placed in folders that are labeled "Indet," an abbreviation for "indeterminate."

The use of morphological characters for herbal identification in a commercial setting remains a viable and important approach.[6] However, due to the fact that identification of many species requires relatively intact botanical specimens including reproductive structures, the method has limited utility across the broader herbal supply chain. Botanical material may lack key diagnostic characters at the time of harvest or the material may be acquired from primary or secondary producers in the form of partially processed, shredded or powdered vegetation, or as a processed liquid extract. In the case of cut and powdered botanical materials, the use of microscopy is often necessary. However, the availability of QC personnel who are adequately trained in microscopy is limited, as are adequate reference materials. [Editor's note: To help meet this growing need, the American Herbal Pharmacopoeia will be publishing an extensive microscopy text soon.]

Identification using Phytochemistry

An alternative to the morphology-based method of identification uses a comparison of the sample's phytochemistry to that of a reference standard created from botanical reference material of documented identity. In this widely used approach, well-established chemical separation techniques provide a profile that is characteristic of a species. Methods such as thin-layer chromatography (TLC) and high-performance liquid chromatography (HPLC) separate the constituent natural chemical compounds into distinctive profiles.[7,8] Other techniques such as mass spectroscopy (MS) and nuclear magnetic resonance (NMR) can provide distinct profiles without necessarily identifying individual phytochemical compounds.[9] The presence of a specific profile indicating the levels of various compounds in comparison to a species' reference standard provides a common basis for a confirmatory test of identification.[2]

Phytochemical approaches to botanical characterization are essential for investigating the presence and concentration of naturally-occurring chemical constituents in botanical materials and can also be used to help detect the presence (or absence) of adulterants and/or contaminants (e.g., heavy metals, pesticides, undisclosed pharmaceutical drugs, etc.). However, complete reliance on chemical profiles for herbal identification and QA/QC remains problematic; such methods have certain limitations.

The production and accumulation of secondary metabolites is a natural process in plants—a process that is dependent on the interaction of a plant's genotype and its growing conditions. The genetic composition of an individual plant defines its ability to create specific compounds.[10,11] However, the same plant will produce different levels of secondary metabolites from year to year based on the season's rainfall, temperature, nutrient availability, and other environmental factors.[12-14] The combined effect of these environmental and genetic variables creates a source of notable variation in the presence and concentration of natural compounds within members of a species, such as from plant to plant or population to population.[15-19] From a taxonomic perspective, the reliance on features (i.e., marker compounds) that may exhibit such wide variation creates a risk for applying the wrong name to a substrate or improperly authenticating botanical material.

Additionally, the use of marker compounds may be problematic in situations where the taxonomic range of the compound's occurrence is not well understood. Related species potentially substituted for a given botanical may not

The adoption and integration of nucleotide sequence-based methods of botanical identification could significantly improve the available set of quality assurance tools for stakeholders in the herbal dietary supplement industry.

have been thoroughly evaluated to determine if they possess similar chemistry. Investigation into the production of secondary compounds in plants is an active area of research among many members of the botanical community, but definitive data are not yet available on the full suite of natural compounds that each botanical species possesses. Therefore, use of marker compounds as a diagnostic indicator in the absence of definitive comparative data also may lead to inappropriate taxonomic diagnoses.[1,20]

Identification using Nucleotide Sequences

The use of DNA sequence data for identity testing of plants has the potential to markedly improve QA and QC for herbal dietary ingredients.[21-24] Plants contain DNA in 3 cellular compartments: the nucleus, chloroplast, and mitochondrion. Specific stretches of DNA contained in these genomes, particularly in areas of the chloroplast and nuclear genomes, are useful for identification.

Over the last 10 to 15 years, various approaches using nucleotide data have been developed to help characterize variation within plant populations and plant species.[21,23] Many of these methods have relied on the use of DNA fragments (as opposed to specific DNA sequences) to characterize or define differences among individuals, populations, or species. Methods such as restriction fragment length polymorphisms (RFLP), randomly amplified polymorphic DNA (RAPD), or amplified fragment length polymorphisms (AFLP), are used to amplify numerous randomly located sections of an individual's genome. These fragments are separated by gel electrophoresis to determine their length. DNA fragments of given lengths are the characters used to compare samples to each other or to reference materials. The overall genetic similarity between 2 samples is determined by the degree to which they share fragments of identical lengths, although it is normal for some variation to occur within and among species.

Without prior knowledge of the name of the substrate being tested and an existing reference library for fragment analysis, the broader applicability of DNA fragment-based analytical approaches to botanical identity testing is limited. Furthermore, these methods work best with samples consisting of fresh material comprised of a single species. In practice, many herbal preparations consist of more than one species and often contain degraded DNA that does not meet the rather stringent requirements for accurate and reliable analysis using fragment-based analytical approaches.

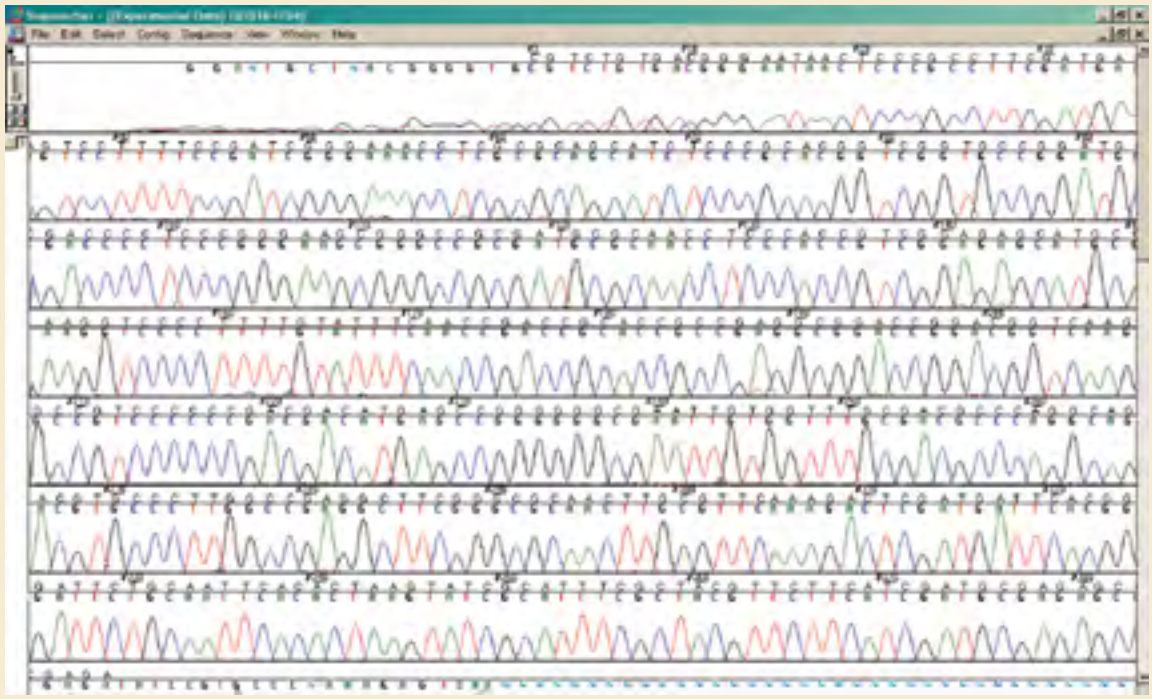
A more robust technique for botanical identification relies on the use of specific DNA sequences to uniquely characterize and differentiate plant material.[25] The specific sequence composition of select regions of DNA, as opposed to its overall length, is effective for identifying or discriminating among botanical species, varieties, populations, and even individual plants. Imagine trying to use the length of a telephone number to differentiate between several people in a phone list. However, when the individual numbers are used to dial a contact, each person can be specifically reached. The same model can be applied when trying to understand how individual sequences can be used to differentiate plants. In the case of DNA, 4 types of bases (adenine, thymine, guanine, and cytosine, symbolized by A, T, G, and C, respectively) constitute a plant's DNA sequence in the same way that 10 numerals are available to compose a person's telephone number. The arrangement or order of these bases, rather than the number of characters that make up the sequence, can accurately identify the plant material. Also, just as longer phone numbers have been adopted by the Bell system to accommodate a need to identify more callers, longer nucleotide sequences can be used to differentiate plants.

Over the last 10 to 15 years, various approaches using nucleotide data have been developed to help characterize variation within plant populations and plant species.

The term *DNA barcode* has been used to describe DNA sequences that can uniquely identify a species.[26,27] Enthusiastic supporters of DNA barcodes imagine a framework where all plants can be quickly identified using a well-defined set of DNA sequence data.[28] However, critics of DNA barcodes are concerned that this approach is too simplistic and fails to accurately classify all botanical species.[29,30] Often these debates become charged with theoretical implications that may never be tested in real-world applications. In the interest of side-stepping the DNA barcode debate, a practical solution is proposed for the identification of plants associated with herbal dietary supplements that employs the use of DNA sequence data within a broader molecular systematic context—a framework that avoids the potential pitfalls of simple DNA barcodes[31] by using DNA sequence data in a more comprehensive phylogenetic system to identify targets and differentiate them from their closest relatives.[32,33]

The fundamental utility of DNA data in molecular systematic applications, such as inferring evolutionary relationships or identity determination, relies on the basic principles of inheritance where, in most cases, exact copies of DNA are passed from one generation to the next. In rare instances, mutations or mistakes in DNA replication occur during gametogenesis, or the process that creates sex cells. Mutations can take many forms, including the substitution, deletion, or insertion of one or more nucleotides, as well as the repetition or inversion of 2 or more nucleotides at any given location. Generally speaking, a new mutation that arises in the sex cells of plants is passed on to offspring by sexual reproduction. If the mutation is not lethal, the offspring may mature and pass the mutation to its progeny. The rate at which any new mutation spreads through a population depends on the many forces associated with natural selection. Over time and many generations, a new mutation may spread to all members of a population, and much later still, occur in all members of a species.

The older a mutation is in an evolutionary sense, the



Nucleotide sequence data can be used to uniquely identify different types of herbs. DNA sequencing chromatograms, similar to the one shown here for the nuclear encoded Internal Transcribed Spacer (ITS) region of *Ephedra sinica,* are used to determine the composition of each herb's unique genetic code.

deeper it will occur in a lineage of plants. For example, a mutation may be shared by all members of the same genus or family of plants. Discovering and noting these mutations helps to classify plants using molecular systematics. In this approach, plants that share mutations of the same origin are classified together. The more mutations that are shared, the more evolutionary history is in common among the organisms.

The goal of a DNA sequence-based approach for any identity related application in the herbal industry is to exploit the mutations that are shared across one species, variety, or population but are absent from their closest relatives. This task is relatively simple in lineages like ginkgo (*Gingko biloba*, Ginkgoaceae), where a single species represents an ancient lineage that has no closely related living relatives. However, the work becomes more difficult, but tractable, in closely related species with apparently shorter evolutionary histories, such as those observed in several genera of grasses and many other flowering plants.

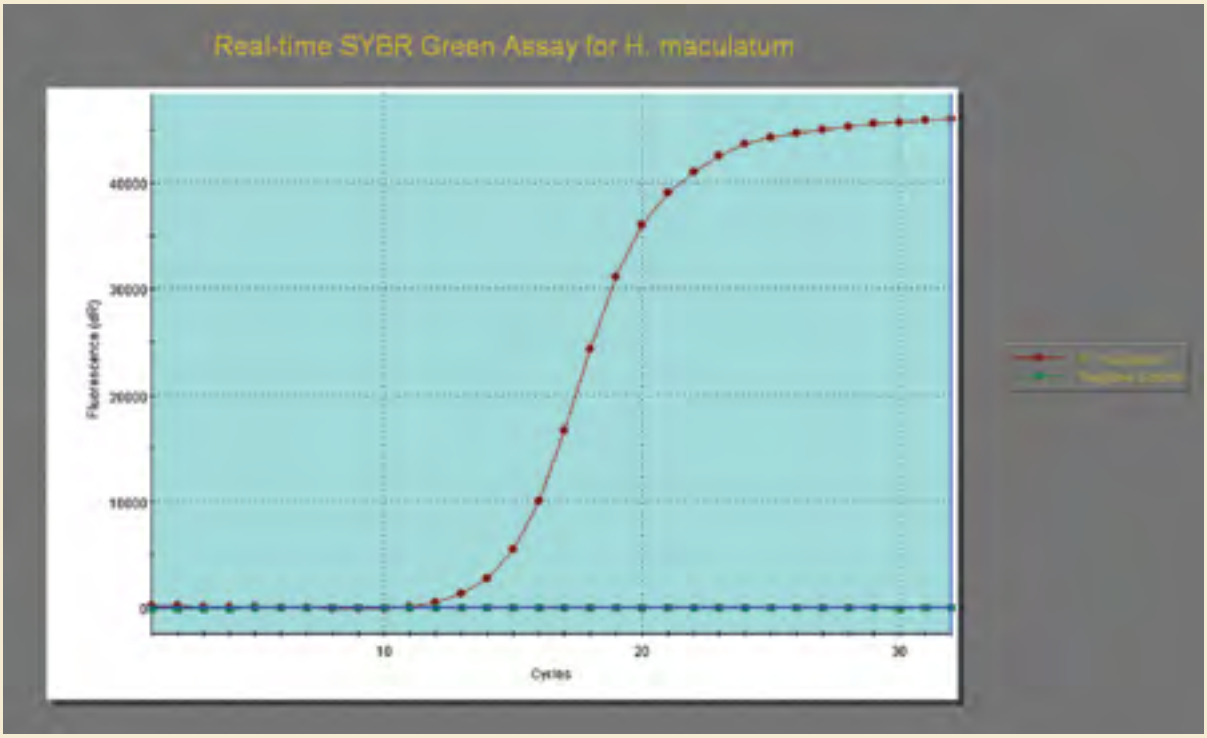
The idea to include or exclude an individual plant from a particular taxonomic group based on its underlying DNA mutations is a common practice in biological systematics.[32-36] Performing the work of DNA-based analysis on herbal specimens is similar to putting this taxonomic approach into practice for industry stakeholders. The task of sorting through numerous vouchered specimens and choosing genes and nucleotide sequences that adequately delineate the taxonomic boundaries for each herb will take time and continued effort. Overall, this DNA-based systematic endeavor aims to adequately recognize important differences between plants of interest and their closest relatives, as well as exceed the established limits of DNA barcoding.[31]

Overview of the DNA-Based Approach

Methods for determining DNA sequence data from plants have been perfected and are now routinely performed in many laboratories around the world.[25] The general method includes 3 main steps: (1) Disruption of cell membranes, followed by isolation and purification of the nucleic acids; (2) Amplification of targeted sequence regions in the purified DNA using the polymerase chain reaction; and (3) Sanger sequencing of the amplified product. Once the DNA sequence data have been determined, identity testing can be performed by comparing the test sample sequence data to the sequence data from reference samples.

Hundreds of thousands of reference DNA sequences are maintained in the National Institutes of Health Genbank database (www.ncbi.nlm.nih.gov/Genbank). Nucleotide sequence data from unknown botanical samples can be quickly characterized by using the online comparative tool BLAST (the Basic Local Alignment Search Tool).[37] The BLAST program identifies sequences in the Genbank database that are most similar to the test sequence by applying a statistical measure of similarity between reference nucleotide data and the test data. Once the most similar Genbank sequences are identified, phylogenetic analysis can be performed using a combined dataset comprised of Genbank and test sample data. This process can quickly characterize unknown or unnamed samples by identifying well-characterized close relatives of the material. If further analysis of the unnamed sample is required, more DNA sequences can be added to the dataset using reference sequences from other members of the unnamed plant's taxonomic group, which was defined by the initial round of testing.

Despite the unparalleled utility that Genbank offers for



Technological advances in DNA-based laboratory procedures allow rapid detection of possible adulterants or plants that are easily confused with common herbs of commerce. Real-time assays, such as the one presented here, which uses fluorescent SYBR Green dye, are useful for cost-effectively screening herbal samples for the presence of specific plants. In this assay, the species *Hypericum maculatum* (a potential adulterant of *H. perforatum* [St. John's wort]) has been detected in a mixture of herbs. The curve of the red line indicates that *H. maculatum* was present in the sample, while the flat-line aspect of the green line indicates its absence in the negative control.

comparative analysis, a relatively small fraction of its data have imperfections stemming from occasional laboratory errors or improperly labeled specimens.[38] Depending on the specific implications of any final analysis, individual taxonomic diagnoses should be confirmed using properly verified data from vouchered reference specimens. (Readers should note that the Genbank application discussed here is for purposes of characterizing samples of unknown identity, such as potential adulterants, trace contaminants containing DNA [i.e., plants, animals, fungi, protozoa] or samples that simply became disconnected from their label.)

The Practical Utility of DNA in Herbal Samples

Nucleotide sequence-based approaches appear to successfully overcome many of the shortcomings associated with morphological and chemical identification techniques, including identification of both single element and mixture preparations. All living plant cells contain DNA and, except for extremely rare events, cells from different portions of a plant (i.e., roots, stems, and leaves) each contain DNA with the same sequences. As such, one plant cell, or a portion of a plant cell, contains adequate DNA for testing and analysis. Very small quantities of plant material are thus required for successful identification of substrates to determine taxonomy. Further, even after treatment in many harsh processing methods, fragments of DNA often are still available for analysis. Examples of successful DNA-based identification have been reported from fossils, pollen, botanical extracts, and refined oils.[39-42]

A number of papers have been published detailing the successful application of DNA-based methods for confirming the identity or purity of herbal products. For instance, the botanical *Hypericum perforatum* (Clusiaceae), or St. Johns wort, is morphologically and chemically similar to other closely related *Hypericum* species, creating analytical challenges for its identification using morphological and phytochemical methods.[1] Howard et al. have shown that DNA-based methods can be used to effectively identify *H. perforatum* in herbal preparations.[43] DNA-based methods also have been used to effectively differentiate the economi-

Examples of successful DNA-based identification have been reported from fossils, pollen, botanical extracts, and refined oils.

St. John's wort *Hypericum perforatum,* is morphologically and chemically similar to other closely related *Hypericum* species. DNA-based methods have been shown to be very effective at accurately identifying *H. perforatum* in herbal preparations. Photo ©2010 Steven Foster

cally important herbs Korean or Chinese ginseng (*Panax ginseng*, Araliaceae) and American ginseng (*P. quinquefolius*), which appear morphologically similar in powdered forms.[44] In support of purity determination for Chinese star anise (*Illicium vernum*, Illiciaceae), DNA sequence data has been shown as a useful tool to detect the presence of its known toxic adulterant Japanese star anise (*I. anisatum*).[45]

Plant mixtures often represent particular challenges to morphological or chemical approaches of confirming identity. Assigning biochemical or morphological attributes that can be used reliably to determine individual botanical mixture components becomes increasingly difficult, if not impossible, as the number of plants contributing to a mixture increases.[46]

DNA-based approaches are useful for deconstructing mixtures of 2 or more plants and could become useful for confirming the identity of components in blended herbal products. Recombinant DNA techniques that are applied in microbiology studies and environmental investigations can be applied to the identification of plant mixtures.[47] In these approaches, DNA is extracted from botanical mixtures in the same manner applied to single-element samples, and targeted regions of DNA are amplified from the extracted material. Prior to sequencing the amplified product, individual copies of DNA are combined with longer engineered fragments of DNA called vectors. The joined pieces of DNA are then inserted into bacteria that have been chemically treated and specifically prepared to receive vector DNA, a process called transformation. Generally, the engineered fragment of DNA will contain a gene that confers resistance to antibiotic drugs, e.g., kanamycin or ampicillin. Successfully transformed bacteria are plated onto a nutrient agar plate containing kanamycin or ampicillin. Bacteria that contain a vector (and the gene for antibiotic resistance) will grow, with each surviving colony representing one fragment of DNA amplified from the original sample mixture. The process is completed when the vector is purified from each bacterial colony and sequenced. Using this approach, botanical species present in any meaningful concentration can be detected in a mixture of 2 or more plants. The ratio of plants in each sample indicates how many colonies need to be screened to give a high likelihood of obtaining a sequence from each plant in the mixture.

The time and cost surrounding DNA-based analytical techniques have steadily decreased over the last 20 years. Procedures and nucleotide sequence data collection methods that once required days or weeks can now be completed in hours. Technological advances, such as robotics, have also increased levels of laboratory productivity, which allow fewer technicians to process more samples. Furthermore, the world's schools of higher learning continue to produce botanists that are trained in molecular systematics and laboratory sciences—permitting competition to foster a continued trend toward faster and lower-cost DNA-based herbal test-

Chinese Star Anise *Illicium vernum*, can be declared pure and without the presence of Japanese star anise, a known toxic adulterant, through DNA testing. Photo ©2010 Steven Foster

ing services. Today, routine DNA-based analytical testing can be performed in a timely manner with service pricing in the neighborhood of morphological and phytochemical methods.

Identity Testing vs. Quality Determination

The availability of DNA-based identity testing procedures for plants used in herbal dietary supplements provides an expanded paradigm that may distinguish botanical ingredient identity from botanical ingredient quality. The preponderance of processed botanical material in the herbal supply chain precludes the broader, reliable application of morphology-based identity testing, and by default the herbal community relies largely on phytochemical measurements to ascertain sample identity. However, the scientific literature indicates that biochemical profiles are not ideal as a routine measure of identity, due to the inherent variation in the production of secondary compounds,[12,48] the possibility of diagnostic indicator compounds occurring in more than one botanical species,[1,20] as well as the occurrence of botanical mixtures in many herbal preparations.[46,49]

The adoption and integration of DNA-based testing by the herbal dietary supplement community can provide an independent, sensitive, and specific means to ascertain the specific identity of botanical materials, addressing the FDA's fundamental requirement for herbal product ingredient identification.

The opportunity to remove the ambiguity associated with botanical ingredient identity will allow members of the herbal dietary supplement community to more prominently recognize 2 distinct attributes of herbal ingredients: identity as well as quality. The combination of DNA-based identification (or, where possible, morphology-based authentication) complemented by measurements of biochemical compound concentration contained in a particular lot of raw material would be especially beneficial. These correlated but distinct measures will provide stakeholders with well-defined tools to discriminate and understand differences between physically similar sets of raw materials. HG

Matt Cimino, PhD, is a practicing molecular systematist and the DNA laboratory director at Stoney Forensic, Inc. in Chantilly, Virginia.

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European Union Prepares for Full Enforcement of Traditional Herbal Medicine Regulations

Controversy and confusion grow in United Kingdom

In less than one year, consumers across the European Union will have access only to herbal medicines that have obtained a product license or registration.[1] Beginning in April of 2011, if an herbal product is considered a medicine and has not received traditional-use registration or full marketing authorization, it will be taken off the shelves of pharmacies, stores, and practitioners' businesses.

This enforcement is based on the Traditional Herbal Medicinal Products Directive (THMPD), which the European Union adopted in 2004 as an amendment to earlier medicines legislation (EU Directive 2001/83/EC) requiring all human medicines—ranging from pharmaceuticals to herbal medicines—to obtain full marketing authorization.[2,3] The THMPD is meant to provide a simplified registration process for traditionally-used herbal medicines that do not meet the stringent efficacy standards for obtaining marketing authorization as medicines.

In order to obtain traditional herbal registration (THR), the herbal medicine must meet the safety and quality standards required for all fully-licensed medicines, including good manufacturing practices (GMPs) and pharmacovigilance (adverse event reporting). Instead of requiring evidence of efficacy, manufacturers of these products must provide evidence of a minimum of 30 years of traditional use, with at least 15 of these years having taken place within the European Union. The product must also be traditionally prepared and used (although in some cases, preparations other than traditional macerations and infusions, e.g., complex extracts, are allowed if the herbal product has been on the EU market for more than 15 years).

Traditional-registered herbal medicines must feature statements on their labels and in advertisements noting that any health claims are based on traditional usage.[1,2] Herbal medicines supported by strong scientific evidence that wish to use strong claims, on the other hand, may do so by obtaining full marketing authorization after meeting the requirements outlined in EU Directive 2001/83/EC. Herbal products not classified as medicines* can be marketed as foods, food supplements, or ingredients of functional foods or cosmetics; such products are not allowed to use any medicinal claims.

Acronyms Used in this Article

ANH:	Alliance for Natural Health
CNHC:	Complementary and Natural Healthcare Council
CPHM:	Campaign for the Protection of Herbal Medicine
DH:	UK Department of Health
EC:	European Commission
EHTPA:	European Herbal and Traditional Practitioners Association
MHRA:	Medicines and Healthcare products Regulatory Agency
PFIH:	Prince's Foundation for Integrated Health
RCP:	Royal College of Physicians
THMPD:	Traditional Herbal Medicinal Products Directive
THR:	traditional herbal registration

Effects on Consumers and Practitioners

In the introduction of *A Practical Guide to Licensing Herbal Medicinal Products*, Elizabeth M. Williamson, PhD, director of pharmacy practice at the University of Reading, writes that the THMPD will benefit patients *and* practitioners.[1] Although traditionally-registered products are restricted to making general claims, the registration process serves as a good option for products that do not meet the requirements for full marketing authorization as medicines, as it allows them to use more expansive claims than those permitted for food supplements. She writes that "for a reputable manufacturer, there seems to be little point in trying to avoid registration, and much to be gained from complying with these standards and being rewarded with the certificate of registration and the authority it provides."

But according to the Alliance for Natural Health (ANH), a legal and scientific policy organization, the THMPD is resoundingly negative as it discriminates against non-European cultures and could "effectively steam-roller ancient and effective medicine cultures," such as Traditional Chinese Medicine (TCM) and Ayurveda, "out of existence."[4]

"It's not just a question of cost, which obviously impacts smaller companies much more than larger ones—it's also that some of the requirements are simply very difficult to meet from a technical perspective, especially for complex herbal products typical of these traditions," said Robert Verkerk, PhD, founder of ANH. Dr. Verkerk noted that no Ayurvedic or TCM products have obtained a THR thus far.

A September 2008 report from the European Commission (EC) echoed this sentiment.[5] The EC said that some of these products are not appropriate candidates to apply for a THR because they can sometimes consist of several non-herbal components, be administered by injection, require practitioner supervision, be used to treat serious diseases, and lack evidence of 15 years of traditional use within the European Union.

Dr. Verkerk also claims the THMPD has negatively impacted other herbal manufacturers.

"For many [manufacturers] who have thus far been successful in getting registrations, these registrations represent only a small or very small proportion of their full product range," he said. "For most companies, the [Directive] represents too big an obstacle and they have to make do with continuing to sell botanical food supplements." In March of 2010, ANH announced its intentions to take legal action challenging the THMPD.

*Article I of EU Directive 2001/83/EC defines a medicinal product as "any substance or combination of substances presented for treating or preventing disease in human beings," or "any substance or combination of substances which may be administered to human beings with a view to making a medical diagnosis or to restoring, correcting, or modifying physiological functions in human beings."

The UK-based Herb Society, an herbal education organization, has likewise said that the expensive cost might cause many popular herbal medicines to become unavailable.[6] The Herb Society also claims that promising new herbs with less than 30 years of traditional use might be taken off the market, and that the availability of herbs imported from the United States and other countries could decrease because they are not manufactured under the same regulations/licensing requirements. But, like Dr. Williamson, the Herb Society also recognizes that THMPD could establish a legal basis for herbal medicine and improve the quality of over-the-counter (OTC) herbal medicines.

Controversy in the United Kingdom

In the United Kingdom, 105 THR applications have been submitted and 48 have been granted for products containing such herbs as the root and rhizome of rhodiola (*Rhodiola rosea*, Crassulaceae), the rhizome of black cohosh (*Actaea racemosa*, Ranunculaceae; syn. *Cimicifuga racemosa*,) and the root of echinacea (*Echinacea angustifolia*, Asteraceae), among others.[7] The current majority of UK herbal medicines, however, remain unlicensed.[1]

While most UK groups agree that many herbal remedies will have difficulty in obtaining a THR, a particularly heated disagreement has arisen, centering on whether statutory regulation of herbal practitioners will enable them to continue supplying *unlicensed* herbal medicines.

According to Michael McIntyre, chair of the European Herbal and Traditional Practitioners Association (EHTPA), EU Directive 2001/83/EC will make it impossible for herbalists to commission unlicensed, finished herbal prescriptions made by third-party suppliers unless they gain "authorized health professional" status via statutory regulation (e-mail, February 22, 2010).

Often called "specials," these medicines are used to meet the special needs of individual patients and are often made of complex mixtures and sent directly from the third party to the patient. Many Western herbalists do not have the room for an herbal pharmacy on their own premises to make their own remedies, and they have therefore depended on third-party commission services over the past 30 years, said McIntyre. Additionally, commissioning special prescriptions from third parties is essential as it is the only way Ayurvedic and TCM practitioners can legally supply their patients with manufactured complex remedies, he continued.

"The fundamental problem for practitioners who see patients face-to-face is that THR remedies are not sufficiently flexible or precise enough to enable the practitioner to treat a range of conditions on an individual basis," he said. "THR products would not answer the specific needs of these individual patients."

Representatives of the UK's Medicines and Healthcare products Regulatory Agency (MHRA) confirmed that herbal practitioners would not be able to use third-party services beginning in April 2011 unless a national arrangement is made to consider them authorized health professionals through systematic professional regulation and accountability (J. Kyne, F. Palmer, e-mail, February 17-19, 2010). The representatives noted that this does not apply to remedies made by the practitioner on his or her own premises, as these are considered non-industrial medicines and can be dispensed unlicensed.

The majority of the UK's herbal profession, including various alternative medicine organizations such as the EHTPA, supports statutory regulation of herbalists. The Prince's Foundation for Integrated Health (PFIH) has said that if herbalists and TCM practitioners are prevented from prescribing many herbal medicines due to unauthorized status, then customers will seek such medicines on a dangerous black market of bogus practitioners or Internet retailers.[8]

A particularly heated disagreement has arisen, centering on whether statutory regulation of herbal practitioners will enable them to continue supplying *unlicensed* herbal medicines.

According to McIntyre, without statutory regulations, anyone who calls themselves an herbalist can prepare remedies on their own premises and practice on patients. He noted the recent criminal trial of a TCM practitioner who, allegedly unknowingly, prescribed medicines containing aristolochic acid, a nephrotoxic and carcinogenic substance from the genus *Aristolochia* (Aristolochiaceae), to a woman who later developed kidney failure and cancer. (The use of products containing the ingredient *Aristolochia* is banned in the United Kingdom.)

"In these circumstances it is difficult for the public to distinguish between the good, the bad, and the ugly," said McIntyre.

Other organizations, however, disagree on the value of statutory regulation of herbalists. The Campaign for the Protection of Herbal Medicine (CPHM), an alliance of herbal medicine practitioners, patients, and retailers, has stated that herbalism is already a legitimate profession and does not need statutory regulation. According to Jennifer Wharam, ND, co-founder of CPHM, herbalism is safe and statutory regulation would not increase safety. And while THMPD might cause some difficulties for Ayurvedic and TCM practitioners, statutory regulation is not the answer (e-mail, February-April 2010).

"It is not impossible for these practitioners to prepare the medicines themselves, in which case it will mean more work in their practice but will provide access to the medicines without the need for regulation," she said.

The UK's Royal College of Physicians (RCP), meanwhile, claims that statutory regulation would be "completely inappropriate" for disciplines of complementary therapy "whose therapies are neither of proven benefit nor appropriately tested."[9] According to RCP, statutory regulation would imply that these modalities are as safe, effective, and have as much evidence as conventional medicine, potentially increasing the possibility of harm. RCP states that acupuncture should be statutorily-regulated but that herbalism and TCM should be self-regulated by professional associations.

Further enflaming the debate, the UK Department of Health (DH) announced on April 1, 2010, that it plans to "legislate to ensure that all practitioners supplying unlicensed herbal medicines to members of the public in England must be registered with the Complementary and Natural Healthcare Council (CNHC)."[10]

"Emerging evidence clearly demonstrates that the public needs better protection, but in a way that is measured and does not place unreasonable extra burdens on practitioners," said UK Health Secretary Andy Burnham in a press release. "I believe that the introduction of such a register will increase public protection, but without the full trappings of professional recognition which are applied to practitioners of orthodox healthcare." Separate measures will later be enacted to protect those who use acupuncture, Burnham added.

According to DH Press Officer Julia Harris, any details of this decision are not yet available and will be worked through by CNHC, professional members, and associated stakeholders. She confirmed, however, that this is *not* intended to be statutory regulation (e-mail, April 1, 2010).

McIntyre disagrees with DH's recently-announced plan and said that because it does not provide statutory regulation, the public will lose access to properly regulated herbalists and a wide range of herbal medicines.[11] (It remained unconfirmed at press time if registering with CNHC would or would not fulfill the "authorized healthcare practitioner" requirements of EU Directive 2001/83/EC. Most parties currently presume that it will not, as CNHC registers practitioners on an entirely voluntary basis.)

CPHM, however, welcomed the recent DH announcement.

"The initial reaction of [CPHM] has been one of great surprise and relief," said Dr. Wharam. "With information given so far, this is a much better outcome than the statutory regulation that was being considered. We provide a different model of healthcare which enables people to have freedom of choice and excellent one-to-one treatment. We want this to continue. As always, 'the devil is in the detail,' and the release of Mr. Burnham's statement is just the beginning of unraveling the decisions put forward by government." HG

—Lindsay Stafford

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Herbal Supplement Sales Rise in All Channels in 2009

By Courtney Cavaliere, Patrick Rea, Mary Ellen Lynch, and Mark Blumenthal

Sales of herbal and botanical dietary supplements in the United States rose by a relatively large amount in 2009, according to data gathered from market research firms. Information Resources Inc. (IRI) found that herbal supplement sales growth in the mainstream market channel in 2009 was about double that of 2008,[1] and SPINS has reported moderate growth in botanical supplement sales in the health and natural food stores sector.[2] *Nutrition Business Journal* (NBJ), meanwhile, has pooled various primary and secondary data sources and determined that total estimated herb sales in all channels of the US market rose by 4.8% in 2009 (see Table 1).

Herbal dietary supplements are sold in the United States through a variety of market channels, including health and natural food stores; food, drug, and mass market (FDM) retailers; warehouse and convenience stores; mail order, radio, and television direct sales; Internet sales; network or multi-level marketing (MLM) companies; health professionals in their offices (e.g., acupuncturists, chiropractors, naturopaths, some conventional physicians, massage therapists); and others. While market data companies are able to generate relatively accurate data of herbal dietary supplement sales for some market channels through cash register and computer scanning records, most channels do not have such tracking capabilities and are estimated with a lesser degree of accuracy. However, by pooling various sources of available data and modeling the remaining multi-channel firms, NBJ has arrived at a total *estimated* figure for all US herbal dietary supplement sales in 2009 of $5,030,000,000.

According to data supplied by IRI of Chicago, Illinois, sales of herbal dietary supplements in the FDM channel increased by about 14.4% in 2009 from 2008 sales, for a total figure of $335,585,700.[1] However, the IRI data does not represent the entire FDM channel, as it does not include sales reports from Wal-Mart, Sam's Club and other large warehouse buying clubs, or from convenience stores.

Previous statistics from IRI found that sales of herbal supplements increased for the first time in the FDM channel in 2007, after showing steady decreases for several years.[3] Sales of herbal supplements increased by 7.6% in 2007 over the preceding year, then increased by 7.2% in 2008. This year's IRI data seems particularly significant as sales of herbal supplements from mainstream market retailers have reached double-digit growth.[1] The 20 top-selling single herbal dietary supplements within the FDM channel, as determined by IRI, are listed in Table 2.

Cranberry (*Vaccinium macrocarpon*, Ericaceae) supplements, which were the top-selling herbal supplement product within the FDM channel in 2008, have remained the leader in this category for 2009. Sales of cranberry supplements rose by 23.3% in 2009. Sales of milk thistle (*Silybum marianum*, Asteraceae), green tea (*Camellia sinensis,* Theaceae), and ginger (*Zingiber officinale*, Zingiberaceae) supplements also made significant strides in the FDM channel, whereas sales of horse chestnut seed (*Aesculus hippocastanum*, Hippocastanaceae) continued to decrease in 2009.[1]

The market information firm SPINS of Schaumburg, Illinois, meanwhile, has determined that sales of botanical dietary supplements in the natural and health foods channel increased by 4.5% in 2009 from 2008 sales, for a total of $249,664,836.[2] SPINS collects data on supplement sales from a variety of natural and health foods retailers. As with IRI's data, however, the SPINS data does not represent the entire natural and health foods channel; in particular, it does not include sales data from the natural foods retailer Whole Foods. (In previous years, SPINS estimated sales from Whole Foods using an algorithm. SPINS, however, has discontinued its Whole Foods estimation. Data from SPINS in the previous *HerbalGram* market report [published in issue 82] *did* include a Whole Foods estimation,[3] which is why SPINS' 2008 data published in *HerbalGram* 82 and in this market report will appear dissimilar.)

The 20 top-selling botanical dietary supplements within the natural and health foods channel, as determined by SPINS, are listed in Table 3. According to SPINS, aloe (*Aloe vera*, Liliaceae) supplements were the top-selling botanical supplements within the natural and health foods channel. The so-called "superfruit" supplement açaí (*Euterpe oleracea*, Arecaceae), meanwhile, again experienced a particularly significant increase in sales in this market channel. Sales of açaí rose 120.5% in 2008 over the previous year, and the supplement has exceeded this growth in 2009 with a 133.1% increase over 2008 sales. Turmeric (*Curcuma longa,* Zingiberaceae) is another botanical supplement that enjoyed significant

Table 1. Total Estimated Herb Sales in All Channels, 1999—2009

Year	$ Total Sales (millions)	% Increase (-decrease)
1999	4,110	2.7%
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%

Source: Nutrition Business Journal, www.nutritionbusiness.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 2009 (per IRI)*

Common Name	Latin Name	$2009 Sales (USD)	% Change 2008
1. Cranberry	*Vaccinium macrocarpon*	31,314,220	23.28
2. Soy	*Glycine max*	19,647,980	-12.35
3. Saw Palmetto	*Serenoa repens*	18,813,300	7.09
4. Garlic	*Allium sativum*	17,908,530	-7.66
5. Echinacea	*Echinacea* spp.	16,230,560	6.94
6. Ginkgo	*Ginkgo biloba*	16,011,830	-8.10
7. Milk Thistle	*Silybum marianum*	11,162,670	19.72
8. St. John's wort	*Hypericum perforatum*	8,758,233	5.90
9. Ginseng†	*Panax ginseng*	8,292,474	1.65
10. Black Cohosh	*Actaea racemosa*‡	8,123,878	-0.29
11. Green Tea	*Camellia sinensis*	6,715,113	21.71
12. Evening Primrose	*Oenothera biennis*	4,259,037	9.17
13. Valerian	*Valeriana officinalis*	4,142,234	24.76
14. Horny Goat Weed	*Epimedium* spp.	2,819,403	16.94
15. Bilberry	*Vaccinium myrtillus*	1,983,723	7.41
16. Elderberry	*Sambucus nigra*	1,837,587	-0.42
17. Grape Seed	*Vitis vinifera*	1,783,874	-3.78
18. Ginger	*Zingiber officinale*	1,183,641	24.81
19. Aloe vera	*Aloe vera*	646,164	-4.81
20. Horse chestnut seed	*Aesculus hippocastanum*	558,946	-28.79
Total All Herb Sales (including herbs not shown)		**$335,585,700**	**14.38**

*Source: Information Resources Inc., FDM Market Sales Data for Herbal Supplements, 52 weeks ending December 27, 2009.
†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*).
‡Synonym: *Cimicifuga racemosa*.

growth in 2009 in this channel.

Herbal supplements for the treatment of colds and flu seemed to be big sellers in 2009, probably due in part to media focus and global concern regarding the Influenza A(H1N1) virus (aka "swine flu") during 2009. Sales of echinacea (*Echinacea* spp., Asteraceae) increased in both the FDM and natural and health foods channels during 2009. Elderberry (*Sambucus nigra*, Caprifoliaceae) supplement sales grew by nearly 50% in the natural and health foods channel, while elderberry remained relatively stable in the FDM channel. Although not a top-20 botanical supplement, the immune-modulating herb astragalus (*Astragalus membranaceus,* Fabaceae) also experienced a rise in sales in the natural and health foods channel in 2009, with a 27.7% increase over 2008 sales.

In reviewing the IRI and SPINS data, it bears emphasis that market research companies use different definitions and coding techniques to compile and analyze data on a particular topic. Therefore, data from IRI on botanical supplement sales in the FDM channel and data from SPINS on botanical supplement sales

Table 3. The 20 Top-Selling Botanical Dietary Supplements in the Natural and Health Foods Channel in the United States for 2009 (per SPINS)*

Common Name	Latin Name	$2009 Sales (USD)	% Change 2008
1. Aloe vera	*Aloe vera*	21,853,391	6.27
2. Flaxseed and/or Oil	*Linum usitatissimum*	20,776,836	-6.90
3. Wheat or Barley Grass	*Triticum aestivum* or *Hordeum vulgare*	13,243,966	2.34
4. Açaí	*Euterpe oleracea*	10,413,011	133.06
5. Turmeric	*Curcuma longa*	10,199,020	22.70
6. Milk Thistle	*Silybum marianum*	9,387,702	-5.14
7. Stevia	*Stevia rebaudiana*	8,834,816	3.50
8. Elderberry	*Sambucus nigra*	6,850,969	49.27
9. Saw Palmetto	*Serenoa repens*	6,660,475	-2.18
10. Echinacea	*Echinacea* spp.	6,583,991	11.26
11. Garlic	*Allium sativum*	5,538,815	-11.38
12. Echinacea with Goldenseal Combination	*Echinacea* spp. and *Hydrastis canadensis*	5,017,058	8.44
13. Oregano Oil	*Origanum vulgare*	4,704,920	6.56
14. Valerian	*Valeriana officinalis*	4,613,969	4.26
15. Ginkgo	*Ginkgo biloba*	4,276,489	-8.71
16. Chlorophyll/Chlorella	*Chlorophytum arundinaceum*	3,960,091	-2.01
17. Black Cohosh	*Actaea racemosa*†	3,645,883	3.23
18. Cranberry	*Vaccinium macrocarpon*	3,579,839	4.20
19. Evening Primrose	*Oenothera biennis*	3,102,840	-3.20
20. Green Tea	*Camellia sinensis*	2,915,369	5.98
Total All Herb Sales (including herbs not shown)		**$249,664,836**	**4.48**

*Source: SPINSscan Natural, 52 weeks ending December 26, 2009 and year ago, SPINS defined herbal category.
†Synonym: *Cimicifuga racemosa*.

Table 4. Herb Sales by Category in All Channels: Singles (Monopreparations) vs. Combinations

	2005		2006		2007		2008		2009	
	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth	$ Sales (millions)	% Growth
Total Single Herbs	2,742	0.9%	2,912	6.2%	3,047	4.6%	3,093	1.5%	3,289	6.3%
Total Combination Herbs	1,639	4.2%	1,649	0.6%	1,712	3.8%	1,707	-0.3%	1,741	2.0%
Total Herbs	**4,381**	2.1%	**4,561**	4.1%	**4,759**	4.3%	**4,800**	0.9%	**5,030**	4.8%

Source: Nutrition Business Journal, www.nutritionbusinessjournal.com

Table 5. Herb Sales by Channel for 2008 & 2009

	2008 $ Sales (millions)	2009 $ Sales (millions)	% Increase (-decrease)	Estimated 2009 Market Share
Mass Market*	764	878	14.9%	17.5%
Natural & Health Food†	1,560	1,639	5.1%	32.6%
Direct Sales‡	2,476	2,513	1.5%	50.0%
Total	**4,800**	**5,030**	**4.8%**	100%

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 includes supplement and specialty retail outlets, including Whole Foods, GNC, sports nutrition stores, etc.

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

in the natural and health foods channel—though both considered reliable statistics and important for understanding the herbal market—may not be directly comparable. The 2 market research firms categorize products differently and do not necessarily include the same products in their data of herbal supplement sales. For example, some of the leading products noted by SPINS as top-selling botanical supplements (including flaxseed [*Linum usitatissimum,* Linaceae] and stevia [*Stevia rebaudiana,* Asteraceae]) are not classified as individual herbal supplements in IRI's data for the FDM channel. Likewise, NBJ's total estimated figure for herbal supplement sales may or may not include some herbal/botanical supplements contained within the data of IRI and/or SPINS.

Sales of single herbal dietary supplements (monopreparations) grew by 6.3%, and sales of combination herbal supplements increased by 2% in 2009, according to data from NBJ (see Table 4). Monopreparations typically pull in almost twice as much in sales as combinations.

NBJ data also shows that herbal supplement sales increased in every channel in 2009 (see Table 5). According to NBJ, herbal dietary supplement sales increased in the FDM channel by nearly 15%, in the natural and health foods channel by around 5%, and in the direct sales channel by 1.5%. NBJ's market estimate also indicates that half of all herbal supplement sales occurred through the direct sales channel, followed by 32.6% of sales in the natural and health foods channel and 17.5% in the FDM channel. (NBJ's figures for the FDM and natural and health foods channels do include estimates of sales from Wal-Mart and Whole Foods, in addition to other sources not considered by IRI and SPINS.)

These statistics from NBJ, IRI, and SPINS indicate that the economic downturn may have contributed to sales growth for herbal supplements, as it appears to have done for the dietary supplement industry as a whole. An article published in *Newsweek* in October 2009 noted that stores selling vitamins, minerals, and supplements benefited from the recession due to some Americans exchanging bad and/or expensive habits for healthier ones and from some Americans losing their health insurance and choosing supplements over costly prescriptions.[4] The article also added that baby boomers have grown more obsessed with their health and wellness.

The Natural Marketing Institute (NMI), based in Harleysville, Pennsylvania, conducts annual surveys that reflect attitudes, purchasing trends, and use of supplements by consumers. NMI's US data likewise shows that herbal supplement sales are being impacted by health-consciousness and frugality of the American public. According to Maryellen Molyneaux, president and managing partner of NMI, "In general, consumers are shopping less in natural channel stores and more in food, drug, and mass outlets for all things healthy and natural" (e-mail to C. Cavaliere, March 3, 2010). She explained that users of herbal supplements are often more educated about supplements, and they tend to search out the best deals (at least insofar as pricing is concerned)—which drives them to mass market outlets. Additionally, more mainstream consumers are trying to take control over their health issues. Some of the increase in herbal supplement sales could therefore be explained by more mainstream consumers seeking other options to conventional healthcare for treating and preventing their health concerns, as well as by channel switching among regular herbal supplement users.

"Consumers are looking for less expensive outlets, as 46% of herbal supplement users indicated their purchase behavior changes were manifested in 'purchasing less expensive supplements,' including store brands," said Molyneaux. HG

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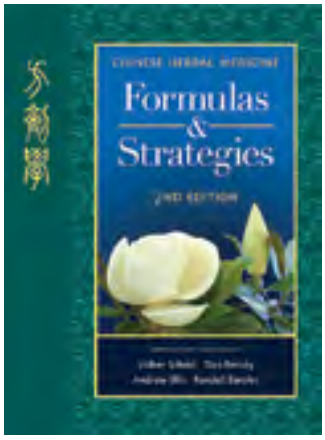
Chinese Herbal Medicine Formulas and Strategies, 2nd edition by Volker Scheid, Dan Bensky, Andrew Ellis and Randall Barolet. Vista, CA: Eastland Press, 2009. Hardcover; 1019 pages. ISBN–13: 978-0939616671. $120.00.

Book reviews often help readers decide whether or not to invest in a book. The subject of this review is an investment both in funds and in time, as it is over a thousand pages, so I will therefore be careful with my enthusiasm.

The first edition of this book came out in 1990 and is on the shelves of thousands of people professionally involved in the field of Chinese medicine. "Formulas and Strategies," as we came to know that first title, was a welcome addition to the limited range of books available to describe Chinese medicine in English. Within about 3 years, most licensed practitioners of Chinese medicine had purchased the book, and it was adopted by numerous colleges of Chinese medicine as the principal text for studying herbal formulas. Its 3 primary strengths were that it relied on a good collection of Chinese source books that had not been translated; it contained competent and sometimes in-depth analysis of the main formulas, going well beyond other texts; and it included details about ingredients, dosage, and method of preparation. Neither the first nor new edition is the sort of book that one sits down and reads from cover to cover. Instead, it is the type of text one uses to looks up individual formulas or specific topics from appropriate sections.



Who should purchase this second edition? Anyone who purchased the older version and plans to use the book more than once or twice a year will likely find this book worth the investment. There are enough major improvements to make this version a "must have" and not merely a more convenient version. For teachers of Chinese herbal medicine, I have not seen any other text that will be as useful as this one for learning about Chinese herbal medicine through study of formulas. People interested in Chinese herbs but not directly involved in the field, however, will likely find this book extremely challenging, and I don't advise it unless one has already encountered and become familiar with the Chinese medicine jargon and Chinese naming systems. Without the professional training, it is hazardous to simply pick through the information to focus on indications or applications of formulas that one might then seek to obtain, skipping over the historical and analytical parts.

The reason I consider the new edition to be so important is that it has been *completely* redone, not just tinkered with to make a few corrections and additions. This edition includes 90 additional principal formulas (a total of 340), all of them easier to locate when scanning the pages or using the indices. While the formulas are still organized according to the standard TCM therapeutic categories, this time they are thankfully presented in the arrangement familiar to practitioners and students. Furthermore, the write-ups for the formulas are far superior. This is said with no disrespect for the work done by the two original authors, Bensky and Barolet, but Scheid and Ellis have helped them to raise this text to a more sophisticated level.

At the beginning of the book, there is more introductory material explaining the categories of therapy, the concepts of Chinese herbalism, and the way in which the information takes on meaning for the practitioner. Those who might simply look up each formula or therapeutic section of interest without reading the introductory chapters will miss out, even with years of experience in this field. While the first edition primarily focused on ancient formulas, the new edition, which has nearly twice as many pages, also brings in a substantial array of formulas described during the past 150 years. This change goes along with a philosophical shift in the field of Chinese medicine as taught in the United States, one which permits greater acceptance of modern influence on the field.

I have picked 2 examples of formula descriptions to show how the second edition overshadows the first: The first formula is *Xin Jia Xiang Ru Yin*, or Newly Augmented Mosla Drink. This formula is intended to treat symptoms not unlike some of the manifestations of the recent epidemic of H1N1 flu, as well as the increasing incidence of "common cold" that occurs in late summer. The formula is included in the first edition book with the same Chinese name, although there it is called Newly Augmented Elscholtzia Decoction. *Elscholtzia* is the genus name for one of the herbs that has been used as a source for the Chinese herb *Xiang Ru*; *Mosla* is the genus name for another herb also used as a source material. They are closely related plants of the family Lamiaceae (the mints). The material on the market today is primarily from *Mosla chinensis*, thus the name change reflects today's greater concern for precisely identifying herb sources. This formula is made by decoction, but the term *yin* is specifically translated in the new edition as *drink*, again providing a more precise description of the formula.

The first edition offers a single paragraph on this formula, whereas the second edition runs nearly a page-and-a-half. Practitioners using the first edition would most likely overlook the formula because it is tacked onto the end (along with 4 other formulas) of a primary formula, *Xiang Ru San*, which gets most of the attention. In the second edition, the formulation is arranged in such a way as to capture the reader's attention.

The second formula is *Bao Chan Wu You Fang*, which is similarly featured. This one is not present at all in the first edition, but in the revised edition it has about a page-and-a-half of text devoted to it. The formula is traced back to a book on women's disorders from 1826, so it is not a new formula. Its English translation grabs attention: "Worry-Free Formula to Protect Birth." This is of special interest to the large number of women who are delaying child bearing, sometimes relying on expensive fertility methods and worried about potential miscarriage, which is more common with pregnancies later in life. The formula is not only for preventing miscarriage, but, purportedly, it helps correct malpositioned fetus and prevent difficult delivery—factors that put the baby at risk. Practitioners may recognize this formulation, which was sold as a pill called *Shi San Tai Bao Wan*, used for the same purposes and best known for the claim of correcting the position of the fetus. The utilization of the formula is given in considerable detail, which is important when considering use of herbs during pregnancy.

For those who have peripheral interest

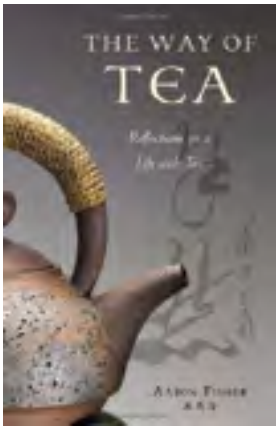
in Chinese medicine, a formula that might help with flu and another that might help with pregnancy seem enticing, but it must be remembered that these are but two of several options, which those who are trained in Traditional Chinese Medicine will have the skills to sort through. And, with these 2 examples, I intend to illustrate that practitioners, teachers, and students who stick to the old version of the book are going to miss too much that could be of help. This new edition will be a fine addition to one's library. As for the old version? Keep it at a second location, as it is still of benefit when you need to check on a well-known traditional formula.

—Subhuti Dharmananda, PhD
Director
Institute for Traditional Medicine
Portland, OR

The Way of Tea: Reflections on a Life with Tea by Aaron Fisher. North Clarendon, VT: Tuttle Publishing; 2010. Hardcover; 192 pages. ISBN-13: 978-0804840323. $19.95

In recent years, there has been a steady stream of tea books that have either reviewed tea's place in human history, described the treasured varieties of tea that have been passed down through the centuries, or postulated about the botanical origins of the tea plant known as *Camellia sinensis* (Theaceae).

The main premise of Aaron Fisher's *The Way of Tea: Reflections on a Life with Tea* is that a deeper understanding of the tea plant as an exquisite *entheogen* can aid in the full enjoyment of tea practice for the aspiring practitioner. According to religion scholar Huston Smith in *Cleansing the Doors of Perception*, entheogens are "virtually nonaddictive mind-altering substances that are approached seriously and reverently," with the inference being that the substances actually induce a mystical or religious experience, such as an encounter with God or the gods.



As Fisher is quick to point out, there are an estimated 5,400 texts written in the Chinese language alone about the Tao, or the flow of the universe. Through tea, "we learn to listen to the unfolding moment, adapting and flowing in harmony with it."

With the exception of classic writings on the subject that are available in translation from Chinese to English, such as Lu Yu's *The Classic of Tea* or Okakura Kakuzo's *The Book of Tea,* this book, *The Way of Tea*, is perhaps the best to be found anywhere that delves into the mystical dimensions of tea. The author takes us into his world and personal experience with tea, giving a deeper appreciation of the way in which tea can be better understood and realized: "The profundity found just beyond the silence that tea inspires is deep, giving rise to joy and reflection, contemplation and meditation."

In order to appreciate tea's contribution to the betterment of human life, Fisher first describes tea in a broader context. We learn that tea evolved with other evergreen trees about one million years ago in the tropical forests that lie beneath the Tibetan plateau, in China's southwestern Yunnan Province.

He suggests we consider that "the story of the Leaf is primarily one of trees, undisturbed in their primordial history. The real story of tea is a silent one; one where the first 999 pages are written in the quiet languages of the forest."

The author also examines the Chinese character for tea, its potential, and original pictographic significance. Fisher acknowledges one of his teachers, a "tea doctor" and artist, who shows the Chinese character for tea as an illustration of the figure of a man living within a tea tree. This image, as interpreted by the author, is a metaphor for nature and shows "that we can live tea, becoming a part of Nature, rather than standing on the outside of it as an observer; and that such a 'becoming' is really a return to our original state."

This is meaningful in today's modern world; we might wish to remember that the earliest shamanic traditions stretching back for thousands of years in this bioregion utilized tea as a plant of the spirit, an entheogen that enabled humans to more deeply connect to the natural world.

To enable the reader to acquire a better overall grasp of the tea experience and its relevance for the well-lived life, Fisher takes the reader through an abridged history of tea in China, Tibet, and Japan. These chapters touch upon the various practices, poetry, and art of tea, primarily as a way to explore its spiritual and cultural-ceremonial significance. From my own experience, I felt that Fisher's representation of the Tibetan history of tea might not be a complete representation of the facts. According to Professor Lobsang Jamspal at Columbia University's Center for Buddhist Studies, tea was never in and of itself viewed as a "sacred and holy substance" in Tibet. The idea put forth by Fisher, that Tibetans refer to tea as a "nectar of the gods," is somewhat misleading, as even water or the fermented barley brew known as *chang* may, like tea, be offered to the deities as well. According to Jamspal, "Tibetan monks are good at visualizing almost everything." That nectar, which is offered, is held in the visual mind of the supplicant.

The historic facts and poignant myths that have grown around tea are, for the most part, a rewarding backdrop within the pages of *The Way of Tea*. The message at the heart of Fisher's charming book appears in later chapters, as he suggests how one might go deeper into the experience and practice of tea. He recommends turning "to the Way of Tea itself," describing the soul and its underlying transmission within the tea experience. This deeper experience is the essential aspect of what Fisher encourages readers to explore within tea.

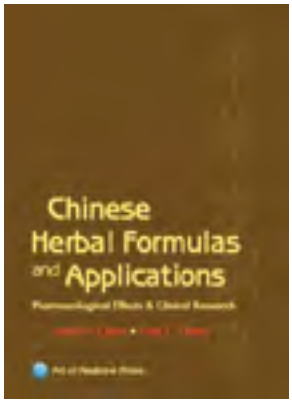
The second half of *The Way of Tea* is primarily a guide to understanding how to approach the day-to-day ritual-practice of tea. Evident in these sections, with chapter titles such as "Calm Joy," "Quietude," and "Presence," the reader learns that "Fine teas are appreciated much better in silence." As Fisher states so succinctly, "In this modern age everything, everywhere seems to lead the senses outward and away from oneself. Don't be afraid of quiet. Find the time for peace and introversion, and life will have new meaning."

—Scott Chamberlin Hoyt
Director/Author of the film and book
The Meaning of Tea
New York, NY

Chinese Herbal Formulas and Applications by John K. Chen and Tina T. Chen. City of Industry, CA: Art of Medicine Press, Inc; 2009. Hardcover, 1622 pages. ISBN–13: 978-0-9740635-7-7. $129.95.

Quality textbook/reference books on traditional Chinese medical herbs have been rare in the West. *Chinese Herbal Formulas and Applications* sets a standard far above any past books in the English language on this subject. It includes many concepts not found within other books and provides the serious student of Chinese Herbology with material to further increase his or her knowledge. Lead author John Chen is both a Doctor of Oriental Medicine and Doctor of Pharmacology, and he is supported by a long list of co-authors who are highly trained in Oriental Medicine, exceptional translators, and numerous contributors. The book contains over 1,600 pages of text, covering 664 formulas (not including modifications). It is divided into 3 main parts: Part I: Introductory information; Part 2: 22 chapters of herbal formulas; and Part 3: 11 appendices, bibliographical information, a glossary, and an index.

This book concerns the historical and clinical effects of Chinese herbal formulas and is a brilliant follow-up to the authors' first book, *Chinese Medical Herbology and Pharmacology*, which is a reference of the actions of individual herbs. These 2 books work well together as a set. The text of *Chinese Herbal Formulas and Applications* is well referenced and cross-referenced to traditional and modern medical literature commonly understood to be standards in the professions of both Western and Eastern medicine. Formula names are identified in both traditional and simplified forms along with their Chinese *pinyin* names. The original source texts for each formula are identified to allow further research.



Traditional formulas are discussed in a traditional sense with a modern awareness and sensitivity to current cultural issues such as the use of endangered species, heavy metals, illegal substances, drug interactions in the context of modern pharmacology, and awareness of current restrictions to obtaining some herbs. The authors and contributing editors blend together historical wisdom with modern circumstance and awareness, which allows for a more informed and nuanced application of any given formula. There is enough information about any of the discussed formulas to make this a manual for immediate clinical application. The text offers an exceptional explanation of each formula's proper use by both traditional Chinese and Western medical diagnosis and treatment strategies. Each formula has proper precautions and contraindications listed, if there are any, along with research relevant to that formula from all parts of the world.

Of particular value to the modern practitioner is the exceptional information provided regarding potential interactions with Western drugs or other traditional formulas. John Chen's background as a researcher and educator in the area of pharmacology, both herbal and pharmaceutical, provides a special understanding from both Western and Eastern perspectives. All of this information is well documented and referenced to provide resources for the clinician, researcher, student, or educator to find a deeper body of knowledge if they wish to pursue it.

The text begins with explanations of the history and methodology of traditional Chinese herbal formulas. This provides the Western student an entry-level background and a view into the vastness of the historical legacy that is Chinese herbal medicine. The first section of the book also discusses dosage, preparation, and administrations for the traditional use of the decoctions.

The body of the text focuses on the formulas themselves, separated into easy-to-use categories based on traditional medical differential diagnosis and treatment terms. Under each disease treatment category are the formulas that could be used to treat that category. For each formula, the book provides the various names of the formula, its composition, dosage used, traditional therapeutic actions of the formula, and the Western clinical applications. The book further includes information on modifications to the formulas that could be used for any variation of symptoms. Any cautions or contraindications are clearly labeled. What makes this text so special is the addition of data on the pharmacological effects, the clinical studies, the research, and the herb-drug interactions and toxicology. Finally, each formula ends with the authors' comments, providing additional clinical and historical insight.

The appendices are of special interest. Included is one appendix cross-referencing herbal formulas to Chinese medicine diagnosis and another cross-referencing herbal formulas to Western medicine diagnosis. The appendices, as well as the extensive bibliographies, also allow the scholar or researcher to go further in referencing names of single herbs, formula names, historical texts, and even famous traditional Chinese doctors.

This book brings Traditional Chinese Medicine (TCM) into the world of scholars and enhances the effectiveness of practitioners of Chinese medicine. It is an excellent book; I would recommend this text to any practitioner seeking to provide the best care and outcome for his or her patients. I would further recommend this book for any student, teacher, or researcher of TCM, as well as any Western medical practitioner, researcher, teacher, or student who seeks a true sense of the depth of knowledge that comes from the thousands of years of clinical use of traditional Chinese medical herbal formulation. This text provides a treasure to society through furthering the knowledge-base of TCM.

—Stuart Watts
Doctor of Oriental Medicine
Placitas, NM

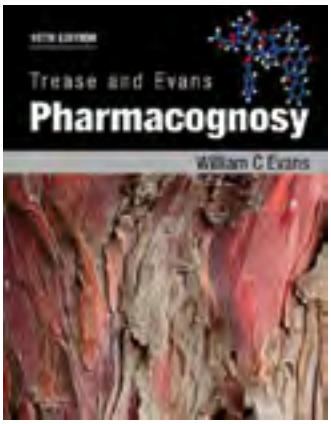
Trease and Evans Pharmacognosy, 16th edition by William C. Evans (ed). Maryland Heights, MO: Saunders; 2009. Paperback; 616 pages. ISBN–13: 978-0702029332. $122.00.

Pharmacognosy can be defined as the study of medicinal products obtained from natural sources such as plants, fungi, animals, and microbes. Once a cornerstone of the pharmaceutical and medical curricula, the study of pharmacognosy and natural medicinal products began to dwindle and was largely eliminated from such curricula of various universities, especially after the end of World War II when the emergence of synthetic pharmaceutical drugs began to rapidly displace most medicines of plant origin.

Times are changing, and this work exemplifies that pharmacognosy, far from being a dead or forgotten subject, is making a strong comeback due to the current world-

wide demand for natural products within various alternative or complementary therapies, in which plants and fungi play a preponderant role.

The book is edited by William C. Evans, PhD, a world-renowned expert in pharmacognosy and phytochemistry. His distinguished collaborators include, among others, Elizabeth M. Williamson, PhD, a well-known expert on medicinal plants and senior lecturer in pharmacognosy at the University of Reading; Simon Mills, professor of phytotherapy at the University of Exeter; and Abayomi Sofowora, professor of pharmacognosy at the University of Ife in Nigeria.



The book consists of 43 chapters divided into 8 parts. Part 1 includes 3 chapters that give an introduction to pharmacognosy, including its definition and scope within the biomedical sciences, followed by plant nomenclature and taxonomy. Part 2 contains 6 chapters dealing with biological drugs derived from plants and animals.

Part 3, composed of 7 chapters, is primarily focused on quality control, deterioration of stored plant drugs, and phytochemical variations within diverse species of medicinal plants. The latter point is of utmost importance regarding the efficacy of botanical drugs. Other chapter topics in this section include new information on more than 60 crude drugs included in the British and European pharmacopeias, as well as commercial aspects regarding plant drugs. A chapter dealing with plant physiology notes the importance of plant growth regulators, while chapters on plant cell and tissue culture highlight the importance of these techniques as a means of obtaining important medicinal secondary metabolites and ensuring the sustainability of various botanical species.

Part 4 is dedicated to the chemical profiles of various plants, especially dealing with methods applied to research on phytochemicals and the main metabolic pathways in plants that give rise to a diverse array of secondary metabolites with important therapeutic properties.

Part 5 is the largest section of the book and includes 16 chapters on the pharmacopeia of diverse plant-derived therapeutic products, featuring the main secondary metabolites found in plants or fungi (carbohydrates, alkaloids, glycosides, isoprenoids, oils, and resins, as well as antimicrobial products derived from plants, such as antiviral, antibacterial, and antiprotozoal drugs). Also covered in this section are plant products currently used to treat various diseases such as cancer and diabetes, as well as coloring and flavoring compounds, vitamins, and nutraceuticals obtained from natural sources.

Part 6 explains the important role that plants play in traditional and complementary systems of medicine and includes a chapter on the regulation and application of herbal medicine in the United Kingdom and other European nations. This section also includes chapters on Asian and African traditional systems of medicine, as well as the use of Chinese herbal medicine in the West. However, it is somewhat disappointing that this section lacks a chapter on the medicinal plants of Latin America, since this region is home to an astounding variety of plants used by diverse traditional medical systems. Perhaps the editors may consider including a chapter on this important region in a future edition. Quinine from *Cinchona* spp. (Rubiaceae) and other plant-derived drugs from diverse American plants are mentioned, but not in a special section devoted to them.

Part 7 describes non-medicinal uses of herbs and fungi, including the poisonous, hallucinogenic, and insecticidal properties of various species used worldwide.

Part 8 is dedicated to the morphological and microscopic examination of plant drugs, including their anatomical description, as well as a differentiation by means of cell constituents. A chapter is included specifically about techniques in microscopy, which are helpful to correctly identify various species, as well as differentiate between diverse products of vegetable origin. These techniques are also helpful in ensuring the quality of medicinal plant products.

Now in its 16th edition, *Trease and Evans Pharmacognosy* continues to be the classic work on the subject, as well as one of the best textbooks on pharmacognosy available in the English language today. This book is a must for phytotherapists, pharmacists, naturopathic physicians, and other biomedical professionals who have a serious interest in the medicinal properties of ingredients derived from natural sources.

The editors, contributors, and publishers are to be commended for continuing to make this great work available to health professionals interested in this important topic.

—Armando González-Stuart, PhD
Research Assistant Professor
University of Texas at El Paso and
UT Austin Cooperative Pharmacy Program

Nutraceuticals, Glycemic Health and Type 2 Diabetes by Vijai K. Pasupuleti and James W. Anderson (eds). Hoboken, NJ: Wiley-Blackwell; 2008. Paperback; 489 pages. ISBN-13: 978-0-8138-2933-3. $229.99.

Type 2 diabetes mellitus, also known as non-insulin-dependent diabetes mellitus (NIDDM), has become a scourge of the modern world, reaching epidemic proportions in various countries.

This serious and chronic disease can have various complications for health if it is allowed to progress. For this reason, various pharmaceutical preparations, as well as herbal and other nutritional supplements (sometimes referred to as "nutraceuticals"), can be of benefit in the treatment of this rapidly spreading disease.

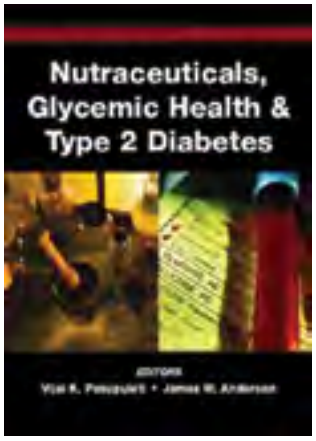
This book is a veritable wealth of information regarding nutraceuticals, functional foods, nutritional strategies, and herbal therapy for the prevention or treatment of type 2 diabetes. The editors, Vijai Pasupuleti, PhD, president of SAI International (a research group based in Geneva, IL) and James Anderson, MD, professor of Medicine and Clinical Nutrition a the University of Kentucky, have done an excellent job striking a balance between the diverse approaches to prevention and treatment contained in this treatise. No treatment or therapy is recommended over another, but rather an integrative or holistic approach to treating this disease is the main theme throughout the book.

The authors stress the importance of an adequate lifestyle and healthy nutrition in order to stave off this chronic disease and its serious health consequences. Among the

contributing factors to this disease—which include diet, obesity, and sedentary lifestyle—they also mention mental stress as part of the overall etiology of type 2 diabetes, a topic that is rarely included in publications related to this disease.

In addition to providing general information on the causes and occurrence of diabetes, the book covers the differences between the terms "glycemic index" and "glycemic load," explains the effects of specific foods upon glucose levels, discusses the effect of dietary fiber and diverse phytochemicals in the prevention and reversal of type 2 diabetes and its complications, discusses minerals and insulin metabolism, mentions oxidative stress and its relationship to diabetes, explores the use of natural starch from high-amylose corn in order to improve glucose metabolism, and mentions proteins and amino acids and their effects on type 2 diabetes. Many of the book's chapters also highlight the use of various medicinal plants for treating diabetes.

Chapter 8, for instance, mentions the phytochemical compounds present in cinnamon (*Cinnamomun verum*, Lauraceae) and cassia (*C. aromaticum*), such as cinnamaldehyde and cinnamic acid, and their effects on glucose metabolism and insulin sensitivity. The results of both animal research and human clinical trials in both species are discussed, as well as the possible modes of action of the diverse phytochemicals on glucose metabolism and pancreatic function.



Chapter 9 discusses soy bean (*Glycine max*, Fabaceae) and soy-derived products and their effects on obesity and diabetes. The diverse bioactive ingredients contained in soy, such as pinitol, isoflavones, peptides, and phytosterols, are discussed regarding their potentially synergistic effect in treating obesity and insulin resistance in the diabetic patient.

Chapter 12 reviews the effects of ginseng species on type 2 diabetes. Both Asian (*Panax ginseng*, Araliaceae) and American (*P. quinquefolius*) ginseng species have known hypoglycemic effects and contain saponins, as well as a variety of other compounds, which may have glucose-lowering effects. The difference in the chemical composition of both species is discussed, as well as an in-depth review of the literature concerning clinical data of ginseng treatment for diabetes.

Chapter 13 summarizes treatment options included in Traditional Chinese Medicine (TCM), including the use of various herbs, such as dogwood (*Cornus officinalis*, Cornaceae), bitter melon—also called balsam pear—(*Momordica charantia*, Cucurbitaceae), and privet (*Ligustrum lucidum*, Oleaceae), among others. The effects of various herbs and animal products used in TCM are discussed with regard to improving the outcome of type 2 diabetes.

Chapter 14 concerns the use of fenugreek (*Trigonella foenum-graecum*, Fabaceae), as well as other herbs used in Indian medicine, as hypoglycemic agents. Fenugreek has been used for hundreds of years in Arabic, Indian, and Chinese medicine due to its nutritive and therapeutic capabilities. The plant's seeds are employed for their expectorant actions, as well as for their glucose-lowering effects. Another plant used in Indian medicine and discussed in this chapter is gymnema (*Gymnema sylvestre*, Apocynaceae), particularly its effects on pancreatic function and glucose metabolism.

Chapter 15 discusses the use of prickly pear cactus (*Opuntia* spp., Cactaceae) and other plants used to treat diabetes in Mexican traditional medicine. The clinical trials including cactus (or *nopal* in Spanish) are discussed, as well as the limited data available on other plants such as matarique (*Psacalium decompositum*, Asteraceae), chilacayote (*Cucurbita ficifolia*, Cucurbitaceae) and guarumbo (*Cecropia obtusifolia*, Cecropiaceae). Unfortunately, no information is mentioned about another important plant from the gourd family: wereke or coyote melon (*Ibervillea sonorae*, Cucurbitaceae), the root of which is also used to treat diabetes in Mexico. The research is limited and has been conducted only in animals.

The book's final chapter discusses future trends and directions in the treatment and management of type 2 diabetes, highlighting the importance of lifestyle changes, as well as nutritional, herbal, and nutraceutical approaches for its prevention and/or treatment.

This book, even at its relatively hefty price, should be read by all biomedical professionals, such as nutritionists, physicians (conventional as well as naturopathic), nurses, and even herbalists who have an interest in helping to reduce the incidence of one of the most devastating diseases of "modernity."

—Armando González-Stuart, PhD
Research Assistant Professor
University of Texas at El Paso and
UT Austin Cooperative Pharmacy Program

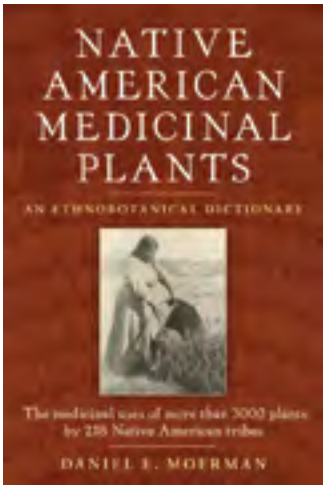
Native American Medicinal Plants: An Ethnobotanical Dictionary by Daniel E. Moerman. Portland, OR: Timber Press; 2009. Paperback; 799 pages. ISBN-13: 97-0-88192-987-4. $29.95. Available in ABC's online store.

This book is an abridged version of Dan Moerman's earlier volume, *Native American Ethnobotany* (2003), also published by Timber Press. The new volume itemizes approximately 25,000 medicinal uses of some 2,700 plant species documented from literature sources as having been used medicinally by native peoples of North America. Developing this immense and comprehensive database has been the work of over 3 decades, starting with an early computer "punch card" version published in 1977. Over the years, Moerman added more and more documents to his database, more than doubling the number of species covered in the current work compared with his original volumes.

The book is divided into 5 major sections. The first is a short narrative introduction, "Plant Use by Native Americans," in which Moerman discusses some of the key issues regarding efficacy of medicinal plants, the range of treatments for which they are applied, and some physiological and cultural aspects of herbal medicines. He also provides brief overviews of the sources of information, the drug use categories applied, and the names of Native American (and Native Canadian) indigenous groups cited in the book.

The second section, comprising the majority of the book, is the "Catalog of Plants," in which species are listed alphabetically by scientific name, starting with *Abies amabilis* (Pinaceae; Pacific silver fir)

and ending with *Ziziphus obtusifolia* var. *canescens* (Rhamnaceae, lotebush). Under each entry is a listing, in a standardized order, of different categories of medicinal use (e.g. Emetic, Analgesic, Antirheumatic, Dermatological Aid, etc.) with brief descriptions of the particular use by each indigenous group for which there is documented information. A few species are illustrated with botanical drawings from the US Department of Agriculture Natural Resources Conservation Service's PLANTS database.



The third section, "Index of Tribes," is a listing of the same information under the names of the indigenous groups, from Abnaki to Zuni. This is followed by an "Index of Plant Usages," categorizing the information according to different medicinal uses, from Abortifacient to Witchcraft Medicine, and listing plant generas alphabetically with the associated indigenous groups. Finally, there is an alphabetical "Index of Common Plant Names" with their corresponding designated scientific names.

The purpose of this book is to provide an easy "one-stop" reference source for botanical medicines used by indigenous peoples of North America. Moerman took pains to incorporate only primary references in the compilation—work based on original, first-hand research with native peoples who used the plants—rather than any secondary sources based on prior published work. The works cited had to have clear scientific identifications and originate from research north of the Rio Grande.

The book has immense value for researchers and educators, as well as for Native Americans and Canadian First Nations' communities themselves. It serves as proof of the rich systems of ethnomedical knowledge developed over millennia by indigenous peoples in all areas of the continent, including some indications of how knowledge has been shared and adapted across geographic and cultural boundaries. Through this highly commendable project, Moerman has aimed to "give back" to the people of the 1,100 or so American Indian tribes and Canadian First Nations who originally shared their knowledge with those who wrote the references sourced in this book. (Some of the references go back as far as the 1880s.) He raised enough money from non-governmental organizations and granting agencies, assisted by his colleague Michael Balick, PhD, of the New York Botanical Garden and by the cosmetic company Nu Skin of Provo, Utah to send copies of his 2003 book to all of the registered indigenous or tribal groups in the United States and Canada.

One dilemma Moerman faced in the organization of the book is that the names of the indigenous tribes, communities, and language groups covered in the database are variable. Some of the names (e.g., Nootka, Southern Kwakiutl, and Bella Coola) are entirely outmoded now, having been widely replaced with names chosen and preferred by the people themselves (e.g., Nuu-chah-nulth, Kwakwaka'wakw, and Nuxálk, respectively). In other cases, different spellings or terms for the same group were used in different sources: Clallam and Klallam, for example. Rather than trying to sort these changes and duplications and to standardize the names, Moerman, as he discusses, made the decision to retain the terms used in the original reference sources.

This poses a major problem, however, in terms of appropriate and up-to-date representations of the groups, and it also results in potential duplication of information, since the same group named by different terms (e.g., Ojibwa and Chippewa) is represented in different places, in the same listing. Including references that cover more than one group (e.g., "Montana Indian"), without separating these into tribes, also creates difficulties in making comparisons, since the information represents different scales of accuracy. It is completely understandable why Moerman chose to present the tribal names in this manner, but in my view, the book would be of even greater utility if he were able to provide (in a future edition) a table with the most common equivalencies of tribal names, and then, in the database itself, use the most widely accepted and up-to-date names for each language group. After all, he used the most current botanical names of the plant species, which have also changed over time.

Despite this difficulty, the book is an amazing and extremely valuable compendium of information and will be used in many different ways and at many scales of inquiry to allow a better understanding of the importance of herbal and traditional medicines. It brings into the 21st century some of the rich knowledge and wisdom of past generations of indigenous botanical experts and medical specialists and stands as a tribute to traditional healers around the world. I highly recommend it to *HerbalGram* readers and all those interested in biocultural diversity.

—Nancy J. Turner, PhD
Distinguished Professor
University of Victoria, British Columbia

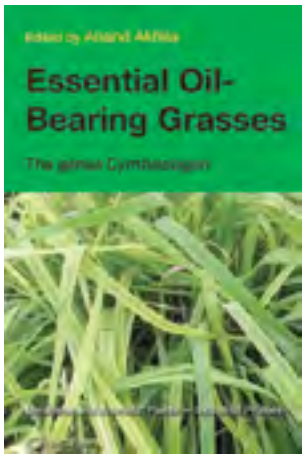
Essential Oil-Bearing Grasses: The Genus Cymbopogon by Anand Akhila (ed). Boca Raton, FL: CRC Press; 2010. Hardcover; 262 pages. ISBN 978-0-8493-7857-7. $139.95.

Chances are that many of us can identify the aromatic lemony scents in Thai soup, natural mosquito-repellant, aromatherapy candles, or cosmetic lotion. If you wanted to know everything there is to know about the group of commercially significant and multidimensional plants that provide this aroma, then this comprehensive book is for you. A quick glance will certainly reveal its value to the phytochemist, industrial magnate, taxonomist, or ethnobotanist, although certain segments will also appeal to other natural product investigators, including forestry officials, agriculturalists, natural flavorists, and cosmetic formulators.

This book is authoritatively written solely on the group of grasses in the genus *Cymbopogon*, the essential oils of which have wide ranging appeal to a number of industries. The book will be most appreciated by the technically inclined—it is far from being any sort of aromatherapy book for the lay person. The editor, plus 10 contributors from various countries, demonstrate their expertise of the subject matter, having backgrounds in academia, scientific publications, regulatory affairs, and natural products chemistry. Through 9 chapters they delve into ethnobotany, pharmacology, phytochemistry, and more, focusing on the multiple uses of these plants.

A thorough examination of this genus

begins by noting the approximately 180 species, subspecies, varieties, and subvarieties of these angiosperms, and continues with information on botanical identification, biochemistry, and molecular biology. Extensive chemistry profiles, diagrams, tables of analysis, and electron scanning micrograph photos will appeal to researchers and natural products chemists alike.



The economic importance of these essential oil-bearing plants is highlighted in the chapters on trade, harvest, and postharvest management, which may be of interest to growers, tea producers, and distillers of this extensive genus. Lemongrass (*Cymbopogon citratus*; *C. flexuosus*; *C. pendulus*), palmarosa (*C. martinii*) and citronella (*C. nardus; C winterianus*)—all in the family Gramineae—are among the most recognizable and significant oils discussed for fragrancing, food flavoring, therapeutic formulation, and insect repellant application. The history of these plants and their practical and health-enhancing uses are lightly touched upon, but these segments primarily focus on commerce, yield, harvest times, drying, storing, extraction methods, and oil content.

There are several chapters that may be of interest to the medical aromatherapist or clinical phytotherapist. One focuses on the antimicrobial and antioxidant activities of these plants. Addressing the main problem of solubilizing essential oils, the authors provide suggestions for overcoming this obstacle for *in vitro* testing.

The authors provide their test results on the effectiveness of *Cymbopogon* essential oils that specifically fight gram positive or gram negative bacteria, as well as the benefits of these oils in countering yeast and mold microbes. It is rare that the mechanism of this activity is well explained in an English language text. They also provide tables that outline which functional group of constituents is responsible for their effectiveness against such microbes, which is very useful in pinpointing biological activity, if only *in vitro*. Holistically minded practitioners will appreciate that activity of the whole oil is also reported.

Another chapter is on the thrombolysis-accelerating activity of these essential oils, certain to attract the attention of the beverage industry. This is welcome research, as information on oral application is also not often published in English. Within the chapter on chemistry, the authors cite research into the use of numerous essential oils with activity against worms, mosquitoes, and even cancers. They reference the investigation of biological activity of essential oils for pain relief, lowering blood sugar, and hair growth.

The book closes with information on toxicology, legislation, classification, and labeling, which may be of use to cosmetic chemists, safety officers, or company legal teams. Three pages of commonly used acronyms are clarified, and essential oil-bearing plants outside the easily red-flagged *Cymbopogon* genus are discussed briefly as alternate sources of sensitizing citral. Up-to-date regulatory information from the European Union should be valuable for creating compliant personal care products for global sales. Legally allowable concentrations of citral for cosmetic products are provided in a small but useful table.

This small book emerges as an updated and focused version of Ernest Guenther's encyclopedic treatise from the late 1940s and early 50s on essential oil-bearing plants. Extensive references at the end of every chapter demonstrate the meticulous research gathered for this book. CRC Press is known for its scientific and technical publications, and this is no exception. Aside from the questionable, if only occasional, errors in grammatical sentence structure, this is a great chemistry-bench reference book and a scrupulous analytical tool for the laboratory. It will be useful for those performing analyses of essential-oil bearing grasses. It may also be appreciated by the overall botanical book junkie and all technical beaker geeks investigating natural products.

—Mindy Green, RA, RH (AHG)
President, Green Scentsations Consulting
Minneapolis, MN

Pocket Atlas of Chinese Medicine by Marnae C. Ergil and Kevin V. Ergil (eds). New York, NY: Thieme Medical Publishers; 2009. Paperback; 415 pages. ISBN-13: 978-3131416117. $49.95.

The elite medical publishing company Thieme has set a new standard for introductory materials on Chinese medicine in this new member of the Pocket Atlas series. *The Pocket Atlas of Chinese Medicine* provides an excellent overview of Chinese medical practices and is suitable for both learners and the curious public.

Editors and authors for this project are Marnae C. Ergil, associate professor in the Department of Acupuncture and Oriental Medicine at New York Chiropractic College, and Kevin V. Ergil, associate professor at Touro College in the School of Health Sciences in New York. They are seasoned practitioners and educators in the field of Chinese medicine. Their unique experience equips them for the task of constructing a fascinating and functional work on the subject. M. Ergil has served on translational teams for important works in Chinese medical diagnostics and K. Ergil has served as dean at more than one school of acupuncture and Asian medicine. They have also collected a team of experts as contributors to the book, including Simon Becker, Stephen Birtch, Mary Garvey, Michael McCarthy, Anne Reinard, Yves Requena, and Douglas Wile.

This book is already considered required reading for a range of 1st and 2nd semester courses at certain schools of Chinese medicine. Designed for both lay audiences and health professionals, it provides a broad view of Chinese medicine that is contextualizing. This book will also serve well as a front-office book within medical clinics for new patients to explore the complexities and nuances of Chinese medicine.

The practice of placing the pictures and graphs opposite each other on facing pages facilitates a conceptual grasp of the material, and the result is a practical reference.

The book is arranged into 10 sections: history, theory, diagnosis, acupuncture, *tui na* (a form of manual therapy), pharmacotherapy, dietetics, the exercise therapeutic *qi gong*, the exercise technique *tai ji*, and acupuncture research. Three case studies are woven throughout each of the sections on diagnosis, herbs, and acupuncture. This is an excellent teaching tool, providing a perspective on practice. This book also provides a unique overview of all of the core practices of Chinese medicine. It is easy to flip to a relevant section and see pictures and text related to a given area of Chinese medical practice.

The editors guide readers through the complexities of Chinese medical thought, beginning with diagnosis and progressing to the treatment plan using acupuncture points, Chinese medicinal herbs and other medicinal materials, and formulas. Learners who read this book early in their studies will be able to obtain a broad perspective of Chinese medicine that should allow them to see where they are headed in their careers. Such insight will enhance their ability to integrate different areas of coursework.

The one concern that I have for the lay public is that the editors have employed a translational standard that at times may cause the reading experience of an otherwise well-written work to be stilted. This is an understandable decision that fulfills professional-technical language requirements with a need for accurate translations from the original Chinese. Moreover, I do not believe that this decision has impeded the potential success of this work. Indeed, it lends clarity to those who seek one-to-one correlations with the original Chinese language materials.

The Pocket Atlas of Chinese Medicine provides the reader with a brief historical and cultural triptych of Chinese medicine since ancient times and showcases that which continues to influence its growth throughout the world today. The editors also present the philosophical roots of Chinese medicine, which inform the theoretical bases and models of practice.

This book fulfills my previous recommendations for an introductory text on Traditional Chinese Medicine. The editors have created a thorough, accurate, and accessible introduction to this complex field. Kudos to Thieme and the Ergils.

—William Morris, PhD, DAOM
President
The Academy of Oriental Medicine
Austin, TX

Caribbean Herbal Pharmacopoeia, e-Book, 2nd edition updated by Lionel Germosén-Robineau (ed). Santo Domingo, Dominican Republic: TRAMIL; 2007. $30.00.

This CD-ROM describes the culmination of a 23-year research effort by TRAMIL, an applied, nonprofit scientific research program on medicinal plants based in the Dominican Republic. TRAMIL research addresses the popular therapeutic practices of Caribbean grassroots communities, particularly their use of medicinal plants, and aims to position practices that meet appropriate criteria into mainstream primary healthcare.

As stated in the e-book, TRAMIL's major goals are "to reduce the cost of therapeutic medications, by providing grassroots communities and paramedical personnel with practical knowledge concerning the treatment of certain common ailments that may be cured by plants at a minimal cost and in harmony with popular tradition" and "to stimulate action-oriented research that has the potential to educate physicians, pharmacologists, health personnel, and those involved in primary healthcare programs."

To accomplish these goals, a team of more than 200 specialists in the areas of botany, ethnobotany, chemistry, pharmacology, and medicine, working in cooperation with social workers, initiated its collaborative research in 1984.

Under the leadership of Lionel Germosén-Robineau, MD, TRAMIL general coordinator, the enda-Caribe research team carried out well-documented ethnopharmacological, disease-based field surveys on the traditional medicinal uses of plants among grassroots people throughout the Caribbean, including countries bordering the Caribbean region (namely Mexico, Guatemala, Honduras, Belize, Nicaragua, Costa Rica, Panama, Colombia, and Venezuela). The results of these surveys were analyzed to determine uses for a given health problem that are considered "significant," namely uses with a frequency of 20% or more. The significant uses were then subjected to further studies for scientific validation. The studies included review of literature on the plants' chemistry and pharmacology, as well as actual laboratory experiments (chemical screening, *in vitro*, and *in vivo* studies). The results of the field surveys, the literature reviews and analyses, and the laboratory experimental studies were then subjected to further discussions and debate in periodic group meetings in an international setting. These rotated from one country to another, to classify these significant uses as either REC (recommended) or TOX (toxic, not recommended for further use). Significant uses that have not been fully studied are classified as INV (under investigation). In this second and updated edition of the e-book, 321 "significant" uses for the plant parts of 99 species are described, of which 315 are classified as REC and 6 as TOX.

When starting the CD ROM, the overall contents are presented in a folder called "todo" (Spanish for *all*.) The book's introductory portions are placed in the "start" file. Instructions for downloading a PDF reader (Acrobat reader) for PC and Mac is contained in the "utilities" folder.

Clicking "start" provides an image of the CD with the book title, followed by an acknowledgment page, a description of the e-book format, navigation instructions, the table of contents, and a list of 37 institutions involved in the study, among other materials.

Following these pages comes the entire introductory portion of the book, consisting of an introduction; an explanation of the TRAMIL survey method; a list of herbarium institutions associated with TRAMIL research; a listing of the actual TRAMIL field surveys with information on geographic coverage, name of coordinator, and number of human families surveyed; a description of the botanical diversity of the Caribbean basin; a descrip-

tion of TRAMIL's standards for "quality," "safety," and "effectiveness;" a long list of the pharmacological assays used in the validation of the "significant uses;" description of the principles used when classifying plant parts into the categories of REC, TOX, and INV; a template providing itemized entries of information used in the TRAMIL monograph section; and general recommendations concerning preparation, dosage form, and restrictions.

One has to exit these introductory sections in order to open the monograph pages of the 99 medicinal plants, by returning to the folder "todo." Aside from monographs, this folder also contains a file on "index to indices," individual named index files, a special file named "miscela0," and a file on the Caribbean philately based on medicinal plants.

There are a total of 198 files relating to monographs, which includes the 99 plant monograph files plus illustrations and color photographs in separate files. Each monograph file provides data on the species as follows: botanical description, voucher herbarium specimen, and geographic distribution of each species; significant TRAMIL uses (namely, TRAMIL recommendations on uses); chemistry data; biological activity data; toxicity information that includes a summary of the TRAMIL research; preparation and dosage form for each disease/affection category; and a list of references cited in the text of the monograph.

The "miscela0" file provides an extensive summary of TRAMIL work, collaborations, and activities. It includes a listing of TRAMIL publications (in Spanish, French, and English); a record of all previous editions of the pharmacopeia; the record of TRAMIL workshops, conferences, animal studies, and protocols; lists of sponsors; and 30 color photos of medicinal plants.

The e-book very successfully accomplishes its goal of communicating the work and philosophy of TRAMIL. In particular, the book is a source of scientific learning in itself, extensively provided in the monographs section—the core of the book's contents. This learning is further guided by the extensive and elaborate indices. The contents of the book as presented in the numerous files and folders are easy to search and navigate. This e-book is definitely recommended as an excellent addition for the enrichment of any library and should be useful to any learned person of wide-ranging interests and professions, particularly those interested in the study of medicinal plants. At a price of $30.00, this e-book is a steal.

—Djaja Doel Soejarto, PhD
Professor of Pharmacognosy
University of Illinois at Chicago
Chicago, IL

New Book Profiles

African Natural Plant Products: New Discoveries and Challenges in Chemistry and Quality. H. Rodolfo Juliani, James Simon, and Chi-Tang Ho (eds). Oxford, OH: American Chemical Society; 2010. Hardcover; 595 pages. ISBN-13: 978-0-8412-6987-3. $195.00 Available in ABC's online store.

This book focuses on Africa's biodiversity and indigenous knowledge of African medicinal plants. Topics include medicinal applications of African plants and clinical research that supports traditional uses. Also explored are recent discoveries in natural plant products chemistry, case studies of African medicinal plants in pharmaceutical preparations, and the emerging efforts in developing quality control in African medicinal plants.

Evaluation of Herbal Medicinal Products: Perspectives on Quality, Safety and Efficacy. Pulok Mukherjee and Peter Houghton (eds). London: Pharmaceutical Press; 2009. Hardcover; 502 pages. ISBN-13: 978-0-85369-751-0. $199.99. Available in ABC's online store.

This book explores the current approaches and techniques used to evaluate the quality and efficacy of herbal medicine. It contains chapters on the current thinking and practices in this area. Topics include determining the mechanisms of action of herbs and their phytochemical constituents, development of standardized phytomedicines, shelf-life of herbal remedies, clinical trials, toxicology, and more.

Integrative Women's Health. Victoria Maizes and Tieraona Low Dog (eds). New York, NY: Oxford University Press; 2010. Hardcover; 688 pages. ISBN-13: 978-0-19-537881-8. $49.95,

This is the fourth text in the Weil Integrative Medicine Library series. This book focuses on such topics as reproductive health (including premenstrual syndrome, pregnancy, menopause, fibroids, and endometriosis), women's spirituality, sexuality, and attitudes about aging. Also explored are specific integrative treatment recommendations for conditions that may affect women differently than men, including cardiovascular disease, depression, and cancer. Co-editor Tieraona Low Dog, MD, is a well-known expert in herbs and women's health, and Victoria Maizes, MD, is a leading expert in integrative medicine.

Molecular Targets and Therapeutic Uses of Spices: Modern Uses for Ancient Medicine. Bharat Aggarwal and Ajaikumar Kunnumakkara. Hackensack, NJ: World Scientific Publishing Company; 2009. Hardcover; 410 pages. ISBN-13: 978-981-283-790-5. $105.00. Available in ABC's online store.

This book outlines the traditional and therapeutic uses, active constituents, health benefits, and molecular targets of many common spices. Spices explored in monographs include black pepper, mint, cardamom, cinnamon, turmeric, ginger, and more. Also explored are the bioactive compounds isolated from spices that have led to a scientific basis for the incorporation of spices into the diet.

The Sexual Herbal: Prescriptions for Enhancing Love and Passion. Brigitte Mars. Rochester, VT: Healing Arts Press; 2010. Paperback; 502 pages. ISBN-13: 978-159477286-3. $24.95.

Author Brigitte Mars, a founding member of the American Herbalist Guild, uses her herbal and nutritional expertise to suggest common herbs, herbal recipes, and more for improving sexual health and function. She includes advice on finding and maintaining an emotionally healthy and loving relationship.

Traditional Medicine. Steven Kayne. London: Pharmaceutical Press; 2010. Paperback; 320 pages. ISBN-13: 978-0-85369-833-3. $59.99. Available in ABC's online store.

Spanning 5 continents, this study explores traditional medicine systems in Europe, North and South America, Africa, China, India, Japan, Korea, and more. Each section is written by a different expert and notes the history, philosophy, quality control, and evidence of effectiveness of traditional medicines within featured geographic locations or cultures.

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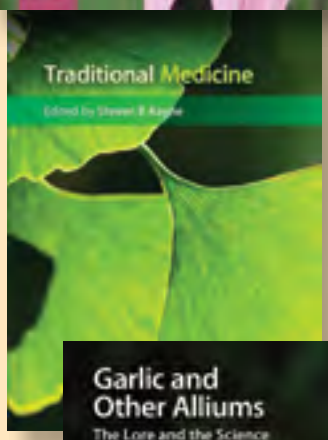

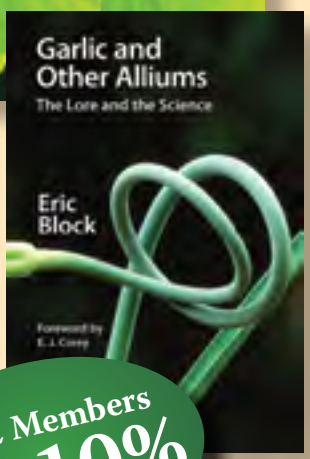

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- **An Oak Spring Herbaria: Herbs and Herbals from the Fourteenth to the Nineteenth Centuries: A Selection of the Rare Books, Manuscripts and Works of Art in the Collection of Rachel Lambert Mellon** by Lucia Tongiorgi Tomasi and Tony Willis, 2009. This year's winner of the James A. Duke Excellence in Botanical Literature Award. Authoritative and magnificently illustrated catalogue describing rare books, manuscripts, and other works of art conserved at the Oak Spring Garden Library in Upperville, Virginia, a collection formed over many years by Rachel Lambert Mellon. Thematically organized, this volume addresses 63 works from manuscript herbals to editions of Fuchs, Mattioli, Turner, Clusius, Culpeper, and Linnaeus, among others. Sure to be of interest to botanists, garden historians, bibliophiles, and herbalists. Hardcover, 394 pages. **$89.00**

- **Evaluation of Herbal Medicinal Products: Perspectives on Quality, Safety and Efficacy** edited by Peter Houghton and Pulok K. Mukherjee, 2009. Describes and assesses different approaches and techniques for evaluating the quality and efficacy of herbal medicines. Brings together articles on current thinking and practice in these areas and highlights up-to-date research meant to facilitate improvements in the topics under consideration. Three sections and a total of 32 chapters cover general aspects, pharmacology and clinical aspects, and quality and safety aspects. Hardcover, 520 pages. **$199.00**

- **Traditional Medicine: A Global Perspective** edited by Steven B. Kayne, 2009. A crucial resource for complementary and alternative practitioners and students worldwide. Covers Aboriginal/traditional medicine in North America; traditional medicine in the Colombian Amazon, the Pacific, Africa and Europe; and traditional Chinese, Ayurvedic, Kampo, Korean, and Jewish medicine. Includes history, philosophy, methods of practice, safety issues, evidence and examples of medicines. Softcover, 352 pages. **$59.99**

- **Garlic and Other Alliums: The Lore and the Science** by Eric Block, 2010. Outlines the extensive history and the fascinating past and present uses of these plants, sorting out fact from fiction based upon detailed scrutiny of historic documents as well as numerous laboratory studies. Technical material is presented in a manner understandable to a general audience, particularly through the use of illustrations to simplify more difficult concepts and explain how experimental work is conducted. The book is heavily illustrated with examples of alliums in art, literature, agriculture, medicine and other areas and includes rare botanical drawings of many members of the genus *Allium*. Hardcover, 474 pages. **$49.95**

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Silviano Camberos Sánchez 1962–2009

Physician and ethnobotanist Silviano Camberos Sánchez, MD, died from Chagas, a parasitic disease that affects the heart, on August 17, 2009, at the age of 47.

Throughout his career, Dr. Camberos displayed a perpetual interest in expanding his knowledge of natural medicine, particularly the medicine of indigenous tribes in Mexico. His deep yearning to learn from others, while also helping them, led to his becoming a medical physician *and* an ethnobotanist, a rare combination of professions.

Born in Guadalajara, Jalisco, Mexico, Dr. Camberos' interest in ethnobotany and medicine grew out of the moments he spent with his maternal grandmother, who was a pharmacist during the 1930s, said his brother Jorge Camberos Sánchez (e-mail, January 25, 2010). Early on, Dr. Camberos desired to work with the indigenous Huichol people of central Mexico, something that also influenced his decision to become a doctor, said Yvonne Negrin, Dr. Camberos' long-time friend and a co-founder of the Association for the Economic Development of the Western Sierra Madre (e-mail, December 2009-February 2010). A tribe of about 15,000 living in Mexico's Sierra Madre Mountains, the Huichols are thought to be the last-remaining tribe in North America to have maintained their indigenous traditions.[1]

After receiving his bachelor's degree in biology, Dr. Camberos earned a medical degree with a specialty in surgery and obstetrics from the University of Guadalajara in 1991. He was always interested in an integrative approach to medicine and did not think Western medicine had all the answers, said Mark Plotkin, PhD, president of the Amazon Conservation Team and a friend of Dr. Camberos (oral communication, December 8, 2009). During medical school, he therefore further explored his interest in herbalism and ethnobotany. He completed the required 1-year social service component of his medical degree with the Huichols, and his medical thesis discussed the tribe's shamanism and roots of traditional therapeutic medicine, said Negrin.

Dr. Camberos went on to receive his master's degree in ethnobotany from the University of California at Berkeley (UC-B). He stayed in California, serving as ethnobotanical field investigator for Shaman Pharmaceuticals for 4 years. At Shaman, he contributed to about 6 ethnobotanical research expeditions in different parts of Latin America, said Tom Carlson, MD, a professor of integrative biology at UC-B who also worked for Shaman Pharmaceuticals at the time (e-mail, December 10, 2009).

"He always had a bright energetic smile and contagious enthusiasm about his appreciation of indigenous people throughout the world," said Dr. Carlson. "All of Silviano's collaborators spoke very highly of his field research methods and how respectful he was of all the people with whom he worked, especially the indigenous communities. His scientific contributions to ethnobotanical research were very valuable."

Dr. Camberos spent about 15 years working with the Huichols, including his time as the head physician for a community clinic in San Andrés. He also worked with the Huichols through his home clinic and under several non-governmental organizations, which included treating patients before and after surgeries and those with tuberculosis and other diseases, said Negrin.

Dr. Camberos also worked alongside the indigenous Mazatec Indians in Oaxaca, Mexico.[2] During these times he would spend weeks in some of the most remote regions of the country, but the lack of amenities never seemed to bother him.

"He was never motivated by luxury or modernity," said his brother Jorge.

Dr. Camberos' medical philosophy was "there are no illnesses; there are ill people," and he provided free medical care for the Huichols and Mazatecs and studied with their shamans and healers in order to learn about their plants and investigate their ancestral healing techniques, said Jorge.

"The high point in his career was when he was able to integrate his breadth of medical knowledge in his practice. During his work with the Huichols and Mazatecs he fully dedicated his knowledge and his resources to them," he continued.

"He never gave up his love for plants or people," said Dr. Plotkin, who sometimes joined him on ethnobotanical trips, including a visit to the Trio Indian village in Suriname of the northeast Amazon. Though Dr. Camberos spoke Spanish and English fluently and understood Huichol, Mazateco, French, and some Italian and German, he did not speak the language of the Trios. But this did not prevent him from communicating.[2]

"Silviano made friends almost immediately and began teaching the Trio Indians songs and calls in the Huichol language," said Dr. Plotkin. "Ten years after he last set foot in that village, they ask about him still."

Dr. Camberos maintained strong relationships with the people, and when some of them left their villages, he helped them transition to urban areas by furthering their education, said Jorge.

In addition to learning from indigenous tribes, Dr. Camberos relentlessly broadened his knowledge of natural medicine by taking courses in institutions across Latin America. During medical school, he received an 80-credit hour diploma in ecology and environmental impact; while in San José, Costa Rica, he studied 160 hours on tropical dendrology; in Bogotá, Columbia, he took an international course on medicinal plants; and back in his home of Guadalajara he completed a workshop in natural medicine and courses in nutrition, diet and natural therapies, iridodiagnosis, and natural psychotherapy.

He obtained degrees in homeopathy, homotoxicology (the use of homeopathic remedies to remove toxins from the body), naturopathy, bio-magnetic therapy, and holistic medicine. He also took courses in natural emergency medicine, natural therapeutic medicine, and Reiki and Bach flower remedies.

"His work as a physician was constant—not only did he practice medicine, he also continued researching treatments his whole life," said Jorge. "Watching him work left me with a profound sense of service and charity.

"The influence and legacy Dr. Silviano Camberos Sánchez leaves with his collaborators and students is that of responsibility, service, dedication to furthering one's depth of medical under-

standing, and never allowing one's profession to become commercialized. He is survived by his brothers and sisters, who were his students and will follow his footsteps."

Dr. Camberos' siblings, Rebecca, Javier, and Jorge Camberos Sánchez, are active in furthering their own natural medicine educations and have taken over the direction of their brother's science library, garden, and collection of rare plants. Dr. Camberos is also survived by his mother. HG

—Lindsay Stafford

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Jean Andrews 1923–2010

Jean Andrews, PhD, known so widely as "The Pepper Lady®" that she had the name registered,[1] passed away on January 7, 2010, at the age of 86.[2]

Dr. Andrews is well-known for her internationally acclaimed books on the genus *Capsicum*, some of which feature her pepper expertise, photography, botanical drawings, and/or paintings. Her best-selling book *Peppers: The Domesticated Capsicums*, published by University of Texas (UT) Press in 1984 and later re-published in 2 subsequent editions, includes scientific, cultural, and historical information about peppers.

Aside from peppers, Dr. Andrews was recognized for her books on shells and wildflowers. Such books included *The Texas Bluebonnet* (UT Press, 1986), *Sea Shells of the Texas Coast* (UT Press, 1972), and *American Wildflower Florilegium* (University of North Texas [UNT] Press, 1992).

Dr. Andrews was born in Kingsville, Texas in 1923.[2] She began collecting chiltepins (hot wild peppers) as a young girl in South Texas at the request of her mother.[3] Dr. Andrews once reported in an interview that these peppers were too hot for her to eat, though she did often hide them in her chocolate-covered cherries to deter her brother from eating them.[3]

She earned a bachelor's degree in home economics from UT in 1944, a master's degree in education from what is now Texas A&M at Kingsville in 1966, and a PhD in art from UNT in 1976.

"She was so outgoing that I think the people who knew her knew everything about her," said Amelia Fales, her friend of 46 years (oral communication, March 2, 2010). "She put everything forward. You either liked her or you didn't, and she didn't care."

During her time at UNT, Dr. Andrews became even more fascinated with peppers, and after her graduation she searched the globe for different varieties to grow in her garden.[3] She also collected other objects during her extensive travels; she visited more than 100 countries and all 7 continents, including Antarctica. She even learned to scuba-dive so that she could hunt for shells in the waters surrounding the Philippines, the Australian Great Barrier Reef, Costa Rica, Panama, and the Canary Islands.[2]

She ultimately amassed a shell collection of over 20,000 specimens and 900 different species. She donated many of the shells to Texas Memorial Museum in 2003.[4,5] She also used some of her shell collection to create art by placing some in the doors to her dinning room: "The panes going into the dining room were of thick molded plastic with the shells (around 50) molded into the plastic as though the shells were floating in water. When the light hit those doors it was amazing," said Fales. "She was so talented, and her talent was unending."

Other items that Dr. Andrews collected included bones, skulls, and textiles, which she also incorporated into her art.

"Jean was an amazing hostess, and walking into her small, eclectically-decorated home was like being in a mini-museum," said Mark Blumenthal, founder and executive director of the American Botanical Council. "There were dried plants, shells, skulls, bones, walking sticks, and other memorabilia she had collected over the years from all over the world. She was a dynamo and almost indefatigable, even in her later years!"

"When she was interested in something, she wanted to know all about it," said long-time friend Marc English, founder and chair of the Order of Oosik, a society established in Dr. Andrews' honor (oral communication, February 25, 2010). "She had this innate curiosity."

English met Dr. Andrews in 2002 when a friend asked if he could borrow English's Harley-Davidson so "a little old lady" could pose on it for a photo shoot. English arranged the photo shoot and soon saw an older woman wearing black leather and velour posing on his bike, with a raccoon oosik in her hat. She excitedly informed him of what it was—a J-shaped bone that exists inside the male genitalia of some mammals, including the raccoon and the walrus. Dr. Andrews collected the oosiks of many species and even created a necklace comprised of several. Her varied collections of art—as well as oosiks—led to the Order of the Oosik, an occasional dinner party/show-and-tell gathering at Dr. Andrews' house that began with 4 people, including English, and expanded to a society of 30 men. Dr. Andrews would often recite the poem "Ode to the Oosik" at their meetings. At Dr. Andrews' surprise 85th birthday party, the Order presented her with a 3-foot-long walrus-oosik-shaped, banana cream-filled cake.

"Everything about Jean was right out there," said long-time friend and artist Marc Burckhardt (e-mail, February 28, 2010). "She was definitely not a closed book."

Dr. Andrews suffered a number of hardships during her lifetime. She was predeceased by her daughter Jean ("Jinxy") Andrews Wasson, who died at age 14 in a car accident.[2,3] She also went blind in her right eye for many years before corrective surgery returned some of her sight.[3] This no doubt made it difficult for her to continue her paintings during that time, but Dr. Andrews persevered. "She had a light and joy in her life, despite many hard-

ships, and that made her a remarkable person to be around," said Burckhardt.

Dr. Andrews served as vice-president of the Board of Trustees for the Useful Wild Plants of Texas (1994–1996) and was the first woman inducted into the Hall of Honor for the College of Natural Sciences at UT in 1991.[4,5] She was also awarded the Distinguished Alumna award by both UNT (1991) and UT (1997).[3,4] Dr. Andrews established 2 fellowships at UT, both of which enable professors to visit UT and share their expertise with students and the public. One of those endowments allows famous ethnobotanists to spend a week in Austin every April to lecture before students and faculty.

Dr. Andrews is survived by her son Robert Wasson.[2] HG

—Kelly E. Lindner

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Calendar

May 10-12: 7th Annual Nutrition and Health Conference. Atlanta, GA. This event, titled State of the Science and Clinical Applications, brings together a variety of health professionals, such as researchers, clinicians, educators, and chefs. Attendees will have the opportunity to taste healthful, organic, sustainable meals made by Andrew Weil's personal chef and professional development credits are also offered. Topics discussed at plenary and concurrent sessions include macronutrients, cardiology and diet, heart disease and genetics, nutritional strategies for cancer in women, nutritional child psychiatry, environmental contaminants in food, and healthier food packaging, among others. More information is available at: www.nutritionandhealthconf.org/.

May 11-16: 41st TCM Kongress Rothenburg 2010. Rothenburg, Germany. This event is a premiere international gathering of practitioners and students of Traditional Chinese Medicine (TCM) and related fields of Eastern medicine. Experts in these modalities share their knowledge with students, while authors, teachers, and others discuss some of the most important questions within contemporary TCM. The concurrently-held trade show attracts about 1,000 attendees, presents retail and educational resources, enables the forming of business relationships, and provides other networking opportunities. More than 80 speakers, 98 classes, and other special events are included. More information is available at: www.tcm-kongress.de/en/index.htm.

May 23-26: 7th Annual Meeting of the Natural Health Products Research Society. Halifax, Nova Scotia, Canada. Titled "The Next Wave: NHP Research in the 21st Century," this event highlights the evolution of natural health products research and discusses its possible future. Topics discussed include the history of natural product research by traditional healers, as well as the production, characterization, and clinical use of authenticated, high quality raw and processed botanicals, animal extracts, minerals, and microbial products. More information is available at: www.nhprs.ca/?q=node/9.

June 5-7: Medicines from the Earth 2010. Black Mountain, NC. This 18th annual symposium on botanical medicines will feature a keynote session by Tieraona Low Dog, MD, on the "greening" of medicine, as well as a plenary session in which Rosemary Gladstar discusses the role that herbalists and stewards of healing herbs have in the future of medicinal plant heritage. The remainder of the symposium features concurrent presentations, workshop intensives, and an herbal therapeutics series, all of which are led by additional experts in the herbal community. Attendees can also enjoy guided herb walks, drumming and dancing, and an expanded exhibit hall (the proceeds of which benefit the United Plant Savers nonprofit organization). More information is available at: www.botanicalmedicine.org/conferences/me2010/me2010genl.htm.

June 6-10: 51st Annual Meeting of the Society for Economic Botany. Xalapa, Veracruz, Mexico. This year's annual meeting for the Society of Economic Botany takes on the theme of agrobiodiversity, a set of socially-constructed habitats and cultures combined with diverse agricultural systems. The meeting will present a set of approaches that promote the conservation of agrobiodiversity under the themes of ethnobotany, community conservation, food production systems, food self-sufficiency, and others. Amongst the beautiful culture and scenery of Veracruz, the meeting will also feature field trips to the main archeological sites of the state and educational journeys to local markets and regional coffee plantations. More information is available at: www.econbot.org/_organization_/index.php?sm=07|meetings_by_year/2010.

July 10-14: The 51st Annual Meeting of the American Society of Pharmacognosy and the Phytochemical Society of North America. St. Petersburg Beach, FL. This event features leaders from the industrial and academic communities, as well as a scientific program of over 50 symposia covering the topics of biocatalysis, environmental microbiology, fermentation and cell culture, metabolic engineering, and natural products. Attendees can exchange information, share ideas, network, and advance the science of pharmacognosy, the study of the properties of drugs, drug substances, or potential drugs or drug substances of natural origin. Additional topics discussed include natural products in agriculture, biodiversity, discovery of drugs for problematic diseases, and botanical issues. More information is available at: www.asp2010.com/.

July 18 - August 1: Herbal Medicine in Bhutan. Bhutan. Taking place in the South Asian nation of Bhutan, this trip is organized by Snow Lotus Voyage and offers the opportunity to explore and learn from the country's traditional medicine and customs. The journey begins with a blessing from the revered Buddhist teacher Rinpoche and continues with a visit to a traditional medicine hospital. Other destinations include the capital of Punakha, the Horticultural Research Center, the national museum, monasteries, and schools, and attendees will also be able to walk among high altitude medicinal plants. More information is available at: snowlotusvoyage.ning.com/events/bhutan-trip.

July 20-23: 1st Annual American Council for Medicinally Active Plants Conference. New Brunswick, NJ. ACMAP is a new organization that aims to promote and foster research, development, production, and conservation of medicinal, aromatic, and other bioactive plants. Its first annual conference will feature oral and poster presentations on medicinal and aromatic plant research and current work, scientific sessions, networking, field tours, research stations, and discussions on commercial medicinal and aromatic plant operations. More information is available at: www.acmap.org/.

September 24-26: Green Nations Gathering. Rowe, MA. This event is the 19th annual gathering of Green Nations, communities of people who love and respect the Earth and honor the interdependent diversity needed for peaceful, sustainable life. The gathering includes special guest Rosemary Gladstar, a variety of featured teachers, Equinox Fire Circle, and a live case study with an herbalist panel. Attendees will view a slide presentation of North America's meadows, woodlands, and backyards in order to identify medicinal plants and weeds. Presentations and classes will discuss topics including: herbs for winter health, animal medicine, the art of fermenting, and clinical skills. More information is available at: www.greennations.org/workshops.htm.

September 30 - October 3: 2010 American Herbalist Guild National Symposium. Austin, TX. This annual conference, titled "The New American Herbalism: Exploring the Roots and Branches of Our Herbal Heritage and Bringing Theory into Practice," will explore the roots of modern Western herbalism tradition and its many branches. The conference also aims to combine theory and practice with clinically focused classes on herbalism fundamentals, such as physical assessment, formulation, and clinical strategies. Attendees will have the opportunity to gain a deeper understanding of new clinical skills, botanical medicines for their practice, the business of botanical medicine, as well as gain a new inspiration for teaching. The conference's classes discuss such topics as health activism, Traditional Chinese Medicine, and cannabis history and clinical uses. More information is available at: http://americanherbalistsguild.com/symposium_2010.

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The Nutritional Supplement/OTC/Rx Consumer Insight & Market Opportunity Report, recently released by Natural Marketing Institute (NMI), consists of over 100 pages documenting consumer attitudes, behaviors, and product usage patterns. The report is NMI's most in-depth endeavor in researching and analyzing the nutritional and dietary supplement market from a consumer point-of-view, with each page providing insights, charts, graphics, and tables, as well as analysis and commentary. Based on a quantitative, online survey of 2,012 US adults conducted in September and October of 2009, the report aims to provide a comprehensive overview of the nutritional and dietary supplement marketplace and its consumers. Topics covered in the report include new product and applications development, development of product messaging, and enhancing consumer compliance and lapse in use. The report's summary and table of contents are available for free, and the complete report can be purchased for $3,000 or $6,000 at an increased access level. Available at: www.nmisolutions.com/r_consumer_insight_toc.html.

The Food Chemicals Codex (FCC), recently released in its 7th edition by the US Pharmacopeia (USP), features new and updated quality standards for functional food ingredients and manufactured food products. The FCC is internationally-recognized as a compendium of standards that help ensure the identity, quality, purity and consistency of food ingredients. It is designed as a resource of science-based standards on which suppliers and manufacturers of the food industry can base the authenticity and quality of their food ingredients. This latest edition of the FCC includes quality and purity standards for 1,100 food ingredients, with information on chemical formulas, structure and weight, function and definition, impurity limits, and packaging, storage and labeling. Additionally, 11 appendices offer validated methods with step-by-step guidance on how to analyze and demonstrate the authenticity, quality, and purity of food ingredients. Unlike past editions, the FCC's 7th edition features a comprehensive section on current good manufacturing practices (GMPs) for food chemicals and additional international standards and guidelines on method validation. The printed codex can be purchased for $499 and a 2-year subscription to the online codex can be purchased for $599. Available at: www.usp.org/fcc/.

Natural Medicine Journal (NMJ) is the recently-created, official journal of the American Association of Naturopathic Physicians. NMJ is published monthly in an online format and the first issue came out in September of 2009. The journal aims to help readers stay informed on natural medicine research and practice, while also creating a community for health professionals of various modalities. It claims to provide scientifically-valid, patient-centered healthcare information, including clinically-relevant content, and is based on strong collaboration among integrative medicine organizations. Integrative healthcare and natural medicine practitioners, students, faculty, and other readers have open online access to the journal's peer-reviewed content, which includes literature reviews, treatment protocols, herb and nutrient profiles, researcher interviews, and original research when available. NMJ's website also provides 2 interactive databases from Natural Standard: one on herb and supplement interactions and another on drug nutrient depletions. Available at: www.naturalmedicinejournal.com/index.shtml.

NutraceuticalsWorld.com, the online version of *Nutraceuticals World* magazine, has recently been redesigned to include expanded content, enhanced navigational tools, and additional resources meant to streamline reader experience. The new layout aims to increase the speed and ease at which users can access existing features, which include breaking news, opinions, peer-reviewed research, herbal and dietary supplement monographs, industry events, webinars, product releases, and much more. Several new features have been added to the website, such as the "knowledge center," which contains news and articles associated with specific categories of the nutraceuticals industry, and the new website-wide search engine that allows visitors to search broadly and narrowly. Additionally, the "buyer's guide" section of the website has been updated to include searchable information on more than 400 companies, associations, and consultants. Available at: www.nutraceuticalsworld.com/.

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

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