At Herb Pharm we continue to revere and follow the centuries-old, time-proven wisdom of traditional herbal medicine, but we also integrate that wisdom with the herbal sciences and technology of the 21st Century.

We produce our herbal extracts in our new, FDA-audited, GMP-compliant herb processing facility which is located just two miles from our certified-organic herb farm. This assures prompt delivery of freshly-harvested herbs directly from the fields, or recently dried herbs directly from the farm’s drying loft. Here we also receive other organic and wildcrafted herbs from various parts of the USA and world.

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It’s an approach that our customers agree with, and is a key reason why Herb Pharm is the best-selling line of liquid herbal extracts in America.
**Herb Profile**

**Dragon's Blood**

_Croton lechleri_

Family: Euphorbiaceae

**Introduction**

_Croton lechleri_ is a medium-sized tree (10-20 meters or 30-60 feet) native to the Amazonian region of the South American countries of Bolivia, Brazil, Colombia, Ecuador, and Peru. It most commonly grows in the northwest lowland Amazonian forest area in disturbed soil and along rivers and streams.\(^1\)\(^4\) Despite its height, the tree has a narrow trunk of approximately 1 foot (30 cm) in diameter.\(^1\) The large leaves are heart-shaped and bright green. The plant’s greenish-white blooms and small 3-part capsule fruit are borne on a spike and are relatively inconspicuous.\(^5\) Both the bark and the red latex that seeps from wounds made in the trunk are used medicinally.\(^1\)\(^3\)\(^4\)

**History and Cultural Significance**

_C. lechleri_ (synonyms: _C. draconoides_, _Oxydectes lechleri_) is commonly known as _sangre de drago_ in Peru and _sangre de grado_ in Ecuador, both meaning dragon’s blood.\(^6\)\(^8\) This refers to the characteristic red or orange-red latex the trunk produces when cut, hence its standardized common name, dragon’s blood croton, according to the _American Herbal Products Association’s Herbs of Commerce, 2nd edition_.\(^1\)\(^9\) Due to its wide distribution in South America and its concomitant widespread traditional medicinal use, _C. lechleri_ has a plethora of vernacular names—including _uruchnum_ (Untsuri Shuar), _lan huiqui_ (Quichua), _manjuyuain_ (Cofan), and _conéwé_ (Waorani) used in Ecuador’s indigenous languages.\(^4\)

Approximately 750 species of _Croton_ grow throughout tropical and subtropical areas of both hemispheres.\(^10\) Milky white sap that is often toxic, or at least irritating to the skin, is common to members of the spurge family, Euphorbiaceae, and some _Croton_ species have no latex at all.\(^10\)\(^12\) However, a handful of species found in Mexico and Central and South America produce a red latex that is used medicinally; they include _C. lechleri_, _C. draco_, _C. palanostigma_, _C. sordidus_, _C. urucurana_, and _C. xalapensis_.\(^3\)\(^8\)\(^10\)\(^12\)

A 1996 survey in markets in and around Iquitos, Peru, of the ethnomedical uses of dragon’s blood, revealed that 30 of 52 randomly selected people (57%) used the stem-bark of _C. lechleri_ for diarrhea.\(^13\) Traditional indications of the latex in South America include treatment of diarrhea and dysentery; treat-
ment of bone cancer and tuberculosis; as a vaginal bath before and following childbirth; in hot water to speed internal healing after an abortion; for treatment of intestinal and stomach ulcers; to treat inflamed or infected gums, fractures, hemorrhoids, and leucorrhea (vaginal discharge, usually non-pathological); and for staunching blood flow and healing wounds.\textsuperscript{1,5,13,14} The latex is so often used to stop bleeding in rural Peru that its indigenous common name means “liquid bandage.”\textsuperscript{8} It is also used traditionally for respiratory illnesses such as influenza, lung infections, pharyngitis, pneumonia, respiratory syncytial virus (RSV), tuberculosis, and tonsillitis, as well as bacterial skin infections, cholera, gastritis, herpes simplex, and oral candidiasis.\textsuperscript{4,13}

\textit{Sangre de drago} latex has been available in various products in the United States since before the passage of the Dietary Supplements Health and Education Act (DSHEA) in 1994, and it is listed on the old dietary ingredients list of plants submitted by the Utah Natural Products Alliance to the US Food and Drug Administration as part of the Administration's premarket notification program for New Dietary Ingredients.\textsuperscript{4,15}

\section*{Modern Research}

An abundance of chemical constituents have been isolated from \textit{sangre de drago} including alkaloids, diterpenes, lignans, phenols, phytosterols, proanthocyanidins, steroids, and tannis.\textsuperscript{1,8} \textit{In vitro} studies have been performed on some of these chemicals and some studies have proposed that a complex molecular compound from the latex, a proanthocyanidin oligomer, isolated and named crofelemer (SP-303, NP-303), is the principal active ingredient in the stem bark latex.\textsuperscript{13} Pharmacokinetic studies determined that there is little or no absorption of crofelemer from the GI tract into the bloodstream. SP-303 was standardized by the former Shaman Pharmaceuticals and became the chemical marker for its product Normal Stool Formula (67\% by weight of each 350 mg tablet).\textsuperscript{4,13} The intellectual property rights for SP-303 transferred to Napo Pharmaceuticals, Inc., and it is currently called crofelemer, the official United States Adopted Name (USAN) for the chemical compound (NP-303).

In a 1993 \textit{in vitro} study, SP-303 was evaluated for antiviral activity against RSV.\textsuperscript{16} EC\textsubscript{50} (half maximal effective concentration) values for SP-303 were equal to or better than ribavirin (the only drug approved for treatment of RSV at the time) in the same assays.

A multicenter, double-blind, placebo-controlled, Phase II study performed in 1997 evaluated a topical antiviral agent, Virend\textsuperscript{*}}
(15% SP-303 w/w, Shaman Pharmaceuticals, South San Francisco, CA) on recurrent genital herpes lesions in patients with AIDS.\textsuperscript{17} Patients received Virend (n=24) or placebo (n=21) 3 times per day for 21 days. Nine Virend patients (41%) experienced complete healing of lesions compared to 3 (14%) in the placebo group. Additionally, 50% of the Virend group became culture negative during treatment as opposed to 19% in the placebo group.

In a 1999 randomized, double-blind, placebo-controlled study to assess the safety and efficacy of treating diarrhea in patients with AIDS, participants discontinued all antiarrheal medications for more than 24 hours before treatment. Twenty-six subjects received 500 mg of SP-303 orally and 25 received a placebo every 6 hours for 4 days.\textsuperscript{18} The SP-303 group experienced a statistically significant reduction in stool weight and abnormal stool frequency.

In one randomized, placebo-controlled study, 98 adult Indian patients with acute watery diarrhea for less than 24 hours were given either 250 mg crofelemer every 6 hours for 2 days or placebo.\textsuperscript{19} No antibiotics were allowed in this study. The crofelemer was rated better than placebo at alleviating diarrhea and clinical success was achieved in approximately 75% of the crofelemer group compared to 37% in the placebo group. Additionally, 12 patients in the placebo group required antibiotic rescue compared to 4 patients in the crofelemer group.

In another study, 100 Bangladeshi patients with cholera and acute, severely dehydrating, watery diarrhea were given a placebo, or 125 mg or 250 mg crofelemer QID (4 times per day) as an oral dose.\textsuperscript{19} The crofelemer or placebo treatment followed a 4-hour rapid rehydration therapy and oral administration of 1 gm azithromycin by one hour. Both crofelemer doses reduced watery stool volumes by approximately 25-30% in the 0-6 and 0-12 hour periods following the treatment, with the 125 mg dose showing a stronger trend toward reduction of watery stool.

Another randomized, double-blind, placebo-controlled study (n=184, 169 evaluated) examined the effect of SP-303 (Provir\textsuperscript{TM}, [100% SP-303 ± 10%]) on traveler's diarrhea.\textsuperscript{20} Participants received 125 mg, 250 mg, or 500 mg Provir or placebo 4 times per day for 2 days. The mean number of hours from beginning treatment to the
in the United States) were given 125 mg, 250 mg, or 500 mg crofelemer or placebo 2 times per day. Crofelemer treatment did not result in significant stool consistency improvement, stool frequency, urgency, or adequate relief in the combined male and female groups; but female patients experienced significant improvement in abdominal pain and increased discomfort-free days. The authors concluded that further studies are warranted to evaluate crofelemer's analgesic effect.

In 2010, a pivotal Phase 3a, 6-month, double-blind, placebo-controlled study in HIV patients with chronic diarrhea receiving antiretroviral therapy (ART) was completed using crofelemer (ADVENT trial). The results of the study have not been published yet, but topline data were released to the public in November 2010. Crofelemer at a twice daily oral dose of 125 mg was significantly better than placebo treatment in the reduction of watery stools in the HIV patients receiving ART. The p-value for this study was 0.0096 for the primary endpoint. The results from the ADVENT study confirm the previous results observed in acute (1-week) trials in HIV patients with diarrhea.18

**Future Outlook**

Tapping *C. lechleri* over time for large quantities of latex ordinaril-ly kills the trees in a short period of time and yields less latex than felling the tree and tapping it. Counterintuitively, felling trees to extract the latex is more sustainable. Studies have determined that there are approximately 3-10 trees per hectare in rainforest areas of the Andean Amazon region.12 Shaman Pharmaceuticals sponsored reforestation and agroforestry initiatives with *C. lechleri* in the 1990s and determined that a ratio of 3 trees planted for every tree harvested was a safe ratio, but that replanting 5 trees when situations are favorable is even better. Primarily due to Shaman’s efforts, more than 230,000 trees have been planted across appropriate habitat in South America. By the end of 2011, Napo will have planted an additional 700,000 trees.

Because dragon’s blood thrives in disturbed soil and produces a large number of seeds, it is a good agricultural crop choice for parts of South America.4 Additionally, because it is a very fast-growing pioneer tree (i.e., species that establish themselves quickly in areas disturbed by fire and logging), it improves soil conditions in clear-cut areas through aeration, addition of organic material and important nutrients, balancing soil pH, and catalyzing microbial activity. It also provides shade for understory plants and grows well in plantation crop combinations with banana (*Musa* spp., Musaceae), chocolate (*Theobroma cacao*, Sterculiaceae), manioc (*Manihot esculenta*, Euphorbiaceae), oranges (*Citrus sinensis*, Rutaceae), and shade-grown coffee (*Coffea* spp., Rubiaceae), among others.4

—Gayle Engels and Josef Brinckmann

**References**


Please join The American Botanical Council's celebration of HerbDay 2011 in Austin, TX. HerbDay is a grassroots effort to involve people around the world in the celebration of herbs and the part they have played in human culture throughout history. This year's focus is Sustainable Healing, featuring keynote speakers Mark Blumenthal and Christopher Hobbs. Activities for the day will also include herb walks, plant lectures, herb demonstrations, book signings, and a market featuring local vendors and musicians. Please mark your calendars now and plan to join us for this special event. More information can be found at www.herbalgram.org.

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The History of Adulteration of Herbs and the Passing of Norman Farnsworth

Although many companies in the herb and dietary supplement industry utilize strict due diligence by employing high-tech quality control procedures and selling honest and reliably high-quality, properly labeled raw materials and finished herbal products, unfortunately some companies do not. One area of significant concern among many responsible elements of the herb community is the adulteration of herbal raw materials. This can occur when an ingredient contains a material different from what is stated on certificates of analysis or product labels, and it can take the form of dilution with cheaper materials, or spiking with undisclosed natural or synthetic compounds to artificially enhance specific marker compounds. This practice, whether by accident due to lack of proper quality control measures or by design (referred to as economically motivated adulteration), is not new; it is part of the history of commerce for foods, spices, botanicals, drugs, etc. In this issue, noted author, photographer, and botanist Steven Foster provides a history of adulteration of herbal materials going back 2 millennia to Greco-Roman times. Herb enthusiasts and others will find this article highly interesting and enlightening.

Foster’s history of botanical adulteration article is part of a larger program that the American Botanical Council has initiated with several other leading herb quality-oriented organizations. ABC is partnering with our good friends Roy Upton, director of the American Herbal Pharmacopoeia (AHP), and Ikhas Khan, PhD, of the University of Mississippi’s National Center for Natural Products Research, to establish the ABC-AHP-NCNPR Botanical Adulterants Program in which we will be publishing a series of peer-reviewed papers on various subjects related to accidental and intentional adulteration of herbal materials. Included in the program will be references to published official and unofficial analytical methods that responsible companies can use to detect the presence (or absence) of a confirmed adulterant, plus commentary on the strengths and weaknesses of each method. Numerous leading third-party laboratories and many responsible companies are involved in the multi-year program. The goal is to make this information widely available to people in the global botanical market so that companies can help ensure that the products they are manufacturing contain properly identified ingredients.

In closing, we reflect the sentiments of many people in the medicinal plant community in honoring the life of world-renown Professor Norman R. Farnsworth, whose leadership and accomplishments in the field of pharmacognosy and medicinal plant research are legendary. There has been an enormous outpouring of condolences from around the world since his passing on September 10, and we are honored to print some of these in an extensive tribute to him in this issue. Norm was not only a driving force in global medicinal plant research, but he was also one of the founding board members of ABC, and maintained an active role in board deliberations since its founding in 1988 until earlier this year as his health declined. His many significant contributions to the world of medicinal plant research cannot be measured, but we have made a modest attempt to communicate some of his accomplishments in our tribute to our co-founder, our mentor, and our good friend. He is irreplaceable and his passing is a great loss to the medicinal plant research profession. There will never be anyone like Norman R. Farnsworth, particularly in the hearts of so many friends, students, and colleagues who deeply cherish his memory.
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Paula M. Gardiner, MD, MPH
Assistant Professor, Dept. of Family Medicine, Boston University Medical School, Boston, MA

Patricia Gerbarg, MD
Kingston, NY

Joe Graedon, MS
Author, syndicated columnist, radio host, Durham, NC

Mindy Green, MS
Blaine, MN

De-An Guo, PhD
Professor, Shanghai Research Center for TCM Modernization, Shanghai Institute of Materia Medica, Shanghai, China

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Charlotte Gylenhaal, PhD
Research Assistant Professor, College of Pharmacy, University of Illinois at Chicago, Research Program Manager, Block Center for Integrative Cancer Care, Evanston, IL

Mary Hardy, MD
Medical Director, Simmons/Mann-UCLA Center for Integrative Oncology, Los Angeles, CA

Christopher Hobbins, LAc, AHG
Herbalist, botanist, licensed acupuncturist, Davis, CA

Freddie Ann Hoffman, MD
CEO and Managing Member, Heterogeneity, LLC, Washington, D.C.

David Hoffmann BSc, FNIMH
Medical herbalist, author, and research associate, Traditional Medicinals, Sebastopol, CA

Timothy Johns, PhD
Professor, School of Dietetics and Human Nutrition; Centre for Indigenous People’s Nutrition and Environment, McGill University, Montreal, Canada

Kenneth Jones
President and Medical Writer, Armana Research, Inc, Halfmoon Bay, B.C., Canada

Edward Kennelly, PhD
Associate Professor and Chair, Dept. of Biological Sciences, Lehman College, City University of New York, Bronx, NY

Ikhlas Khan, PhD
Research Professor of Pharmacognosy, Assistant Director, National Center for Natural Products Research, University of Mississippi, Oxford, MS

Steven King, PhD
VP, Sustainable Supply and Ethnobotanical Research, Napo Pharmaceuticals Inc., South San Francisco, CA

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Principal and Founder, Dr. Koetter Consulting Services, Switzerland

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Chair, Medicinal Plants Specialist Group, Species Survival Commission, International Union for the Conservation of Nature, Ottawa, Ontario, Canada

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Director and Chair, Dept. of Nursing,
Humboldt State University
Arcata, CA

Tieraona Low Dog, MD
Director of the Fellowship, Arizona Center for Integrative Medicine, Clinical Assistant Professor, Dept. of Medicine, University of Arizona Health Sciences Center, Tucson, AZ

Robin J. Marles, PhD
Director of the Bureau of Research and Science, Natural Health Products Directorate, Health Canada, Ottawa, Canada

Will C. McClatchey, PhD
Professor of Botany, University of Hawaii, Mānoa, HI

Joe-Ann McCoy, PhD
Director, Medicinal Germplasm Repository
Bent Creek Institute / NCSU
Asheville, NC

Dennis J. McKenna, PhD
Senior Scientist, British Columbia Institute of Technology, Burnaby, B.C., Canada

Marc S. Micozzi, MD, PhD
Private Practice in Forensic Medicine, and Policy Institute for Integrative Medicine, Bethesda, MD

Simon Y. Mills
Senior Teaching Fellow, Peninsula Medical School, Exeter, England

Daniel E. Moerman, PhD
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Executive Director, Amazon Conservation Team, Arlington, VA

John M. Riddle, PhD
Professor, Dept. of History, North Carolina State University, Raleigh, NC

Eloy Rodriguez, PhD
James Perkins Professor of Environmental Studies, School of Agriculture & Life Sciences, Cornell University, Ithaca, NY

Aviva Romm, MD
Boston, MA

Robert Rountree, MD
Practitioner, Boulder Wellcare Inc., Boulder, CO

Paul Schuck
Founder and Chairman, New Chapter, Inc., Brattleboro, VT

Holly Shimizu
Executive Director, US Botanic Garden, Washington, D.C.

Victor Sierpina, MD
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James E. Simon, PhD
Professor, Director of the Center for New Use Agriculture and Natural Plant Products, Rutgers University, New Brunswick, NJ

Ed Smith
Chairman, Herb Pharm, Williams, OR

S. H. Sohmer, PhD
President and Director, Botanical Research Institute of Texas, Fort Worth, TX

Michael S. Tempesta, PhD
Managing Partner and Founder, Phenolics, LLC, El Granada, CA

Barbara N. Timmermann, PhD
Chairperson-Professor of Medicinal Chemistry, University of Kansas, Lawrence, KS

Steve Foster
President, Steven Foster Group, Inc., Eureka Springs, AR

Fredi Kronenberg, PhD
The New York Botanical Garden, Bronx, NY

Bernadette M. Marriott, PhD
Principal Associate, Nutrition & Health Research, Abt Associates, Inc., Durham, NC

Morris Shifftman
CEO, Mozart, Inc., Petaluma, CA

Arthur O. Tucker, PhD
Research Professor of Agriculture and Natural Resources, Delaware State University, Dover, DE

Nancy Turner, PhD
Distinguished Professor and Ethnobotanist, Environmental Studies Program, University of Victoria, B.C., Canada

Jay Udani, MD
CEO and Medical Director, Medicus Research LLC., Medical Director, Northridge Hospital Integrative Medicine Program, Northridge, CA

Roy Upton
Executive Director, American Herbal Pharmacopoeia, Scotts Valley, CA

Daniel T. Wagner, RPh, MBA, PharmD
Owner, Nutri-Farmacy, Wildwood, PA

John Weeks
Publisher-Editor, Integrator Blog
Seattle, WA

Andrew T. Weil, MD
Author, Director of the Program in Integrative Medicine and Associate Director of the Division of Social Perspectives in Medicine, College of Medicine, University of Arizona, Tucson, AZ

David Winston, RH (AHG)
Director, Herbal Therapeutics Research Library, Herbalist & Alchemist, Inc., Washington, NJ

Jacqueline C. Wootton, MEd
President, Alternative Medicine Foundation, Inc.

David Blumenthal (ex officio)
Founder and Executive Director American Botanical Council

Steve Foster
President, Steven Foster Group, Inc., Eureka Springs, AR

Fredi Kronenberg, PhD
The New York Botanical Garden, Bronx, NY

Bernadette M. Marriott, PhD
Principal Associate, Nutrition & Health Research, Abt Associates, Inc., Durham, NC

Morris Shifftman
CEO, Mozart, Inc., Petaluma, CA

Arthur O. Tucker, PhD
Research Professor of Agriculture and Natural Resources, Delaware State University, Dover, DE

Nancy Turner, PhD
Distinguished Professor and Ethnobotanist, Environmental Studies Program, University of Victoria, B.C., Canada

Jay Udani, MD
CEO and Medical Director, Medicus Research LLC., Medical Director, Northridge Hospital Integrative Medicine Program, Northridge, CA

Roy Upton
Executive Director, American Herbal Pharmacopoeia, Scotts Valley, CA

Daniel T. Wagner, RPh, MBA, PharmD
Owner, Nutri-Farmacy, Wildwood, PA

John Weeks
Publisher-Editor, Integrator Blog
Seattle, WA

Andrew T. Weil, MD
Author, Director of the Program in Integrative Medicine and Associate Director of the Division of Social Perspectives in Medicine, College of Medicine, University of Arizona, Tucson, AZ

David Winston, RH (AHG)
Director, Herbal Therapeutics Research Library, Herbalist & Alchemist, Inc., Washington, NJ

Jacqueline C. Wootton, MEd
President, Alternative Medicine Foundation, Inc.

David Blumenthal (ex officio)
Founder and Executive Director American Botanical Council
A Brief History of Adulteration of Herbs, Spices, and Botanical Drugs
By Steven Foster
Cheating in commerce is as old as human civilization. People have adulterated foods, spices, medicines, and many other items since the advent of trade. Author and botanical expert Steven Foster discusses significant events in the history of herbal adulteration. This overview begins by tracing the roots of adulteration from ancient times to the present. In the United States, the federal government first attempted to deal with the problem of adulterated products with the 1848 passage of “An Act to prevent the importation of adulterated and spurious drugs and medicine.” More than a century later, advanced analytical methods now allow scientists to detect even the most expertly adulterated products. This article is the first in a series of forthcoming publications as part of the American Botanical Council-American Herbal Pharmacopoeia-National Center for Natural Products Research at the University of Mississippi Botanical Adulteration Program.

Norman R. Farnsworth, Renowned Medicinal Plant Researcher, Dies at 81
By Mark Blumenthal
ABC Founder and Executive Director Mark Blumenthal pays tribute to the late Norman R. Farnsworth, PhD. The legendary pharmacognosist and internationally recognized medicinal plant researcher died on September 10, 2011. Prof. Farnsworth was a co-founder of ABC and the longest-serving member of its Board of Trustees. Blumenthal recalls his numerous contributions to science, his impact on the medicinal plant community, and, of course, his trademark Marsh Wheeling cigars.
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ABC’s Mark Blumenthal Awarded 2012 Jean Andrews Visiting Faculty Fellowship at University of Texas

The American Botanical Council is honored to announce that the 2012 Jean Andrews Visiting Faculty Fellowship at the University of Texas at Austin (UT) has been awarded to ABC Founder and Executive Director Mark Blumenthal. The fellowship entails 3 lectures over the course of 3 days in April in Austin, Texas; the first lecture will be promoted as a university event, the second will be geared toward graduate plant biology students, and the third will take place at the Lady Bird Johnson Wildflower Center following a reception (B. Simpson, e-mail, August 15, 2011.)

The fellowship’s namesake and founder is the late Jean Andrews, PhD—aka “The Pepper Lady”—who received her BA at the University of Texas and published several books through the UT’s press, including her highly regarded book on Capsicum spp. (Solanaceae) peppers.1 Dr. Andrews established 2 fellowships at UT, the other being the Jean Andrews Centennial Faculty Fellowship in Human Nutrition.1 Past recipients of the Jean Andrews Visiting Faculty Fellowship include ABC Board of Trustees member Michael Balick, PhD (1997), and Advisory Board members Mark Plotkin, PhD (1989), Hardy Eshbaugh, PhD (1993), Paul Cox, PhD (2000), Timothy Johns, PhD (2001), Will McClatchey, PhD (2007), and Nancy Turner, PhD (2010) (B. Simpson, e-mail communication, September 2-October 4, 2011).

“Jean wanted important people in the areas of tropical (because of her interests in Costa Rica) and economic botany (her peppers, etc.) to come and interact with students. The first couple of speakers were here for only a day and Jean wanted that changed so that there would be ample time for the visitor to meet with students,” said Beryl Simpson, PhD, the C.L. Lundell Professor of Systemic Botany and director of the Plant Resources Center at UT’s School of Biological Sciences (e-mail, September 14, 2011).

Dr. Simpson previously selected the fellow in collaboration

“I am also grateful and humbled to be chosen to join the list of some of the most respected names in ethnomedicine who Jean and Dr. Simpson have chosen for this fellowship over the past several decades.”
with Dr. Andrews. Presently, Dr. Simpson decides unilaterally, taking into consideration the suggestions of students and faculty.

“I was surprised and am deeply honored to have been chosen to give the Jean Andrews Visiting Faculty lectures next spring,” said Blumenthal. “Jean was a remarkable woman, and her passion for native uses of herbs and medicinal plants—particularly the capscium—is legendary. I am also grateful and humbled to be chosen to join the list of some of the most respected names in ethnobotany who Jean and Dr. Simpson have chosen for this fellowship over the past several decades. This choice is an acknowledgement of the pioneering and strategic educational publications and programs that ABC conducts in the field of medicinal plants and ethnobotany.”

In addition to the lectures, the fellowship also comprises a traditional dinner. “[Jean] used to host a dinner—originally one that she cooked and later prepared in her house by a chef she hired. With her own health failing, and upon learning that her chef had died when she tried to find him one fall, she moved the dinner to a restaurant,” said Dr. Simpson. “We have been having a small dinner at the AT&T Center since her death.”

—Ashley Lindstrom

Reference

Employee Profile:
Toby Bernal

Caring for the 2.5-acre, herb-rich grounds on which the American Botanical Council is headquartered is no walk in the park. This is hotter-than-hot Central Texas, after all. In the past, due to budget limitations, the numerous tasks vital to perpetuating ABC’s 30 medicinal herb theme gardens fell to the education coordinator. This year, ABC was fortunate enough to be able to hire a dedicated gardener: Toby Bernal.

Toby is responsible for maintaining ABC’s herb gardens, coordinating garden volunteers, and managing ABC’s greenhouse, rainwater collection system, equipment, and tools. But Toby’s contributions to ABC extend beyond his job description: He can always be counted on as a source of laughter and has an ever-ready ear to bend. He shares his artistic talent and Japanese garden landscaping experience with ABC by adorning its grounds with rock sculptures (which remain beautiful without watering—a benefit during a record-setting Texas draught!).

A man of just 45 years, Toby seems to have lived many lifetimes. He was born in Austin, Texas, and spent his childhood in the idyllic Hyde Park neighborhood. After graduating from high school, he went “vagabond” and immediately traveled south to Mexico and through Central America. “As I was doing that,” said Toby, “I started to see how art was a part of their cultures, not just something to look at.”

In 1987, he began to study art in Mexico City; later, he earned his bachelor’s degree in art—with focuses in sculpture and painting—from the University of Texas at Austin.

After graduation, he subtly shifted gears by opening an antiques business and apprenticing with a master finisher for 5 years. The latter opportunity allowed him to participate in the restoration of the Texas State Capitol building.

Toby ran a “small-time” refinishing business on Austin’s East Side for several years, but in 1996, he fell in love, sold everything, moved to Alaska and then on to Hawaii.

The decline of his mother’s health brought Toby back to the mainland. “That’s when I became interested in homeopathic medicines and herbal remedies,” said Toby, though his herbal education truly commenced much earlier, in the gardens of his mother and his aunt, a faith healer.

For nearly 4 years, Toby—a practicing Buddhist—was the garden coordinator at Austin’s Shambhala Meditation Center, where his knowledge of irrigation, indigenous plants, and herbs increased. Toby continues to devote about 10 hours per week to the Center’s garden.

According to Toby, it took just 30 minutes from the time ABC’s former education coordinator posted the gardener job listing to Craigslist for him to arrive at ABC in person to apply for the position. Looking around the gardens, Toby recognizes the potential for improvement. “I’m not going anywhere,” he said, seriously, confident that he has years ahead of him to realize the possibilities. “I’ve found a place that I can call home.”

Toby is contemplating continuing his education during off-hours to obtain a degree in botany. Presently, when his hands aren’t in the soil or balancing stones, Toby enjoys cooking—particularly French cuisine—as well as kyudo (Japanese archery), ikebana (Japanese floral arrangement), many forms of dance, classic movies, swimming, and skateboarding with his 13-year-old daughter.
Nonprofit Collaboration Addresses Adulteration of Botanical Ingredients

American Botanical Council, American Herbal Pharmacopoeia, and University of Mississippi’s National Center for Natural Product Research Join Forces to Educate on Supplement Adulteration Problems, Challenges, and Solutions

There is a major problem in the global herb and dietary supplements industry in which there may be a persistent trend related to the availability of adulterated herbs, herbal extracts, essential oils, and other plant-derived dietary ingredients,” said ABC Founder and Executive Director Mark Blumenthal.

Although not all cases of botanical adulteration are deliberate, the ABC-AHP-NCNPR Botanical Adulterants Program will focus on both accidental adulteration as a result of poor quality control procedures, as well as the intentional adulteration of plant-based products for financial gain. Earlier this year, the US Food and Drug Administration (FDA) held a public conference on this issue, which they named “economically motivated adulteration” (EMA). This industry-funded program hopefully can serve as a self-regulatory mechanism for industry to address adulteration problems through education rather than federal regulation.

Title 21 of the Code of Federal Regulations defines adulteration as the “Addition of

The ABC-AHP-NCNPR Botanical Adulterants Program aims to help protect consumers and responsible members of the herb and dietary supplement industry, as well as other manufacturers, by producing a series of detailed white papers.

ABC-AHP-NCNPR Botanical Adulterants Program
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Verdure Sciences
Weil Lifestyle, LLC
Whole Foods Market
ZMC-USA
an impure, cheap, or unnecessary ingredient to cheat, cheapen, or falsify an ingredient or preparation.” The Code also considers a product adulterated “if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, or make it appear better or of greater value than it is.”

According to AHP Executive Director and herbalist Roy Upton, “With GMPs in full force there are now a lot of companies realizing that the supply chain for ingredients that pass identity and quality good manufacturing practice requirements has shrunk dramatically. Ingredients that used to readily pass manufacturer specifications are now failing when proper identity and quality tests are applied.”

“We are pleased to partner with ABC and AHP in this effort to raise awareness about adulteration of botanicals and the methods/principles that can minimize this problem,” said Ikhlas Khan, PhD, assistant director of NCNPR and the director of the Center’s botanical supplement authentication program. Prof. Khan is an internationally recognized expert on laboratory analytical methods to identify botanical materials. The Center has a cooperative agreement with FDA to identify botanicals, provide reference materials, and develop appropriate analytical methods.

The ABC-AHP-NCNPR Botanical Adulterants Program aims to help protect consumers and responsible members of the herb and dietary supplement industry, as well as other manufacturers, by producing a series of detailed white papers, which will serve as an authoritative source of information on botanical adulterants with references to published official and unofficial analytical methods for companies and/or third-party laboratories to utilize to help detect the presence (or absence) of known adulterants.

In the program’s first published paper (available on page 42 in this issue of HerbalGram), “A Brief History of Adulteration of Herbs, Spices, and Botanical Drugs,” noted botanical expert Steven Foster provides a history of accidental and intentional adulteration of botanical ingredients spanning the past 2 millennia. Foster is a well-known author, photographer, and consultant on herbs and is currently Chairman of the Board of Trustees of ABC.

—Tyler Smith

Reference
Due to its fertile soil and temperate climate, the southernmost Indian state of Kerala is known as a hub for medicinal plants used in the traditional medicine system of Ayurveda. But other than a few tourist destinations, Sri Narayan has seen most traditional lifestyles in his homeland replaced by culturally popular Western conveniences.

“Pockets of traditional living that used to exist have eroded a lot over the past 20 to 25 years,” he said.

So when Narayan, a nutrition and health coach, came across Kerala’s Handloom Weavers Development Society (HWDS) and its project of dyeing fabric with Ayurvedic medicinal plants, he knew he had a role in spreading the word.

“It’s happening in my backyard, and their voice needs to be heard,” Narayan said of this project in the region where he lived for 24 years until moving to the United States (oral communication, July 28, 2011).

During the early 1990s, the Kerala weaving industry went through an economic crisis. In hopes of stimulating the industry, a group of hand weavers in HWDS began reviving their ancestors’ practice of dyeing clothing with medicinal Ayurvedic plants. According to Rajan and Satish Kumar—chief dyeing technician and secretary of HWDS—their relatives in the Kuzhuvila family did this to make the clothing retain its color, and the current family members have dedicated their lives to developing it further (S. Narayan translator; S. Narayan e-mail to L. Stafford, September 1, 2011).

HWDS named the practice ayurvastra, a convenient and memorable combination of the Sanskrit words ayur—which means life, health, or longevity—and vastra or vastram—which means clothing. HWDS began creating the fabric and selling it to some shops and markets in Kerala, and the project has received some support from the local Kerala government. But the overall demand for their products from within India has had slow progress.

A worker of the Handloom Weavers Development Society in Kerala, India washes fabric that has been dyed with medicinal plants according to the ayurvastra process. Photo ©2011 Vastra™
“The Indian market for a large part is busy adopting Western tastes and ideas influenced by big name brands and media influence,” said Rajan and Kumar.

In January of 2011, Narayan collaborated with HWDS and created the Washington, DC-based company Vastra™ to promote the organization’s Ayurvedic dyeing products in North America and the West. Vastra plans to expand its initial offering of shirts and bed sheets to include other apparel items and more fabric varieties that cater to the retail and wholesale market. With the Vastra project, HWDS and Narayan expect to provide employment to more local workers at fair living wages.

The Ayurvastra Dyeing Process

To create the subtle yet beautiful colors of their ayurvastra fabrics, HWDS workers begin by bleaching all-natural cotton or yarn with a cow urine-based preparation, which is used traditionally in rituals to bathe Hindu idols. They dry the fabric in direct sunlight and then apply a gumming substance, containing plants like _Aloe vera_ (Xanthorrhoeaceae) and camphor (_Cinnamomum camphora_, Lauraceae), and then dip it into a concoction called _kashaya_ that contains up to 40 medicinal plants, one of which is the primary herb selected for its specific wellness benefits. The gumming substances help the _kashaya_ take hold, giving the fabrics their colors. The fabric is left to dry for 3 days and then kept in a room for 15 days for “seasoning,” a period of time that allows the fabric to dry completely and the _kashaya_ to settle in to the fabric. It is then washed, dried in the shade, and seasoned for another 15 days.

“It is a process that requires manual labor that involves handling large pieces of fabric that get heavy when wet dipping and wringing,” said Rajan and Kumar. “It requires attention and focus to ensure standards, like timing and consistency.” (An online video of the workers creating ayurvastra fabrics can be viewed at www.youtube.com/watch?v=Nx5iClrkqPw.)

Current Vastra products include shirts in 6 different colors: Yellow (main herb is turmeric [_*Curcuma longa*, Zingiberaceae]); blue (main herb is indigo [_*Indigofera tinctoria*, Fabaceae]); olive green (main herb is holy basil or tulsi [_*Ocimum tenuiflorum*, Lamiaceae]); beige (main herb is neem [_*Azadirachta indica*, Meliaceae]); gray (main herb is vetiver [_*Chrysopogon zizanioides*, Poaceae]); and light peach (main herb is sandalwood [_*Santalum album*, Santalaceae]). These are available through Vastra’s website at www.vastra.us. Bed sheets are also available in turmeric, tulsi, and a sunset color dyed specifically for sleep-enhancing benefits. According to Narayan, the herbs that HWDS uses are either organically grown or wild crafted and sustainably harvested by local tribal groups. Even sandalwood, he said, is certified as sustainable by the Forest Department of India.

The US Department of Agriculture (USDA) certifies fibers and textiles as organic based only on the growing process, meaning that products containing organic fibers might also contain non-organic and unnatural substances used in the manufacturing process. The Global Organic Textile Standard—an independent certification—goes beyond the USDA requirements by taking into account processing, manufacturing, packaging, labeling, trading, and distribution. This program, however, requires that textiles are made from only at least 70% certified organic natural fibers.

According to Narayan, the ayurvastra products are 100% organic. “No [synthetic] chemicals are involved in any stage of creating the fabric,” he said. Narayan hopes that Vastra will encourage other businesses in the natural and eco-clothing markets to develop and adopt fully natural processes.

Supporting Research

Two studies have been completed on ayurvastra’s effects in humans, both indicating positive results. As reported on the Vastra website and in a _TIME_ magazine article, researchers in the Department of Pharmacology at the Government Ayurveda College (GAC) in Kerala found that patients who used bedding, rugs, and towels dyed with medicinal plants experienced relief in symptoms of eczema, psoriasis, and even rheumatism. Kerala’s Ministry of Health conducted its own study on the effects that herbal-dyed clothing, bed sheets, and mattresses had on patients with a variety of ailments. They also hung ayurvastra cloth mats on their walls and ceilings. Researchers reported that patients’ arthritis and rheumatism symptoms improved, suggesting possi-
ble effects that go beyond dermatological responses.\(^5\)

However, the design and control of these studies are not clear and they have not been published. As GAC currently conducts a third study, Narayan said he is encouraging them to seek publication in a peer-reviewed journal.

“It is very difficult to pass any comment about the reliability and significance of ayurvastra without a comparative study between herbal decoction dyeing and chemical dyeing,” said Hari M. Chandola, MD, PhD, the head of internal medicine at Gujarat Ayurved University. “It needs scientific evaluation with multi-centric survey and trials before reaching to any conclusion.”

Dr. Chandola noted that because the ayurvastra linens are natural and free of synthetic bleaches and dyes, people using them could have a minimized chance of skin reactions from possible allergies to non-natural substances. Also, he said, natural fabrics allow perspiration to evaporate properly, something that can be difficult when wearing synthetic clothing.

“Of course,” he added, “if any individual is allergic to any particular plant-based material, then he may show allergic reaction due to that plant also.”

**Traditional History**

According to Rajan and Kumar, until about 100 years ago, people in many parts of India were still using various forms of natural dyeing, in which people repeatedly dipped their clothing in a herb-based preparation after each wash. People in India have also used plants for coloring fabric during the annual festival of colors, known as Holi, because the dyes are “close to nature and toxicity free,” said Dr. Chandola.

“At some point—use after use, wash after wash, dipping after dipping—the color and value would hold,” said Rajan and Kumar. “But it was seen just as another part of living harmoniously with the environment.”

Dr. Chandola claimed that ayurvastra is not referred to in the ancient or contemporary classics of Ayurveda. Instead, he said, some references mention certain plants that have a therapeutic result when applied to the skin by working through a mode of action called *Prabhav*, which means effect.

Narayan maintained that the use of medicinal plants to dye clothing is mentioned in some Ayurvedic texts, just not under the name ayurvastra. Additionally, Vasant Lad, BAMS—president of the Ayurvedic Institute in New Mexico and a distinguished Ayurvedic doctor and author—said that the usage of fabrics dyed in medicinal plants is discussed in the Padma Purana, a Hindu religious text, and the Astanga Hridaya, a text that covers the Eight Branches of Ayurveda (oral communication, September 26, 2011). The color of the fabric can be used to balance the doshas, Dr. Lad continued, and the medicinal properties of the plants can be obtained through their energy and dynamic action.

Though the process of ayurvastra is not mentioned in some of the more famous Ayurvedic texts, Dr. Lad noted that in-depth Ayurvedic knowledge is scattered about in ancient Vedic literature. “It is there,” he said about documentation of the ayurvastra process.

Dr. Lad also said that the prescription of ayurvastra by Ayurvedic practitioners in India and the United States is uncommon, but he recommends it for some of his clients—especially turmeric-dyed fabrics for people experiencing skin disorders.

**Conclusion**

Since collaborating on Vastra, HWDS’s ayurvastra project has been increasing global awareness of the practice. The team in India hopes the partnership will help build a platform for education on ayurvastra as an alternative to synthetic and synthetically dyed fabrics, and to increase business that results in a stable economy providing a livelihood for hundreds of people.

While Narayan does recognize that Vastra is a for-profit company, and therefore would like to experience success, he said he does not wish to see the company attain a large commercial production volume “at any point.” His intention for the project is to create more health education in Kerala, for HWDS to have the opportunity to sell their ayurvastra fabrics around the world, and to encourage other interested researchers or companies to investigate the wellness potential of fabrics dyed in medicinal plants.

—Lindsay Stafford

**References**

Adopt-An-Herb is an exciting and mutually beneficial way to support ABC! Each adopting organization helps ensure that the most current information on its adopted herb is available in the powerful HerbMedPro database on ABC’s website. This enables consumers, researchers, educators, media, health practitioners, government agencies, and members of industry to have easy access to abstracts of the latest scientific and clinical publications on the many aspects, properties, and benefits of the adopted herb.

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  - Mentha x piperita
Sacred Seeds Nonprofit Establishes Garden Network

Sacred Seeds, a nonprofit organization affiliated with the William L. Brown Center at the Missouri Botanical Garden and NewChapter, Inc., is preserving plant species and knowledge in gardens across the world. Collaborating with local experts and medicinal plant and herb enthusiasts, Sacred Seeds helps research and plan gardens featuring useful medicinal plants native to each garden’s respective area.¹

“[We] keep these plants around by keeping them with the people that use them,” said Ashley Glenn, program manager of Sacred Seeds (oral communication, July 13, 2011). “[It’s] a living museum.”

The first Sacred Seeds garden was established at Finca Luna Nueva, an eco-lodge and organic farm nestled in the Costa Rican rainforest. The Sacred Seeds Sanctuary, or Santuario Semillas Sagradas as it is known, consists of more than 300 species of tropical medicinal plants, making it one of the largest collections of such plants in the new world. The mission of the Sacred Seeds Sanctuary is to protect Costa Rican biodiversity and celebrate the cultural significance of endangered plant species.²

“Think of the garden as a living encyclopedia of ethnobotany, growing larger every day when grandmothers come and tell us how they, in their village, work with these healing botanicals,” wrote Steven Farrell, president of Finca Luna Nueva, in the preface of Plants of Semillas Sagradas: An Ethnomedicinal Garden in Costa Rica.³

Ellen Zimmerman, founder of the Austin School of Herbal Studies, relates personally to Sacred Seeds’ mission. “I have a philosophy of using what is grown in our own environment, what grows native, or what we can cultivate ourselves,” she said (oral and e-mail communication, July 18-24, 2011). “My choice is to use the medicine from the source, from the plant itself.”

Zimmerman, who recently visited the Sacred Seeds Sanctuary in Costa Rica, described it as a magical experience. Ten gardens later, Sacred Seeds is continuing to inspire garden visitors and protect biodiversity in ecosystems around the world, from the grasslands of Madagascar to the Appalachian oak-pine forests of Vermont.

The American Botanical Council (ABC) is in the early stages of planning what will become Sacred Seeds’ 12th foundational garden. As with previous foundational gardens, the focus of ABC’s garden will be on local plants with medicinal value, in this case, a preliminary list of plants to be included in the ABC garden has been created.⁵ The garden will likely include prickly pear (Opuntia ficus-indica, Cactaceae), a plant native to Texas and the American Southwest. The edible leaves of the hardy prickly pear have blood sugar-regulating properties, and the fruit has been shown to reduce cholesterol.⁶ Mullein (Verbascum thapsus, Scrophulariaceae), used folklorically for respiratory relief, and plaintain (Plantago major, Plantaginaceae), an edible plant with some topical benefits, are also on the list of possible plants.⁷ Both plants were naturalized from European sources, but they grow well in the Texas climate.

Armando Gonzalez-Stuart, PhD, coordinator of the Center for Interdisciplinary Health Research at the University of Texas at El Paso College of Health Sciences, says that genuinely native plants can be difficult to identify. “Right now in the Mexican traditional flora, it’s about 50% native plants and 50% [naturalized plants],” he said (oral communication, July 8, 2011). An even smaller percentage of these plants have been scientifically studied. “Unfortunately, probably [only] 2-3% of Mexican flora has been researched for its medicinal properties,” he said.

Despite limited research, approximately two-thirds of the world’s population rely on plants as their primary source of medicine.³ To help convey the importance of local medicinal plants to its member gardens, Sacred Seeds offers training in botanical science and conservation. The organization also offers assistance in plant documentation and publishing, if requested, as well as international visibility through its network of gardens.⁸ More information and pictures of the foundational gardens are available at Sacred Seeds’ recently-launched website, www.sacredseedssanctuary.org.

Besides creating a source of useful local medicinal plants, Sacred Seeds is dedicated to passing on its collective knowledge. “How do we involve school children, colleges, high schools to carry this on and participate in it?” Glenn asked. “[T]he next generation is a really a big concern in getting these kinds of things happening, not just now, but in future years.”

Education is especially important to Zimmerman, who believes younger generations are losing touch with their food. “We need to maintain our plants. We have to have something to pass down to future generations,” she said. “They can’t believe all that our medicine and food comes from the supermarkets. They need to learn that it comes from the ground.”

Zimmerman offers educational talks and tours of the botanical gardens at her Austin School of Herbal Studies. Tour topics include “The Medicinal Herbs in our Central Texas Gardens,” “Herbs for Common Ailments,” and “Herbal First Aid.”⁹ She is passionate about the possibilities of educational gardens such as the ones created by Sacred Seeds. “I like to encourage people to learn from the plants by growing them. I think they’re our best teachers,” she said.

Foundational gardens are just the starting point for Sacred Seeds Nonprofit Establishes Garden Network
Seeds. One of the organization’s main goals is to have gardens in as many unique ecosystems as possible. Although the goal is ambitious, the organization is growing steadily, and more gardens are already in the planning process.

“We’re starting with what really needs to be done and then expanding piece by piece,” said Glenn. “What we hope to roll out in the next couple of years is to have community gardens or even individual family gardens all over the world that are looking to us for examples.”

Glenn hopes the foundational garden at ABC will inspire others to create locally focused gardens. “Maybe in Texas, people will come to the ABC garden and see what [they’re] doing and learn from what [they’re] doing and then bring that into their backyard.”

—Tyler Smith

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5. ABC Special Projects Director provides list of approved plants. (G. Engles personal communication, July 8, 2011).
No new *Escherichia coli* infections have been reported in Europe since mid-July, marking the end of the deadliest *E. coli* outbreak in history. The Robert Koch Institute (RKI), Germany’s disease control agency, identified fenugreek (*Trigonella foenum-graecum*, Fabaceae) seeds imported from Egypt as the source of the outbreak. More than 50 people died and approximately 4,400 people were left ill after eating raw fenugreek sprouts harvested from the contaminated seeds.

“What I do not understand is why the contamination was not discovered. Officially the manufacturers do microbiological [testing], and *E. coli* is always part of the package,” said Mathias Schmidt, PhD, a pharmacist with HERBResearch Germany (e-mail, September 7, 2011). He added, “There are 2 possible reasons: Either the seeds were tested, and the problem was not detected as a random effect of sampling, or the material was not tested.”

The *E. coli* outbreak began on May 21 when RKI reported a cluster of kidney failure cases in Germany associated with a particularly virulent strain of the bacteria known as Shiga toxin-producing *E. coli* (STEC), type O104:H4. Symptoms of STEC infection include severe stomach cramps, bloody diarrhea, and vomiting. In some serious cases, patients may develop hemolytic-uremic syndrome (HUS), which occurs approximately one week after exposure to the bacteria and can lead to kidney failure and, eventually, death.

As an herbal remedy, fenugreek seed is often used to treat symptoms associated with Type 2 diabetes by helping to normalize blood sugar levels. Fenugreek can also be used to treat loss of appetite, upset stomach, and can be applied topically to reduce inflammation. It also has traditionally been used as a galactagogue to increase breast milk production. Fenugreek sprouts are often eaten raw in soups and salads.

In June, a number of people with STEC infection-like symptoms became ill after attending an event in the Bordeaux region of France, according to a report by the European Food Safety Authority (EFSA). In both cases, the infection was linked to fenugreek sprouts harvested from a single farm in Germany. A “trace-back” report by EFSA found that the German producer had imported 75 kg of the tainted seeds from Egypt in 2009. According to the European Commission report, these organically-grown seeds contaminated with *E-coli* strain O104:H4 “[reflect] a production process which allowed contamination of fecal material of human and/or animal origin.”

Imports to the European Union from foreign countries can include questionable sanitation credentials, Schmidt explained. “Of course you can [rely on] certificates of analysis delivered by the supplier, provided the lab is credible,” he said. “But with microbiology you never know who was in contact with the material between Egypt and the EU.”

Joe Veilleux, the general manager of EUROMED U.S.A.—a producer of standardized herbal extracts and natural active substances for the pharmaceutical, food, and cosmetic industries—is familiar with American regulations but does not deal with fenugreek or other fresh plant material.
“The only thing I would worry about is supply sources that aren’t doing all that testing,” said Veilleux. “Like everything else in our industry, you really need to stick with a quality source that you know does the testing. That’s the only way you’re going to eliminate the possibility of these kinds of things,” he said.

Import regulations differ by product category. Veilleux noted. In the United States, herbal products are usually regulated as dietary supplements, a subset of foods. Both food and drugs are subject to government-mandated manufacturing and processing guidelines known as current Good Manufacturing Practices (cGMPs); even though there are different sets of GMPs for dietary supplements and drugs, microbial testing is required for both.

In order to be classified as a drug—which is seldom the case in the United States—each herbal ingredient in the product must go through a process that includes meeting stringent cGMP requirements for purity. Dietary supplements, which have to meet standards for identity and purity, do not have to go through the same rigorous testing for purity and safety as do drugs. “In Europe, because our products are more like medicine, many of the companies there require [the more stringent] drug GMPs,” said Veilleux (oral communication, July 24, 2011).

In July, the European Commission, an EU governing body, adopted emergency measures requiring member countries to remove and destroy specific lots of fenugreek seed imported from Egypt since 2009. Health officials from the German Federal Institute for Drugs and Medical Devices (BfArM) went a step further in requiring any medicinal products containing fenugreek seed to be removed from markets. Further imports of the seed in all EU member countries were prohibited until October 31 of this year. In early September, however, Ukraine became the first country to resume importing Egyptian seeds and vegetables. More countries are expected to follow.

“I think the BfArM overreacted by revoking the marketing authorizations of fenugreek-containing products, without even a re-test,” said Dr. Schmidt. “The new version of E. coli should have been detected even with the standard test battery.”

—Tyler Smith

References

THMPD Effects on Ayurveda and Traditional Chinese Medicine

One of the most frequently voiced complaints about the EU Traditional Herbal Medicinal Products Directive (THMPD) is that it effectively removes traditional Chinese and Indian herbal medicines from the European market. The international press in Europe and Asia writes dozens of articles on the controversial situation each month, and a lawsuit against the legislation is being planned. The Alliance of Natural Health (ANH) in Europe, the natural health nonprofit behind the legal challenge, has called the THMPD a “protectionist tool” for “favor[ing] certain products of the European phytopharmaceutical system and discriminating against those of non-European traditional systems of medicine.” About 14 organizations have expressed support for ANH’s THMPD legal challenge, and some have also filed their own petitions noting the effects on India and China as a serious problem.

The THMPD, fully implemented in April of 2011, was adopted by the European Union in 2004 as 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 a traditional herbal registration (THR), the herbal medicine must meet the safety and quality standards required for all fully licensed medicines. But, instead of being required to prove efficacy, manufacturers of these products can provide evidence of a minimum of 30 years of traditional use—at least 15 years of which must have taken place within the European Union.

The majority of complaints against the THMPD focus on the requirement for demonstrating at least 15 years of a product’s use within the European Union, as well as the high cost incurred from documenting necessary information required for a license application (which ANH estimates as more than $131,000 per product; other sources say it is less, especially for products that are already well supported by documented research). Many say that both stipulations will be very difficult—if not impossible—for Ayurvedic and Traditional Chinese Medicine (TCM) products to meet.

However, in a guest editorial in the December 2010 issue of HerbalGram, natural products industry consultant Thomas Brendler commented that these assumptions are incorrect. “The market remains open,” he wrote, “except for products with unapproved claims. Every manufacturer can carry on selling their herbal tea, Traditional Chinese Medicine, or Ayurvedic product without THMPD registration or [European Food Safety Administration] approval, as long as these products are recognized foods and do not make health claims.”

In a recent interview with the American Botanical Council, Brendler went on to note that the main issue with TCM and Ayurvedic products is that they commonly contain multiple compounds, making it more difficult to properly document the quality of these products’ ingredients (validating identification methods, stability testing, etc.) as is required in the THMPD guidelines. “It is not the proof of 15 years of use but the forbidding complexity of the quality documentation which is the true hurdle,” said Brendler.

Ayurveda

Pukka Herbs, a UK company specializing in the production of organic Ayurvedic herbal products, took the only practical route available and relabeled its Ayurvedic herbal capsules as food supplements. According to Pukka’s statement on the THMPD, the company did this in order to be confident in their products’ legality, and the relabeled products had already been registered as food supplements in a number of EU member states. Additionally, many of the products’ ingredients were also being sold as foods in other member states.

Ranjit Puranik, CEO of Ayurvedic formulations manufacturer Shree Dhootapapeshwar Ltd., in India, said the option of removing health claims and relabeling products as food supplements is a left-handed consolation based on a minimal nuisance consideration by the EU regulatory body.

“It’s all fitting a square peg (traditional medicine) in an available round hole (EU regulatory model),” he said. “It will never satisfy anybody involved nor attract any serious players.”

If Ayurveda were accepted as being a body of knowledge and a lifestyle, Puranik continued, it would not be appropriate to regulate the traditional medicine system according to a product approval mechanism. The 7 Ayurvedic herbal monographs in the EU Pharmacopoeia, which he said would ideally be a factor of a THR application, “is not really any solace at all. In Ayurveda—even at a diminished level of activity—we use over 1,000 medicinal plants. So tapping into THMPD EU opportunity is a very tall order and not very motivating to take on.”

But, he said, “We neither can demand a foreign country or group of countries to accept our aggressive appeal for an opportunity for our traditional medicine to prosper.”

Pukka Herbs maintains its stance that the THMPD is “a disproportionate regulation, especially for herbs from non-European traditional medicinal systems such as Ayurveda, and an infringement on human rights by limiting an individual’s access to natural plant medicines.” Pukka is a supporter of the safe production of herbal products as well as the ANH’s campaign for judicial review of the THMPD.

Pukka’s Co-Managing and Herbal Director Sebastian Pole noted that the company has been working on THMPD applications for 3 of its products for the last 2 years. “Because of the less researched nature of the species that we are proposing for registration, the more complex nature of the analytical work, and the reduced volume of available data, it has taken us longer than anticipated,” said Pole. “But we will get there.”

Pole estimated that the cost per application will end up being about $114,000 (about £70,000) and noted that this figure is probably higher than the costs for products containing well-known species documented by quality research, but lower than the cost for highly complex, multi-botanical formulæ. “And many traditional medicines are in any event excluded from the registration scheme on eligibility grounds (e.g., they contain mineral active ingredients or they cannot demonstrate more than 15 years usage within the EU).” Additionally, Pole pointed out that many Ayurvedic herbs and products cannot be recognized as foods supplements—such as Astragalus spp. (Fabaceae), the herbal blend Triphala, and Coriolus versicolor (Polypora-
ceae)—making this route around the THMPD impossible for them.

Because the United Kingdom’s Medicines and Healthcare products Regulatory Agency has allowed for the sale of compliant products purchased by retailers before April 30, 2011 (until the product stocks run out or expire), the biggest impact on herbal companies is yet to be felt. Still, Pole noted that sales of Pukka’s Ayurvedic product lines have decreased by about 15% since May of 2011, despite the rest of the business growing at a rate double this.

“We relate this loss to consumer and retailer confusion, fear and doubt, created by wide-scale publicity about the effects of the EU Herbal Directive, as well as associated, generally unfounded, negative publicity about safety concerns over herbal products,” said Pole. “We have been inundated with calls from concerned customers who have benefited from our products and are worried that they will not be available in the future. Some people have been stockpiling, but rather like our approach to health and ecology, this has resulted in short-term security for a few, but long-term vulnerability for the many.”

According to the Times of India, in January of 2011, a delegation of Indian officials visited the European Union and asked lawmakers to revise the THMPD’s traditional use requirement so that products used for at least 30 years inside or outside the European Union could be eligible for a registration.9 The officials also asked that the European Union accept non-herbal ingredients commonly used in Ayurvedic medicinal products, such as honey and ghee, within the THMPD framework. The European Union, however, has not made any changes to the legislation, and in July of 2011, the International Ayurveda Foundation urged the Indian government to fight the THMPD and began planning to pursue legal action.10

Traditional Chinese Medicine

Prior to the THMPD’s full implementation date of April 2011, several departments of the Chinese government began recommending certain medicinal products that should attempt to obtain THMPD registration.11 One company, Lanzhou Foci Pharmaceutical Company, Ltd., in the Gansu Province of China, applied for a THMPD license for its Concentrated Pill of Angelica (containing Chinese angelica, Angelica sinensis, Apiaceae) in March of 2011. Most news articles refer to Foci as the only or one of the only international companies to seek THMPD registration.

As reported by the magazine China Today, Foci sent its application to the Swedish Drug Institute and was told that a response would be issued within 200 days. According to the article, Foci sent its application after analyzing the THMPD requirements and conducting internal research, both of which led them to conclude that it could prove its product’s safety and at least 30 years of use, including 15 within the European Union.11 [Editor’s Note: Several interview requests sent to Foci were not answered as of press time.]

Simon Mills, a UK herbal expert and renowned author, noted a strangeness in Foci’s application for this product, considering that Angelica species (containing furanocoumarins) have long been listed in Europe as unsuitable for general sale.” He attributed this to a lack of cross-cultural communication on both sides and said he hoped that better chosen TCM applications would be forthcoming soon.

Du Xiangdong, general manager of the European and American Division for Department of Natural Medical Product at China MEHECO Corporation—a botanical medicine and pharmaceutical company—recently told China Daily in a televised interview that the THMPD has “markedly affected” its export trade of patented herbal medications.12 Huang Jianyin, deputy secretary of World Federation of Chinese Medicine Societies (WFCMS), echoed this situation, noting that very few TCM products are currently attempting to obtain a license due to the high cost.

“The main impact will be that there are no Chinese patent drugs for sale. As the ban takes effect, many TCM pharmacies will have to be closed, which may cause some unemployment” (e-mail, September 23, 2011).

Jianyin emphasized, however, that TCM exports to Europe account for a small percentage of China’s overall TCM sales. “The biggest portion of China’s TCM sales is in Asia,” said Jianyin. “The key issue is that TCM culture has not become popular yet in Europe and the rest of the world. This leads to the limited scale of our TCM export trade. Many manufactures are interested in domestic market share instead of European market, as there is a little market share for their TCM products.”

The Association for Traditional Chinese Medicine (ATCM) in the United Kingdom welcomed the THMPD as a regulation to promote public healthcare and consumer safety (H. Shen, email, September 11, 2011). But the organization of TCM practitioners points out that no TCM products have been registered, and attributes this to the requirement for quality control of every ingredient of the product. According to ATCM President Huijun Shen, this “makes it very difficult, costly, and even impossible for TCM products with multiple ingredients to register [for] THR.”

ATCM is encouraging an amendment to and simplification of the THMPD that would give multiple-ingredient products a chance at registration while maintaining quality standards. Shen said these goals could be achieved by adopting the quality control methods for multiple-ingredient herbal products used in the Chinese pharmacopeia. These establish a small number of main ingredients (usually 1 to 3) from a complex product, have been used for several decades, and have proven to be safe and cost effective, he said.

Until such amendments are considered, however, ATCM is supporting the United Kingdom’s decision to give TCM practitioners statutory regulation, which Shen said is currently “the only way to maintain the public access to TCM products.”

Conclusion

What may make proof of 15 years EU usage somewhat easier for Ayurvedic and TCM companies is the fact that the THMPD legislation allows for the inclusion of overseas EU

territories under this requirement, said Brendler. Also, he continued, different EU countries have different interpretations of the THMPD. “Some accept traditional use evidence for an herbal preparation from which the THR is derived,” he said. “Others stringently require evidence for reference products equal or similar to the product in question. The guideline leaves room for interpretation in this matter.”

Because the THMPD is intended for products sold over-the-counter for self-medication purposes where no healthcare professional is in attendance, some say that most Ayurvedic and TCM products—which are usually developed for prescription by a practitioner of the traditional medicine system—are not appropriate for this regulatory category.

“There needs to be further translation of Ayurvedic and Chinese health concepts into labeled claims suitable for the open market,” said Mills, who is also the secretary of the European Scientific Cooperative on Phytotherapy, the lead European body working to ensure quality, safety, and efficacy for herbal medicinal products with the European Medicines Agency. Mills noted that the effort from these traditional medicine sectors should be focused on creating statutory regulation of practitioners (as is currently taking place in the United Kingdom).

“If Ayurvedic and TCM practitioners were to achieve licensed status,” he continued, “they could prescribe most of their materia medica to their patients without hindrance.”

But Pole of Pukka Herbs brought up the possibility that if the Ayurvedic or TCM product is in “any way processed,” which helps the patient be more compliant with usage, its ability to be simply prescribed by a practitioner is more questionable.

“This is the question,” said Pole. “What category are [Ayurvedic and TCM products] appropriate for?”

—Lindsay Stafford

References
Chinese Herbal Medicine Manufacturer Selected as Finalist for Wall Street Journal Awards

In the summer of 2011, the Wall Street Journal selected a Chinese herbal medicine manufacturer as one of 12 finalists for the paper’s 2011 Asian Innovation Awards. According to the Journal, these awards “recognize innovations that break with conventional processes in creative ways,” and most of this year’s finalists are noted for “spotting disease and other health conditions, then treating them cheaply and quickly.” Other finalists include: the University of Hong Kong’s earthquake “cushion,” The Singapore Institute for Bioengineering and Nanotechnology’s portable disease detection system, Awak Technologies’ wearable artificial kidney, Toshiba’s glasses-free 3-D television technology, and more. The Wall Street Journal plans to announce the award winners on November 3, 2011 (C. Tendler, e-mail, August 31, 2011).

Chinese pharmaceutical company Hutchison MediPharma Limited in Shanghai was chosen by the panel of judges for its product HMPL-004, an extract of the Chinese and Indian herb andrographis (Andrographis paniculata, Acanthaceae) that is intended to treat inflammatory bowel diseases. With more than 30 global patents and patent applications, HMPL-004 is the company’s key product. In 2005, Hutchison applied for an Investigational New Drug (IND) for HMPL-004 from the US Food and Drug Administration (FDA). In May of 2007, it completed a Phase II proof-of-concept study on HMPL-004 for ulcerative colitis and in 2009, completed Phase II clinical trials on HMPL-004 for Crohn’s Disease and ulcerative colitis.

Contemporary Research

Andrographis and various extracts of the herb have been shown in several recent studies to exhibit antimicrobial, hepatoprotective (ability to protect the liver), antimalarial, antioxidant, and antimicrobial properties. Several systematic reviews of controlled clinical trials on andrographis preparations (as well as andrographis combined with Eleutherococcus spp., Araliaceae) also have concluded that the herb is helpful in relieving symptoms of upper respiratory tract infections.

While Hutchison declined to answer questions from the American Botanical Council (ABC), the company’s website says the product is “derived from a botanical extract;” is an “orally active, proprietary botanical product that acts on multiple targets in the pathogenesis of inflammation;” and is “a compound extracted from a Chinese herb under controlled conditions.” A Wall Street Journal story and a published scientific article identified the botanical as andrographis, and a 2007 Forbes Asia article as well as Hutchison’s US patent application for the product report that HMPL-004 contains andrographolide.

The results of the Phase II trial on HMPL-004 and ulcerative colitis were positive, with HMPL-004 showing similar efficacy to mesalamine, a drug commonly prescribed to treat ulcerative colitis inflammation and other symptoms. Study participants tolerated the product well, with some experiencing rash. According to Hutchison’s website, additional Phase II studies on HMPL-004 and ulcerative colitis and another on Crohn’s Disease were also successful, though these results have not yet been published in a peer reviewed scientific journal. Hutchison is reportedly planning to begin Phase III trials soon.

“The significance of the research for inflammatory bowel disease is unknown at this time,” said Subhuti Dharmananda, PhD, director of the Institute for Traditional Medicine and Preventative Health Care in Portland, Oregon (e-mail, August 14-21, 2011). “Initial results look promising, but there are also other herbs which have shown promise, such as wormwood (Artemisia absinthium, Asteraceae). Further testing will reveal how well this product works. If it does have a high rate of success, that could be quite significant, because the current [conventional pharmaceutical] drug regimens are far from ideal.”

Traditional and Modern Use

According to Dr. Dharmananda, medicinal use of andrographis (chuan xin lian) was first documented in China in 1936, and has been used in Traditional Chinese Medicine (TCM) mainly to treat infections, especially those of the respiratory tract, skin, and intestines, as well as viral hepatitis. The Pharmacopoeia of the People’s Republic of China documents the use of andrographis in dry herb and tablet forms for the treatment of influenza with fever, soar throat, ulcers in the mouth or on the tongue, acute and chronic cough, colitis, dysentery, urinary infection, carbuncles, sores, and venomous snakebites.

Andrographis also has a history of traditional use in India. “There it has been used as a household remedy—alone or with other Indian herbs such as cumin [Cuminum cymimum, Apiaceae], anise [Pimpinella anisum, Apiaceae], and cardamom [Elettaria cardamomum, Zingiberaceae], or with cinna-
Common [Cinnamomum verum, Lauraceae], cloves [Syzygium aromaticum, Myrtaceae], and cardamom—applied for many disorders, but especially for treating fevers and for intestinal disorders (cramping, diarrhea, etc.),” said Dr. Dharmananda. 

Editor's Note: Questions sent to the Indian Traditional Knowledge Digital Library (TKDL) regarding the legal status of Hutchison’s patents on this product were not answered as of press time. Since 2000, the TKDL has successfully challenged approximately 56 patents and patent applications on proprietary products using traditional Indian medicinal plants, e.g., neem (Azadirachta indica, Meliaceae) and turmeric (Curcuma longa, Zingiberaceae).]

A common usage of andrographis in China consists of decoctions (tea made by boiling the herbs) of 6 to 9 grams per day and up to 15 grams per day to treat infections, including some recipes that feature additional herbs to reinforce the intended effects of andrographis, said Dr. Dharmananda. But because andrographis has a bitter taste—sometimes inducing nausea—the herb is most often prepared as an extract in capsule and tablet form, Dr. Dharmananda continued. Extract products available in Asia contain from 30% to 50% of andrographolides, with a dosage of 200 to 400 mg of andrographolides per day used to treat upper respiratory tract infections and arthritis-related inflammation. Sometimes in Asia, according to Dr. Dharmananda, preparations of up to 98% andrographolides are used in dosages from 600 to 1,200 mg per day—an amount noted as “unbelievably high” by a peer reviewer of this article.

“Commercial products commonly sold in the West, containing as little as 10-40 mg of diterpene lactones per unit, may lead to significant under-dosing,” said Dr. Dharmananda.

Additionally, Dr. Dharmananda continued, using andrographis in its various forms is unlikely to produce the same effects as HMPL-004. “When a particular fraction is isolated from an herb, the pharmacology and clinical effects of that fraction may be entirely different than that of the whole herb,” he said. “This is especially the case when an herb has numerous different types of active constituents, as is the case with andrographis.”

Conclusion

The Wall Street Journal noted that Hutchison is one of several Chinese pharmaceutical companies that have long manufactured generic versions of Western drugs and are now developing new drugs.9 According to De-An Guo, PhD,* a professor at Shanghai Research Center for TCM Modernization and
the Shanghai Institute of Materia Medica, Chinese pharmaceutical companies are growing very fast and now have enough capital to invest more in research and development. Also, the Chinese government provides financial support for many new product development programs. The reason why many companies are interested in botanicals used in TCM, Dr. Guo said, is very simple. “TCM has a long history of treatment of diseases in China and [shown] to be effective through clinical practice.”

Considering the scope of Chinese pharmaceutical innovation, some of the statements from Hutchison’s founder—as documented in the Wall Street Journal article—are not entirely accurate. Samantha Du, PhD, was quoted as saying that HMPL-004 is “the first major development of traditional Chinese medicine into a Western oral prescription pharmaceutical,” and “the first global herbal botanical oral product treating a serious disease.”

In fact, about 438 pre-IND/IND botanical product applications have been submitted to FDA as of 2009, said Dr. Guo. “There are about 10 Chinese Pharma [companies] filing applications and are now at different stages. [Hutchison] may be walking the fastest, but it is not the only one.”

As ABC reported in October of 2010, another is Tasyly Pharmaceutical Company, Ltd., in Tianjin, China, which will soon begin Phase III clinical trials on its Danshen Dripping Pill.13 This product is meant to treat angina and coronary heart diseases, and contains extracts of Chinese salvia (Salvia miltiorrhiza, Lamiaceae; known as danshen), notoginseng (Panax notoginseng, Araliaceae), synthetic borneol, ginger (Zingiber officinale, Zingiberaceae), and other spices.

While noting that it can take up to 10 years from the start of Phase III trials to drug approval—and that many drugs still fail after Phase III—ABC reported that the Danshen pill “could become the first TCM product to obtain drug approval from the FDA.” And now, with both HMPL-004 and Danshen Dripping Pill seemingly at the same point in the journey to market, it is impossible to say which—if either—will be first.  

* Members of the ABC Advisory Board

—Lindsay Stafford

References
Sequencing the Cannabis Genome: Impact, History, and Future

The August announcement that Massachusetts-based company Medicinal Genomics had sequenced the entire genome of Cannabis sativa L. (Cannabaceae) received much national attention, including coverage by media outlets from National Public Radio (NPR) and CBS to recreational marijuana blog HailMaryJane.com.1,2,3 While the development makes for attention-grabbing headlines—“Marijuana Genome Sequenced for Health, Not Highs,” “Science Cracks the Cannabis Genome”—how will it impact research and public health?

Medicinal Genomics founder Kevin McKernan became interested in decoding the cannabis genome when working with a clinical oncologist to sequence the DNA of cancer tumors and patients.

“As a result of this,” said McKernan, “[I] had a few friends with cancer ask about medical marijuana” (e-mail, September 29, 2011).

Then he read Spanish scientist Manuel Guzmán’s research documenting that cannabinoids, some of the biologically active compounds in cannabis, have a favorable therapeutic index in cancerous cell cultures and animal models.4 McKernan said this “really drove it home,” as that finding is rare with most potential cancer drugs. Additionally, McKernan read Etienne de Meijer’s work emphasizing that the cannabis chemotype is strictly governed by genetics,5 “but we only knew CBD [cannabinidiol] and THC [tetrahydrocannabinol] synthase sequences to date.”

“I naively figured we could sequence the whole genome for under $50k and that this had to be a priority,” he said. “Turned out to be far more complicated of genome than one could gather from the literature.”

Though other scientists and organizations have been working on sequencing cannabis, Medicinal Genomics is said to have produced the “largest known gene collection” at more than 131 billion bases of sequence.6 The sequence bases of C. sativa were made available on August 18th on Amazon EC2—a public cloud computing service—via Nimbus Informatics, an open source data management website. A data assembly is also available for download.

Impact of Genome Decoding

Before the sequencing of the cannabis genome, about 12 cannabis genes were known, and now tens of thousands are known, said McKernan. Additionally, the genome has provided a better understanding of THC synthase genomics, as well as more than 2 million single nucleotide variants.

McKernan also noted that the genome has made apparent that THC synthase is not one gene with 2 copies in a diploid genome, “as all of the previous papers have postulated.” Instead, the recent sequencing implies that the gene has been replicated 8 times—with the potential assistance of a transposable element—and diverged.

In discussing the genome’s importance with NPR, McKernan said it will allow scientists to investigate the genes that govern cannabis compounds other than THC and CBD, and to sequence other cannabis strains to highlight different traits.1 Leading cannabinoid researcher Ethan Russo, MD, finds these possibilities “very exciting.”

“The publication of the cannabis genome is a welcome scientific development,” said Dr. Russo, “but one whose potential applications remain to be determined. The possibilities are enticing, and it seems certain that many able minds will apply their imagination to the task. Every phytotherapeutic that has been closely researched so far has demonstrated unique therapeutic potential. There are hundreds of strains available on the black market, but these are not necessarily stable and reproducible” (e-mail, September 22-29, 2011).

Dr. Russo thinks the most promising new investigations that might stem from the genome could be in the area of epigenetics—the study of heritable gene function changes that occur with no change in DNA—such as determining the factors regulating cannabinoid production, biosynthetic pathways, and terpenoid regulation.

“One example,” he said, “might be the production of high-CBD strains. Some researchers, like myself, believe that terpenoids synergize phytocannabinoid effects. Thus, it might be theoretically possible to produce plants that express one cannabinoid and one terpenoid to therapeutic advantage, say in treating anxiety.”7

The sequencing of the genome has resulted in discussion that it will enable researchers to study cannabis without actually having to use real cannabis plants, which can be difficult to obtain within the strict US regulatory environment. Researchers could study cannabis’s genome through bioinformatics, said McKernan, noting that the human genome project enabled the understanding of how to reprogram cells to be capable of making several different cell types, such as adult stem cells. The cannabis genome, he said, will enable people to potentially discover novel genes related to terpenoid synthesis by comparing the sequence to grape (Vitis vinifera, Vitaceae) and hops (Humulus lupulus, Cannabaceae).

“This isn’t to say no one will ever need the plant again,” said McKernan. “But a much larger audience can now legally study the plant than prior to August 18, 2011.”8

But Donald Abrams, MD—professor of clinical medicine at the University of California San Francisco, chief of hematology/oncology at San Francisco General Hospital, and a researcher of cannabis’s effect in humans—stressed the importance of having
access to actual cannabis material. “We know already a lot about the plant and its components without knowing the genome,” said Dr. Abrams (e-mail, September 19, 2011). “You don’t need the genome; you need the plant.”

Previous Cannabis Genetics Work

Though several media outlets reported McKernan as saying that not much has been accomplished in cannabis genomics, he told the American Botanical Council (ABC), “One article took a comment out of context and it went viral through the news.”

Instead, McKernan recognized that much valuable work has been completed. “Many people intimate with the science of cannabis have offered up their time to help guide us on good places to apply this work in both the medical and hemp areas,” he said. “There is a lot of previous groundwork on THC and CBD synthase so there is a lot to learn from the road which has been paved to date.”

According to Dr. Russo, “Arguably, the genes for the most pharmacologically versatile components in cannabis have already been identified.” Dr. Russo, who is the senior medical advisor to GW Pharmaceuticals—manufacturer of Sativex®, an oromucosal spray containing cannabis extracts—reminded that THC and cannabidiolic acid; isolation of THCA synthase; and identification of a unique single nucleotide polymorphism from an ancient cannabis sample found in a Chinese tomb. Additionally, Dr. Russo noted that high-THC, -CBD, -CBG, and -CBC strains of cannabis plants have been produced already, as have high-THCV, -CBDV, -CBGV, and -CBCV strains that are currently being researched.

“A lot of great work has already been done on CBD and THC synthase,” said McKernan, “and all of those cannabinoids mentioned above are derivatives within those 2 isolated pathways. The next question is what makes the other 77 cannabinoids reported to be in the plant?”

And though some news stories reported that the genome will enable scientists to breed cannabis plants containing no cannabinoids, McKernan said in his interview with ABC that this has already been accomplished and clarified that he hopes the genome will give scientists a better understanding of the cannabinoid pathways that can be regulated up or down.

McKernan noted the genome of mustard weed (Arabidopsis thaliana, Brassicaceae)—the first-ever plant genome to be sequenced—and will be debuted as an iPad® app.

—Lindsay Stafford

References

Human Studies on Rhodiola Show Enhanced Physical and Mental Functions


Rhodiola (*Rhodiola rosea*, Crassulaceae) is found at high altitudes in Europe and Asia and traditionally has been used in Russia, Scandinavia, and Eastern Europe for combating high altitude sickness, depression, and fatigue, and for nervous system stimulation. Rhodiola is reported to influence monoamines and opioid peptides, and has been found to contain compounds unique to its species.\(^1,2\) Although the bioactivity of this plant is diverse, the authors point to a dearth of review articles on its efficacy and set out to summarize the methodology and results of randomized clinical trials (RCTs) of rhodiola.

To identify RCTs for the review, the authors searched the following medical databases: AMED from 1985-July 2009, CINAHL from 1982-July 2009, The Cochrane Library in July 2009, EMBASE from 1974-July 2009, MEDLINE from 1950-July 2009, and Web of Science in July 2009. They employed the following words or phrases representing Latin names, common names, marker compounds, (and, in 2 cases, trademarks for patented formulations) for *R. rosea*: “*R. rosea*,” “SHR-5,” “golden radix,” “rhodiola,” “arctic root,” “Aaron rod,” “rose-root,” “rosavin,” “rosin,” “rosarin,” “rhodaz,” “Vitano,”* and “hong jian tian” (the Chinese name for *R. rosea*). The authors also searched the references of all literature obtained to identify additional RCTs and inquired with rhodiola manufacturers and herbal medicine professionals to find any overlooked or unpublished material. The authors included all material regardless of language of publication.

The authors included only RCTs that investigated rhodiola as a single preparation used as an oral treatment alongside a control group with either ill patients or healthy subjects. Control group criteria included a placebo, no treatment, or an active treatment. Studies that used rhodiola in combination with other treatments were excluded. The authors gathered the study design, study quality, number of participants, intervention, results, and adverse events. Each study was assessed using the Jadad score for methodological quality, with additional assessment taken from *The Cochrane Handbook of Systematic Reviews of Interventions*, used for standardizing healthcare interventions, and the CONSORT statement of herbal medicine, which among

\(*a* proprietary *R. rosea* root extract manufactured by the Swedish Herbal Institute; Göteborg, Sweden

\(*a* proprietary *R. rosea* root extract manufactured by W. Schwabe Pharmaceuticals; Karlsruhe, Germany

Rhodiola *Rhodiola rosea*. Photo ©2011 Steven Foster
other recommendations to medical journal editors, clinical trial researchers, et al., includes provision of clear, concise explanation of the actual botanical treatment used in the materials and methods section of herbal RCTs and other clinical papers. (The CONSORT statement of 15 criteria for clinical trials involving herbal medicine is conveniently included as an appendix). The type and appropriateness of sequence generation, allocation adequately concealed, whether intention to treat (ITT) analysis was conducted and described, matching of groups at baseline, and the 15 items in the CONSORT statement were used to assess each RCT.

The literature searches yielded 693 candidate papers for further screening. Of these, 11 RCTs met all the inclusion criteria. In summary, the studies were published between 2000 and 2009 and were from Russia, Armenia, the United States, Sweden, Belgium, and the Netherlands. Although one study did not report the number of subjects, there was a wide range of participants in the included RCTs (n=12-121) for a total of 503 in the remaining 10. Eight of the studies were conducted on healthy subjects exposed to hypoxia, fatigue, or stress from exercise, work, or exams, and one RCT investigated subjects for alterations of photon emission, stress, and fatigue. The 2 remaining trials focused on patients with stress-related fatigue and mild-to-moderate depression. All RCTs included a placebo.

The authors separated the studies into 7 investigations of physical performance and its physiological indicators—4 on mental performance, and 2 for mental health conditions. Parameters reported in the RCTs of physical performance ranged from physical performance itself and exhaustion levels, to blood oxygenation in hypoxia conditions. Two of the RCTs (n=15 and n=12) reported that rhodiola failed to improve blood oxygenation after hypoxia was induced or to increase skeletal muscle phosphocreatine recovery after exercise. In contrast, other studies reported a significant increase in time to exhaustion, mean C-reactive protein levels, and neuromotoric fitness in the rhodiola treatment groups (P<0.005). Another study also found that rhodiola improved tiredness perception (P=0.049).

The measurements used in the mental performance RCTs were short-term memory, reaction time to various stimuli, and concentration. Two of these studies observed significant improvements in Total Antifatigue Index and Total Fatigue Index scores of the rhodiola treatment groups in comparison with the placebo (P<0.05).

In the RCTs examining mental health, fatigue syndrome and depression were analyzed. The rhodiola-treated patients with stress-related fatigue improved significantly over the placebo group (P=0.047). In addition, patients suffering from depression significantly improved when treated with rhodiola as compared to the placebo group (P<0.0001), according to the Hamilton Rating Scale for Depression and the Beck Depression Inventory, which are commonly used questionnaires for rating the severity of depression symptoms. Of the 11 RCTs in this analysis, 8 of them assessed adverse effects and only 3 were reported including headache and hypersalivation, both from the placebo group. Although the trials did not describe these as serious, an unexplained illness caused one patient to drop out of the study.

According to the authors’ assessment, 5 studies had good methodological quality with a Jadad score of 3 points or higher. Four studies had a score of 2 points or lower, and the authors mentioned that 7 RCTs failed to clearly state their ITT analyses. The authors noted that, with possibly one exception, the studies did not adequately report on the preparations of rhodiola utilized.

The authors conclude that R. rosea root preparations may be active in a variety of ways and might be used to treat several ailments, including those brought on by stress and depression. However, they do point out that they may have overlooked certain RCTs, and that the studies included in this review have not been replicated.

This review is thorough and balanced, and the authors made excellent use of quantitative assessment to evaluate the RCTs involving rhodiola. The authors themselves concluded that the reported bioactivity of rhodiola warrants further investigation; this review outlines a convincing argument for this conclusion.

—Amy C. Keller, PhD

References
Quality of Case Reports of Herbal Medicinal Products Improves


Because of an increased use of herbal medicinal products (HMPs) and awareness among healthcare professionals that adverse effects are possible, the reporting of adverse effects has increased substantially. Case reports, which vary in quality, play a crucial role in reporting adverse effects of therapeutic interventions. The authors, from the Universities of Exeter and Plymouth in Exeter, United Kingdom, developed a point-based rating scale for assessing the quality of case reports. In this study, they used the scale to evaluate the quality of published case reports of adverse effects of herbal medicines. They hypothesized that the quality of these reports has improved during the last 3 decades.

The scale estimates the quality of case reports by providing a score ranging from 0 (lowest quality) to 36 (highest quality). The 18 items on the scale are grouped into 4 key aspects: (1) information about the medicinal product and treatment; (2) patient history, diagnosis, medical condition(s), and medications; (3) concomitant medications; and (4) adverse event/drug interaction information. For case reports of HMPs, 3 additional items addressed specific issues related to that kind of therapy.

The authors searched Medline, Embase, AMED, and CINAHL for the following time periods: July 16, 1986-July 16, 1988; July 16, 1996-July 16, 1998; and July 16, 2006-July 16, 2008. Case reports were included if adverse effects suspected to be caused by an HMP were described. Case reports were excluded if they described more than one case of adverse effects, reported adverse effects associated with suicide or drug abuse, involved an HMP known to be illegal in the United Kingdom, or reported adverse effects in animals.

Two authors evaluated all case reports. They coded data for all 21 items (18 general and 3 specific for herbal medicine) and calculated a total score for each case report. Disagreement between the 2 evaluators was resolved through discussion. Each report was categorized as low quality (score between 0 and 14), lower medium quality (score between 15 and 21), upper medium quality (score between 22 and 28), or high quality (score between 29 and 42).


For case reports from 1986-1988, the median score was 20.9; for 1996-1998, it was 26.3; and for 2006-2008, it was 25.3. The difference between the first 2 periods was statistically significant (P=0.015), but not between the last 2 periods (P=0.528).

The 3 best-reported items were age, description of adverse event/interaction, and sex. The worst-reported items were description and use of a formal instrument for causality assessment, description of concurrent diseases/medication conditions, and analysis/consideration of concurrent disease regarding their relevance to the adverse effect. These results are consistent with those from conventional medicine, showing that important features of case reports are frequently omitted.

A vitally important aspect of this paper added to these worst-reported items was an overall lack of clear information on product names or manufacturers of the HMPs, with almost 80% of all reports failing to state the product name or manufacturer. The lack of reporting on product and manufacturer names also accompanies and results in inadequate reporting of descriptions of the herbal preparations used, e.g., type and/or concentration of the herbal extract(s) in the preparation (i.e., if extracts are included), the list of herbal ingredients (if the HMP is a combination product), etc. This lack of clarity and detailed description makes full assessment of the case report difficult, and can greatly hinder any medical, toxicological, and/or pharmacovigilance-related significance that such report(s) may have. Also, the lack of description and definition of the HMP is inconsistent with the recommendations of the CONSORT statement for reporting of clinical trials on herbal preparations.

Of all the case reports, 72.3% were of upper-medium (43.8%) or high quality (28.5%). Only 2.9% ranked as low-quality reports. High-quality case reports increased over time (from 0% in the first period to 27.9% in the second and, finally, to 34.2% in the third period), while the percentage of low-quality reports decreased (from 13.3% to 0% to 2.5% during the three periods). The authors noted that the median scores of the last 2 periods were not significantly different, suggesting that the quality reached a plateau in 1996.

Among the study's limitations is the fact that the construct validity of the scale has yet to be tested and certain items may need to be reconsidered (some items may be difficult to answer without a formal discussion by a healthcare professional). Also, restricting case reports to those published only in English is a limiting factor.

“Our results are consistent with the hypothesis that the quality of case reports of adverse effects of HMPs has improved during the last three decades,” the authors concluded.

—Shari Henson

References
Green Tea and L-Theanine Combination Lowers Incidence of Flu Infection


Influenza (flu) infection is the cause of respiratory illness that plagues many in the winter months. Numerous public health interventions have been put forth to help prevent the spread of infection, and additional methods can only help along those lines. There is some evidence that green tea (Camellia sinensis, Theaceae) and its active constituents, catechins and theanine, can prevent the occurrence of influenza in humans, but studies have been inconclusive. This randomized, double-blind, parallel study aimed to further investigate the efficacy of green tea and some of its components in preventing influenza infection.

Healthcare workers from 3 healthcare sites in Higashimu-rayama, Japan, were recruited for the study during the influenza season of November 9, 2009 to April 8, 2010. Subjects were over 20 years of age and were excluded if they met any of the following criteria: (1) had the flu within the preceding 6 months or 24 hours after entering into the study; (2) were using any medications or supplements that would affect the respiratory system; (3) had tea allergies; (4) were pregnant or lactating; or (5) had an immune, cardiac, respiratory, renal, or hepatic dysfunction.

A total of 197 subjects enrolled, with 98 in the treatment group and 99 in the placebo group. One subject in the treatment group was excluded according to the exclusion criteria (influenza infection within 24 hours after entering the study). Demographic and anthropometric data were collected from 196 subjects (mean age: 42.7 years), as well as tea consumption patterns. Subjects were asked to consume 6 green tea catechin/theanine capsules a day, containing a total of 378 mg catechins (including 270 mg epigallocatechin-3-gallate [EGCG; a proprietary form of EGCG extracted from green tea leaves; THEA-FLAN 90S; ITO EN, Ltd.; Tokyo, Japan] and 210 mg L-theanine [Suntheanine®, produced by fermentation by Taiyo Kagaku Co., Ltd.; Mie, Japan]) or a taste- and appearance-matched placebo for 5 months. Monthly questionnaires collected data on infection occurrence, adverse events, and compliance. Tea or herbal tea
consumption was restricted to ≤250 ml per day during the study.

The primary outcome was an influenza infection that was doctor-verified according to the following criteria: fever (≥37.8°C or ≥100°F), plus any 2 of the following symptoms: cough, sore throat, headache, or myalgia. Secondary outcomes were: (1) confirmed infection by viral antigen immunochromatographic assay, and (2) the infection-free time from the beginning of the study.

During the 5-month study period, infection was physician-confirmed in 17 subjects (8.7%) and laboratory-confirmed in 6 subjects (3.1%). No subjects had more than 1 infection during the study period. Doctor-confirmed infection incidence was significantly lower in the catechin/theanine group (4 incidences) compared to the placebo group (13 incidences) (adjusted odds ratio [OR], 0.25; 95% confidence interval [CI], 0.07 to 0.76; P=0.022). A similar pattern was observed in laboratory-confirmed infection, but it did not reach statistical significance. The authors suggest that this may be due to the population size not being large enough, as laboratory detection of viruses has been generally low.

The time to first infection was statistically significantly greater for the catechin/theanine group than the placebo group (adjusted OR, 0.27; 95% CI, 0.09 to 0.84; P=0.023).

In univariate analysis, age was the only variable that correlated with infection; younger age correlated with higher incidence of infection (P=0.027). Other variables included vaccination, preventive measures for maintaining hygiene (e.g., hand washing), smoking, alcohol, the subjects’ sex, and other types of tea consumption.

There were no significant adverse events.

Earlier studies have demonstrated a preventive effect of green tea catechins with combination of L-theanine for influenza infection but with inconclusive evidence; however, the present study shows that a combination of catechins with L-theanine could also lower the incidence of flu infection and thus reduce the prevalence of influenza infection.

The outcome of a statistically significant preventive effect on the incidence of clinically defined influenza infection could be easily perceived; however, the mechanisms of action of green tea catechins and L-theanine on the prevention of influenza infection require further insight. Moreover, the study may overestimate the effect, as a large proportion of the healthcare workers had been vaccinated. Additional large trials are warranted to confirm these interesting results.

—Risa Schulman, PhD
Meta-Analysis Shows that Tea Improves Flow-Mediated Dilation, a Measure of Vessel Health


Drinking tea (*Camellia sinensis*, Theaceae) is associated with a reduced risk of cardiovascular disease, partly due to beneficial effects on the vasculature. These effects can be studied by measuring flow-mediated dilation (FMD), the extent to which the brachial (upper arm) artery relaxes as a result of its endothelium (inner lining of arteries) responding to a signal by nitric oxide (NO). This response is induced when a blood pressure cuff is released after prolonged tightness. Several human intervention studies have assessed the effect of tea on FMD and have shown a positive effect. This paper reports a meta-analysis of these studies.

Studies were gleaned from the Medline, Embase, Chemical Abstracts, and Biosis databases. Studies using freshly brewed green or black tea or tea powder from freshly brewed green or black tea were included; those using purified or isolated tea components (e.g., the tea catechin EGCG) were not. Also excluded were those studies missing data on FMD, with no measures of variability of FMD reported, no suitable control, or no full text available.

Quality of the studies was assessed using a tool specially designed for this analysis, based on the Delphi Consensus, which took into account randomization, similarity of baseline characteristics between treatment groups, specification of eligibility criteria, blinding procedure, proper execution of FMD measurements, and recording of compliance.

A total of 478 studies were discovered in the databases, of which 470 were excluded for a variety of reasons. One additional study was found after the search, bringing the total number of studies included in the meta-analysis to 9. Seven studies had a crossover design, and 2 had a parallel design. The studies included 213 subjects with the mean age ranging from 30.0-62.1 years and body mass index (BMI) ranging from 22.1 to 29.7 kg/m². Subjects were healthy or mildly hypercholesterolemic (high cholesterol) in 5 of the studies; the other studies included patients with kidney disease or transplant, or coronary artery disease. One study used only men, 2 studies used only women, and the rest included both (1 study did not report the sex of its subjects).

Mean baseline FMD ranged from 4.3-7.8%. Six studies looked at the acute effects of FMD, and 3 studied long-term effects (1 month).

Black tea was used in 7 studies and green or green and black tea in 3 studies. Tea was brewed in hot water or tea powder dissolved in hot water using defined amounts of tea, water, and brewing time. The median dose of tea was 500 ml per day, roughly equal to 2-3 normal cups.

The meta-analysis showed that tea increased FMD by 2.6% (95% confidence interval [CI]: 1.8-3.3%; P<0.001), which was 40% better than the average FMD measured with placebo (in crossover studies) or at baseline (in parallel studies). In post-hoc analysis, the exclusion of 1 study with 4 arms because of its disproportionate contribution to the total, and 1 study in a very specialized disease population (renal transplant recipients) did not change the outcome of the analysis.

The quality scores (as measured by the Delphi Consensus tool) correlated significantly with the net FMD response (P<0.002), but this correlation was lost when other variables were included in the analysis. The type of tea, type of placebo, health status, study duration, age, and baseline FMD did not correlate significantly with net FMD.

Among predefined subgroups, there was a correlation of study quality score, with higher quality studies showing smaller improvements in FMD (P=0.005). There were significant overall FMD effects for subgroups with diseased and healthy subjects, and young and old subjects, high and low baseline FMD values, different amounts of tea prescribed, different study quality scores, black tea as intervention, when using hot water as control, and with acute intake of tea.

In post-hoc analysis, the position of the cuff (whether proximal or distal to the area of ultrasound measurement) correlated significantly with FMD response; smaller responses were observed with distal occlusion (P=0.017; R²=0.36).

Between-study heterogeneity was significant (62.1, P<0.001, with accompanying I² statistic 75.8%). A funnel plot showed an absence of publication bias (intercept: P=0.176). When the most extreme outlier was excluded, only the symmetry of the plot was improved (intercept: P=0.401).

While the active ingredients in tea are not completely known, the flavonoids (especially the catechins) have received wide interest and support. It is possible that the flavonoids may act by increasing NO, but other mechanisms may also be involved. The authors were not able to show a dose-dependent effect on FMD. This may be because a given volume of tea could contain varying amounts of active ingredients across studies, making comparisons difficult.

Limitations of the meta-analysis include methodological differences across studies (difficulty of reproducing FMD measurements and differences in cuff positioning); the fact that a majority of the studies were acute and the clinical relevance of such studies is unclear; and the inclusion of 2 studies that compared more than one active ingredient to the same control.

The authors concluded that, “Moderate consumption of tea substantially enhances FMD,” and that the results seem robust because 8 out of 9 studies showed a difference using various tea types and various populations, and there were no indications of systematic publication bias. Whether improved FMD is correlated with decreased risk of cardiovascular disease is still unclear.

—Risa Schulman, PhD
Meta-Analysis Finds Soy Reduces Systolic and Diastolic Blood Pressure in Hypertensive Patients

High blood pressure, or hypertension, is often symptomless and can lead to heart attack or failure. Diet is commonly investigated as a therapeutic method for treating hypertension, necessitating the research of food and compounds therein for the condition. Some research suggests that isoflavones from soy (*Glycine max*, Fabaceae) may benefit arterial vasodilatation, endothelial function, and blood pressure, but studies examining the effect of soy on blood pressure have produced inconsistent results. The authors of this paper conducted a meta-analysis of all randomized, double-blind, placebo-controlled trials examining the effect of soy protein and isoflavones on blood pressure.

Databases used included PubMed from 1950-2009, Embase from 1966-October 2009, and The Cochrane Library. The search terms used were “soy” or “soy protein” or “soya,” “isoflavones” or “isoflavone,” and “blood pressure” or “hypertension.” References in the articles were also searched. Studies were included if they were published in English as full-length articles, had at least 10 adult subjects or patients that ingested soy isoflavones for 1 to 12 months, and were published, randomized, double-blind, placebo-controlled trials. Trials also had to have means or differences between means for systolic blood pressure (SBP) and diastolic blood pressure (DBP) reported at baseline and the endpoint of the study, as well as standard deviation, standard error, 95% confidence interval (CI), or probability values. Reporting of dose and duration of study was also necessary.

The authors found 1,080 articles, but excluded 1,045 due to study design or incomplete reporting. Of the remaining 35, 24 were excluded due to inappropriate source material, having fewer than 10 participants, incomplete data, or insufficient duration. A total of 11 trials were included in the meta-analysis. The sample size ranged from 18 to 302 participants with average ages from 48.5 to 66.7 years and a body mass index (BMI) of 25.5 to 32.2 kg/m². Soy protein consumption ranged from 20 to 50 g/day with isoflavone intake ranging from 65-153 mg/day. Duration of treatment ranged from 1 to 12 months. Two trials included diabetic patients, and 4 trials had patients with hypercholesterolemia. Quality scores ranged from 3-5.

Four trials reported reduced SBP and DBP, one reported an increase in SBP and DBP, and the remaining trials showed no change in blood pressure. When all data were pooled and analyzed, soy isoflavones were shown to significantly decrease SBP by 2.5 mmHg (95% CI, -5.35 to 0.34 mmHg, P=0.08) and DBP by 1.5 mmHg (95% CI, -3.09 to 0.17 mmHg, P=0.08). Since there was heterogeneity between the studies, a meta-regression was performed. Age—but not dose, duration, or BMI—was found to be a significant predictor of heterogeneity.

When data were divided into hypertensive and normotensive subgroups, the reduction in both SBP and DBP compared to placebo was statistically significant in the hypertensive group but not in the normotensive group (for hypertensive group, 5 of 11 trials, SBP: -5.94, 95% CI, [-10.55, -1.34] mmHg, P=0.01; DBP: -3.35, 95% CI, [-6.52, -0.19] mmHg, P=0.04). Blood pressure reductions were found to be greater in younger patients. According to the authors, the effectiveness of soy isoflavones appeared to be “significantly disturbed” by the presence of diabetes or hypercholesterolemia in some of the subjects, though due to low statistical power, these findings should be interpreted with caution.

“The real effects of both diabetes and hypercholesterolemia on BP need to be investigated further in the studies aimed at hypertensive subjects without other comorbidities,” wrote the authors. There were no significant effects of duration, dosage, or sex. No publication bias was detected for either SBP or DBP.

The reductions in SBP seen in hypertensive patients with soy treatment are comparable to those seen with antihypertensive medications (5 mmHg). Therefore, the authors suggested that ingestion of 65-153 mg/day of soy protein-containing isoflavones for 1-12 months can make a significant impact on cardiovascular disease risk in the hypertensive population. The mechanism for this effect is not well understood, but may involve improvement of endothelial function. It is also unclear whether the causal compound is soy protein or soy isoflavones, or whether the 2 act synergistically. As there was considerable heterogeneity in the trials analyzed, additional studies in homogeneous populations and at a wide range of doses are needed to confirm the results.

—Amy C. Keller, PhD

Reference

Lavender Oil Inhalation Prior to Surgery-Like Setting Reduces Perceptions of Stress and Pain


Intraoperative anesthesia requirements increase when a patient has high baseline anxiety and stress. These patients also have a more difficult recovery from anesthesia. Accordingly, patients are given anxiolytic and sedative drugs before surgery, but these may delay discharge from the hospital. Aromatherapy may be able to reduce anxiety before a procedure. The purpose of this randomized, blinded, controlled study was to evaluate whether lavender (*Lavandula angustifolia*, Lamiaceae) oil aromatherapy could decrease stress, bispectral index values (using electroencephalogram to determine level of consciousness during sedation), and pain of needle insertion in a surgical setting.

Healthy subjects (*n* = 30, mean age 21 years) participated in this study conducted at Kyungpook National University Hospital in Daegu, South Korea. Subjects were randomly assigned into lavender treatment or control groups. Subjects arrived at the preoperative area, rested on a bed for 5 minutes, and then baseline bispectral index (BIS) values were calculated via electrodes placed on the scalp. Next, the subjects were asked to score their stress and tension on a visual analogue scale (VAS; 0 = no stress to 10 = maximum stress). One minute later, a 25-gauge needle was inserted 3 mm into the skin of the non-dominant forearm and kept there for 30 seconds. The subject rated pain intensity on a VAS (0 = no pain to 10 = worst pain imaginable).

Next, subjects in the lavender group received oxygen for 5 minutes via a face mask coated with 2 drops of 2% lavender oil, which was applied with a cotton swab to the inside of the mask. The lavender oil (100% pure lavender oil; Plant Life Natural Body Care; San Clemente, California) was diluted to 2% lavender oil with jojoba (*Simmondsia chinensis*, Simmondsiaceae) oil. The subjects in the control group received oxygen for 5 minutes through a face mask with no lavender oil. Immediately after receiving treatment, the subjects were transported to the operating room, and then BIS values were measured at 5, 10, 15, 20, and 25 minutes after inhalation therapy. The subjects scored their stress level 6 minutes after inhalation treatment, and 1 minute later, a needle was inserted similar to baseline. The subjects rated pain intensity from 0 to 10. Adverse effects were recorded.

At baseline, both groups had similar levels of stress, pain intensity at needle insertion, and BIS values. Lavender oil significantly reduced the stress level (*P* < 0.001) and pain intensity (*P* < 0.001) compared with the control. BIS levels at 5, 10, 15, and 20 minutes after aromatherapy inhalation were significantly lower than after control inhalation (*P* < 0.001 for all). There was no between-group difference in BIS 25 minutes after therapy. No adverse effects were reported.

The authors conclude that lavender inhalation significantly reduced BIS values, stress levels, and pain intensity of needle insertion. The exact mechanism of action is unknown. The advantages of aromatherapy with lavender oil is that it can be easily applied, is safe, has a low cost, would not prolong sedation after surgery or increase the incidence of vomiting, and can improve patient satisfaction. Aromatherapy may be helpful in controlling preoperative stress and fear. Although not assessed here, the findings may extend to the outpatient setting where patients need to give blood. The appropriate dose and efficacy would need to be assessed.

—Heather S. Oliff, PhD
Review of the Effect of Cocoa and Chocolate on Coronary Heart Disease


Cocoa (*Theobroma cacao*, Sterculiaceae) and chocolate have been investigated for their beneficial effect on factors related to cardiovascular heart disease (CHD); however, it is unclear if these substances affect the actual risk of CHD. This article, written by authors in Massachusetts who analyzed the relevant clinical literature, reviews the evidence for an effect on clinical and subclinical CHD, CHD risk factors, and biological mechanisms, as well as the limitations of the literature and suggested future directions.

Chocolate is made from the seeds of the cacao tree and is a combination of cocoa solids, cocoa butter or other fats, and sugar. Milk chocolate also contains milk, while dark chocolate contains added fat and sugar. [Editor’s note: what makes dark chocolate dark is that it contains more cocoa solids than milk chocolate and no milk.] White chocolate consists primarily of cocoa butter, sugar, and milk, and does not contain any cocoa solids or flavonoids. Cocoa contains polyphenols and flavonoids, in particular epicatechin, at a rate of 18-24 μg/100g in milk chocolate and 52-125 μg/100g in dark chocolate. Chocolate also contains saturated fat (60%), monounsaturated fat (35%), and linoleic acid (3%).

A number of studies examine the associations between chocolate/cocoa consumption and CHD prevalence, cardiovascular disease (CVD), and all-cause mortality. The cross-sectional National Heart, Lung, and Blood Institute (NHLBI) Family Heart Study of 4,970 subjects showed an inverse relationship with prevalent CHD for those who consumed chocolate as often as or more than (≥) 5 times per week (odds ratio [OR] = 0.43; 95% confidence interval [CI], 0.28–0.67). A second study reported a 35% reduced risk of CVD with consumption of chocolate ≥ 1 time per week (multivariable adjusted relative risk [RR] of 0.65 [95% CI, 0.46–0.94]).

In subclinical heart disease, a single-blinded, randomized trial in 39 men who ate flavanol-rich dark chocolate showed improved coronary flow velocity reserve (CFVR; 3.38 ± 0.49 before and 4.28 ± 0.85 after dark chocolate intake; P < 0.01), but no improvement in those who ate white chocolate. A cross-sectional study (NHLBI Family Heart Study) found an association between chocolate consumption and calcified atherosclerotic plaques in coronary arteries in 2,217 participants, OR of 0.94; (95% CI, 0.66–1.35), 0.78 (95% CI, 0.53–1.13), and 0.68 (95% CI, 0.48–0.97) for chocolate consumption of 1-3 times per month, once per week, and ≥ 2 times per week, respectively, compared to no chocolate intake as the reference group.

With respect to CHD mortality, Janszky et al.,1 observed a strong inverse association in post-myocardial infarction patients for those who consumed chocolate less than once per month, up to once per week, and twice or more per week, hazard ratios (HR) of 0.73 (95% CI, 0.41–1.31), 0.56 (95% CI, 0.32–0.99), and 0.34 (95% CI, 0.17–0.70), respectively. A similar association was found in the Iowa Women’s Health Study after 13 years of follow-up in post-menopausal women. Buijsse et al.,2 reported RR of 0.50 (95% CI, 0.32–0.78) for cardiovascular mortality and 0.53 (95% CI, 0.39–0.72) for all-cause mortality in elderly men when comparing the highest to the lowest tertile of cocoa intake. Another study in post-menopausal women by Mink et al.,3 showed a RR of 0.90 (95% CI, 0.86–0.95) for incident CHD, and 0.88 (95% CI, 0.82–0.96) for total mortality for the highest to the lowest quintile of flavanone consumption. Decreased cardiovascular-related deaths were also noted in an observational study in which subjects consumed cocoa as their main beverage.

The mechanisms involved could include 3 actions: antioxidant activity that would reduce oxidative stress, improvement of endothelial function of blood vessels via increase of nitric oxide (NO), and increased intracellular free calcium concentration and activation of endothelial estrogen receptors. Vasomotor function was improved by 47% in a randomized, controlled,
double-blind, crossover study comparing the effect of high and low flavanol chocolate given to 16 CHD patients for a month. An increase in the number of endothelial progenitor cells, which are responsible for repair of damaged vasculature, was also seen.

Effects on blood pressure (BP) were studied by Grassi et al.,4 in hypertensive patients with impaired glucose tolerance, showing a 3.83-mm Hg decrease in systolic and 3.92-mm Hg decrease in diastolic BP in those consuming high flavanol chocolate compared to white chocolate. A possible mechanism was brought to light in a study showing inhibition of angiotensin-converting enzyme (ACE) activity and increased NO in human endothelial cells (P<0.01) after consumption of dark chocolate. Another study showed no effect of 70% cacao dark chocolate (50g/day) on BP. A meta-analysis concluded that chocolate causes a mean change in systolic BP of –3.2 ± 1.9 mm Hg and diastolic BP of –2.0 ± 1.3 mm Hg (P = 0.003).

Cholesterol lowering has also been explored. One study using dark chocolate reported a decrease in total cholesterol (–6.5%; P < 0.0001) and low-density lipoprotein (LDL) cholesterol (–7.5%; P < 0.0001), with no effect on serum high-density lipoprotein (HDL) cholesterol or triglycerides (TG). Another study showed a decrease in cholesterol along with an increase in HDL cholesterol (1.16 ± 0.08 vs. 1.26 ± 0.08 mmol/L; P = 0.05). A meta-analysis by Jia et al., for short-term chocolate consumption concluded that it lowered LDL cholesterol by 5.87 mg/dL and total cholesterol by 5.82 mg/dL, but that this was highly dependent on the amount of cocoa consumed and health status of the patients (no effects were observed in healthy participants). A second meta-analysis showed that dark chocolate was associated with a reduction in serum LDL (–5.90 [95% CI, -10.47 to –1.32] mg/dl) and total cholesterol (–6.23 [95% CI, –11.60 to –0.85] mg/dl), but not with an increase in HDL cholesterol or TG.

Insulin resistance was decreased after consumption of flavanol-rich dark chocolate (P < 0.0001), along with enhanced insulin sensitivity (P < 0.05) and improved beta-cell function (P = 0.035), compared to no effect for white chocolate. A second study also saw an improvement in insulin resistance (0.31% reduction).

Reduction in platelet aggregation has also been reported in one study assessing 100g of dark chocolate consumption. A possible mechanism could be reduced ADP/collagen-activated, platelet-related primary hemostasis due to a reduction in activated glycoprotein IIb/IIIa surface proteins.

According to the authors, the existing literature, while showing effects, has the limitations of short duration of studies; lack of clear notation of type or amount of chocolate used, or separation of dark and milk chocolate, which may have led to an underestimation of effects; lack of clarity of optimal intake level; lack of recording of polyphenol content; and heterogeneity of studies making interpretation difficult.

Future studies should pay attention to these factors, as well as the separation of lifestyle factors. The authors concluded by noting, "Long term, double-blind, randomized controlled trials with hard clinical endpoints are needed before recommending cocoa or its products as a treatment option in patients with high risk for CHD or for healthy individuals. In the meantime, it would be safer to consume dark chocolate only in moderate amounts." —Risa Schulman, PhD

References
A BRIEF HISTORY OF ADULTERATION OF HERBS, SPICES, AND BOTANICAL DRUGS

BY STEVEN FOSTER

Echinacea Echinacea purpurea. Photo ©2011 Steven Foster
Introduction

In an April 1896 lecture on drugs and food adulteration delivered to the state medical society in Los Angeles, California, San Francisco physician G. F. Hanson suggested that adulteration and sophistication began with the earliest human interactions.

“Since the memorable occasion upon which young Eve palmed off the green apple on old man Adam, more or less fraud in food handling has occurred, as opportunity offered and occasion for profit suggested. In the adulteration of drugs even more elasticity of conscience has been necessary to permit the almost unlimited sophistication which has been practice from time immemorial.”

Since the beginnings of civilization, once commerce develops, adulteration follows. Adulteration, falsification, substitution, and sophistication of willful intent or wanton neglect have evolved, along with the trade of one item of value for another item of equal or greater value. In the context of drugs, loosely defined as substances intended to benefit health or cure disease, adulteration results in accidental, negligent, or intentional variations in identity, strength, purity, and expected outcomes from a named or at least implied identity of a drug, even if the standard of identity was merely an organoleptic (sensory observation) expectation. In modern times (the past 500 years), adulteration by intent or neglect of defined professional standards is perhaps even more nefarious. As scientific method or professional expertise usually offers at least the potential of authentication, falsification generally involves knowingly offering or labeling a substance as something that it is not.

Substitution may involve offering one substance in place of another more expensive ingredient, or substituting one substance for another that might not be readily available or available only at a much higher price. If knowingly offered by both seller and buyer as a “substitute” for another substance, then the practice may be socially (and economically) acceptable, depending upon the cultural context. As Traditional Chinese Medicine became part of China’s national public healthcare system in the mid-1950s, local species of important herbal drugs were reasonably substituted for the official source plant with the knowledge that the substitute was less potent. For example, in the 1985 Pharmacopoeia of the People’s Republic of China, with respect to the official source plant for the herb jin yin hua is Lonicera japonica (Caprifoliaceae, Japanese honeysuckle flowers). Three species, L. hypoglauca, L. confusa, and L. dasystyla, are listed as interchangeable substitutes for L. japonica. An additional 9 species are acknowledged to be acceptable as local substitutes in specific regions. In this example, when the “official” species is unavailable, local substitutes are acceptable.

Sophistication or the use of sophisticants to change the expected nature of a substance or product may involve premeditated and in some cases elaborate methods to introduce adulteration and falsification to a substance or product. An example is the elaborate attempt to make fluidextract of ginger more palatable as a way to attain a cheap drunk during the prohibition of alcohol in the United States during the 1920s by systematically adding plasticizers such as dibutyl phthalate and ethylene glycol (antifreeze) to the illegal beverage disguised as a medicinal “fluidextract.” Finally, tri-ortho-cresyl phosphate was added to the extract to smooth out the taste—an infamous example of sophistication that led to thousands of tragic toxic reactions, the story of “ginger jake.”

For the purposes of this article, permit this author to simplify the definition of the broad concepts of causes and manifestations of adulteration common terms: An adulterated product is one in which the customer does not receive what he or she is led to believe to be purchasing.

Adulterants, Sophisticants, and Falsification of Botanical Medicines in History: Rise of the Promise of Science

Ancient sophistications and adulteration are described, though not systematically, by the famous Greco-Roman medical and natural history writers, including Dioscorides, Pliny the Elder, Theophrastus, and Galen, often in the context of organoleptic variations in taste and smell or physical differences such as color.

In his Materia Medica, the first century Greek physician in service to Rome, Pedanius Dioscorides (40-90 CE), observed methods of detecting sophisticants for balsam, identified as Balsamodendron opobalsamum, perhaps a synonym of Commiphora opobalsamum (Burseraceae). The taxonomy of this plant is currently unresolved; it is referred to as a synonym of C. gileadensis in the American Herbal Product Association’s Herbs of Commerce 2nd edition, under the common name balm-of-Gilead (oleo-gum-resin), with the synonyms Mecca balsam, Mecca myrrh, and opobalsamum.

Dioscorides said of Balsamon: “It is adulterated in a variety of ways. For some mix it with ointments, as for instance terebinth (Pistacia terebinthus, Anacardiaceae), flower of henna (Lawsonia inermis, Lythraceae), mastic oil (Pistacia lentiscus, Anacardiaceae), lily oil (Liliaceae), oil of ben tree nut (Moringa peregrina, Moringaceae) metopion he, honey, cerate of myrtle (Myrtus
communis, Myrtaceae), or very thin unguent of henna flowers. Thus this kind can easily be detected. For when dropped onto a wollen cloth and thoroughly washed out, that which is pure leaves neither stain nor spot, but the adulterated juice does not do. The milk, when poured on milk or water, dissolving immediately, becomes milky, but the adulterated floats like oil, whirling and spreading out in a star-like manner. Yet, as time goes by even the pure one deteriorates, thickening by itself.  

Dioscorides noted that frankincense (Boswellia sacra, Burseraceae) was easily flammable, and the smoke was clear with a pleasant fragrance.

Stieb’s analysis of Dioscorides’ Materia Medica offers 40 adulteration examples, 30 of which include methods of detection. Most included organoleptic and other physical or qualitative distinctions, in addition to suggesting that geographic origin or an often-ambiguous botanical description might serve to distinguish the presence of adulterants or suggest purity. Physical determination included the flame test (flammability or lack thereof), displacement, weight, organoleptic tests, and solubility, among the most often used methods.  

Even today a simple flame test is useful for any traveler to Peru. When a merchant attempts to sell a garment or textile claimed to be made of “baby alpaca wool,” one need only pull a lighter or match from one’s pocket and ignite a small thread to test for the common spurious substitute—polyester. If the thread burns cleanly without a hint of melting, it has a chance of being the genuine article. If the thread shrivels and melts like plastic, one is likely being offered alpaca-like soft polyester. Societal response to adulteration throughout history seeks to prevent wool from being pulled over one’s eyes.

Pliny the Elder (23–79 CE)—the Roman naturalist, author, and philosopher—wrote the encyclopedic work Naturalis Historia, which remains one of the most important accounts of natural history in first century Rome. Pliny wrote of various means of authenticating not only herbs and spices, but also other natural substances such as silver. Placing a piece of silver on a shovel and thrusting it into a kiln at white heat could ascertain the best quality of silver. The best quality, he asserted, would remain perfectly white. If the silver turned a reddish color, it was an inferior grade. If it turned black, it was worthless. But fraud has found its way even into this test; if the shovels are kept in human urine, the silver shaving is stained by it during the process of being burnt and counterfeits whiteness. There is also one way of testing polished silver with a person’s breath—if it at once forms surface moisture and dissipates the vapor. Speaking generally about adulterations, Pliny lamented: “…the same fraudulence which is so extremely ingenious in every department of life has devised an inferior material.”

In ancient Athens, a special inspector was charged with detecting and halting wine adulteration. One wine purveyor enjoyed the reputation of excelling at adding ingenious sophisticants, imparting the flavors of both age and maturity to new wine. Galen of Pergamum (129-201 CE), physician to Roman Emperor Marcus Aurelius, suspicious of purveyors of drugs, characterized such merchants as “roguish dealers of petty wares.”

Archimedes, born a year after Theophrastus’s death in 288 BCE, is often held as the first to apply scientific methods to the detection of adulteration by using concepts akin to modern scientific methodology. He famously applied a measurable physical constant—the displacement of the volume of water by an object placed in water—to show that something other than gold was the base metal in the crown of King Hiero (of Syracuse, in modern-day Sicily). Therefore, he used what is known today as specific gravity to measure metal purity. Subjective empirical opinion based on the knowledge and experience of a trader, buyer, or observer of nature was displaced by emerging science.

Centuries of Low Expectation: Medieval Centuries

Arabs of medieval Islam, assimilating the works of Greek and Roman authors into a more sophisticated pharmacy, relied on control systems of religious oversight. Inspections and the presence of an amin overseeing the preparation of compound medicines helped to thwart adulteration. An oath was required that no change to the mixture would occur after the amin left the premises. The use of false weights and measures or adulteration was controlled with a fear of God, the threat of severe punishment, and impromptu weekly inspections. Adulteration was recognized. Controls were implemented.

From ancient times to the 17th century, the collective evolution of experience and empirical knowledge further refined organoleptic nuance and specificity. The literature from the 12th century forward is rich with specific examples of attempts to adulterate virtually any spice or drug of value in order to serve a demand outstripped by supply and tempted by the opportunity for wealth. Municipalities, medical professionals, societies, organized religions, regional authorities, national governments, and kings imposed responses with consequences for those who strove to prey on the void of verification.

History is replete with accounts of adulteration recognized in myriad substances—from bread and flour to alcoholic beverages, foods of all manner, and even attempts to add alloys of little value to precious metal. It is in this author’s lifetime that American coinage has moved from the value of the precious metals the coins contain to alloys of no intrinsic value beyond the denomination assigned to them. From ancient
times to today, society has punished the counterfeiters of the “coin of the realm” with stiff fines and sentences. Societies throughout history have targeted and punished the baker, butcher, vintner, product manufacturer, and druggist who adulterate the merchandise they sell and hence adulterate the very construct of public trust as a social concept.

By the mid-11th century, Europe began to experience a revival of the arts. In 1070, construction began on the London Bridge and Westminster Abbey. In 1095, the first Crusade intermingled Christian militants with established schools of higher learning in Salerno, Seville, Toledo, and Cordova. Guilds of students formed to establish places of study and mutual protection of collective interests. These associations led to the creation of universities (universitas means association), such as Paris in 1110, Bologna in 1113, Oxford in 1167, Cambridge in 1209, Padua in 1222, and Naples in 1224. Pharmacy was part of the course of medicine. By the 12th century, guilds were formalized in England to protect the collective interests of spice traders.9

In 1100, the Ancient Guild of Pepperers was organized in London, and, in 1345, was formalized as a fraternity receiving permission from Edward III to incorporate, though the Guild did not receive a formal charter until 1428. In 1373, the Grocers’ Guild joined the fray with a charter, granted by Richard II of England, to regulate and control the spice trade. In 1419, the试行 of the Apothecaries Guild—a separate professional class—was established with a charter from Henry V of England. National integration continued in 1500 with the establishment of the Worshipful Company of Apothecaries (WCA), and, in 1617, King James gave the WCA a separate charter and independence from the Grocers’ Guild, restricted only to practitioners of pharmacy. In 1624, when the Grocers’ Guild petitioned the King to reverse the 1617 Apothecaries’ Guild charter, King James responded, “Grocers are but merchants; the business of the apothecary is a mystery; wherefore I think it fitting that they should be a corporation of themselves.”9

Societies throughout history have targeted and punished the baker, butcher, vintner, product manufacturer, and druggist who adulterate the merchandise they sell and hence adulterate the very construct of public trust as a social concept.

the fraternity was called the Company of Grossers. Three years later, it changed its name to the Company of Grocers of London. The Company’s name is derived from the Latin, grossarius, meaning one who buys and sells in gross (en gros), or wholesale merchants. In 1453, the Grocers’ Company was entrusted with the King’s Beam, officially weighing all goods sold by the Aver-de-Pois weight or the peso grosso. It was also charged with the duty of garbling, or preventing the adulteration of spices and drugs. Garbling is sifting, sorting, cleaning, separating, and culling to remove physically unwanted soil, dirt, etc., or separate particles by size and/or quality.

Late in the 15th century, the Grocers’ Company consolidated its power and was given the exclusive right to garble drugs and spices and examine the drugs and prescriptions sold by apothecaries. They exercised their authority over apothecaries by imposing fines for any adulterated or misrepresented preparations.10

As the 15th century progressed, the application of movable type and oil-based ink by the German Johannes Gansfleisch, better known as Gutenberg, revolutionized the availability of information with the printed book, starting with the relatively low-priced and high-quality Bible, published in 1455. In a few short years the Elzevir Press was established in Holland, followed by the Caxton Press in England. Second to the production of religious works was the production of herbs, initiating the great age of early modern herbal and works on materia medica in the period from 1500 to 1800. Details on the source plant in herbal traditions and their use moved from the experienced master and the apprentice to the literate citizen.

By the late 17th century, the mystery of art and craft yielded to the new, emerging force of science. Application of the scientific method of physical science to the detection of adulterants in drugs was heightened by the 1690 work of Sir Robert Boyle (1627-1691) in Medicina Hydrostatica: or Hydrostatics applied to the Materia Medica. For the first time, Boyle’s scientific method of measuring specific gravity, borrowed with credit from Archimedes’ underlying theories, was used to expose and rectify intentional adulteration of drugs.11

The first national English pharmacopeia in the modern sense—in which the medical and pharmacy professions attempted to agree collectively on a professional standard of the materia medica, if only by agreeing on a list of what to prescribe—is the Pharmacopoeia Londinensis. First issued in a now very rare, typographical error-ridden printing on May 7, 1618, the work was quickly canceled and withdrawn with embarrassment, then replaced with the “official” version printed on December 7, 1618. This ushered in an era of national dispensaries, compendia, and pharmacopeias, backed by legal standing, which, by scientific consensus, defined the “standard” of and “standards” for drugs of the day. Verification of purity and imposed standards of identity would require public outcry and 2 slow centuries of development.12,13

By the late 17th century, the professions of medicine
and pharmacy were becoming more distinct in England, with druggists and grocers supplying wholesale quantities to retail pharmacists who compounded physicians’ prescriptions. Efforts to draw distinctions between the professions began much earlier from elsewhere in Europe: the Holy Roman Emperor Frederick II separated the professions of physicians and apothecaries in southern Italy in 1240.

Works such as Pomet’s *A Complete History of Druggs*, first published in French in 1694, then in a first English edition in 1712, were attempts to expose the growing disdain toward the practice of adulteration. The anonymous author of the 1737 English translation was dedicated to Dr. Hans Sloane (1660-1753), physician, collector, and founder of the British Museum as well as the Chelsea Physic Garden in London. Sloane’s patronage was sought, in part, as protection from exposé in the work on adulteration.

“. . . it is not easily apprehended how much the Publick suffers in the Sale, which is daily made of I know not what sophisticated and decay’d Druggs, which are not capable of producing the Effects that are design’d by them, and expected from them, either to restore or preserve the Health of Mankind. We may yet be more surpriz’d at the fatal Mischief that flows from Mens Ignorance in the common Choice of Druggs; and that nothing is more frequent in Druggists and Apothecaries Shops than adulterated Medicines, which deserve not least Tittle of those pompous Names, but which they enhance the Prices of them.”

Hence the author asks for Sloane’s indulgence, “Therefore as one can scarce discover their Works of Darkness without suffering by the Malignity of their Tongues, who so undeservedly make a Gain of Peoples Credulity, I stand in Need not only of an Advocate but a Protector.”

Pomet’s *Druggs* describes the quality of many drugs and suspected adulterants. In the book’s first entry on wormseed (*Chenopodium ambrosioides*, Chenopodiaceae), the authors suggest that one choose seeds that are plump, of a greenish cast, with the typical distinctive flavor, and clean with nothing sticking to the seed. It should not be too green, and the reader is warned that the seed of southernwood (*Artemisia abrotanum*, Asteraceae) not be imposed upon the buyer. The seeds of the latter are larger, longer, and of a darker green color. Obviously, such subtle distinctions require that the buyer be knowledgeable and trusting of the purveyor.

In the case of cinnamon (*Cinnamomum verum*, Lauraceae), Pomet warns that oil of cinnamon may be mixed with spirit of wine, and with salt of tarter added ‘so that those who buy an Ounce of this Oil, have not above half an Ounce for their Money. Tho’ the Cheat is easy to discover two Ways: The first is, when looking into the Bottle in which it is contain’d, you may observe the Humidity that is with in. The second is, by dipping the Point of your Knife in, and putting it into the Candle; if there is any Mixture of the Spirit of Wine, it will take fire presently; but, on the contrary to that, when it is pure, it will do nothing by smoke.”

Of saffron (*Crocus sativus*, Iridaceae), Pomet’s book notes, “...there is a great deal of Saffron-Powder sold, so it is generally a Cheat upon honest People, that being almost only sold in...”
Powder, which has been us'd before hand by the Druggist, or Apothecary, to Make Tinctures, Spirits, or the like, with.14 It was then redried and sold as powdered saffron.

Public Outcry—Accum's Exposé

Professional organizations that evolved from guilds began to form and self-police the shops in London, but the nefarious practices continued and gained even greater levels of sophistication. The popular acceptance of the science of chemistry and its rise as the scientific foundation of a liberal education in the second half of the 18th century set the stage for a popular uprising against adulterators. The modern era—still evolving today—in which scientific theory, analytical methods, and reproducible techniques permit accurate measures of purity, identity, and detection of sophisticants—starts with the landmark 1820 work of Frederick Accum: A Treatise on Adulterations of Food, and Culinary Poisons. Bakers, brewers, vintners, and “pepperers” were among the most suspect of tradesmen he exposed. The title page of Accum’s work famously declared, “There is death in the pot.”15 Accum himself was sometimes referred to as “old death in the pot.”

Accum described himself as an operative chemist and lecturer on practical chemistry, mineralogy, and on chemistry applied to the arts and manufacturers. By the time Accum’s Treatise was published, chemistry had become the central science and an “indispensable” subject in a liberal education. Accum was celebrated in social circles of England among the most active of laborers in the field of chemistry, particularly in practical applied chemistry in daily life. Born in Germany, he came to England in 1793, and by 1800 had established a laboratory at Compton Street in Soho, where he sold chemical preparations, and established himself as a public and private lecturer in chemistry, operating out of his own home. In 1809, he was appointed Professor of Chemistry at Surrey. By 1820, he had published 9 treatises on various subjects relative to chemistry and the philosophy of chemistry. One work published in 1891—Chemical Amusement: Comprising a Series of Curious and Instructive Experiments in Chemistry, which are easily performed, and unattended by Danger—might be regarded as the first primer on chemical entertainment and education, paving the way for the popular chemistry set of the 20th century. Accum became a frequent witness in courts and in Committees of Parliament, explaining processes and facts pertinent to chemical science. His popularity as a lay and academic lecturer, plus contributions to scientific and popular periodicals, set the stage for publication of his Treatise on Adulterations in 1820, and the development of public awareness and reaction that was to lead to the implementation of a series of laws, regulations, and acts that are the foundation of modern food and drug laws.16

Accum was obviously an industry insider. He knew what really happened in the marketplace. Spurious black pepper (Piper nigrum, Piperaceae) was manufactured with a mixture of spent linseed (Linum usitatissimum, Linaceae) cakes, powdered clay, and a little cayenne (Capsicum annuum, Solanaceae), pressed through a sieve then rolled inside a cask to produced granules of appropriate size. Once he exposed the adulteration, he offered methods for detection:

“That factitious pepper-corncorns have of late been detected mixed with genuine pepper is a fact sufficiently known. Such an adulteration may prove, in many instances of household economy, exceedingly vexatious and prejudicial to those who ignorantly make use of the spurious article... The mode of detecting the fraud is easy. It is only necessary to throw a sample of the suspected pepper into a bowl of water; the artificial pepper-corncorns fall to powder, whilst the true pepper remains whole.”15

Accum exposed the smoking gun that implicated traders. Ground pepper dealers sophisticated the product with genuine pepper mixed with pepper warehouse sweepings. In the wholesale markets, ground pepper “P.D.” signified pepper dust, and “D.P.D.” represented dust (dirt) of pepper dust. Accum used scientific evidence that was supplemented by the traders’ own designations to expose spurious commodities. Great Britain’s “Pepper Act” of July 5, 1819, imposed a fine of 100 pounds on those in possession with intent to deliver the adulterated pepper.15

Respectable chemist shops, Accum revealed, used a liberal amount of white porcelain clay (pipe clay) from Cornwall as a substitute for sugar in formulating lozenges of substances not soluble in water, such as ginger, cream of tartar, or magnesia. He quoted Dr. T. Lloyd, who, upon suspecting the fraud, went to a prominent chemist’s shop to demand an explanation. The chemist informed him that 2 kinds of ginger lozenges had been kept for sale. One was priced at 3 pence per ounce, the other at 6 pence per ounce. The higher-priced lozenges that contained pure sugar were sold to regular customers. The half-priced version, cut with pipe clay, was manufactured for those customers that were fond of haggling over the price and content to “enjoy the delight of getting it cheap.”15

He reported on other food preparation practices that would lead to unintentional, though predictable poisoning.
In the north of England prepared mint sald by bruising and grinding the leaves in a large wooden bowl. However, to bruise and process the leaves more efficiently a ball of lead weighing 12-14 pounds was rolled in the bowl, “and portions of the lead are ground off at every revolution of the ponderous instrument.”

Imported commodities such as coffee (Coffee spp., Rubiaceae) or tea (Camellia sinensis, Theaceae) were often subjected to cutting with other substances or outright substitution with other ingredients. Accum reported on several cases of tea adulteration for which convictions were delivered in the courts, as reported in London newspapers including the Times and the Courier from March through July of 1818. Edmund Rhodes was charged with dying, fabricating, and manufacturing large quantities of tea made from a mix of sloe leaves (Prunus spinosa, Rosaceae), ash leaves (Fraxinus excelsior, Oleaceae), elder leaves (Sambucus nigra, Adoxaceae) and leaves of a certain other tree. The accused was convicted and fined 500 pounds. The falsified tea was made by mixing together the green leaves of the various plants, boiling them, baking them on an iron plate until dry, and then rubbing them by hand to mimic the curled, rolled leaf of the genuine article. Black tea was colored with logwood and spurious green tea was colored with carbonate of copper. Accum gives detailed methods for detecting the presence of logwood in black tea and copper additives to falsified green tea. Accum also notes that “Mr. Twining, an eminent tea-merchant, asserts, that ‘the leaves of spurious tea are boiled in a copper, with copperas [also known as ferrous sulfate or green vitriol] and sheep’s dung.”

Accum’s “Treatise” is the Silent Spring of food adulteration. Its publication marked a societal watershed moment where public outrage spurred a slow struggle toward legislative control. A popular anti-adulteration movement emerged from the widespread indignation.

**A Response by the Professional Medical Community**

Popular discontent inevitably led to professional action. In England, leading professionals in the newly emerging academic field of pharmacy were convinced that the problem had to be self-policed from within the profession. The Pharmaceutical Society was formed in 1841, conceived in the spring of that year in the home of Jacob Bell (1810-1859) in Oxford. Bell was a pharmacist (he described himself as a “pharmaceutical chemist,” chemist being the term now synonymous with pharmacist in the United Kingdom) who worked to reform the profession with Jonathan Pereira (1810-1853), an early pioneer of pharmacology and author of the 2-volume *The Elements of Material Medica* and other works, along with Daniel Bell Hanbury (1825-1875), botanist, pharmacist, and co-author (with F.A. Flückiger) of the 1879 classic *Pharmacographia*. They conceived of the idea of the Pharmaceutical Society. Hanbury, a health advocate, also famously championed opposition to the consumption of alcohol and tobacco, and was a vegetarian. At the time of this meeting Hanbury was still a teenager, yet about to enter pharmacy school, and at age 16, had just begun work in his father’s pharmacy. On April 15, 1841, at a public meeting at the Crown & Anchor in Bloomsbury, the Pharmaceutical Society was formerly chartered, with the express purpose of educating retail chemists and druggists on the incidence and techniques of adulteration, and how to avoid purchase of adulterated products from wholesalers. The Society also sought to establish professional standards for pharmacists and established the *Pharmaceutical Journal*, which in its early years published many papers on the subject of adulteration.

**Legislative Reaction in the UK**

In 1855, Britain’s Parliamentary Select Committee—appointed to investigate adulteration of food, drinks, and drugs—issued its report with landmark testimony. Armed with microscopy, chemistry, and physics, Arthur Hill Hassall, MD, testified that annatto (*Bixa orellana*, Bixaceae) seed was adulterated with chalk, red lead, turmeric (*Curcuma longa*, Zingiberaceae), salt, soap, and rye (*Secale cereale*, Poaceae) flour. Cayenne pepper might contain ground rice, mustard husk, sawdust, and salt, skillfully colored with red lead or bisulphate of mercury. The list of substances tested with an obvious result of pervasive adulteration shocked the public. Hassall, too, was quick to explain that his list of adulterants was by no means exhaustive, but represented only what could be reproducibly detected by microscope and chemistry. The expert testimony of Hassall and others at the hearings lit the fire of developing laws and regulations leading to modern controls. Hassall championed the use of the microscope in detecting adulterants, ushering in a new discipline of expertise in the use of microscopy in authenticating food and drugs and exposing adulterants they may contain.

Hassall (1817-1894) began his medical studies in 1834 as an apprentice to his uncle, Sir James Murray. His interest in microscopy and botany, particularly freshwater algae, led to publication of a landmark study in 1850, “A Microscopic Examination of the Water Supplied to the Inhabitants of London and the Suburban Districts.” The work became influential in the development of reforms in management of public water supplies. His many papers on food and drug adulteration followed, leading directly to England’s 1860
Food Adulteration Act. During his lifetime he was regarded as “the father of public analysis” and the “Apostle of Anti-Adulteration.”

In A Memoir of Arthur Hill Hassall, author Edwy Godwin Clayton described Hassall’s most conspicuous public service as, “the application of the microscope, for the first time on an important scale, in the analysis of food and drugs, and in the determination of the exact nature of the living organisms found in water supplied for the public use.”

In the mid-19th century, widespread adulteration of foods attracted the most attention of regulators and enforcement officials, partly because food adulteration was so pervasive. Detecting drug adulteration proved to be more nuanced, requiring regulations that not only detected spurious additions to a product, but that also sought to maintain standards of quality and potency toward a predictable therapeutic action at a specific dose.

The Rise of the Anti-Adulteration Movement in the United States

The anti-adulteration movement grew in the United States at the same time as those in the rest of the world. In 1838, William Hodgson Jr. began a regular series in the American Journal of Pharmacy, “Notes on Falsifications and Adulterations.” “It cannot be denied that this evil is rapidly increasing, and perhaps as much so in the department of Pharmacy as in any other,” he wrote. “In this state of things the question naturally occurs, whether it be not the duty of the honest pharmacists and physician to do all that single or combined efforts can accomplish to protect the community from its effect.”

Professor of chemistry and natural history at Rutgers University, physician and botanist Lewis Caleb Beck publicized the issue in an 1846 work Adulterations of Various Substances Used in Medicine and the Arts, with the Means of Detecting Them. Beck’s scientific authority and ability to communicate scientific concepts in plain language—while also providing simple, practical techniques to identify sophisticants—rallied public and professional attention to the subject. Two years later, in the spring of 1848, time coalesced around the need for federal legislation in response to the growing awareness and disdain toward adulterated drugs, in particular, imported drugs. The Colleges of Pharmacy of Philadelphia and New York, the state of Mississippi, the fledgling American Medical Association, and M.J. Bailey, MD—the drug examiner of the New York customhouse—came together to petition Congress to take action. On June 26, 1848, Congress passed the first statute meant to block the importation of deteriorated or adulterated drugs, titled, “An Act to prevent the importation of adulterated and spurious drugs and medicine.” In practice, the requirement in the law that imported medicinal raw materials conform to the pharmacopias and dispensaries of the United States, Edinburgh, London, France, or Germany was difficult to enforce because the required works did not have a uniform single standard and existing customs officials had little knowledge of pharmacopelia standards and methods. In many cases, too, there was no method to detect the adulterant.

In order to further enforcement, Dr. Bailey, Special Examiner of the class of Merchandise in the United States Custom at the Port of New York, produced a report relative to the practical application of the law. The law took effect on July 12, 1848. Before one year had passed, by June 1849, Bailey had rejected importation of about 90,000 lbs of adulterated plant drugs and other medicines, “which met from its inception, the open, determined and unremitting hostility of a God-forsaken portion of our trading community.” Among the items rejected were 13,120 lbs of “Spurious Yellow Bark” in October 1848; 12,800 lbs of Spurious Yellow Cinchona Bark (Cinchona spp., Rubiaceae) in December 1848; and various shipments of rhubarb root (Rheum spp., Polygonaceae), opium (Papaver somniferum, Papaveraceae), myrrh (Commiphora myrrha, Burseraceae), senna (Senna alexandrina, Fabaceae) leaf and/or fruit, and other drugs. Professional organizations had been successful in a public response to adulteration in the form of legislation, and had put the merchant class on notice that spurious adulteration would no longer be tolerated, setting the stage for legislation and regulations to follow until today.

In a May 24, 1895, lecture, Willis G. Tucker—director of the New York State Board of Health Laboratory—outlined some of the differences between the adulteration of foods and drugs. Intentionally adding inferior ingredients to make weight in foods—such as adding sugar to maple syrup, roasted cereals to ground coffee, or “all sorts of rubbish to ground spices”—is not the type of debasement commonly met with drugs. He suggested that the adulteration of drugs can be more subtle than the adulteration of foods and does not necessarily involve the willful and direct addition or substitution with foreign substances, but instead offering articles of inferior quality or of
inferior potency, or, in some cases, excessive strength. Citing the law of the State of New York at the time (Public Health Law, Chapter 661, 1893), Tucker outlined the conditions for which legal adulteration was defined:

1. If when sold under or by a name recognized in the United States Pharmacopeia, it differs from the standard of strength, quality, or purity laid down therein.

2. If when sold under or by a name not recognized by the United States Pharmacopeia, but which is found in some other pharmacopeia or standard work on materia medica, it differs materially from the standard of strength, quality, or purity laid down in such work.

3. If its strength or purity fall below the professed standard under which it is sold.

An angry public with science on its side prompted legislative action in Great Britain and culminated in the United States with passage of the Food and Drug Act of 1906. The term sophisticants has long been associated with adulteration. Indeed, some adulterators have gone to great lengths to disguise their misdeeds, as in the case of sophistication of tea, described by Accum in 1820. In the annals of adulteration, particularly in the United States, no case of sophistication acquired more infamy than the “ginger jake” incident of the 1930s.

Ginger Jake Epidemic
The most famous incidence of adulteration leading to life-changing, crippling effects of epidemic proportion grew out of society’s circumvention of the 1919 Volstead Act that created prohibition. High-proof liquor was banned. Honesty in labeling imposed by the Pure Food and Drugs Act of 1906 required patent medicines to list their ingredients such as opium, morphine, heroin (all derived from \textit{P. somniferum}), cocaine (derived from \textit{Erythroxylum coca}, \textit{Erythroxylaceae}), or cannabis (\textit{Cannabis sativa}, \textit{Cannabaceae}), along with the alcohol that inevitably represented the bulk of the volume and weight of many a patent medicine swill.

Medicines listed in the United States Pharmacopeia (USP) or that claimed to be a certain type of medicine—such as a fluidextract or elixir, including those offered as patent medicines—were required to meet USP standards. For example, to be labeled a fluidextract, the product had to contain 4% solids. In the case of a fluidextract of ginger (\textit{Zingiber officinale}, \textit{Zingiberaceae}) root in the form of “Essence of Jamaica Ginger,” ginger jake delivered 70% alcohol in the form of a patent medicine. In an effort to enforce prohibition, government agents would seize products from store shelves or manufacturers and test it for the percentage of solids. If it failed the test, the manufacturer was forced to improve the percentage of ginger solids. The taste of the USP ginger extract was not inviting. In order to make it more palatable, some manufacturers adulterated the extract with molasses, glycerin, or castor oil to mask the taste. Random sampling of suspected adulterated lots by the Treasury Department’s Bureau of Industrial Alcohol led to the confiscation of adulterated product, which in turn inspired more creativity by those manufacturing ginger jake for a cheap, illegal drunk.

Two shady brother-in-law businessmen from Boston, Harry Gross and Max Reisman, worked diligently to circumvent
the government chemists. In 1921, Gross obtained a Prohibition Bureau permit to handle alcohol for various manufacturing purposes, but it was revoked within 2 years. Reisman shipped 5 gallons of pear (Pyrus communis, Rosaceae) extract to an Indian reservation and was indicted for violating federal law prohibiting the sale of alcohol on reservations. The Prohibition Bureau was convinced the pair was bootleggers and found a still at their country house in 1927, though no arrest was made. By 1928, they became wholesale manufacturers of ginger extract, which was shipped around the country in barrels labeled “liquid medicine in bulk.” In 1929, they sought an adulterant less expensive than castor oil and more difficult to detect. They tried the plasticizer dibutyl phthalate, fusel oil, butyl carbitol, and ethylene glycol (antifreeze), but none quite fit the bill for them. Finally they settled on another plasticizer, an industrial chemical used to finish lacquers, leather treatments, and airplane finishes—tri-ortho-cresyl phosphate (TOCP).30

By February of 1930, Oklahoma physicians, including Ephraim Goldfain of Oklahoma City, began seeing patients with neurological problems. By the end of the day on February 27, 1930, Goldfain had seen 4 patients with the same condition. One of the patients informed the physician that 65 people in the same area of Oklahoma City were afflicted with the same symptoms. City health supervisor E. Miles joined Goldfain in interviewing more than 30 people, and discovered that they had all ingested Jamaica ginger extract in the previous 2 weeks. They unsuccessfully attempted to discover a toxic compound in the ginger extract. Other physicians from New York to California began to see similar cases. Early in 1930, the Treasury Department’s Bureau of Industrial Alcohol discovered the presence of TOCP in offending samples of ginger extract. Despite the fact that by mid-March of 1930 the emerging epidemic was reported in newspapers around the country, it was already too late for tens of thousands of imbibers of ginger jake. Many of the victims were single, poor African Americans or downtrodden, poverty-stricken veterans of World War I.

Symptoms of TOCP poisoning, following initial gastrointestinal problems, had a latency period of 10-20 days. The proceeding neurotoxicity included pain and paresthesia of the lower extremities, then progressive muscle weakness usually developing into paralysis of the lower extremities. The paralysis often left rubbery function of the lower limbs, creating a dragging gait or shuffle, requiring one foot to be physically moved in front of the other with the hands. The symptoms were the result of axonal degeneration in peripheral nerves and degeneration of anterior horn cells from the spinal cord. No legal remedy was available for the victims despite the best efforts of the United Victims of Ginger Paralysis, formed in May of 1931 in Oklahoma. Product liability law barely existed. Federal laws to create class action suits were yet to be conceived. Gross and Reisman were eventually to plead guilty to violations of the Prohibition laws as well as the Pure Food and Drug Act. They convinced the judge that they were only middlemen and bargained their way to probation. Gross’s probation was revoked by a California judge when, in the plea bargain, he failed to mention a shipment of 2 barrels of ginger jake shipped 2 weeks after the stories of the jake-induced toxicity had reached the papers. He served 2 years’ prison time, starting in April of 1932. Brother-in-law Reisman served no jail time.30,31

The ginger jake epidemic spurned a cultural response. Numerous blues artists wrote and recorded jake leg songs. John Morgan, MD, a self-described pharmacoethnomusicologist, compiled a collection of jake leg blues songs issued by Stash Records in 1977. [See: “The Jamaica Ginger-Paralysis Episode of the 1930s” by John Parascandola, HerbalGram 34, pp. 28-35, Summer 1995]. A simple search of “Jake Leg Blues” at an online music store will net many examples.31 Several movies, television episodes, and documentaries also incorporate or cover the story, many of which can be discovered with a simple Google search.

**Eleuthero and the Hairy Baby**

In the late 1960s and early 1970s, a Chinese herb entered the herb trade, known to botanists as *Eleutherococcus senticosus* (syn. *Acanthopanax senticosus*, Araliaceae). Products called “Wuchaseng,” “Wujiaseng,” and “Siberian ginseng” appeared in the market. There was no historical precedence in Chinese traditions for applying the qualifier “seng” to *E. senticosus*. “Seng” refers to fleshy rootstocks used in Chinese medicine as tonics. “Gin-seng,” for example is one “seng”-producing...
unintentional product mislabeling, but nevertheless would fit under the definitions of adulteration presented by Willis Tucker above, as the substance in question was defined in a monograph in the English edition of *Pharmacopoeia of the People’s Republic of China*.* The case of eleuthero adulteration evolved as the result of a letter to the editor in the December 12, 1990, issue of the *Journal of the American Medical Association*. A Canadian physician and colleagues reported on a purported case of neonatal androgenization, associated with maternal “ginseng” use in Canada—the so-called “hairy baby” story.*35 The isolated case was attributed to the mother’s use of “pure Siberian ginseng.” The authors erroneously confused eleuthero with *P. ginseng* in the publication. Shortly after the story appeared, longtime HerbalGram Contributing Editor and American Botanical Council Advisory Board member, Dennis Awang, PhD—then head of the now defunct Natural Products Section of Health and Welfare Canada (now Health Canada)—performed an analysis of the plant material in question, and found that the product, though labeled as “Siberian ginseng,” actually contained the root of another herb, *Periploca sepium* (Asclepiadaceae).36,37 Waller et al., (1992) performed pharmacological tests on rats with the implicated plant material from the case and observed no androgenicity, and concluded that, “the effects observed were specific to humans and possibly related to an undetermined peculiarity of the subject patient.”38

In Chinese tradition, the whole root and lateral roots of *E. senticosus* are known as *Ci-wu-jia*, jia-pi, the bark of *E. gracilistylus*, is the official source of *Wu-jia-pi* in the Chinese Pharmacopoeia. The bark of *E. senticosus* (jia-pi or *Ci-wu-jia-pi*) is sometimes used as a substitute. *Ci-wu-jia*, the root of *E. senticosus*, is a separate article of materia medica in Chinese tradition. An unrelated plant, *Periploca sepium*, a vine in the milkweed family (Asclepiadaceae), is known in Traditional Chinese Medicine as *Wu-jia-pi*, *Xiang-jia-pi* (bark), *Gang-lu-pi* (bark), and *Bei-wu-jia-pi* (bark).3,39 Similiarities of the Chinese names for *E. senticosus* and *P. sepium* apparently led to unintended confusion among American importers and presumably Chinese exporters. Hence *Periploca* entered the American herb trade as “Siberian ginseng.”* Over the last 20 years or so, *P. sepium* has on several occasions been identified as an adulterant to Siberian ginseng. That confusion extends to the scientific literature.

A case report by a Canadian physician perpetuated that confusion. The physician presented a case report in which a 74-year-old man who had been taking the cardiotonic drug digoxin for many years had abnormally elevated levels of digoxin in his blood. Digoxin levels remained high even after digoxin therapy was discontinued. The physician then discovered that the patient was taking a “Siberian ginseng” product. After stopping use of the product, serum digoxin levels returned to normal. Treatment with digoxin resumed. Several months later, the patient started taking “Siberian ginseng” once again, and serum digoxin levels rose. Use of “Siberian ginseng” was stopped, and serum digoxin levels again returned to normal. The abnormally high levels of digoxin were attributed to “Siberian ginseng.”40 It appears this may have been another case of confusion between Siberian ginseng (i.e., *E. senticosus*), a shrubby member of the botanical family Araliaceae (ginseng family) with its higher-priced cousins in the genus *Panax* (such as Asian ginseng [*P. ginseng*] and American ginseng [*P. quinquefolius*]). This shrubby member of the ginseng family was widely sold as “Siberian ginseng,” prompting confusion and controversy in the herb trade for more than 30 years, leading one trader to ask if you could call something ginseng if it is harvested with a chainsaw! In Chinese tradition, the whole root and lateral roots of *E. senticosus* are known as *Ci-wu-jia*, jia-pi, the bark of *E. gracilistylus*, is the standard common name for the plant’s products in trade. The debate relative to application of common names in trade of *E. senticosus* was resolved (in the United States) when the Farm Security and Rural Investment Act of 2002 included a provision that effectively banned the use of the name “ginseng” in product labeling or promotional material in any commercial herb product except those products containing members of the genus *Panax*. Therefore, with the stroke of President George W. Bush’s pen on May 13, 2002, use of the term “Siberian ginseng” in reference to *E. senticosus* in US commerce was banned.33 Eleuthero was involved in a case from the early 1990s that provides an example of vicarious substitution involving
senticosus) and *P. sepium*. *P. sepium* may contain glycoside compounds to the cardiac glycosides in foxglove (*Digitalis purpurea*, Plantaginaceae). A laboratory analyzed the offending “Siberian ginseng” capsules for digoxin and none was found. No further analysis was conducted on the product, so the identity of the plant material was never confirmed. It is highly probable that the “Siberian ginseng” product in question was actually *P. sepium*.

**Wild Red American Ginseng—Fraud Exposed**

Occasionally a product appears on the market that defies definition as adulterated and instead can be categorized as outright unscrupulous fraud. Such is the case with the offering of products labeled “wild red American ginseng” in the late 1970s. The product was indeed a red-colored root, was collected from the wild, and, as advertised, was a plant native to the Southwest United States (and adjacent Northern Mexico). However, the plant—by any stretch of defining plant materials—was not remotely related in any respect to (1) use of the common name “ginseng;” (2) the genus *Panax;* (3) the ginseng family; (4) ginseng’s chemistry; or (5) ginseng’s expected adaptogenic or traditional effects.

The plant was canaige (***Rumex hymenosepalus***), a member of the buckwheat family (Polygonaceae). Also known as Arizona dock, tanner’s dock, or canaige dock, this species is found in sandy and rocky alkaline soils or along dry washes in the Southwest, north to Colorado and south to Baja California and Chihuahua, Mexico. The then-fledgling and now-defunct Herb Trade Association (predecessor of the American Herbal Products Association) investigated the “wild red American ginseng” issue, and found the offering to be fraudulent. The results
were published as the “Herb Trade Association Policy Statement No. 1—Canaigre,” after which the product slowly disappeared from the market.33,44

In the late 19th century, canaigre gained notoriety as a potential economic plant due to its very high tannin content. Mexicans and American Indian groups utilized the plant as a tanning agent. In 1887, R. J. Kerr of Tucson, Arizona, became interested in the plant’s commercial development as a tanning agent and shipped the first train carload of the dried root to a Texas tannery. Academic interest followed. In the early 1890s, the Texas Agricultural Experiment Station at the Agricultural and Mechanical College of Texas (now Texas A&M University) initiated cultivation studies. The production trials produced dried roots with up to 31% tannic acid. Eugene Dittman, a tannery owner in New Braunfels, Texas, suggested that tanning could be done cheaper with canaigre in Texas than in any other part of the country. Like other Texas tanners of the late 19th century, he believed that the best quality leather is produced by canaigre or its extract, and “is of the very best; a very fine, mellow leather, with a very fine yellow color, of great durability; pronounced by all leather consumers [in New Braunfels] as of extra good quality.”45

**Echinacea: Adulteration Extends to Confusion in the Scientific Literature**

In the spring of 1985, *HerbalGram* published a brief notice titled “Herb Traders Beware,” alerting readers to the possibility that dried root marketed as “Echinacea purpurea” (Asteraceae) may instead be the root of wild quinine, prairie dock, or Missouri snakeroot (*Parthenium integrifolium*, Asteraceae). At the time, *HerbalGram*, then in its second year, was a 12-page, black-and-white newsletter.46 Later that year, Rudolf Bauer, PhD, and colleagues at the University of Munich, published on the discovery and elucidation of 4 new cinnamoyl esters of sesquiterpene alcohols from *E. purpurea*. They named them echinadiol, epoxyechinadiol, echinaxanthol, and dihydroxynardol.47,48 However, in the late summer of 1986, Dr. Bauer confirmed that the plant material used for the studies was in fact a widespread adulterant to commercial *E. purpurea* lots, a plant known botanically as *P. integrifolium*.49 Bauer’s purpose in performing the 1985 chemical study on *E. purpurea* was to look at the chemistry of commercial *E. purpurea* root products. An assumption was made that the plant material in the marketplace was correctly labeled. That assumption proved erroneous. About 20 different batches of commercial “Echinacea purpurea” roots were tested, which showed 4 characteristic patterns in chemical assay. Isolation and elucidation of the chemical structure yielded 4 new compounds—new to *P. integrifolium* rather than *E. purpurea*.50
These cases and many others that are not mentioned herein highlight the need for proper identification of plant materials in the botanical market.

Though *Parthenium* is not similar in appearance to Echinacea, once the root is dried, cut, and sifted, it has an uncanny resemblance to *E. angustifolia* or *E. pallida* roots, although it possesses its own characteristic flavor and fragrance. It does not resemble the root of *E. purpurea*. One *Parthenium* root may weigh up to 10 times more than one *E. purpurea* root.

*Parthenium* was documented as an adulterant in commercial Echinacea lots as early as 1909.51 The renowned Eclectic pharmacist and author John Uri Lloyd noted that echinacea was one of the most variable drugs known to him in its crude form, and he found that insipid, tasteless lots of Echinacea root had little medicinal value. Other adulterants in lots of the dried root mentioned by Lloyd included *Lespedeza capitata* (round-headed bush clover, Fabaceae), *Eryngium aquaticum* (rattlesnake-master, Apiaceae), *Rudbeckia nitida* (St. John’s-Susan, Asteraceae), *Helianthus annus* (common sunflower, Asteraceae), *Liatris aspera* (rough blazing star, Asteraceae), and unidentified plant roots.52

Further study showed that the work had in fact been done on *P. integrifolium* root products labeled as *E. purpurea*.

This raised the question about the identity of other Echinacea species reported in the chemical, pharmacological, and clinical literature. Bauer and colleagues in Germany, Austria, and elsewhere have since developed clear HPLC (high-performance liquid chromatography) and TLC (thin-layer chromatography) analytical methods for distinguishing various species of Echinacea. In the process of the research, it became clear that previous reports on the chemistry and pharmacology of *E. angustifolia* had actually involved *E. pallida*.53 Therefore, the identity of *Echinacea* species in published reports prior to 1987 must be questioned, in the absence of a vouched reference specimen of the source plant material in a published report.

The ABC-AHP-NCNPR Botanical Adulterants Program

These cases and many others that are not mentioned herein highlight the need for proper identification of plant materials in the botanical market. Sophistication and adulteration of botanical drugs has occurred throughout history. Quality assurance or quality control begins with proper identification of the source plant material. Agreed upon standards of identification, quality, and potency follow. While there is ample evidence that responsible elements of the herbal products and dietary supplements industry in the United States already adhere to scrupulous quality control regimes and the ever-increasing efforts in this area, the unfortunate situation appears to be that there may be numerous cases of accidental and intentional adulteration of herbal ingredients, including raw materials, extracts, essential oils, fungal ingredients, and more.

Three leading independent, nonprofit organizations—the American Botanical Council, the American Herbal Pharmacopoeia, and the National Center for Natural Products Research at the University of Mississippi—have joined forces along with other parties to create the ABC-AHP-NCNPR Botanical Adulterants Program, a long-term, multi-party coalition of herb quality and identity experts in university research groups, third-party analytical laboratories, government agencies, trade associations, and industry companies to examine the extent of suspected adulteration of herbal materials, particularly adulteration that is economically motivated. The intention is to confirm the extent of adulteration in the United States and global markets, determine which official or unofficial analytical methods are currently available to help detect the presence (or absence) of a suspected or known adulterant, and to provide comment and guidance on the relative strengths and/or weaknesses of differing analytical methods. The results of this investigation will be published in a series of reports (white papers) and will be made available on the ABC website. This present paper, or possibly an expanded version of it, detailing the history of both the accidental and the economically motivated adulteration of herbal raw materials and herbal drugs, is the first in the proposed series of publications.

Steven Foster, president of Steven Foster Group Inc., is an author, photographer, and consultant specializing in medicinal and aromatic plants.

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Renowned pharmacognosist and internationally respected medicinal plant research expert, Norman R. Farnsworth, PhD, died on September 10 at a Chicago hospital at the age of 81. He had been in declining health for months, suffering from long-term congestive heart failure and Type 2 diabetes.

Prof. Farnsworth was born on March 23, 1930 in Lynne, Massachusetts. He was a veteran of the Korean War, drafted into the US Army in 1949 at the age of 18. PFC Farnsworth served in the Third Infantry Division, Seventh Regimental Combat Team. After being seriously wounded in the winter of 1950, he was awarded the Korean Ribbon with Four Battle Stars, the Combat Medical Badge, and Bronze Star with a “V” device.
Prof. Farnsworth received his degree in pharmacy from the Massachusetts College of Pharmacy in 1953 and his doctorate in pharmacognosy—the study of drugs from natural origins (including medicinal plants, microbes, marine organisms, and fungi)—from the University of Pittsburgh (Pitt) in 1959. At Pitt, he helped institute a pharmacognosy PhD program and served as its first chairman.

In 1970, Prof. Farnsworth left Pitt for a post in the College of Pharmacy at the University of Illinois at Chicago (UIC), where he served as head of the Department of Pharmacognosy and Pharmacology from 1970-1982. At UIC, he was also Research Professor of Pharmacognosy, Director of the Pharmacognosy Graduate Program, and Director of the World Health Organization (WHO) Program for Collaborative Research in the Pharmaceutical Sciences—a multidisciplinary program that brought together, for the first time, scientists in numerous fields of medicinal plant research to collaborate on drug discovery from medicinal plants. In 1988, he was named Senior University Scholar at UIC. He held the title of Distinguished Professor of Pharmacognosy, which he received for his “scholarship, creativity and leadership,” from 2001 until his death.

As head of the pharmacognosy graduate program at UIC, he mentored more than 100 doctorate and 30 graduate students. Also, he had said he “personally” mentored about 30 PhD and 5 MS students, as well as mentored or co-mentored 30 post-doctoral fellows.

Prof. Farnsworth was an internationally recognized scholar and initiator or co-initiator of many significant projects in the fields of pharmacognosy and medicinal plant research. Among numerous other accomplishments, he was a founding member of both the American Society of Pharmacognosy (ASP) in 1959 and the Society for Economic Botany (SEB) in 1959.

In 1975, Prof. Farnsworth created the NAPRALERT (Natural Products Alert) Database at UIC, the world’s first computerized database of ethnobotany, chemistry, pharmacology, toxicology, and clinical trials on medicinal plants.

In 1974, Prof. Farnsworth was one of 12 members of the first delegation of scientists from the United States to travel to the People’s Republic of China to study traditional Chinese herbal medicine. The American Herbal Pharmacology Delegation’s excursion resulted in the publication of Herbal Pharmacology in the People’s Republic of China by the National Academy of Sciences in 1975.

Prof. Farnsworth also was Principal Investigator and Director of the Botanical Dietary Supplements for Women’s Health Center at UIC, which was funded by the National Center for Complementary and Alternative Medicine at the National Institutes of Health. The author and co-author of hundreds of research papers published in peer-reviewed journals, Prof. Farnsworth co-founded the peer-reviewed journal Phytomedicine, the International Journal of Phytotherapy and Phytopharmacology, along with Professor Hildebert Wagner, PhD, at the University of Munich, who remains the journal’s editor-in-chief. This journal is now acknowledged as one of the leading scientific journals in the field.

Among many other organizations and publications with which he was involved, Prof. Farnsworth was also a co-founder of the American Botanical Council (ABC), and the longest-serving member of its Board of Trustees. In 2005, ABC established its Norman R. Farnsworth Excellence in Botanical Research Award, given to medicinal plant researchers who have made significant contributions to the field of medicinal plants and herbal dietary supplements.

Also in 2005, the ASP renamed its annual Research Achievement Award in honor of Prof. Farnsworth, given to outstanding members of the medicinal plant research community. In 2010, UIC established the Norman R. Farnsworth Professor in Pharmacognosy Endowed Professorship, which is currently chaired by Prof. Chuan-Tao Che, PhD, one of Prof. Farnsworth’s former doctoral students.

Prof. Farnsworth was the recipient of numerous awards and honorary degrees from around the world, including the SEB’s Distinguished Economic Botanist Award in 1983. In the 1990s, he was a member of the Commission on Dietary Supplement Labels, established by President Bill Clinton as part of the provisions of the Dietary Supplement Health and Education Act of 1994 (DSHEA) to develop recommendations for the review of the quality, safety, benefits, and appropriate labeling of dietary supplements.

A larger-than-life figure, Prof. Farnsworth was rarely seen without his trademark Marsh Wheeling cigars in his mouth, even long after he was forced to give up smoking. As public venues allowing smoking diminished over the past 2 decades, Prof. Farnsworth would often be seen in a restaurant or public area with one of his cigars in his mouth, even after being admonished by waiters. He would point out the obvious fact that he was not smoking and that the cigar was not lit, and would continue to keep the cigar in his mouth, seeming to relish the opportunity to keep walking up to the line, but not exceeding it.

He was highly respected and admired in life, and is now remembered fondly by his former students, mentees, and friends. Often seen as brash and outspoken, frequently critical of other scientists and institutions that to him were guilty of producing less-than-acceptable work or policies, Prof. Farnsworth pushed his students and all those around him to strive to the highest degree of academic and professional excellence. And under-

Norm was a personal friend and mentor to me and many others in the botanical and pharmacognosy communities. He was an exceptional person on many levels. Norm had been ill for quite some time, and so I am relieved that his suffering is over, but saddened that we no longer have his unique wisdom, humor, and generosity with us. We must now do our best to carry forward and carry on his tradition and legacy of respect of and interest in medicinal plants and the native populations who have used these plants to our collective benefit.

—Loren Israelsen
Executive Director
United Natural Products Alliance
I am heartbroken, and the loss is felt out here in [the South Pacific island of] Pohnpei. He was, and is, a giant among giants, and the last of the close collaborators of Richard Evans Schultes. He was one of those heroes to us graduate students in the ’70s, a wonderful travel companion, and extraordinary mentor.

—Michael J. Balick, PhD 
Vice President and Director 
Institute of Economic Botany 
New York Botanical Garden

The world is a much quieter and less interesting place now that Norm is gone.

—Michael Tempesta, PhD 
Managing Partner, Phenolics, LLC

What a wonderful, feisty, irreplaceable guy! He held a torch for many years and we just would not be where we are without him. Our thoughts are with the many, many people whose lives he touched.

—Peggy Brevoort 
President, Brevoort, LLC, Kapa’au, HI

Norman Farnsworth was an academic giant in the pharmaceutical sciences and always at the leading edge of each new trend in natural products. Quite remarkably, he managed to obtain almost continuous support as a Principal Investigator for many decades for the US National Institutes of Health and other extramural funding agencies. Norman built an outstanding and large team of faculty members, postdoctorals, visiting scholars, and graduate students at the College of Pharmacy, University of Illinois at Chicago—all focused on making new discoveries in natural products. As a result, he touched the lives of many people. Norman was also a talented journal and book series editor. He worked extremely hard and traveled all over the world, and was an incredible ambassador for his discipline. Pharmacognosy will probably never see his like again.

—A. Douglas Kinghorn, PhD, D.Sc. 
Jack L. Beal Professor and Chair 
College of Pharmacy 
The Ohio State University

neath the brash veneer, was a man who was seen by his colleagues and students as extraordinarily generous with his time and personal funds.

His long-time friend and colleague of 56 years, UIC Professor (ret.) Harry H.S. Fong, PhD, once said, “Everyone who has come into contact with Norman Farnsworth has a ‘Farnsworth story’ or 2 to tell.” Dr. Fong recalled that Farnsworth—who continued working up until shortly before his illness—recently noted that Dr. Fong, his former graduate student, had retired, as an example of how long Prof. Farnsworth had hoped to be able to continue his never-ending work in medicinal plant research.

Another phrase used to describe Prof. Farnsworth is the “quintessential renaissance man,” as he was called in an editorial in the ASP’s Journal of Natural Products by his colleagues Dr. Fong, Geoffrey A. Cordell, PhD, and A. Douglas Kinghorn, PhD, the journal’s editor-in-chief: “To fully depict Farnsworth, one needs to write a book,” said Dr. Fong.

In addition to being an ASP founder and its second president (the late Prof. Varro E. Tyler, also an early ABC Trustee, was the first), Prof. Farnsworth relished the role of being the official “roaster” of subsequent ASP presidents. Every year at its annual meeting and scientific conference, one of the true highlights was Farnsworth’s humorous satire, or “roast,” of the ASP’s out-going president—a tradition continued for almost 50 years. In the days and weeks since his passing, numerous colleagues have expressed their laments that Prof. Farnsworth—with his unlit, well-chewed cigar in mouth—would no longer be conducting this light-hearted tradition. It will now be ably carried on by Prof. Farnsworth’s former student graduate Barry O’Keefe, PhD, of the National Cancer Institute.

Dr. Fong shared several anecdotes about Prof. Farnsworth. One story involved his propensity for cigars. “On every lab bench and in every office that Norm has spent any length of time at the University of Pittsburgh and at University of Illinois at Chicago, one will find a littering of chewed remains of Marsh Wheeling cigar butts,” said Dr. Fong. “In fact, such mementos can even be found in Munich, Germany. When he was a visiting professor in Prof. H. Wagner’s lab in 1966, I had the ‘pleasure’ of regularly mailing boxes of Marsh Wheeling cigars labeled as ‘Investigational Material: Of no commercial interest’ to the Institute in Munich.”

However, when it comes to picking out Prof. Farnsworth’s most important accomplishment, Dr. Fong could not choose: “It is not
Even though we knew Norman’s time was near, it did come as a great shock this morning to realize that he is no longer with us. These past few minutes I was immediately reminded how gracious and helpful he was to Memory and me when we visited him in Chicago for the first time with the text of our first book, Medical Botany, in hand. He took the time to read it from cover to cover before we took it on to New York for publication. Throughout his life, if he thought something was good and meaningful, he would always be active in his encouragement and always supportive... just as he was, for example, in the formation of the American Botanical Council. I truly feel the loss immediately as I’m sure his family and many students and colleagues do worldwide. His presence is already missed by all who knew him.

—Walter Lewis
Professor of Biology
Washington University

As I think back, I recall the last ride we took together in a cab to the airport. I can almost smell his unlit cigar as it hung from his lips while we talked. When I offered to split the cab fare, he almost chastised me and forced the driver to only take his money—my North Carolina money was not good up there! He truly leaves us a legacy with many, many extensions just like the roots of the medicinal plants he researched so passionately!

—Edward Fletcher, PhD
COO, Botanical Division
Strategic Sourcing, Inc.

possible to pinpoint any one piece of Norm’s work as being most influential and important,” said Dr. Fong. “Rather, it is his body of work that will constitute his legacy.”

ABC Founder and Executive Director Mark Blumenthal first met Farnsworth in 1977 at the Herb Trade Association’s Herb Symposium in Santa Cruz, California. After a decade of a growing mentorship and friendship with Blumenthal, Prof. Farnsworth—along with economic botanist and ethnobotanist James A. Duke, PhD—were the first to agree to help found ABC and serve on its Board of Trustees.

“Norm was a force of nature—a man with incredible energy and profound and endless commitment to the world of medicinal plant research. There is no one like him in the profession of pharmacognosy and other fields of medicinal plant research,” said Blumenthal.

“He was like a father or uncle figure to many of his 130-plus graduate students and post-docs, creating a ‘family’ of medicinal

Norman Farnsworth’s self-assessment as “the big picture guy” who “never worked a day of his life” describes the essence of what it takes to live a happy life on a fulfilling mission. His vision and energy formed the basis of the extraordinary role he played in the lives of many, including myself. Norm’s academic leadership resulted in, but not from, multiple doctoral degrees, and even the highest accolades were unable to distract him from being a “normal person.” Pharmacognosy has lost a visionary and creative genius, and the world has lost an amazing human being. Those of us who have been fortunate enough to know and work with Norman have lost a dear friend and an inspiring mentor. Norman leaves behind an academic environment that only he could have built, and his spirit will forever be the foundation of pharmacognosy.

—Guido Pauli
Assistant Professor, Department of Medicinal Chemistry and Pharmacognosy
College of Pharmacy, University of Illinois at Chicago

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plant researchers who are now working in many institutions internationally. No matter how busy he was—and he carried an incredible workload not matched by many in any field of medicinal plant science—Norm would always take time to talk to students and fellow colleagues,” Blumenthal noted.

“As he neared the last few years of his life and he began to disengage from many of his former associations and responsibilities, Norm still remained active on the Board of ABC, attending all on-site and teleconference meetings, asking questions about budget issues, organization, administration, policy decisions, etc. All of us on the ABC Board were—and still are—grateful for his continued association with ABC. We were amazed with his interest in and knowledge of details of the organization, and his profound commitment to the success of ABC’s unique nonprofit educational mission to spread the scientific basis supporting the responsible use of herbs, medicinal plants, and phytotherapeutics,” said Blumenthal.

One of Prof. Farnsworth and Dr. Fong’s former students Daniel Fabricant, PhD, is now director of the Division of Dietary Supplement Programs at the US Food and Drug Administration, and formerly served as Vice President of Science and Regulatory Affairs at the Natural Products Association, an industry trade group. Dr. Fabricant said that he chose UIC because of Dr. Farnsworth and his legacy there. “He’s a straight shooter, he doesn’t put on airs, and he’s very disarming. He’s easy to gravitate to because of these unique qualities,” said Dr. Fabricant. “He’s been my mentor, a hero, and a friend.”

“He has launched a thousand careers, including my own,” said Gail Mahady, PhD, a clinical pharmacognosist who also met Prof. Farnsworth during graduate school, and who headed the project at UIC to produce monographs on herbal medicines for WHO. “For that I will be eternally grateful.”

Prof. Farnsworth is survived by his devoted wife Priscilla Marston Farnsworth, his brother, Bruce, and sister-in-law, Donna, of Massachusetts, a niece and nephew, and hundreds of graduate students, PhDs, post-doctoral fellows, and close colleagues who will always cherish his beloved memory.

A wake and viewing were held in Downers Grove, Illinois, on September 13. A memorial service for Prof. Farnsworth was held September 14 at the North Shore Baptist Church in Chicago with funeral and burial with military honors in Lynn, Massachusetts, on September 16 at Pine Grove Cemetery.

Norm’s sense of doing what he believed to be right no matter what others thought (particularly university administrators) and his nuanced sense of humor left big impressions upon me when I met him at 21 years of age. The following year, I had the opportunity to visit him in Chicago. The sign at the entrance to his department read, “Welcome to the Greatest Department of Pharmacology and Pharmacognosy in the World.” Norm disarmed any pretensions to greatness, despite the fact that he was clearly the world’s leading figure in his discipline. Instead, he treated me, an unlettered herbalist, as an equal. A scheduled 1-hour meeting stretched to 2 days and a friendship was sealed. Above all his immeasurable contributions to medicinal plant research, I am fortunate and honored to have called Norm a straight-shooting down-to-earth friend.

—Steven Foster
Author, Photographer, Herbalist
Chairman of the Board, American Botanical Council
Health Canada Relaxes Guidelines on $p$-Synephrine Use

By Sidney J. Stohs, PhD

The Natural Health Products Directorate (NHPD) of Health Canada recently released a Health Risk Assessment (HRA) report on $p$-synephrine, $p$-octopamine, and caffeine$^1$ that markedly relaxes the previous guidelines for Canadian government compliance enforcement against unlicensed products containing these 3 natural ingredients. $p$-Synephrine is the primary protoalkaloid in bitter orange extract ($Citrus aurantium$, Rutaceae)$^2$ and is frequently combined with caffeine in weight loss and sports performance products. $p$-Octopamine, a protoalkaloid that is structurally and pharmacologically related to $p$-synephrine, exists in $Citrus$ species such as lemons ($C$. limon, Rutaceae), but is present in trace amounts or

The HRA report,$^1$ approved and issued in May of 2011, indicates that up to 50 mg per day of $p$-synephrine use in healthy adults is now classified as a Type III health risk, which by definition is “a situation in which the use of, or exposure to, a product is not likely [emphasis added] to cause any adverse health consequences.”$^3$ The report further notes that products providing 40 mg per day or less of $p$-synephrine with 320 mg per day or less of caffeine are also classified as a Type III health risk. Products containing greater amounts of these ingredients are classified as a Type II health risk, which by definition is “a situation in which use of, or exposure to, a product may cause temporary adverse consequences or where the possibility of serious adverse health consequences is remote.”$^3$ The daily dose-based health risk classifications for $p$-octopamine are identical to $p$-synephrine.

The previous "Guidelines for the Use of Synephrine in Natural Health Products,” published by Health Canada in January of 2010,$^4$ had adopted a limit of 30 mg per day as the maximum allowable dose for total synephrine and octopamine, and prohibited the addition of any caffeine to a synephrine-containing product without submission of sufficient clinical evidence in human subjects.

The new report also requires the following cautionary statements (or words to this effect) on product labels “at doses higher than 50 mg $p$-synephrine or in combination with caffeine or other ingredients in vulnerable subpopulations, to mitigate the risk of potentially serious adverse events:"

- “Contraindicated in children, pregnancy, and breast feeding;”
- “Do not use if you are taking blood pressure medications (either hypertensives or antihypertensives), thyroid medications, sympathomimetics, or monoamine oxidase inhibitors (MAOIs).”

If these cautionary statements are lacking from a product containing 40 mg or less of $p$-synephrine and 320 mg or less of caffeine per day,$^1$ the product is classified as a Type II health risk as defined above.$^3$

Health Canada has functions similar to the US Food and Drug Administration. The $p$-synephrine compliance guidelines were reviewed and the report was written because of information brought to the attention of NHPD in the form of new research and review publications:

- human clinical trials,$^5,6$
- animal studies,$^7,8$
- clinical case study reviews,$^9,10$
- recent in-depth review articles on the safety and efficacy of $p$-synephrine alone and in combination with caffeine,$^{11-13}$
- a review of comparative adrenergic receptor binding studies of the isomers and enantiomers of $p$-synephrine and related protoalkaloids,$^{14}$ and
- the occurrence of up to 20-25 mg or more of $p$-synephrine per 8 oz glass of various citrus juices.$^2,15$

The conclusions of these various articles were not consistent with existing Health Canada guidelines for the use of $p$-synephrine.$^4$

The new HRA report on $p$-synephrine, $p$-octopamine, and caffeine is a detailed and well-researched document that reviews the chemistry, receptor binding and $in$ $vitro$ studies, animal studies, human studies, summaries of clinical case reports,
and Canadian clinical case reports. The report concluded that although p-synephrine-containing products had been implicated in adverse event case reports, “causality is not likely due to the p-synephrine content on its own, but rather due to other ingredients.” The report addresses misconceptions and misinformation concerning the safety of p-synephrine, and establishes more appropriate dosing guidelines for p-synephrine based on new clinical studies and published reviews of safety information. It does not address efficacy of p-synephrine-containing products.

All Health Canada reports must be made available in both English and French before they can be placed on the public website (www.healthcanada.gc.ca). The new report is 49 pages in length and has not been translated into French. Therefore, it has been available only upon request since its approval in May. Permission has been requested to make the report available through the American Botanical Council website (www.herbalgram.org).

Health Canada Clarification

According to Robin J. Marles, PhD, director of the Bureau of Clinical Trials and Health Sciences at NHPD, “This is not a new regulatory approach; it is guidance to inspectors recommending that they don’t give priority for compliance enforcement to unlicensed products with lower doses of caffeine and synephrine that don’t pose a significant risk to health” (oral communication and e-mail, to M. Blumenthal, August 1, 2011).

“It is not Health Canada’s position as to how these products can be regulated,” he continued. “This is not a guideline to manufacturers as to what they can put into their products. They can actually include more of these ingredients if they can justify their approach with appropriate scientific and clinical evidence in an application for a natural health product license. A key difference from the US regulatory framework is that in Canada, dietary supplements can have therapeutic claims on the label but must be licensed before they can be sold legally.”

Dr. Marles, who is also a member of the ABC Advisory Board, further clarified his agency’s position on this issue: “Most of the products containing p-synephrine, sold as dietary supplements in the United States, are not licensed as Natural Health Products in Canada (which require government pre-approval). One of the biggest problems for NHPD/Health Canada is correlating the actual claims for the weight loss products with the actual clinical trials that have been conducted on weight loss, e.g., duration of the trial or label recommendations for duration of use of the product, dose, clinical endpoints tested, etc. So far there is little evidence to support these products helping people to lose enough body weight, over a long enough time, to be a real benefit to their health. Consuming fewer calories and getting more exercise remains the only proven weight loss approach.”

“Health Canada continues to work with industry stakeholders, healthcare practitioners, academia, regulatory agencies and consumers on how best to regulate weight loss and weight management products” (S. Sawler, director general of NHPD, September 1, 2011).

Summary

The Health Canada NHPD has reviewed and revised its guidelines to inspectors on the prioritization of compliance enforcement against unlicensed health products with respect to the amount of p-synephrine that can be contained in a product for daily use, as well as the amount of caffeine that may also be present. Cautionary label statements are required under some conditions. More appropriate dose-based guidelines have been established based on recent clinical studies, as well as published reviews of safety information.

Conflict of Interest Disclosure

The author has served as a consultant for Nutratech Inc., a company that markets bitter orange extracts.

References

Estimated Herb-Sales Growth in 2010: Clarification

New information from the *Nutrition Business Journal* (NBJ)—a source for The American Botanical Council’s annual Herb Market Report—has altered its estimated percentage of 2010 herb-sales growth published in *HerbalGram* 90 earlier this year.\(^1\) Based on information available at the time of publication, the estimated increase in sales of herbs in all channels initially reported by *HerbalGram* was 3.3%.\(^1\) However, subsequent to that issue’s release, more information has been procured by NBJ that decreased the estimated growth of herb sales in 2010 to just 0.2%, the figure published in NBJ’s June/

“Our models are very dynamic and the numbers we provide earlier in the year are estimates,” said Patrick Rea, NBJ publisher and editorial director (oral communication, September 9, 2011). “If we get better information, we will change.”

According to Carla Ooyen, NBJ’s director of market research, the publication gathers data throughout the year from public sources and through interviews with industry insiders (oral communication, September 9, 2011). NBJ ultimately received evidence that the Food, Drug, and Mass Market channel—specifically WalMart—and the Network (or Multi-Level) Marketing channel—specifically superfruit juice distributor MonaVie—did not perform at projected levels, according to Ooyen.

“NBJ uses a variety of primary and secondary sources to gauge the size and growth of the industry,” said Ooyen. “We consider scanner data from sources such as SPINS, IRI, and Nielsen, public company filings, conduct various interviews with company executives, and conduct online surveys. We also use our 15-year analysis of the industry for a basis of our data” (e-mail communication, September 12, 2011).

Because of the probable reason for the remarkable growth of herb sales in 2009 (an increase of almost 5%), the fact that the figure for 2010 remained positive is still significant. Concern about H1N1—or the “swine flu”—likely contributed to the boost in overall herb sales in ’09, but the fervor of that concern had ceased by the following year, suggesting that Americans continued to integrate herbs in their healthcare and nutrition regimens.\(^2\)

—Ashley Lindstrom

References


Kurt Schnaubelt has been a pioneer in the movement to bring more scientific validation to the use of essential oils for the aromatherapy practitioner and consumer. His most recent book demonstrates the practical applications of plant essences and their effects on human physiology. There is significant emphasis on the benefits of the complex chemistry of secondary metabolites (e.g., those compounds found in essential oils) through explorations of evolutionary biology, cellular biology, and pharmacology.

Though beginners may get a great deal of reliable information from this book, it is best understood by the professional aromatherapist, herbalist, or natural health practitioner seeking to learn more about how and why essential oils work and their potential uses in an herbal or integrative practice. Occasionally, the author suggests incorporating herbal therapies. For instance, along with a suggested blend of essential oils for staph infection (Methicillin-resistant Staphylococcus aureus [MRSA], Staphylococcaceae) is a blend of antimicrobial herbs. Dr. Schnaubelt, who holds a doctorate in chemistry, also recommends adding an essential oil blend to a base of herb-infused oils for greater efficacy than that provided by either ingredient alone in a carrier such as coconut oil.

Furthermore, the book covers essential oil first-aid issues, as well as treatment protocols for more serious conditions such as hepatitis, osteoporosis, liver detoxification, and the side effects of conventional cancer treatments. Dr. Schnaubelt counters the concerns of dangerous toxicity with a sane and scientific approach for safe application and treads upon a much-avoided area, that of oral and internal use. He also interweaves cosmetic and skin care applications and explains how they contribute to overall well-being while building natural immunity.

Particularly unique is the layout of pages and the tidbits of information on the edges highlighting subjects such as toxicity myths, quotes by various contributors to the craft, nods to plant pioneers, and more. Throughout the book, Dr. Schnaubelt presents the work of other prominent figures in the profession, explores historical views of essential oils from around the world, and the utilization of essential oils in various cultures.

The Healing Intelligence of Essential Oils is divided into 3 parts and begins with an overview of the biological understanding of essential oils and their advantages over synthetic drugs. The author first links human biochemical and cellular heritage with human’s symbiotic relationship with plants. Various theories about how essential oils contribute to traditions such as Chinese Medicine, Five Element Theory, and French-Style Medical Aromatherapy are also discussed. In Part I, Dr. Schnaubelt presents findings that support the use of whole oils, claiming distinct advantages over single components such as essential oil isolates and conventional pharmaceutical drugs.

Part II delves into essential oil authenticity, traditions, safety, and the cultural aspects of fragrance perception and healing. Myths perpetuated in numerous other books are addressed head-on with an emphasis on the use of high-quality unadulterated oils. Therapeutic activity of various chemotypes are also explored and explained.

Part III takes up the second half of the book with its emphasis on treatment strategies, case studies, and the practical applications of essential oils, including cosmetic and therapeutic uses. The extreme caution usually seen in aromatherapy books is debunked throughout, with suggestions for oral and other internal uses. An entire chapter is devoted to the safe use of essential oils internally, which includes oral ingestion and rectal and vaginal suppositories. Recipes and instructions on self-care are also included.

Antiviral uses are discussed with a focus on herpes and flu. The inclusion of herbal support is occasionally provided. Three chapters in Part III are devoted to issues around caring for cancer patients. These chapters deal with the side effects associated with chemotherapy and radiation such as nausea, mucous membrane inflammation, bowel discomfort, skin problems, and burns. The section on the prevention of melanoma and the photoaging of skin includes lesser-known carriers such as sea buckthorn (Hippophae rhamnoides, Elaeagnaceae) and rose hip (Rosa canina, Rosaceae) oils (extracted by super-critical carbon dioxide) and newer carriers to the skincare market such as raspberry (Rubus idaeus, Rosaceae), pomegranate (Punica granatum, Punicaceae), and cranberry (Vaccinium macrocarpon, Ericaceae) seed oil.

The Healing Intelligence of Essential Oils builds on existing information from other aromatherapy books on the market and assumes a basic level of knowledge from the reader. Though it lacks a standard materia medica, the book highlights the uses of numerous oils. It stands apart from most of what is available in the English-speaking market on plant essential oils by delving into the scientific reasoning behind the effectiveness of essential oils as anti-inflammatory, antiviral, and antimicrobial agents. Citation references are provided for all 15 chapters. Indeed, Dr. Schnaubelt excels in turning dense scientific information into language that can be understood by the simple practitioner. This book summarizes his teachings of the last 30 years—that plant essences provide a sustainable form of health maintenance by supporting the integrity of the human genetic code with a form of biologically familiar medicine. This book encourages the reader to use her or his own experiential knowledge, stating, “We are only beginning to understand, in scientific terms, the many dimensions in which highly complex natural mixtures such as essential oils benefit our wellbeing.”

—Mindy Green, MS, AHG, RA

www.greenescentsations.com


Situated approximately halfway between Pohnpei and Guam, the island of Pohnpei is the largest of the four main islands of the Federated States of Micronesia. It is 46 miles long and 14 miles wide and has an area of 170 square miles. The island has a population of 40,000, mainly Micronesians, with a small European and Chinese minority. The island is mountainous with a variety of vegetation, from tropical rain forest to grassland and desert. The climate is tropical with high humidity, and heavy rains are common. The island is home to a variety of wildlife, including birds, reptiles, and amphibians. The Pohnpei Primary Health Care Manual is intended for use by health care providers working in the primary care setting on the island of Pohnpei. It provides information on the diagnosis and treatment of common illnesses, as well as guidelines for managing chronic diseases. The manual also includes information on the prevention of diseases, including vaccinations and other preventive measures. The Pohnpei Primary Health Care Manual is a valuable resource for health care providers working in the primary care setting on the island of Pohnpei.
between Australia and Hawaii, Pohnpei is one of the 4 widely dispersed islands that comprise the Federated States of Micronesia. In addition to boasting pristine waters and a genuinely friendly population, this small island state is known for its biodiversity.

I was delighted to read and review the *Pohnpei Primary Health Care Manual* written by a diverse interdisciplinary team of botanists, medical doctors, ethnobotanists, local healers, and national healthcare officials of Pohnpei. This book provides an excellent template for any research team working in public health, traditional medicine, biodiversity conservation, or basic botanical inventories.

It truly is a primary healthcare manual, and—as the authors state—was created as a reference manual for medical professionals and other people knowledgeable on the use of plants for healing. The book is based on more than 400 interviews with Pohnpei community members, 1,300 plant collections made between 1998 and 2008, and interviews with almost 200 others.

The book is divided into 11 chapters focusing on treatments for the most common health problems experienced by the people of Pohnpei, including: bites and stings, diarrhea and gastric disorders, skin disorders, cuts and wounds, cold and flu, pain, stress, infectious diseases, culture-bound syndromes, women’s health, and men’s health.

The layout and content of each chapter is crisp, clear, and highly relevant. The general condition is described first. For example, the chapter on diarrhea and gastric diseases begins with an introduction to the condition in direct, non-technical language. It also includes cautions and emergency actions required if a person has had diarrhea for more than 72 hours or if there is blood in the stool. The authors then present an overview of the most common causes of diarrhea and clinical signs of dehydration. This is followed by general medical advice on how to treat and manage dehydration. In this chapter, the authors describe how to prepare and administer a simple oral rehydration solution. From that point, the botanical treatments for diarrhea and gastric disorders are described.

The information on each treatment includes the local and botanical names of the plant, a description of the plant and its range of distribution, traditional uses, pharmacological properties, and any reports of toxicity. In all cases, a photograph of the entire plant or a detail of the plant is included. The images are black and white and, in most cases, clearly identify the plant beyond any doubt. There are few cases where the photograph is a bit hard to interpret, but the majority is very clear and dramatically enhances the utility of the manual.

In the back of the book, there is a useful glossary of terms that includes botanical, medical, and Pohnpeian terminology. I believe this is a first for this kind of manual, and the authors should be congratulated for this integrated glossary. There is also an extensive 12-page bibliography and, finally, an appendix providing the voucher numbers used to document the collections made as part of the research. This inclusion is extremely useful, and all volumes focusing on traditional medicine should have such an appendix.

I found this book to be remarkable for several reasons. One of the aspects that I greatly appreciated was its overall tone of respect, utility, and humility. This is a complex undertaking to provide basic medical descriptions of commonly experienced medical conditions along with diagnosis, prevention, and basic treatment before starting the presentation on plants used in local traditional medicine to treat the condition.

Main authors Michael Balick, PhD, an ethnobotanist, and Roberta Lee, MD, are well known leaders in the fields of ethnobotany and integrative medicine. This is a part of what makes this manual so rich, yet humble. There is also no doubt that the local healers, ethnobotanists, and botanists greatly influenced the tone and utility of this work as well.

It is still rare, however, to find such an integrated approach that maintains the integrity of the disciplines while paying homage to traditional healers and biocultural diversity. The authors clearly have a deep respect and empathy for the community they are working with. They thoroughly accomplish the stated purpose of the manual: to create a primary healthcare manual for the people of Pohnpei. Appropriately, the copyright bears the names of both the Pohnpei Council of Traditional Healers and The New York Botanical Garden.

I would strongly recommend this book for a wide range of healthcare professionals, botanists, ethnobotanists, and public health workers. It would also be of use for university librarians and those focusing on international development or biocultural diversity conservation. In many ways, this volume sets a new standard for healthcare manuals because of the excellent integration of practical information.

This book is only one of many products of the Plants and People Project of Micronesia from 1998 to 2008. It would be wonderful if all such projects resulted in the production of a primary healthcare manual. This, however, would require a significant amount of funding and the creation of a team of scientists and medical professionals with similar credentials to those of the authors of this book.

The people of Micronesia and the international ethnobotanical research community are grateful for the fruits of this project, and I hope to see and review many more such primary healthcare manuals for other parts of the world based on this excellent example.

—Steven R. King, PhD
Sr. Vice President Sustainable Harvesting and Ethnobotanical Research
Napo Pharmaceuticals, Inc.
San Francisco, CA


One might get a different notion of author Richard Mabey’s purpose in writing _Weeds_ from the British subtitle, “How Vagabond Plants Gatecrashed Civilisation and Changed the Way We Think About Nature,” than from the more American subtitle, “In Defense of Nature’s Most Unloved Plants.” The latter signals his purpose to somehow defend these plants...
from their many abusers.

Matter of fact, there are divisions within my family regarding our sentiments for some of the important weeds, a few of which, curiously, Mabey fails to mention. For example, he omitted sweet wormwood (Artemisia annua, Asteraceae), the world’s most promising antimalarial. My wife, Peggy, hates it, and Judi, my long-time right-hand lady, is incredibly allergic to it. My daughter, Celia, has no specific grudge against it, but sides with the many anti-invasive weed campaigners in the United States who fear that the proven anticancer and antimalarial properties of one of its key constituents (artemisinin) might encourage careless introductions of it to new areas, furthering the invasion.

Helen Metzman, the curator and director of our Green Farmacy Garden, precluded me from planting another antimalarial, Ailanthus altissima (Simaroubaceae), the so-called tree-of-heaven. Mabey mentions this genus because of its invasiveness. The weed grows to heights of 30 feet atop abandoned buildings in Detroit. Mabey also mentions it as the tree that took over an abandoned section of the New York Central Railroad in Manhattan.

I doubt that most readers will criticize the lack of scientific names within the text, but many of us who share his respect for the weeds do not know them by the names particular to Mabey’s British Isles that he uses. As a trained taxonomist, I find it annoying to have to look up plants in the book’s glossary. Perhaps the book’s editors [in the United Kingdom] deemed inserting the Latin names in the text as a potential distraction to the books primary target audience, i.e., general consumers and plant lovers, but not professional botanists like myself.

Like me, Mabey is interested in the edible weeds that are often more nutritious than their cultivated counterparts. He mentions many edibles in his chapter on knotgrass (Polygonum aviculare, Polygonaceae), including some that were discovered in the stomach of a 2,000-year-old corpse found preserved in a bog in Denmark. The preserved corpse’s stomach contained at least 63 varieties of seeds, including buttercup (Narcissus pseudonarcissus, Amaryllidaceae), fat-hen (Chenopodium album, Chenopodiaceae, aka lamb’s quarters), lady’s-mantle (Alchemilla xanthochlora, Rosaceae), rye-grass (Secale cereale, Poaceae), smooth hawksbeard (Crepis capillaris, Asteraceae), yarrow (Achillea millefolium, Asteraceae), and Yorkshire fog (Holcus lanatus, Poaceae). The index to Weeds lists these plants as appearing on page 52 in the knotweed chapter, but alas, sans scientific name. I fear that many taxonomists will be quick to lament ready access to the scientific names associated with the weeds Mabey mentions, like mealy-leaved fat-hen. I strongly recommend the Latin binomials be included in the main text if he and his publisher prepare a second edition.

Additionally, Mabey’s defense does not include much information on the plant’s medicinal uses. Ailanthus, which is growing—and, dare I say, overgrowing—in Brooklyn, Detroit, and Manhattan, contains some very potent antimalarial compounds worth mentioning.

I wrote this review in a rehab facility where my wife was recovering from a botched pacemaker operation. In retrospect, I think an edible weed tree, such as hawthorn (Crataegus laevigata, Rosaceae), could have prevented the atrial fibrillation that sent her to the emergency room. Mabey, however, does not mention any such medicinal virtues. His book is packed densely already without mentioning the potentials of medicinals. The edible weedy relatives of cultivated garlic (Allium sativum, Liliaceae) and onion (A. cepa) could have served as cardioprotectives almost as well as hawthorn. If Mabey mentions the wild Alliums, I missed it in my perusal of the book.

All of the still-cognizant little old ladies in their wheelchairs or on their rollators at the rehab center were strikingly inquisitive about why I was reading a book on weeds, so I showed them the aromatic invasive weed lemon balm (Melissa officinalis, Lamiaceae), telling them how it can do the same thing that Aricept® did for Alzheimer’s (preserve the choline messengers in the brain). As a chronic compiler, I could readily write another book cataloging the weeds of proven and folkloric medicinal value that Mabey mentions in his delightfully erudite and entertaining book.

For a change, I learned the meaning of waybread (Plantago major, Plantaginaceae) on the first page of Chapter 4. Waybread is called traveler’s foot in Great Britain, but we tend to call it plantain and white man’s footprint in the United States. Seeds of P. major have been substituted for Metamucil®, the bulk laxative made from the husks of the psyllium seed from a plant in the same genus (P. isphagula). Furthermore, in his accurate account of the ecology of stinging nettle (Urtica dioica, Urticaceae), he fails to mention its many traditional and modern documented medicinal activities, particularly that of the root, which is one of the 3 most clinically documented remedies for symptoms of benign prostatic hyperplasia.

The waybread chapter probably gives more information on St. John’s wort (Hypericum perforatum, Clusiaceae) than on waybread itself, but—surprisingly to me—there was no mention of its use for melancholy that predates its current use for depression. In the Middle Ages, midsummer fires were lit in honor of St. John on St. John’s Day, now June 24, burning several species of weeds including St. Johns wort. Finally, on page 245, Mabey notes that St. John’s wort is a “source of an effective anti-depressant.”

Chapter 5 correctly describes self heal (Prunella vulgaris, Lamiales), a panacea to Amerindians, as “the medicinal weed.” The chapter devotes much more space to interesting accounts of the doctrine of signatures and the idiosyncrasies of some of the early physicians and herbalists than to the herb itself. Medicinal uses of this weed focus on the tannin-rich leaves, which act as an anti-dyspeptic mint for unsettled stomachs.

Mabey has done an admirable defense and critique of many of the interesting facets of weeds. He discusses interesting asides that could spice up a boring account devoted to examining a single facet of these complex plants. Weeds is almost overwhelmingly dense with interesting reflections. Savor them leisurely.
You do not need the scientific names to enjoy the read. But I do.

—James A. Duke, PhD
Botanical Consultant
Economic Botanist (USDA, ret.)
Fulton, MD


Plants, People & Nature emerged from a workshop on benefit sharing that took place in Cape Town, South Africa during the 4th World Congress on Medicinal and Aromatic Plants (WOCMAP) in November of 2009. The book is comprised of 22 case studies on benefit sharing practices—the process of providing a portion of revenues from drug discovery and/or other commercialization ventures based on traditional knowledge, particularly that related to medicinal plants. Given the location of the meeting, it is understandable that 15 of the case studies pertain to African countries, 8 of which are specific to South Africa. In addition, 4 of the South African case studies explore different aspects of the development and commercialization of one species, umckaloabo (Pelargonium sidoides, Geraniaceae).

Many of the other case studies focus on familiar and well-known plants that have been developed and sold as phyto-medicines, dietary supplements, or personal care product ingredients over the past 20 years. Such plants include: hoodia (Hoodia gordonii, Apocynaceae), devil’s claw (Harpagophytum procumbens, Pedaliaceae), pygeum (Prunus africana, Rosaceae), maca (Lepidium meyenii, Brassicaceae), shea butter (Vitellaria paradoxa, Sapotaceae) and Aroyga Pacha (Trichopus zelanicus, Trichopodaceae) from southern India.

In other case studies, the authors discuss plant-based product development in Madagascar, Nigeria, Congo, Kenya, and India. In addition, there are several chapters that focus on creating community protocols for access and benefit sharing, and a brief overview of the South Africa Traditional Health Practitioners Act, passed into law in 2008. There is, fortunately, one brief chapter by a patent attorney from a South African law firm in which he discusses the importance of protecting traditional knowledge.

The preface, introduction, and sections that precede the first chapter set up the book very well with section headings that include “What do we mean by benefit sharing?” and “Some fundamental problems of benefit sharing.” These focused introductions to the topic of benefit sharing pose excellent questions, such as “3% of something is better than 30% of nothing?”

I have to admit that, as an ethnobotanist, I loved this book, and it is in my opinion one of the best produced on this important topic. The case studies are concise and well described with a minimal amount of jargon. In most instances, the length of each case study is 10 pages or less. Most of the case studies provide detailed information on the volume of plants utilized and harvested over time, the prices paid to harvesters and brokers, and the price obtained for the final product. I was amazed to learn that the best selling product of Traditional Medicinals of Sebastopol, California, required over 50 tons of senna (Cassia senna, Fabaceae) leaf in 2009. Analysis of the overall benefit sharing process in each case study is provided, including sections on stakeholders; background; project objectives; a timeline of important events; lessons learned; and the impacts of projects on a local, national, and international level.

I also appreciated the book’s 1-page overviews on 17 important topics, such as the Convention on Biological Diversity, the Bonn Guidelines, a bio-prospecting checklist, and numerous other highly relevant overviews that relate to the evolution and implementation of benefit sharing practices. There are about 50 photographs related to the case studies presented in a 15-page section of photographs.

There is also an excellent list of useful books and websites included at the end of the book.

I have followed many of the specific cases presented in the book over the past 20 years, and I was impressed with the ability of the authors to condense the most relevant information on the history of benefit sharing practices, problems, and challenges into so few pages. There has been a small cottage industry of lawyers, academics, nonprofit organizations, and others who have written long papers and books on many of these cases. The authors and the editors of this book are to be applauded for providing core information, data, and facts, along with an honest assessment of a decade or more of research on these culturally important plants. It is also very helpful that they describe the impact of the rapidly evolving national and international benefit sharing laws meant to conserve biological diversity.

The book cover states that, “The book is designed to help private and public sector organizations better understand the challenges and opportunities of working with bio-resources, especially in Africa, Asia, and Latin America.” I have to say that this book does an excellent job of fulfilling its stated purpose. I wish someone would purchase enough copies of this book to send to all the phytomedicine, herbal medicine, cosmetic, and dietary supplement companies of the world so that they can learn, from the experience of others, how to share plant-derived benefits used and discovered by local and traditional communities. It would be great to make this book widely available at the United Nations Conference on Sustainable Development, Rio +20, which will take place in Brazil in 2012 to assess the progress we have made on sustainably using, developing, and conserving the biological diversity of our planet.

Bravo, then, to the authors of these case studies and to the organizers of the WOCMAP meeting. I look forward to seeing more examples of benefit sharing in practice in future volumes.

—Steven R. King, PhD
Sr. Vice President of Sustainable Harvesting and Ethnobotanical Research
Napo Pharmaceuticals, Inc.
San Francisco, CA

The Handbook of Chinese Medicinal Plants by Tang and Eisenbrand is a much expanded, updated, and reformatted edition of their 1992 book, Chinese Drugs of Plant Origin, in which these expert authors gathered and interpreted published reports on Chinese medicinal plants. Given the plethora of research papers on Chinese herbs produced since 1992 and the expanded interest in Chinese medicinal herbs as sources for unique drugs, this new effort by Tang and Eisenbrand is most welcome.

The 2 volumes are a collection of monographs, arranged alphabetically by botanical names. Aside from the near doubling in number of monographs from their prior publication—from 124 to 231—there has been a shift in emphasis from chemical constituents to pharmacology. This shift reflects the fact that chemical analysis for the major active components of these herbs was largely completed by the time of the earlier book, while extensive pharmacological research with good cellular and animal models was just getting started.

For those who are familiar with summaries of scientific research on Chinese medicinal herbs, I would compare this to Handbook to Chinese Materia Medica by Zhu Youping, published in 1998, which was primarily an updated and simplified version of the 1976 2-volume Pharmacology and Applications of Chinese Medicinal Materials by Chung and But. Zhu’s collection of monographs is arranged by Traditional Chinese Medicine categories and reports on nearly 300 herbs, which covers many of the standard items used by practitioners. The new Handbook is far more comprehensive in describing Chinese herb research than these previous publications and supersedes their source materials.

A key feature of the Handbook of Chinese Medicinal Plants is that it is well written. As long as the reader is armed with the technical terminology of chemical and pharmacological analysis, it is relatively easy to get a good sense of what each herb is about. The shortest monographs are informative 2-page compilations, such as for Dipsacus asper (Dipsacaceae), Juncus effusus (Juncaceae), Monardica groomsorii (Cucurbitaceae), and Polyporus umbellatus (Polyporaceae) [Chinese: xuduan, tengxincao, luohanguo, and zhubing respectively], while there are several with 6 to 10 pages or more that cover an array of pharmacological properties, such as for Angelica sinensis (Apiaceae), Eucommia ulmoides (Eucommiaceae), Panax ginseng (Araliaceae), and Sophora flavescens (Fabaceae) [Chinese: danggui, duzhong, renshen, and kushen, respectively]. The authors conducted an intensive search of the literature; the majority of references were published after those that were used for Chinese Drugs of Plant Origin. For practical reasons in compiling such a large work, most of the references in each monograph were published before 2005 to 2007. Through their diligent efforts, the authors successfully provide the essential background into which one can then place new reports on these herbs.

The primary target audiences for the Handbook would include the following: researchers in university departments of pharmacy, pharmacognosy, and medicinal chemistry; investigational drug researchers; product development specialists working for the nutraceutical, dietary supplement, or herb industry; and herbalists who want to have a good summary of scientific research that is available for commonly used Chinese herbs. It would be an essential book for university libraries and for libraries of the colleges where Chinese medicine is taught.

The technical jargon is usually dense, and I will give a brief example from the pharmacology section of the monograph on Prunella vulgaris (Lamiaceae), the Chinese herb xiakucao:

2α,3α-Dihydroxursolic acid demonstrated a significant inhibition of the release of β-hexosaminidase by cultured RBL-2H3 cells in dose-dependent manner, with an IC50 value of 57 μM. Ursolic acid and 2α-hydroxysalic acid strongly each inhibited the production of nitric oxide from cultured murine macrophages, RAW 264.7 cells, with IC50 values of 17 and 27 μM, respectively.

The plant components mentioned here are triterpens that were listed in the chemistry section of the Prunella monograph. Triterpens are important components of several key Chinese herbs, and ursolic acid is a widely occurring and pharmacologically-interesting compound in herbal medicine that occurs in plants along with the methylated variant, oleanolic acid. The hexosaminidases are enzymes that affect brain function; nitric oxide (NO) is one of the most intensively studied compounds in human physiology. The molecule has an impact on numerous physiological functions, including relaxation of smooth muscles and a neurotransmitter for certain brain cells and motor neurons. The effects of NO are usually measured in cell cultures, in this case from rat and mouse immune system blood cells, with the ursolic acid and hydroxysalic acid showing a rather strong activity. These findings may not reflect upon the usual use of Prunella in clinical practice, but point to the potential medicinal and nutraceutical uses of ursolic acid and its derivatives, which are now obtained by technical extraction procedures that yield high levels of these compounds.

To illustrate the important contributions of this Handbook compared to previous literature, consider an herb that has recently been in the news for its potential as an anti-inflammatory drug: Andrographis paniculata (Acanthaceae; Chinese: chuanxiong). The herb was described earlier in Chinese Drugs of Plant Origin, the entry for which had 17 references from 1911 to 1987; 4 pages of the initial monograph were devoted to chemistry, with many chemical structure diagrams, and just over one page to pharmacology. In the new handbook, there are 79 references from 1971-2006, with 2 pages devoted to chemistry, reducing the space allotted for structure diagrams and eliminating discussion of the historical aspects of the chemical analysis and extraction; but 5 pages to pharmacology (and toxicology), incorporating several new findings. The main active component of this herb is...
andrographolide, a diterpene lactone, and though some of the newer applications of interest are not in this monograph, there are reports here showing hepatoprotective effects, antihyperglycemic action, immunostimulant activities, and cardiovascular modulating properties, among others.

For those looking at direct clinical applications of Chinese herbs, this Handbook is not a source; it has a very limited review of the traditional uses in the introductory section of each monograph and only rarely mentions research reports on clinical work. This is by design rather than any failing, as the text is devoted to chemistry, pharmacology, and toxicology. Most clinical studies of Chinese herbs—such as summarized in Zhu’s Chinese Materia Medica—are fraught with difficulties in research design and reporting, requiring accessing the original reports rather than relying on short overviews, as can be presented successfully for chemistry and pharmacology data, excellently done by Tang and Eisenbrandt in their Handbook.

—Subhuti Dharmananda, PhD
Founder and Director
Institute for Traditional Medicine and Preventive Health Care
Portland, OR


Author and clinical herbalist Kerry Bone is back, once again leading the way in evidence-based clinical phytotherapy publications. This time he has teamed up with Australian medical herbalist and a father himself, Rob Santich, in writing a textbook and reference guide on the use of botanical medicine in children’s health and wellness. Phytotherapy Essentials: Healthy Children, Optimising Children’s Health with Herbs addresses the major issues involved with using botanical medicine in the pediatric population. This is a clinical textbook focused on bringing together evidence-based botanical information applicable to children’s healthcare. The authors thread in personal clinical experiences with children and herbal medicine to round the edges and make it more personal.

In the opening chapter, “Basic Principles,” the authors bring forth specific issues and topics addressing the general use, efficacy, and safety of botanical medicine in the pediatric population. They discuss issues of particular importance to this population such as dosage, compliance, taste, and alcoholic versus non-alcoholic preparations.

As a naturopathic physician with a pediatric clinical practice, I was pleased to see that the topic of bioavailability of herbal medicines in children was also included. This brings to the reader’s attention the fact that a child’s physiologic operates differently from that of an adult and highlights the need to incorporate this thinking when administering herbal medicines to children. This section looks at factors affecting route of administration, including digestive maturity, gastric emptying, breastfeeding position, hepatic function, body composition, and intestinal microbiota.

The authors include a separate chapter on common disorders and health issues seen in newborns. The need for clear guidelines in the application of herbal medicine in this population is of great importance. The authors remind readers of the fact that a human infant has a developing immune system with less developed defense responses, which increases the susceptibility of neonates to certain viral, fungal, and bacterial infections. Included here are the most common health complaints that arise for an infant with practical herbal recommendations. The authors also include evidence-based studies to confirm traditional herbal remedies used for such conditions. Examples include chamomile (Matricaria recutita, Asteraceae) and calendula (Calendula officinalis, Asteraceae) cream for diaper rash, and the gripe water formula of lemon balm (Melissa officinalis, Lamiaceae), fennel (Foeniculum vulgare, Apiaceae), and chamomile for colicky infants.

The book also includes 2 charts. One lists the tablet/capsulated formulas mentioned in the book, which are manufactured by the Australian herb manufacturer Medi-Herb® (founded by the book’s primary author), and the second provides specific herbal safety information for children. I find this chart to be confusing, inconsistent in the use of terminology, and misleading. As far as being a helpful guide, I would have to say that it is not.

The remainder of the textbook focuses on the major childhood disorders. Organized by body system, these sections include relevant information about pathophysiology, etiology, epidemiology, microbiology, pathogenesis, immunology, risk factors, and clinical manifestations for each. The holistic, multi-faceted approach of looking at pathogenesis, etiology, and risk factors is supported by evidence-based research and clinical observations. This approach is refreshing to see, and guides the reader to look at the bigger picture in designing treatment strategies.

Completing each section on childhood disorders is a general discussion on strategies for herbal treatments, treatment rationales, examples of herbal liquid formulas for treating the condition, hints for creating a comprehensive herbal protocol, and a pertinent case history from the authors’ clinical experience (when available). The majority of herbs included in the treatment formulas and protocols are not necessarily based on the traditional child’s herbal materia medica. Rather, they are included due to the availability of evidence-based research or tablet/capsule formulas, which are manufactured by Medi-Herb.

While the benefits of evidence-based knowledge are many, it is important to recognize the drawbacks that this may present in clinical herbal medicine. In this case, there are many traditional children’s herbs being seen through evidence-based research and many that will not be included for various reasons. Remembering to include vital information that has been gained through observation and experience is also an essential part of good herbal education.

There is a brief section on the route of delivering herbal medicine to a breastfeeding baby. The authors cite one study that showed insufficient transfer of a plant’s active constituent to a baby through breast milk. This low level of transfer resulted in a lack of significant therapeutic effects.
Based on this study the authors write, “It is recommended that herbal doses intended for a breastfed child are always directly administered to the child.” Many mothers, herbalists, midwives, grandmothers, and doctors would not agree with this being consistent with what they have witnessed in real-life experiences. This serves as a reminder that facts and observation, like experience, are all avenues of gathering information.

A second issue worth discussing is the authors’ tendency to extract information from evidenced-based studies to support the use of herbs for similar circumstances. For example, the authors recommend the use of diluted propolis for infants in the treatment of oral Candida albicans (Saccharomycetaceae), based on research looking at the use of propolis in the treatment of chronic fungal vaginitis. I recognize that propolis is an effective anti-C. albicans agent, but is that enough to warrant the use of this substance in the infant population? Propolis is often taken from beehives or a high-resin plant (e.g. poplar buds, Populus balsamifera, Salicaceae). It can be made as a high-alcohol tincture and can be very irritating to the mucus membranes of an infant, not to mention the long-lasting foul taste it leaves in the mouth. Evidence-based research provides facts but not necessarily the realistic dynamics of applying the information in a clinical setting. Alternatively, the children’s herb licorice (Glycyrrhiza glabra, Fabaceae) provides a good tasting anti-candidal agent with growing evidence-based research on its use in children’s oral health.

There is a strong need in clinical natural medicine for reliable information on the application, safety, efficacy, and use of herbal medicine with infants and children. This book provides a good reference guide for healthcare professionals using herbal medicines with children and an educational text for students of herbal medicine. The integration of clinical experience, evidence-based research, and herbal tradition makes Healthy Children an excellent resource to add to one’s library on children’s health.

—Mary Bove, ND
Battleboro Naturopathic Clinic
Battleboro, VT

New Book Profiles


In her foreword to Jekka’s Herb Cookbook, celebrity chef Jamie Oliver proclaims McVicar the “herb queen of England.” In this volume, McVicar—owner of Jekka’s Herb Farm—presents recipes for her “top 50 culinary herbs.” The chapters are organized alphabetically by herb, each one opening with an appealing image of the featured herb (as well as a list of its other common names), then an overview of its history of use in cuisine. Among the tantalizing recipes are Lavender Oat Cookies, Sweet Basil Gnocchi, and Rhubarb and Sorrel Sauce.


Foraging—or collecting one’s food from wild plant sources—has been all the rage of late. It is just what most of our parents or grandparents taught us not to do, as the book points out in its introduction, which follows a list of the “Top 10 Reasons to Forage” (among them: reduction in food costs, outdoor exercise, and the promotion of health and wellbeing). The book includes helpful tips on when to harvest leaves and flowers, recipes, and necessary precautionary information, but lacks sufficient images to help the neophyte forager identify food.


Author Howard Markel dissects cocaine addiction—and by extension, the addictive personality—using the lives of Sigmund Freud, the father of psychoanalysis, and William Halsted, surgeon and cofounder of Johns Hopkins University. Both men were fond of the isolated alkaloid from the coca leaf (Erythroxylum coca, Erythroxylaceae). Markel first provides an overview of the young lives of the 2 innovators, then offers a history of the enthnobotanical uses of coca through to the origins of cocaine, and detailed chapters on Freud’s “addict’s death,” as well as Halsted’s eventual rehabilitation.


In this expanded and updated second edition of Radical Healing, author Rudolph Ballentine describes the concept of integrative natural medicine. His unique method incorporates popular holistic traditions including Ayurveda, homeopathy, Traditional Chinese Medicine, Western herbal medicine, psychotherapy, body and energy work, and nutrition. Combined, these therapeutic practices form what the author terms a radical new way to look at one’s health.


In this suggestively titled book, herbalist Susun Weed provides a frank guide to naturally treating both men and women’s sexual health concerns. Part One focuses on pelvic and bladder issues and related herbal solutions. Part Two, “Especially for Women,” and Part Three, “Especially for Men,” are broken down by body part and include tips on how to maintain optimal sexual health.


After a near-fatal experience caused by improperly prescribed antibiotics during cancer treatment, author Raymond Francis, MD, became determined to discover the root causes his disease and heal himself. In Never Fear Cancer Again he presents a guide on how to prevent and survive one of the most-feared diagnoses: cancer. Throughout the book, the author explores various causes of unhealthy cells, including reasons that are mental, physical, genetic, medical, nutritional, and toxicity-related.
Charles Bixler Heiser
1920–2010

Charles Bixler Heiser, PhD, the esteemed ethnobotanist best known for his work on the domestication of sunflowers (Helianthus annuus, Asteraceae), died in June of last year from complications after a stroke he suffered months earlier. He was 89.

Dr. Heiser was born in the small, southern Indiana town of Cynthiana in 1920. Except for his undergraduate years at Washington University in St. Louis and his doctoral work at the University of California at Berkeley, Dr. Heiser spent the majority of his life at Indiana University (IU) researching and studying one of his greatest life passions—plants. He joined the IU faculty in 1947 as an assistant professor of botany, just months after receiving his PhD from Berkeley. By the time Dr. Heiser retired in 1986, he was considered one of the preeminent authorities on the sunflower genus.

“He helped build that botany department,” said Gregory Anderson, PhD, a former student of Dr. Heiser’s who is now a distinguished professor in the Department of Ecology and Evolutionary Biology at the University of Connecticut (oral communication, August 10, 2011). “He had a reputation that was big enough that he could have moved anywhere he wanted to. I think he liked it there. It was a good place to raise a family and a good place to work.”

Growing up in rural Indiana, Dr. Heiser was exposed to the beauty and complexity of nature from a young age. Dr. Anderson believes part of Dr. Heiser’s passion for plants came from his early experiences on his grandparent’s farm. “That farm played very heavily in his love for agriculture, love for land, and his appreciation for people working land and interacting with plants and animals,” he said.

Although Dr. Heiser was known for his work in ethnobotany, he entered college with the intent of becoming a journalist. After meeting his wife, Dorothy Gaebler, in an advanced botany course and developing close relationships with professors Edgar Anderson and Robert Woodson from the Missouri Botanical Gardens, Dr. Heiser graduated with degrees in both Botany and English.

Loren Rieseberg, PhD, a botany professor at the University of British Columbia and a former colleague, attributed Dr. Heiser’s ability to explain complex scientific issues to his background in English (oral communication, August 2, 2011). “I think that we all viewed him as both an incredible scientist as well as one of the best communicators in the business,” said Dr. Rieseberg.

Dr. Anderson expressed a similar sentiment. “His 6 books are a testament to a commitment to writing things that scientists could appreciate and enjoy but were also approachable by educated lay public,” he said. “That was a model for all of us.”

Dr. Heiser wrote several popular science books including Of Plants and People, which examines the history of plant domestication (1985, University of Oklahoma Press); Nightshades, the Paradoxical Plants (1969, W. H. Freeman); and a very popular textbook on economic botany, Seed to Civilization: The Story of Man’s Food (1973, W. H. Freeman). He also wrote Weeds in My Garden: Observations on Some Misunderstood Plants, which was published by Timber Press in 2009, just a year before his death. Dr. Heiser was the author of a well-received book on gourds and another on sunflowers as well.

Throughout his career, Dr. Heiser served as the president of various organizations including the American Society of Plant Taxonomy and the Society for Economic Botany, and was inducted into the National Academy of Sciences in 1987. He also received awards from the New York Botanical Garden, the Botanical Society of America, and the Indiana Academy of Science. Even with myriad awards, Dr. Heiser is most recognized for his work on sunflowers.

“Some of his major discoveries were in some of his early work on sunflowers, showing, for example, that sunflower was domesticated in eastern North America, which was probably his most important discovery,” said Dr. Rieseberg. “It started this whole school of American anthropology looking at the transition from hunter-gatherers to farming communities in eastern North America.”

Dr. Heiser played a vital role in clarifying the importance and evolution of hybridization in flowering plants as well. During his time at IU, Dr. Heiser took a number of sabbaticals to study tropical plants in Ecuador—a place he grew to love. On one such trip, his plane was hijacked while en route to Quito. Cynthia Roberts, one of Dr. Heiser’s 2 daughters, accompanied him on the ill-fated trip.

“I remember somebody leading [a man] down the aisle with a gun pointed in his back,” said Roberts (oral communication, August 11, 2011). The hijackers diverted the plane to Cuba, where they disembarked. Nobody was hurt in the process and the passengers were flown back to Miami. The Heisers eventually made it to their final destination in Ecuador.

Decades later, Dr. Rieseberg still relies on his former colleague’s research. “Almost every paper I write, I cite the background taxonomy and biosystematics work that Charley did,” he said. “Pretty much everything I do has built on the discoveries and work that Charley did 50 to 60 years earlier.”

Roberts still experiences the lasting effects of her father’s reputation as well. “Periodically, I run into people around my age who tell me that they had a class from my dad and it was their all-time favorite class,” she said. “People liked him as a teacher.”

Dr. Anderson believes that part of Dr. Heiser’s success as a teacher and advisor stemmed from his unabashed passion for his work. “He was very demanding about work and high-quality work, but very enthusiastic, very boyishly enthusiastic, about work with plants,” said Dr. Anderson. “That enthusiasm carried over to the rest of us as well.”

Although Dr. Heiser has passed, his association with the bright, yellow petals of Helianthus lives on. “Sunflower means father to us,” said Roberts.

—Tyler Smith

Robert Edward Perdue Jr., PhD, a self-described botanist/historian who played a key part in the development of the cancer drug Taxol®, died from a stroke on July 20, 2011, in Bethesda, Maryland. He was 86.

Taxol, a powerful anti-cancer drug synthesized from the bark of the Pacific yew tree (Taxus brevifolia, Taxaceae), initially discovered by Monroe Wall, PhD, and Mansukh C. Wani, PhD, of the Research Triangle Institute in North Carolina,1 came to being in part due to Dr. Perdue’s insistence on cultivating the tree to ensure adequate supplies for testing. He did this despite resistance from the National Cancer Institute (NCI) for several years.

Dr. Perdue was born in Norfolk, Virginia, in 1924. He spent much of his youth, however, near his father’s side of the family in rural Pittsville, Maryland. Dr. Perdue’s father was a purser for 40 years on the Pennsylvania Railroad-operated ship that carried passengers and freight from Cape Charles to Norfolk, Virginia. His mother, Laura Taylor Perdue, was a milliner who was offered work in New York City before she met her husband.

Growing up, Dr. Perdue’s parents instilled in him the importance of reading. He became an avid non-fiction reader with a special interest in history. As a teenager, he helped tend the 5,000 chickens his family raised on the side, and later developed an interest in horticulture while working in a local plant nursery. Whether raising plants and animals or planning collecting trips for the Agricultural Research Service (ARS) of the US Department of Agriculture (USDA) later in life, Dr. Perdue was known for being exceptionally meticulous and thorough.

“One of the striking things about him was his super organization,” said Joseph Kirkbride, PhD, a former ARS colleague who was hired by Dr. Perdue in 1984 (oral communication, August 9, 2011). “Everything had its place, everything was in its place, and everything was properly labeled.”

Pharmacognosist Georgia Perdue, PhD, described her husband of 35 years as a kind and gentle man who didn’t let an opportunity or moment pass him by (oral communication, August 16, 2011). “He knew his work, and he was thoroughly honest,” she said. “He didn’t cut corners; he was too brilliant for that.”

As a young man in the early 1940s, Dr. Perdue was thrust into the harsh realities of a world at war. In 1944, after completing paratrooper jump school and officer candidate school, he was assigned to the US Army’s 506th Parachute Infantry Regiment, 101st Airborne Division, as 1st Lieutenant. Dr. Perdue, according to his wife, was never one to boast of his distinguished military service, despite having received 2 Purple Hearts and a Bronze Star.

“As he put it to me so many times, ‘I came home, put it out of my mind, put it behind me, and went on with life,’” said Georgia. It was only later that he became interested in exploring his military past when he and his wife traveled to Germany and Holland to retrace his steps during the war. He documented part of his experience in “Battle at Veghel Revisited,” a well-received article published in the British magazine After the Battle.

Fueled by his love of history, Dr. Perdue went on to publish Behind the Lines in Greece: The Story of OSS Operational Group II. The book recounts the story of 22 Greek-American soldiers on a successful mission during which they sabotaged an advancing German force by destroying railroad lines, trains, and bridges. While in Greece in 2005, their nephew Stavros Papa-georiou chauffeured the Perdues over 1,100 kilometers, tracing the paths that were forged on foot decades earlier by these soldiers. “We saw firsthand how very difficult and dangerous the mission was,” said Georgia.

In 1945, Dr. Perdue came home from the war, which made him one of the lucky ones. He didn’t, however, come home unscathed. He received a bullet wound to the knee during Operation Market Garden in Holland, and later—in Sturzelberg, Germany—he stepped on a landmine that permanently lodged shrapnel in his body. After recovering, Dr. Perdue was discharged, and he returned to study botany at the University of Maryland, where he received a bachelor’s degree in 1949. He then attended Harvard University, where he received his master’s degree in biology in 1951 and his doctorate in plant taxonomy in 1957.

Dr. Perdue’s scientific career began in 1951, when he joined the US Geological Survey in Washington, DC, as a botanist. There, he was responsible for mapping vegetation in China, India, and Thailand, among other countries. After a 3-year stint as an associate botanist at the Texas Research Foundation, Dr. Perdue accepted a job in 1957 at ARS in Beltsville, Maryland, where he spent the majority of his professional life.

Dr. Perdue held various titles during his 32 years with ARS. Initially, he was tasked to study various fibrous plants with the hope of finding a new source of paper pulp. He switched focuses in the early 1960s when he became the Chief of USDA’s Medicinal Plant Resources Laboratory. During this time, Dr. Perdue published what was to become one of the most important papers of his career. Georgia described her husband’s paper on giant...
reed (Arundo donax, Poaceae), the plant source of musical reeds, as “highly acclaimed in the ‘music world.’”

When President Richard Nixon declared war on cancer with the National Cancer Act of 1971, ARS coordinated with NCI in an effort to find plants in the United States and abroad with cancer-fighting properties. The goal of the interagency program was simple, but the logistics of the plant collecting trips could be overwhelmingly complicated. Dr. Kirkbridge explained Dr. Perdue’s dedication to the program: “I think he most liked the hands-on field work, combined with his organizational skills and office skills [needed] to carry [it] out,” he said. “That’s what really appealed to him.”

Of all his professional accomplishments, Dr. Perdue was especially proud of his contribution to the development of new cancer-fighting drugs, said Dr. Kirkbridge. “I think he would like to be remembered for having been involved in the cancer research program and having been involved in the discovery of Taxol,” he said.

“There were several plants that were his babies, so to speak,” said Georgia. In addition to the Pacific yew, Dr. Perdue felt a special connection with the Chinese happy tree (Campotheca acuminata, Nyssaceae) and Maytenus buchananii (Celastraceae).2

In 1963, a chemical compound in the fruit, stems, and leaves of the Chinese happy tree was found to have strong anti-tumor capabilities. With the supply of happy trees in the United States dwindling, Dr. Perdue insisted that NCI plant seedlings to secure future materials. The NCI, however, ignored his request. The tree was eventually cultivated in California, due in part to Dr. Perdue’s tenacity. C. acuminata is the source of 2 cancer drugs today—Topotecan® and Irinotecan®.

The fate of M. buchananii was also decided, in part, by Dr. Perdue. “Without Perdue’s imagination, initiative, and positive approach to a formidable task, it is doubtful maytansine would have been available in sufficient amounts for clinical trial,” wrote the late biologist Jonathan Hartwell of the cancer-fighting chemical compound derived from M. buchananii (G. Perdue, e-mail, August 25, 2011). (Hartwell is the author of the pioneering series of articles eventually published as a book called Plants Used Against Cancer [1982] in which he compiled a massive list of plants around the world that, based on ethnobotanical information, were believed to have some type of anti-tumor effect. This compilation formed the basis of NCI’s search for plants with potential cancer-fighting compounds.)

Georgia, who would occasionally travel with her husband, recalled one collecting trip in Kenya in which Dr. Perdue lined up what she referred to as “probably the only wood chipper in the country” for their collecting purposes. “I was with Bob when he collected 35-40,000 pounds of Maytenus,” Georgia said of the plant, which was approved for sampling and designated a “protected species” by the Kenya Forest Service. “It was the most organized and coordinated effort I have ever seen. But that was Bob!”

In an effort to give back to Kenya, Dr. Perdue coordinated with the pharmaceutical company Eli Lilly to donate 2 well-known anti-cancer drugs, vincristine and vinblastine, to a major hospital in Nairobi. With conservation in mind, he was also responsible for planting 35,000 M. buchananii cuttings near Mombasa, Kenya. “He felt like he had to do something for Kenya,” said Georgia. “[It] shows the generous spirit, the kindliness for which Perdue was known worldwide.’

Today, derivatives of maytansine are still being transformed into cancer-fighting drugs. “Conjugates have been made with a variety of antibodies targeting colon, breast, lung, pancreatic, and other solid tumors,” said Gordon Cragg, PhD, who retired from NCI in 1996. (G. Perdue, e-mail communication, August 24, 2011). “Fourteen are in preclinical or clinical development,” he added.

Despite the limited success of the cancer screening program, Georgia hopes that her husband’s countless plant collecting trips, including earlier collections in the United States, will eventually lead to other useful cancer drugs.

“Bob was extremely involved in obtaining the botanicals for cancer drugs in the US,” said Freddie Ann Hoffman, MD, president of the natural products consulting firm Heterogeneity, LLC, where Dr. Perdue worked during the final years of his life (oral communication, August 8, 2011). “It was all I could do to keep Bob from hopping on the plane and going to the far end of the world to take a look at these plants even though he was in his 80s. He worked up until the day he died.”

Dr. Perdue retired from ARS in 1989 to form his own company, Ver-Tech International, Inc., based in North Bethesda. At Ver-Tech, he established Vernonia galamensis (Asteraceae), an oilseed plant he serendipitously came across in Ethiopia, as an industrial crop in Central America. Today, more than 125 laboratories in the United States and abroad have found a variety of uses for this oil, including as paint dilutant that does not produce volatile organic compounds, which mix with nitrogen in the atmosphere to produce the greenhouse gas ozone.3

“He was a goal setter, a detailed manager, who vigorously attached and accomplished such goals,” said retired economic botanist, noted author, and ABC Board of Trustee (emeritus) Jim Duke, PhD, who temporarily replaced Dr. Perdue as the head of the cancer screening program at ARS (J. Duke, e-mail communication, August 10, 2011). “Bob efficiently led the huge Cancer Screening Program of the New Crops Programs for years.”

Although Dr. Hoffman worked with Dr. Perdue for a only few years, she understood the importance of his past work. “The impact of his career touched many around the world in places you can’t even imagine,” she said.

Dr. Perdue is survived by his wife Georgia; his children Robert E. Perdue III, Susan Sherwin, and Holly Boyle; stepsons R. Craig, John, Mark, and Nels Bergstrom; a nephew and 2 great nieces; 10 grandchildren; and 9 great grandchildren.

—Tyler Smith

References


In Memoriam
In Memoriam

Konrad Kail
1949–2011

Konrad Kail, ND, a leading naturopathic physician, researcher, and educator, died July 18, 2011, from a glioblastoma multiforme brain tumor. He was 62 years old.

With an attitude described as passionate and devoted, Dr. Kail helped lead the rebirth of the naturopathic medicine profession during the mid-1980s. Among numerous other achievements, he served as President of the newly formed American Association of Naturopathic Physicians (AANP), co-founded one of the country's leading naturopathic schools, and served on the first-ever advisory council of the National Center for Complementary Health (NCCAM).

"Dr. Kail was a force in our profession and a true leader who has left a mark that will endure for many years," said Carl Hangee-Bauer, ND, LAc, current president of AANP.

Several years after being certified as a physician's assistant by the Baylor College of Medicine, Dr. Kail obtained his doctor of naturopathic medicine from the National College of Naturopathic Medicine (NCNM, now known as the National College of Natural Medicine) in Portland, Oregon, in 1983. Soon after, he and his wife Petie and other NDs took off on a country-wide bicycling trek to spread awareness of naturopathic medicine through numerous in-person and radio interviews. This “Wheeling and Healing Tour”—a physical feat that brought national recognition to the field—was a fore-shadowing of Dr. Kail’s leadership capabilities.

Dr. Kail soon became a member of several naturopathic physician and education organizations, and in 1990 he and Petie established their own practice, Naturopathic Family Care, Inc., in Phoenix, where they treated thousands of patients. During his 25 years of clinical work, Dr. Kail "developed unique community models for involving patients in behavioral change, formulated new natural product combinations, continuously examined his clinical outcomes, and presented widely on clinical topics in integrative medicine."

"Konrad was very devoted to his patients," said Lise Alschuler, ND, vice president of quality and education at Emerson Ecologics. "His enthusiasm for natural medicine was so infective that it was hard for his patients to not get better" (e-mail, September 6, 2011).

In 1991, Dr. Kail was selected as the third president of the AANP, a position to which he brought much of his energy and ambition.

"Konrad’s wasn’t a place-holding sort of presidency,” wrote John Weeks, who was executive director of AANP at the time Dr. Kail was president. “The AANP was just getting its legs. Volunteerism was its lifeblood. Konrad was a perfect exponent of the ‘insanely committed’ who lifted that profession from obscurity.”

According to Michael Cronin, ND, a physician with Naturopathic Physicians Group in Scottsdale, Arizona, one of Dr. Kail’s main initiatives at AANP was called Each Person One Project. “He asked each ND to take on a project, to think about what they would like to see accomplished, volunteer, and through their personal initiative to get stuff done. Konrad was very much about getting stuff done. He was always the first to volunteer” (oral communication, September 15, 2011).

Dr. Kail’s term as AANP President from 1991-1993, according to Dr. Cronin, “was a time of great growth.” Weeks also noted that AANP “more than doubled in size” during Dr. Kail’s time there. Drawing on his passion for real-world research and outcomes, he created a new AANP in-office research award, which he would later win in 2004 and 2006. He was also named AANP Physician of the Year in 1997.

“Some of the achievements that I was personally most grateful for are his unwavering commitment to researching natural therapies,” said Dr. Alschuler. "He led by example and advanced the field through his own research and his mentorship of other researchers."

At the end of his AANP presidency, Dr. Kail, along with Dr. Cronin, Kyle Cronin, Dana Keaton, ND, and Hugh Hawk, PhD, co-founded the Southwest College of Naturopathic Medicine (SCNM). At the time, the only US naturopathic medicine institutions were Bastyr University in Seattle and NCNM in Portland.

“A third naturopathic medical college in sunny Arizona just made sense,” said Dr. Cronin, noting that Dr. Kail taught a diversified set of courses, including public health, clinical training, and pharmacology. Since its founding, more than 700 NDs have graduated from SCNM.

“As a clinical supervisor, he was equally devoted to his students,” said Dr. Alschuler, who met Dr. Kail when she taught at SCNM. “He was an excellent teacher and inspired his students to want to learn.”

In 1999, Dr. Kail took on a position of national importance when he was chosen as a member of the first-ever advisory council for NCCAM at the National Institutes of Health. Though an honorable opportunity, Dr. Kail encountered significant frustration on the NCCAM Council that consisted of many conventional medicine appointees. Dr. Cronin said that Dr. Kail strongly believed in researching, not what one herb does for one condition, but “how effective a naturopathic physician is in the holistic care they are prescribing.” According to Weeks, “Konrad argued for research on what naturopaths and other whole-person practitioners do. NCCAM director Stephen Straus, MD, refused to act on..."
Konrad’s advice that researchers failed the public if they didn’t look at the whole practice. Straus couldn’t be budged.4

Twelve years later, NCCAM finally took the direction that Dr. Kail had so enthusiastically supported. According to a report by the American Botanical Council, NCCAM’s 2011-2015 Strategic Plan “specifically accentuates translational and outcome-based research focused on effectiveness and ‘real-world’ settings.”6

“It was a source of satisfaction for him that the NCCAM strategic plan embraced whole practice,” said Dr. Cronin.

A few other of Dr. Kail’s accomplishments include serving as the executive director of the Southwest College Research Institute and being a 10-year member of the Arizona Naturopathic Physicians Board of Medical Examiners. As for what drove Dr. Kail’s ambition, Dr. Cronin speculated, “The naturopathic community, for many of us, becomes our family. We all grow through a common educational experience that is unique. There is a very strong feeling of commitment and responsibility to provide leadership and direction. Konrad was able to step into the leadership role and be a role model for many of the new leaders.”

“In my conversations with Konrad,” said Dr. Alschuler, “he always spoke about naturopathic medicine and naturopathic physicians with pride and confidence. He articulated a future healthcare system that included naturopathic doctors at its core, delivering naturopathic primary care in integrated settings. I know that one of his goals was to ensure access for every American to a naturopathic doctor.”

And though SCNM and the NCCAM appointment were some of Dr. Kail’s proudest achievements, “His successful marriage to Petie would be first,” said Dr. Cronin.

Dr. Kail is survived by Petie; his mother Jean Peterson; Joe, Barbara, Rosalie, Taryn, and Twilah Kail; Julie Jones; and Tauna Wiltz.1 Donations in Dr. Kail’s memory may be made to the Southwest College of Naturopathic Medicine at www.scnm.edu/.

—Lindsay Stafford

References
3. Curriculum Vitae - Dr. Kail. E-mail to L. Stafford from M. Cronin. August 29, 2011.
Washington, DC. This event, held every year by the American Institute for Cancer Research, gathers a variety of health professionals—including scientists, clinical investigators, epidemiologists, dietitians, nutritionists, and policy makers—who are interested in the ways that food, exercise, and weight management can affect cancer. The 2011 conference features a variety of knowledgeable speakers, including Shrikant Anant, PhD, Robert S. Chapkin, PhD, and Young S. Kim, PhD. Discussions focus on topics ranging from different types of scientific evidence, calorie restriction, nutrition intervention, soy intake for breast cancer patients, and stem cells. More information is available at: http://preventcancer.aicr.org/site/PageServer?pagename=research_conference_home.

November 6-12: The 12th Annual Science and Clinical Application of Integrative Holistic Medicine.
St. Petersburg, FL. Co-sponsored by Scripps nonprofit health system and the American Board of Integrative Holistic Medicine (ABIHM), this 5-day conference also includes a pre-conference seminar titled “Bringing Integrative Medicine to Your Practice and Health Care System,” and ends with the ABIHM Board Certification Exam. The event is targeted toward healthcare professionals who would like an educational experience on integrative holistic medical techniques so that they can begin to incorporate “a mind-body-spirit approach to healing” into their practice. The basis of the event is a weeklong, evidence-based educational course taught by leading experts in the field of integrative holistic medicine. It also features case study discussions, small group exercises, experiential demonstrations, and Q&A panel discussions. More information is available at: www.scripps.org/events/science-and-clinical-application-of-integrative-holistic-medicine.

November 10-12: 8th International Society for Integrative Oncology Conference.
Cleveland, OH. Keynote speaker Francis S. Collins, MD, PhD—director of the US National Institutes of Health—is one of the many highlights of this year’s conference, titled “Innovating Integrative Oncology: New Science, New Solutions.” Attendees ranging from clinicians, researchers, patients, and advocates have the opportunity to study recent scientific findings that “have the potential to transform healthcare.” Additional speakers include integrative oncology experts such as Keith Block, MD, Stan Gerson, MD, Bharat Aggarwal, PhD, and Tieraona Low Dog, MD. Topics of discussion include the future of integrative oncology, science of psycho-oncology, Qigong, oxidative stress and cancer, innovating natural products, whole systems research, immunotherapy, and many more. More information is available at: www.integrativeonc.org/index.php/8th-annual-sio-conference.

November 29-December 1: Food Ingredients Europe & Natural Ingredients 2011.
Paris, France. With more than 23,000 attendees from dozens of countries, this trade show event is a global gathering of those interested in food ingredients. More than 1,500 exhibitors—from ingredient suppliers to retail companies—promote their products to a diverse audience. Attendees have the opportunity to participate in a 3-day concurrent conference that discusses important industry issues, as well as shorter seminars highlighting the latest innovations, developments, and news. More information is available at: http://fiemeurope.ingredientsnetwork.com/.

December 1: 1st World Summit on Medicalized Food & Medical Nutrition.
Paris, France. Titled “The Emerging Market of Therapeutic Complements,” this event investigates how “medicalized food” can affect and help manage various conditions, including neurodegenerative diseases, diabetes, menopause, osteoarthritis, depression, metabolic syndrome, and cancer. Sessions are held on market trends and points of view, regulation and claims, scientific advances and perspectives, and personalized food. More information is available at: www.medicalized-food.com/.

Bangkok, Thailand. Organized and supported by King Mongkut’s University of Technology Thonburi and the International Society for Horticultural Science, this event focuses on the proper management of ornamentals—such as potted plants and cut flowers—through establishing reliable and viable supply chains. Topics of discussion include genetics and plant propagation, cultivation techniques and innovations, pre and post-harvest physiology, handling systems, flowers and human wellbeing, and many more. More information is available at: www.kmutt.ac.th/QMSCO2011/.

Alexandria, Egypt. Scientists, students, and industry leaders from around the world gather at this annual conference to discuss issues affecting plant-based natural products. The conference consists of keynote talks, presentations, poster sessions, and round table talks, all of which cover various topics such as metabolic networks, vitamins, carotenoids, flavonoids, toxins, herbal medicine, plant-derived drugs, phytopharmaceuticals, ethnopharmacology, biodiversity, and policies. More information is available at: www.bionats.org/main/.

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JSTOR, the scholarly publication hosting service, has made all of its pre-1923 United States content free to the public for reading and downloading. The organization also made free its non-US content published before the year 1870. According to JSTOR, this amounts to about “500,000 articles from more than 200 journals, representing approximately 6% of the total content.” Topics covered by these numerous articles range from the arts and humanities, economics and politics, to mathematics and other sciences. Some herbal- and plant-related journals containing free early-date content include the American Journal of Botany, Annals of the Missouri Botanical Garden, American Fern Journal, International Journal of Plant Sciences, Mycologia, and many more. Because these early publication documents are available to all individuals regardless of existing JSTOR membership, this development furthers JSTOR’s goal to provide content to “nonaffiliated users,” or those who have no access to the organization’s publications through institutions such as universities, businesses, or research establishments. Registration with JSTOR is not required to access the new content. Available at: http://about.jstor.org/participate-jstor/individuals/early-journal-content.

GreenMedInfo.com is a website providing free access to research publications discussing natural products—such as vitamins, minerals, herbs and foods—and the role they play in disease prevention and treatment. Its index contains numerous research articles on natural substances that have shown a positive outcome of the product being investigated. Studies that do not indicate such a therapeutic relationship are not available on this website. Users can search for articles by the name of the natural product, therapeutic action (like acupuncture or Ayurvedic medicine), pharmacological action, or health ailment of interest. Users can also access a toxicology database listing “research demonstrating actual or potential harm due to unnatural substances and/or interventions.” Some articles are available to the public for free, while others require a membership with GreenMedInfo. Available at: www.greenmedinfo.com.

United Plant Savers (UPS) has a new website. Launched in June of 2011, the new website features more tools for user interaction, such as the “My Profile” page—which allows individuals to send and receive messages—and an online forum for discussing topics like events and conferences, at-risk plant species, and the Botanical Sanctuary Network. The website also features an updated, user-friendly look, with beautiful images of at-risk plants scrolling at the top of the homepage, and sidebars with links to UPS news and social networking pages. Available at: www.unitedplantsavers.org.

Critical Path Institute, a nonprofit aimed at speeding safe and effective medicine development, has launched a new app for the iPad, iPhone, and iPod Touch. “MyMedsList,” available in the iTunes store for 99 cents, serves as a tool for helping individuals organize and communicate with healthcare professionals about the various kinds of medicines they are currently taking, including prescription drugs, over-the-counter drugs, vitamins and supplements, herbs, etc. The app enables users to create an electronic record of all the medicines they are taking, which can be stored in the phone or other device for memory recall or printing for pharmacists or doctors who need such information to avoid patient adverse reactions and medicine interactions. Available at: www.c-path.org/news.cfm.

Food Day, an annual event sponsored by the Center for Science in the Public Interest, now has its own cookbook. Aiming to celebrate delicious healthy food, the Food Day cookbook contains 32 pages of easy and nutritious recipes from American chefs such as Dan Barber—a member of President Obama’s Council on Physical Fitness, Sports and Nutrition—Mark Bittman, food journalist and New York Times contributor, and Rick Bayless, an expert on Mexican cuisine. Many of the recipes have been adapted especially for this cookbook. They include concoctions such as baked pumpkin-orange custard, sweet and tangy three-bean salad, Tuscan kale and white bean ragout, pomegranate-cinnamon tabouleh, and many more. The entire cookbook can be downloaded in PDF format for free. Available at: http://foodday.org/why-eat-real/recipes.php.
**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.


**Other**

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

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