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Pomegranate

Punica granatum

Family: Lythraceae (formerly Punicaceae)

INTRODUCTION

Pomegranate is a deciduous shrub or small tree, sometimes thorny, growing to 16 feet (five meters) tall.¹⁻³ It has oblong, shiny, leathery leaves up to three inches (eight centimeters) in length, and the scarlet funnel-shaped flower has five-to-eight ruffled petals with a matching calyx.¹⁻⁵ The fruit is a large berry with tough, leathery skin (called a husk, rind, or pericarp), with a persistent calyx and fleshy pulp enclosing edible seeds.^{2,3,5}

The pomegranate is believed to have originated in Persia (modern-day Iran), Afghanistan, Pakistan (particularly the province of Baluchistan),⁶ and perhaps northern India. It was spread throughout the Middle East to Southeastern Europe around the Mediterranean, to China, North Africa, and eventually to warm regions of the New World.^{2,3,7} In India, *P. granatum* is found in the wild only in the Western Himalayan regions comprising the states of Jammu, Kashmir, Himachal Pradesh, and Uttarakhand.⁸ To the northwest of Iran — in Armenia, Azerbaijan, and Georgia — there are wild pomegranate groves found outside of abandoned ancient settlements.⁹ Naturalized in Western China, it was probably introduced there from Central Asia during the Han Dynasty (207 BCE to 220 CE).¹⁰

The pericarp and pulp of the fruit as well as the root bark are used either culinarily or medicinally.¹⁻³

HISTORY AND CULTURAL SIGNIFICANCE

Pomegranate is one of only two species in the *Punica* genus; it was the sole genus in the Punicaceae family prior to its reclassification in Lythraceae.⁷ The generic epithet, *Punica*, is the feminized Latin name for Carthage, originally from the Greek *Phoinix* referring to the Phoenician settlers around Carthage. The specific epithet, *granatum*, means seedy or grainy. Prior to its renaming by Linnaeus in the 18th century, the plant was known as *Malum punicum*, the apple of Carthage.⁷

In the 12th century, the Anglo-Norman name for the fruit, *pome gernate*, became *pume grenate* in Old French and eventually *pomme grenade* in Modern French.¹¹ By the 15th

century, hand-thrown weapons made of cast iron and filled with gunpowder had been invented and called grenades. To this day, opening a grenade exposes tiny balls of shrapnel that resemble a pomegranate's seeds.

The name for pomegranate in both Arabic (*rumman*) and Hebrew (*rimmon*) means “fruit of paradise,” and it has been a symbol of love since ancient times.^{1,7} It was mentioned multiple times in the Biblical Song of Songs, also known as the Song of Solomon (Solomon 4:3, 4:13, 6:7, 6:11, 7:12, and 8:2); it played a large role in the Greek myth of Persephone; and it was associated commonly with Aphrodite and Dionysius.^{1,7} Even Shakespeare made note of the pomegranate tree in *Romeo and Juliet*.¹²

Pomegranate has been affiliated with abundance, blessings, fertility, immortality, invincibility, posterity, prosperity, and the endurance of marriage.^{1,7} While its multitude of seeds might explain why pomegranate is linked with fertility, it is interesting to note that in one version of the Greek myth, Persephone, daughter of the fertility goddess, Demeter, disobeyed her father, Zeus, and ate some pomegranate seeds while in the underworld, causing Demeter's distress and the onset of autumn and winter in the world above (i.e., an interruption of fertility).¹³ Perhaps not coincidentally, contraception was one of the earliest reported medicinal uses of pomegranate. The Greek physician Soranus recorded five prescriptions for either oral contraceptives or vaginal suppositories made from pomegranate seeds or rinds.¹⁴ Hippocrates (468-377 BCE),

Dioscorides (40-90 CE), and Ibn Sina (Avicenna, 980-1037 CE) also described the contraceptive use of pomegranate seeds or rinds.¹⁴ By the Middle Ages, though, pomegranates had disappeared from medical writings for this purpose.

Historically, pomegranate has been significant in several cultures for its food and medicinal uses, as well as for its spiritual and artistic symbolism. The fruit was an extremely useful way of transporting liquid when traveling through the desert.⁷ In addition to its juice, the arils (juicy pulp covering the seeds) were and are a distinctive component of certain Middle Eastern dishes: *fesenjan* (lamb or chicken stew with walnuts and pomegranates), *khosaf al-rumman* (pomegranate with nuts and orange flower syrup), and pomegranate *khoreh* (stew), to name a few.



Pomegranate *Punica granatum*.
Photo ©2013 Steven Foster

Pomegranate is mentioned as a remedy for roundworm in the Ebers Papyrus (the oldest preserved medical document, from Egypt, ca. 1500 BCE).¹⁵ Hippocrates used pomegranate seed extracts for numerous ailments including skin and eye inflammation and as a digestive aid, while Dioscorides recommended various pomegranate parts, sometimes in combination with other ingredients, for stomach ailments, mouth and genital sores, gum disorders and loose teeth, as well as for expelling parasites.⁷ Treatment of bronchitis, diabetes, diarrhea, hemorrhaging, leprosy, and snakebites are all traditional uses of pomegranate.⁷ Both the dried fruit rind and pulp have been used commonly for upset stomachs and diarrhea, prepared as infusions (teas) or tinctures (alcoholic extractions).³

Most parts of the pomegranate — including the flower, fruit rind, leaf, dried seed and fresh seed, root bark or trunk bark, fresh fruit and preparations thereof (e.g., juice) — have defined therapeutic applications in traditional medicine systems such as Ayurveda, Siddha, gSo-ba Rig-pa (Traditional Bhutanese), Sowa-Rigpa (Traditional Tibetan), Traditional Chinese Medicine (TCM), Traditional Iranian Medicine, Unani, and European Homoeopathy. The fresh fruit and fruit juice are used widely as foods and the juice also is used as a source of polyphenols. Essential oils, extracts, and waters of various plant parts, as well as isolates and derivatives such as pomegranate fruit peel extract octenylsuccinate, seed oil hydroxyphenethyl esters, and sterols obtained from the seed oil, are used as cosmetic ingredients.

The flower, fruit, fruit rind, and seed of *P. granatum* L. var. *granatum* are used specifically in Ayurveda, Siddha, Sowa-Rigpa (Amchi), and Unani systems of traditional medicine in India, and in regional Indian folk medicines. The materials of commerce are obtained from both cultivated and wild-collected sources. The flower of *P. granatum* L. var. *nana* Pers. (cultivated) is used in Indian folk medicine.¹⁶

In TCM, pomegranate husk/rind (called *shi liu pi*) is used to treat diarrhea, dysentery, rectal prolapse, spermatorrhea and premature ejaculation, uterine bleeding, vaginal discharge due to kidney instability, and to kill and expel parasites.¹⁷ It also is used topically for ringworm and in combination with other herbs for the conditions mentioned above.¹⁷

The dried ripe fruit (with seeds removed) is used in Tibetan medicine to restore weak digestive heat, to correct indigestion and loss of appetite, and for all forms of cold diseases and disorders of the lungs.¹⁸ In the Bhutanese system of medicine, it functions as a primary component of herbal combinations in pill form indicated for treatment of indigestion and diarrhea.¹⁹

According to the World Health Organization (WHO) monograph Cortex Granati, therapeutic uses described in pharmacopeias and well-established documents for preparations of the root bark and/or trunk bark (aqueous decoction and/or hydroalcoholic fluidextract 1:1) include treatment of diarrhea and intestinal parasites. In systems of traditional medicine, preparations of the bark are used for treatment of dyspepsia, sore throat, menorrhagia (heavy menstrual bleeding), leucorrhoea (vaginal discharge), and ulcers.²⁰

CURRENT AUTHORIZED USES IN COSMETICS, FOODS, AND MEDICINES

In the Ayurvedic system of medicine (recognized in India, Bangladesh, Bhutan, Malaysia, Nepal, and Sri Lanka), the therapeutic uses of the different plant parts are similar to what has been described previously, with some notable exceptions:

The fresh fruit juice of pomegranate at a dose of 15-30 mL is used in formulations for treating conditions including bleeding disorder (hemorrhagic diseases, i.e., bleeding with stools or from nose, excessive bleeding during menstruation, or bleeding from any other part of the body without injury), burning sensation in the eyes, chest, palm and/or soles of feet (e.g., diabetic neuropathy); cough, diarrhea, fever, loss of taste sensation, rheumatoid arthritis, and thirst.²¹

The dried and powdered fruit rind at a dose of 3-6 g is indicated for bleeding disorder and disorders of blood, burning sensation, cough, diarrhea, dysentery, fever, halitosis (bad breath), hyperacidity of the stomach, loss of taste sensation, and throat diseases.²¹

The dried leaf at a dose of 5-10 g is indicated for treatment of bleeding disorder, cough, diarrhea, digestive impairment, dysentery, fever, helminthiasis (worm infestation), loss of taste sensation, and stomatitis (inflamed and sore mouth).²¹

Dried powdered pomegranate seeds are used in Ayurvedic medicine at a recommended dose of 5-10 g for treatment of burning sensation, fever, and morbid thirst.²²

In the Unani system of medicine (recognized in Bangladesh, India, Malaysia, Pakistan, and Sri Lanka), various pomegranate plant parts also have different therapeutic indications usually occurring as components of complex formulations:

The dried leaf at a dose of 5-10 g is used for diarrhea, chest pain, palpitations, spermatorrhea (involuntary discharge of semen without orgasm), stomatitis, and vomiting.²³

The dried seed at a dose of 5-10 g is used for treatment of cardiac weakness, chest pain, jaundice, as an emetic (to induce vomiting), and as a purgative (for intestinal evacuation in certain diseases).²⁴

The fresh seed prepared as juice at a dose of 25-60 mL is used for treating anemia, burning in the chest, general weakness, jaundice, nausea and vomiting, and polydipsia (chronic excessive thirst).²⁵

In Canada, extract of pomegranate fruit and/or aril is classified as a medicinal ingredient of licensed natural health products (NHPs) requiring pre-marketing authorization from the Natural Health Products Directorate (NHPD) and manufacture in compliance with NHP Good Manufacturing Practices (GMPs). “Provides antioxidants” is the NHPD-authorized use for the extract.²⁶

Several pomegranate ingredients also are permitted for use as non-medicinal components of licensed NHPs for specific purposes, including “concentrated pomegranate juice” as a flavor enhancer, “*Punica granatum* fruit extract” as a fragrance ingredient in topical application NHPs, and various extracts of the pericarp and/or seed and fixed oil of the seed as skin-conditioning agents.²⁷

In the United States, essential oils, solvent-free extracted oleoresins, and natural extractives of pomegranate are clas-

sified by the Food and Drug Administration (FDA) as Generally Recognized as Safe (GRAS) for use in conventional food products.²⁸ For use as a source of polyphenols, a pomegranate fruit juice monograph is under development by the United States Pharmacopeial Convention for inclusion in the forthcoming ninth edition of the Food Chemicals Codex.²⁹

Pomegranate plant parts also are permitted for use as dietary supplement components, requiring FDA notification within 30 days of product marketing (if a “structure-function” claim is made) and product manufacturing according to dietary supplement GMPs.

In the European Union, the present regulatory status for the use of fruit oil and rind of *P. granatum* in conventional food products is uncertain. There has been a request made to determine if the fruit oil and rind will require authorization under the Novel Food Regulation.³⁰

Additionally, the 2013 European Pharmacopoeia Commission work program is developing a new quality standards monograph for the homeopathic preparation “*Punica granatum ad praeparationes homoeopathicas*.”³¹

There are nearly 30 different pomegranate ingredients authorized for use in cosmetic products by the European Commission Health and Consumers Directorate — too many to list and discuss in this review. Some examples include the fruit juice for masking (reduces or inhibits the basic odor or taste of the product) and skin-conditioning functions. Fruit water (an aqueous solution of the steam distillates obtained from the fruit) is authorized for functions including astringent (contracts the skin), flavoring, tonic (produces a feeling of well-being on skin and hair), and masking. “*Punica Granatum Sterols*” (a mixture of sterols obtained from the fixed oil of the seeds) is used for skin- and hair-conditioning functions.³²

Corresponding to some of the authorized uses discussed in this article, quality standards monographs are available for specifying and testing the various plant parts of *P. granatum* (e.g., fresh fruit, dried fruit rind, dried leaf, dried seed, fresh seed, root bark or trunk bark) published in the *Ayurvedic Pharmacopoeia of India* (Vol. 2, 1999, and Vol. 4, 2004),²¹⁻²² *Unani Pharmacopoeia of India* (Vol. 2, 2007; Vol. 4, 2007; and Vol. 6, 2009),²³⁻²⁵ and WHO monographs (Vol. 4, 2009).²⁰

For quality control in food applications there are also pomegranate standards, specifications, and test methods available from the East African Community (East African Standard CD/K/102:2010),³³ The Food and Agriculture Organization (FAO) of the United Nations (Codex Standard 310-2013),³⁴ the Government of India Ministry of Agriculture (AGMARK Grading and Marking Rules 2004),³⁵ and the International Organization for Standardization (ISO 23393:2006).³⁶

MODERN RESEARCH

Pomegranate is a relatively good source of several vitamins and minerals such as vitamin C, thiamin, riboflavin, niacin, calcium, iron, and magnesium.³⁷ All plant parts contain polyphenols; the pericarp (both the peel and the membrane) has the largest concentration.⁵ Polyphenols are responsible for the astringency of the juice and comprise

two major classes of compounds — hydrolysable tannins and flavonoids — which are believed to be responsible for pomegranate’s beneficial actions. Numerous in vitro studies have documented the strong antioxidant properties of pomegranate.⁵

In 2012, a randomized, placebo-controlled, parallel group study examined the effect of pomegranate juice on pulse wave velocity (PWV), a measure of arterial stiffness that is a predictor of future cardiovascular events.³⁸ Healthy participants (n=51) were randomly assigned to consume 330 ml/day pomegranate juice (PJ; Pompure®, extracted using an industrial centrifugal juice extractor, The Pure Juice Company Ltd; Twickenham, UK) or placebo beverage for four weeks. Measurements were made at baseline and four weeks. While mean arterial pressure and diastolic and systolic blood pressure all decreased in the PJ group, PWV did not. The authors state numerous limitations to the study, among them the fact that subjects’ compliance was not confirmed, dietary intake was not assessed, the intervention period (four weeks) was short, and the pomegranate juice was not profiled to check for adulteration, although its total antioxidant capacity and content of phenolic compounds and potassium were consistent with reported values.

A study published in 2012 investigated the results of a randomized, placebo-controlled, double-blind clinical trial wherein 101 chronic hemodialysis (HD) patients received, during each dialysis, 100 cc PJ (0.7 mmol/100 cc juice



Pomegranate *Punica granatum*. Photo ©2013 Steven Foster

polyphenols, Naturafood Ltd; Givat Hen, Israel) or matching placebo, three times/week for one year.³⁹ HD patients frequently experience increased systemic inflammation and oxidative stress leading to atherosclerosis. The PJ group experienced reduced inflammation biomarker levels and protein and lipid oxidation. PJ intake also resulted in fewer second hospitalizations due to infections and improvement in the atherosclerotic process in 25% of patients. The beneficial effects disappeared three months after the study ended. The authors state that the findings are novel and should be replicated and validated in order to make PJ intake a part of dialysis therapy.

A number of human clinical studies have been conducted investigating the efficacy in cardiovascular health of POM Wonderful® Pomegranate Juice (POM; proprietary product made exclusively from the whole fruits of the 'Wonderful' variety, POM Wonderful, LLC; Los Angeles, CA). In a small, open-label, parallel group clinical trial in 2004 that ran for one year, 19 patients with carotid artery stenosis (CAS, hardening of the carotid artery; 70-90% occlusion) were randomly assigned to take 50 ml/day POM or no treatment.⁴⁰ The group taking POM experienced a decrease in the properties that lead to hardening of the arteries, such as carotid thickness, lowered systolic blood pressure, and platelet aggregation. However, the two groups were not treated equally; there was no placebo for the control group, and the POM group received more interventions — such as blood draws and carotid ultrasounds — than the control group.

A three-month, open-label, control group comparison published in 2006 was conducted with 10 non-insulin-dependent diabetics and 10 healthy age-matched controls.⁴¹ Each participant was given 50 ml of concentrated POM diluted 1:5 with water to equal eight oz./day. In the diabetic group, serum C-peptide levels were reduced by 23% after POM consumption. Results also indicated that POM had a beneficial effect on oxidative stress experienced by diabetics. Additionally, POM consumption did not worsen the diabetic parameters, as the authors had feared.

A 2005 randomized, double-blind, placebo-controlled clinical study investigated the effect PJ had on myocardial perfusion in patients with coronary heart disease (CHD) and myocardial ischemia.⁴² Over three months, 45 patients with stable CHD ingested 240 ml (eight oz.) POM per day or a modified sports drink placebo. At baseline and at three months, patients underwent treadmill or pharmacologic stress testing. Of the 39 individuals who completed the regimen and underwent testing, stress-induced ischemia decreased in the POM group (by 17% compared to baseline) and increased by 18% in the control group.

In a small open-label study in 2001, 10 hypertensive patients (seven male, three female, all nonsmokers, two diabetic, and two hyper lipidemic) consumed 50 ml POM concentrate per day for two weeks to see if it had an effect on hypertension and angiotensin converting enzyme (ACE).⁴³ Blood pressure and ACE activity were measured before and after POM intake. Juice consumption resulted in a small (5%) but significant reduction of systolic blood pressure and a significant (36%) decrease in ACE activity in seven of the 10 patients.

An 18-month, multi-center, randomized, double-blinded, two-dose human clinical trial in 2013 investigated the ability of a pomegranate extract (POMx) to increase prostate-specific antigen doubling time (PSADT) in men with rising PSA and no metastases.⁴⁴ PSADT is a predictor of metastasis-free survival and overall survival in patients who have undergone primary therapy for localized prostate cancer. In this study, 104 patients were randomly assigned to receive three capsules of POMx (1000 mg/capsule, polyphenol extract, comparable to about eight oz. pomegranate juice, POM Wonderful, LLC) or one capsule POMx plus two placebo capsules (to equal three capsules). Both low-dose and high-dose groups experienced $\geq$ (greater than or equal to) six-month increases in PSADT without adverse effects. The authors state that the significance of the study is unclear and that placebo-controlled studies are needed in this patient population.

In a 2006 phase II, open-label, single-arm clinical trial, 46 men with recurrent prostate cancer and rising PSA took eight oz./day of POM until their disease progressed.⁴⁵ PSA values were measured at least three times over six months prior to the beginning of the treatment, and PSA values as well as blood and urine for laboratory studies were taken at three-month intervals. A positive response was defined as a $\geq 50\%$ decrease in measured serum PSA levels, and progressive disease was defined as either a $> 100\%$ increase in PSA compared with the best response observed or any documentation of metastatic or recurrent disease. Treatment with POM significantly lengthened the PSADT in the patients; mean PSADT increased from 15 months at baseline to 54 months after treatment; and seven subjects experienced decreased PSA over time.

A few studies have investigated the potential of pomegranate to help with the control of dental plaque. In one study published in 2009, 32 healthy men and women with good oral hygiene habits in a randomized, single-blinded, controlled study were assigned to rinse their mouths three times daily (one minute per rinse) with 35 ml of a pomegranate extract-containing aqueous solution (Pomella® Extract; standardized to contain 30% punicalagins, Verdure Sciences; Noblesville, IN) or placebo rinse for four weeks.⁴⁶ Saliva samples revealed that rinsing with a flavonoid-rich pomegranate extract reduced total protein, which can correlate with lowered plaque formation, as well as reductions in cell injury indicators, sucrose degradation, and possible oral oxidant stress, as well as increased radical scavenging capacity.

In an earlier study, 60 subjects were divided into three groups of 20 who, following 24 hours of no dental hygiene, had dental plaque samples taken, then rinsed with one of three mouthwashes.⁴⁷ The mouthwashes were chlorhexidine gluconate (0.12% PerioGard®, Kolynos of Brazil; São Paulo, Brazil [now Colgate-Palmolive; New York]), or hydroalcoholic extract (HAE, 1:1 by volume) of pomegranate (50-60 mg/mL)(Federal University of Ceará, Fortaleza, Brazil), or a control of just the hydroalcoholic extract. The subjects in the HAE and PerioGard groups showed a positive response, i.e., a reduction in oral bacteria as measured by colony forming units (CFUs) after rinsing. The HAE group had an 83.5% reduction and the PerioGard group

had a 79.0% reduction in CFUs. The control group had a non-significant reduction of 11.3%. The authors speculate that the equivalent effect of HAE of pomegranate to chlorhexidine may be due to the hydrolysable tannins in pomegranate, particularly punicalagin, but that further studies are needed to identify the active constituents.

FUTURE OUTLOOK

According to the Iranian regional standard for pomegranate, “In addition to Iran which has the highest area under cultivation, highest production, and is the number one exporter, other countries including Turkey, Afghanistan, Pakistan, India, Armenia, Georgia, Tajikistan, Jordan, Egypt, Italy, Tunisia, Azerbaijan, Libya, Lebanon, Sudan, Myanmar, Bangladesh, Mauritania, Morocco, Cyprus, Spain, Greece, France, China, Japan, and the US are among the countries which have areas under pomegranate cultivation. However, among these countries, India, the Central Asian Republics, Upper Caucuses, and Spain have the highest area under cultivation and varieties diversity. Consumption of pomegranate in Iran is estimated to be on average between 7-8 kg per person per year.”⁴⁸

Total worldwide production of pomegranate is approximately 1.5-to-two metric tons (MT), with Iran and India producing most of the global supply. For the juice market, Iran and India together account for about 95% of concentrate production.⁴⁹

In the United States, most of the pomegranate crop is grown in California. Canada is the number-one export destination for US-grown pomegranates, followed by Korea, Taiwan, Australia, Japan, Mexico, and Russia.⁵⁰ In 2011, California had an estimated 30,000 acres (12,140 hectares) of pomegranates under cultivation.⁵¹

Pomegranate dietary supplement sales were ranked 42nd in the US food, drug, and mass market channel in 2012 with \$2,558,509 in sales, down 25.4% from the previous year.⁵² In the natural food channel (not including Whole Foods Market), pomegranate ranked 66th with sales of \$1,062,539, down 3.4% from 2011.⁵³ (These statistics do not include the sales of pomegranate juices, which are significantly higher.) In Canada, at the time of this writing, there were 188 licensed NHPs containing pomegranate as a medicinal ingredient and another 70 NHPs containing some form of pomegranate as a non-medicinal ingredient.⁵⁴

The United States Agency for International Development is currently working with Afghanistan to increase its pomegranate production and exportation. Trade relationships were established in 2011 among Kandahar pomegranate traders and India, Pakistan, and Europe, ultimately leading to exports of more than 2,700 MTs of pomegranates from Afghanistan.⁵⁵ In the year ending May 2012, Innova



Pomegranate *Punica granatum*. Photo ©2013 Gayle Engels

Market Insights stated that new products featuring pomegranate increased 15% worldwide from the previous year.⁵⁶

—Gayle Engels and Josef Brinckmann

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dear reader

100 Issues: *HerbalGram*'s 30th Anniversary and ABC's 25th

Twenty-five years ago, when I filed the incorporation papers for the American Botanical Council on November 1, 1988, at the Secretary of State's office in Austin, Texas, I could not have envisioned what ABC would become. Now, as I write this in the last week of October 2013, I am profoundly grateful for the significant growth and progress ABC has made since its founding.

Initially, my primary goal for establishing ABC was to create a vehicle to fulfill a dream: I wanted my fledgling newsletter, *HerbalGram*, to grow into a publication with increased content, credibility, and beauty. My vision was to create a magazine on herbs and medicinal plants that was like *Scientific American* or *National Geographic* in its visual appeal, and, of course, in the credibility of its content. Whether we have reached that goal is something that I let you, the reader, decide.

There are many, many people I must thank for ABC's success and longevity for the past 25 years. And, lest I resemble an Academy Award recipient rambling on with a long list of people with whom they wish share the award, I feel compelled to thank many individuals, although space will not allow me to mention all of them.

First, my good friend, colleague, and virtual partner in ABC and *HerbalGram*, Steven Foster, was instrumental in the earliest years of ABC, and remains so to this day. Steven is chair of the ABC Board of Trustees, longtime contributor of much of the vibrant color photography in *HerbalGram*, and author of numerous articles and reviews. In the nascent days of ABC, it was Steven who helped compile and procure many of the "Classic Botanical Reprints," one of our first series of publications, and, soon after, the Botanical Booklets series — initially intended to inform journalists — which ended up being printed in the tens of thousands on more than a dozen popular herbs, helping to increase their popularity. It was Steven's background document on the German Commission E Monographs that I used as a fundraising tool in 1993 to accumulate the money to compile, translate, edit, database, and eventually publish *The Complete German Commission E Monographs – Therapeutic Guide to Herbal Medicines*, one of ABC's key publications and, to many, a watershed document in the history of the herbal medicine movement in the United States.

Then there's Rob McCaleb, who was, back in the day, director of research at Celestial Seasonings. Rob and I met during the Herb Trade Association days in the late 1970s, and we were part of the first Board of Directors of the American Herbal Products Association (AHPA) in 1982. We co-founded the Herb Research Foundation (HRF), of which he was and still is president. As shown in the *HerbalGram* timeline by Steven Foster beginning on page 42 of this issue, *HerbalGram* began as the official publication of AHPA and HRF until the founding of ABC in 1988 with issue #18/19, at which time *HerbalGram* represented ABC and HRF. Rob's

excellent editorial contributions, especially his "Rob's Research Reviews," helped form some of the structure of *HerbalGram* and one of the key departments that remains to this day as Research Reviews. In addition, he provided a significant degree of administrative support, particularly with the computer software and digital groundwork needed when *HerbalGram* was but a burgeoning publication.

Heartfelt acknowledgement goes to the ABC staff. This includes George Solis, who has worked for ABC, and previously for me, since 1986, and also Margaret Wright and Cecelia Thompson, who have run the accounting department for more than 25 years each (see profile on Cecelia on page 18 of this issue, and one on Margaret in issue 98, page 12). In addition, I gratefully acknowledge Gayle Engels, who has been with ABC for almost 19 years, covering education, herding interns, directing the gardens, mastering the website, running HerbMedPro, and so much more. Also, thanks to Lori Glenn, who, for more than 10 years, has done a remarkable job editing and posting thousands of ABC's HerbClip reviews. And of course, my sincere gratitude goes to all current and previous ABC employees for the time and energy spent on furthering ABC's unique nonprofit educational mission, publications, and programs. In addition to those already mentioned, current ABC staff includes Toby Bernal, Janie Carter, Mary Ceallaigh, Stefan Gafner, Ash Lindstrom, Matt Magruder, Denise Meikel, Sara O'Connor, Jenny Perez, Tamarind Reaves, Perry Sauls, Tyler Smith, and Rick Valdez.

A heap of thanks and deep appreciation to the ABC Board of Trustees, who have worked in a volunteer capacity, some for more than 20 years, to help guide the organization. Thanks, too, to all the supportive herbalists, medical doctors, naturopaths, pharmacists, research scientists, and other professional experts who constitute the ABC Advisory Board and who have given so much of their time to help ensure the accuracy and reliability of ABC's educational content — not just in *HerbalGram* — over the years. My earnest appreciation goes out to the ABC Director's Circle, friends who help ABC with ideas for public outreach, development, etc. And, to the thousands of ABC members — in academia, industry, government agencies, libraries, botanical gardens, poison control centers, etc. — now in over 80 countries, our heartfelt gratitude for your continued support of our organization's mission.

When I was being interviewed for a personal profile

in a magazine a few years ago, I was asked what I was most proud of in my career. Frankly, I could not think of anything of which to be *proud*, but I did tell the reporter about what I was the most *grateful* in my career: I am grateful that Jim Duke, and the late Norm Farnsworth — and, several years later, the late Varro Tyler — all helped me get ABC started, and that they provided much encouragement and intellectual and moral support. These three men are universally respected in the domains of ethnobotany and pharmacognosy, and I consider it a privilege to have been given the opportunity to work with them toward our common goal of increasing respect for and responsible use of science-based herbal medicine.

Over the course of its first 25 years, ABC's scope has grown to encompass many publications and programs as noted in various places in this special issue. At the same time, ABC has stayed true to its core mission: to increase the quantity and quality of traditional- and science-based information about the safety and health benefits of herbs, medicinal plants, phytomedicines, and other plant-based materials used in selfcare and healthcare.

In This Issue

Review of 100 Issues of *HerbalGram* and ABC History Timeline. We are deeply grateful to Steven Foster, who took valuable time out during the completion of his latest book (with co-author Jim Duke) to review 100 issues of *HerbalGram* (including the galleys of this one) that he claims occupy a valued shelf in his library, to highlight various articles that, to him, are influential and impactful. I found his tabular history of *HerbalGram* most enlightening, as I, too, had forgotten about some of these seminal articles, many of which are still relevant today.

As part of this special commemorative issue, ABC staff has compiled a basic timeline denoting many of ABC's accomplishments and milestones. These include numerous pioneering educational publications and programs that ABC has created to bring about a greater cultural awareness of the vital role that herbs, medicinal plants, phytomedicines, and related plant- and fungi-based ingredients can and do bring to selfcare and healthcare. These milestones include, but are by no means limited to, the following: the publication of HerbClip, the first continuing education course on herbs for pharmacists, the ABC Pharmacy from the Rainforest Ecotours to the Peruvian Amazon (and elsewhere), the training of pharmacy and dietetic interns at ABC, the ABC Ginseng Evaluation Program, ABC's Media Education Program, the translation and publication of the German Commission E Monographs, the establishment and management of the ABC-AHP-NCNPR Botanical Adulterants Program, and so much more. This timeline is laid across the bottom of the pages containing the table of Steven's comments on 100 *HerbalGrams*.

Rooted in History: The Story of ABC's Case Mill Homestead (with Accompanying Wet Plate Photography). This sweeping feature juxtaposes a captivating narrative history of ABC's Homestead headquarters by HerbalEGram Managing Editor Tyler Smith with ethereal black-and-white photographs of the buildings and grounds taken by ABC Art Director Matt Magruder. Smith meticulously researched the story of the Case Mill Homestead

back to the 1840s, a time when Texas was a republic and the wet plate collodion photography process Magruder utilized was just being developed. The coupling of the images produced through this old, painstaking process — which happens to be Magruder's unusual hobby — with Smith's vivid prose offers a penetrating tableau of the enduring sanctuary that is ABC's home.

A Preliminary Analysis of the Botany, Zoology, and Minerology of the Voynich Manuscript. I remember in the late 1970s when I was introduced to my friend, colleague, and mentor Paul A. Lee, PhD, then the founder and principal organizer of the Herb Trade Association's herb symposia at the University of California in Santa Cruz, I first became aware of the existence of the Voynich Manuscript. Paul, who holds a doctorate of philosophy from Harvard, was enchanted by the mystery of the Voynich, and his keen interest infected me with similar fascination. Long thought a mystery, written in an untranslatable language or cipher, the Voynich has been the subject of almost countless essays and investigations, none of which has been able to "crack the code." Although the Voynich is clearly not the most pressing issue in modern herbal medicine and phytotherapy, we believed we could not pass up the opportunity to publish Art Tucker and Rex Talbert's insightful essay in which they propose a New World origin for the source and identity of the plants in the Voynich — possibly providing a breakthrough in this historical conundrum. As I started building my herbal library in the 1970s, I found a book in a used bookstore in San Antonio, Texas — the 1940 Johns Hopkins University reprint and annotation of the Codex Badianus, the Aztec Herbal of 1552 — the first medical book written in the New World. Little did I know then that this treasured tome would provide answers to the mysterious identity of many of the plants in the Voynich — at least according to Tucker and Talbert.

Also in this issue, Gayle Engels and Josef Brinckmann continue their series of herb profiles, this time on the increasingly popular fruit pomegranate, now found in myriad juices and in dry, concentrate, or extract form as a dietary supplement. ABC's former editorial department member Lindsay Stafford Mader has written a critique on the recent CNN special with Sanjay Gupta, MD, who had an epiphany regarding the safety and legitimate medicinal value of cannabis. The essay notes that Dr. Gupta's turn-about portends a positive future for medicinal cannabis in the US, though the author criticizes the CNN program for a number of errors and omissions. We also present Stafford Mader's essay on the implications of the Affordable Care Act ("Obamacare") on various aspects of complementary and alternative medicine, which, of course includes the judicious use of herbal preparations.

A few lines ago, I commenced this column by expressing my gratitude for ABC's first 25 years of success. I hereby offer my hope and sense of confidence about the positive developments and successes that lie ahead. With the help of ABC's many dedicated members, future members, and supporters to come, I believe that the future is bright, for ABC, and for the global herbal medicine communities.

Mark Blumenthal



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HERBALGRAM

The Journal of the American Botanical Council

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features

42 Reflections on 100 Issues of *HerbalGram*

By Steven Foster

In its 30-year history, *HerbalGram* has transformed from a simple black-and-white newsletter aimed at a small-but-burgeoning herb community to an acclaimed quarterly, peer-reviewed magazine/journal hybrid read by thousands of individuals around the globe. Author and botanical photographer Steven Foster, who has been involved with the publication since its inception, offers his perspective on *HerbalGram*'s evolution and emphasizes significant articles, events, and impacts in an accompanying 15-page timeline.

42 American Botanical Council: History and Highlights

By ABC Staff

In the late 1980s, during a time when consumer acceptance and knowledge of herbal medicine was increasing, Founder and Executive Director Mark Blumenthal launched the independent educational nonprofit American Botanical Council. This extensive timeline features important events in ABC's history — including highlights such as ABC's first "Pharmacy from the Rainforest" ethnobotanical eco-tours for pharmacists and other health professionals, the 1998 publication of *The Complete German Commission E Monographs*, and the 2004 creation of ABC's monthly online newsletter HerbalEGram — along with relevant happenings in the herbal community at large.



8x10 Wet Plate Collodion Photographs

By Matthew Magruder

Rooted in History: The Story of ABC's Case Mill Homestead

By Tyler Smith

The story of the Case Mill Homestead in East Austin — the idyllic setting of the American Botanical Council's headquarters — is one older than the state of Texas itself. In this historical narrative, *HerbalGram* Associate Editor Tyler Smith traces the evolution of the homestead from a 451-acre estate with a thriving gristmill to the extensively renovated and expanded headquarters of the nonprofit ABC. Today, the 160-year-old Colonial Revival structure, with its expansive medicinal plant gardens, greenhouse, educational annex, carriage house, pond, and more, serves as an environment uniquely situated to further the educational mission of ABC.

70 A Preliminary Analysis of the Botany, Zoology, and Mineralogy of the Voynich Manuscript

By Arthur O. Tucker, PhD, and Rexford H. Talbert

In 1912, Polish-born book collector Wilfrid M. Voynich discovered a bizarre and extraordinary manuscript in Italy, written in a mysterious language and script of unknown origin that baffles botanists, cryptologists, and many others even today. Although many researchers believe the Voynich Manuscript to contain plants that grow in Europe, authors Arthur O. Tucker, PhD, and Rexford H. Talbert, here, for the first time, make the case for the manuscript's comprisal of plants of the New World. The style of the drawings in the Voynich Manuscript is similar to 16th-century codices from Mexico (e.g., Codex Cruz-Badianus, also known as the Aztec Herbal, generally regarded as the first medical text in the Americas). Thus, the authors have identified a total of 37 of the 303 plants illustrated in the manuscript (roughly 12.5% of the total), the six principal animals, and the single illustrated mineral. The primary geographical distribution of the materials identified so far is from Texas, west to California, south to Nicaragua, ultimately pointing to a botanic garden in central Mexico.

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Lythraceae)

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ABC Celebrates 30th Anniversary of *HerbalGram*

In August 2013, the American Botanical Council (ABC) celebrated the 30th anniversary of its esteemed flagship publication, *HerbalGram*. Over the course of its three-decades-long existence, *HerbalGram* has transformed from a simple, one-color newsletter to a full-color, 80-page magazine/journal hybrid full of beautiful botanical photography and heavily researched and peer-reviewed articles. The evolution that *HerbalGram* has undergone is significant, yet its editorial mission to educate the public on medicinal and beneficial plants has remained steady.

Three decades ago, in the summer of 1983, ABC Founder and Executive Director Mark Blumenthal produced the very first *HerbalGram*, which was then titled “Herb News” with “Herbalgram” as a subtitle. “Herb News” was the name of a previous publication that Blumenthal initiated as president of the now-defunct Herb Trade Association, an organization founded in the 1970s to focus on the emerging herb industry. Blumenthal, who also was running his former herb distribution business, Sweethardt Herbs, spent his nights and weekends writing and editing articles for the *HerbalGram* newsletter, not yet realizing that one day it would birth an entire organization to help lead the botanical movement within the United States.

“One of the herb community’s biggest challenges, especially back in the early 1980s, was credibility,” said Blumenthal. “Herbs were like the Rodney Dangerfield of medicine; they got no respect. People considered herbs to be simply ‘folk medicines’ and they were unaware — and, unfortunately, many *still* are unaware — of the growing body of scientific and clinical research that supports many traditional uses, as well as modern applications. Throughout its history, starting with Rob McCaleb’s ‘Research Reviews,’ *HerbalGram* has been a leader in reporting the emerging science on herbs. Today, we see many publications, blogs, and websites dedicated to the latest herbal research, and for this, we are grateful that what we helped start 30 years ago has gained so much interest and momentum.”

Originally published with the financial support of the newly formed American Herbal Products Association (AHPA), of which Blumenthal was a founding board member, the first *HerbalGram* was an eight-page, black-and-white, stapled-at-the-spine newsletter consisting of “herb blurbs” on herbal scientific happenings, media watch items on herb-related news articles, a handful of paragraph-long “Rob’s Research Reviews” authored by then-Associate Editor Rob McCaleb (who, at the time, was also head of research at Celestial Seasonings), listings of herbal information resources and schools, and more. The editorial staff consisted of just Blumenthal, as editor, and McCaleb.

The second issue of the newsletter was published jointly by AHPA and the Herb Research Foundation (HRF), which was

founded that year by McCaleb, as president, and Blumenthal, as vice-president. Barbara Johnston and Bobbi Close worked part-time as assistant editors. The publication now featured the title “Herbalgram” in larger, predominant font. This issue took on a more defined format, with organized sections on industry news, conferences/meetings, HRF news, and “potpourri” — a catch-all section featuring various news items of possible interest to the growing herbal industry and surrounding community.

In the years that followed, *HerbalGram* underwent many changes that transformed it into the publication it is today. In 1988, at five years old, *HerbalGram* (issue 18/19) welcomed color to its pages for the first time with a cover illustration of St. John’s wort (*Hypericum perforatum*, Hypericaceae) and doubled in size from 24 to 48 pages. That issue also was the first published by HRF as well as ABC, which Blumenthal founded that year with ethnobotanist Jim Duke, PhD, and the late Professor Norman Farnsworth, PhD, in order to help transition the publication from newsletter to magazine. In 1992, issue 28 was the first full-glossy, four-color issue, and featured the first plant photograph to grace the magazine’s cover (Harvard’s glass flowers). In 1999 came the first perfect-bound issue and an increase to 82 pages, along with the 32-page ABC book catalog. One year later, in 2000, issue 50 was the first to be published under ABC’s name alone (although HRF members still receive *HerbalGram* as a benefit of membership).

Thirteen years and 50 issues later, *HerbalGram* has remained a leading publication for the botanical community. Its staff has grown to include an art director and four full-time editors, including Blumenthal as editor-in-chief. In addition to its in-house writers, its articles are authored and peer reviewed by numerous botanical experts from around the world. *HerbalGram* and its monthly electronic version (HerbalEGram) are read by thousands of readers in more than 81 countries, representing a range of diverse professions, from research scientists (e.g., pharmacognosists, ethnobotanists, etc.) and health practitioners (e.g., herbalists, naturopathic physicians, pharmacists, conventional physicians, etc.) to industry members and government regulators.

“*HerbalGram* is a unique hybrid periodical blending popular interpretation of scientific studies on medicinal plants with original peer-reviewed research,” said ABC Board of Trustees President Steven Foster. “Under Mark Blumenthal’s steady editorial guidance, the information has always been cutting-edge and, in a word — reliable. From history to new clinical studies, reporting on new regulatory and market developments to comprehensive reviews, and cover-



ing the world's herbs and the world of herbs, no publication has provided more to all interested stakeholders in every aspect of herbal medicine. It's been a remarkable journey."

"As part of ABC's public educational mission," added Blumenthal, "we have always tried to ensure the accuracy, reliability, and authority of the information in *HerbalGram*. It is quite common for us to send a feature article out to four-to-five, and, sometimes, up to eight or nine expert peer reviewers to check the facts."

Starting early, *HerbalGram* was a leader in presenting extensive literature reviews on specific herbs, beginning with sarsaparilla (*Smilax* spp., Smilacaceae) in issue 17, then St. John's wort in issue 18/19, followed by feverfew (*Tanacetum parthenium*, Asteraceae) in issue 20, valerian (*Valeriana officinalis*, Caprifoliaceae) in issue 21, and hawthorn (*Crataegus monogyna*, Rosaceae) in issue 22 — all of which were written by herbalist and author Christopher Hobbs, RH (AHG). Some of these reviews helped establish a scientific basis for the specific health benefits of each herb and, in other cases, helped clear up some erroneous and inappropriate marketing claims being made at the time. Issue 39 contained a 24-page literature review of kava (*Piper methysticum*, Piperaceae) by Yadhu N. Singh, PhD, and Blumenthal, and issue 40 introduced the American Herbal Pharmacopoeia's (AHP) first-ever monograph (on St. John's wort). Other literature reviews included a cover story on the increasingly popular adaptogenic herb *Rhodiola rosea* (Crassulaceae) in issue 56 and a cover story on the South African antioxidant tea rooibos (*Aspalathus linearis*, Fabaceae) in issue 59.

Recent *HerbalGram* issues have featured significant articles, such as the 2009 and 2010 feature stories on climate change's impact on medicinal plants, the rising sales of pet supplements, and the usage of endangered animal parts in traditional medicines — all authored by then-Managing Editor Courtney Cavaliere. Each year, *HerbalGram* publishes its annual Herb Market Report, which is widely used and cited by numerous medical and scientific journals and industry publications and companies. Additional key articles published in recent issues have included the myth of the unregulated industry; the history, ethnobotany, and modern uses of Turkish rose (*Rosa* spp., Rosaceae); FDA's approval of the second botanical drug, crofelemer; and much more.

In November 2011, *HerbalGram* became the main outlet for the ABC-AHP-NCNPR Adulteration Program's important work. Issue 92 featured the first article in a series of adulteration pieces, titled "A Brief History of Adulteration of Herbs, Spices, and Botanical Drugs," written by Foster. In 2012 and 2013, *HerbalGram* published four extensively peer-reviewed feature articles on the adulteration of bilberry (*Vaccinium myrtillus*, Ericaceae) extract, skullcap (*Scutellaria lateriflora*, Lamiaceae) herb, so-called "grapefruit seed extract," and black cohosh (*Actaea racemosa* syn.

Cimicifuga racemosa, Ranunculaceae). (All are available for free on ABC's website.)

In 2012, meanwhile, ABC brought *HerbalGram* into the digital age by launching an online page-flip version of the journal that is available on smartphones, tablets, and computers. According to an ABC press release on the development, "The flip-formatted *HerbalGram* creates a stunning visual display on numerous digital devices. Each issue contains dozens of full-color, high-quality photographs of botanicals that can now be appreciated on an even greater scale."

ABC Board of Trustees member Peggy Brevoort, president of Brevoort, LLC, congratulated the organization and the many others involved with the magazine "who have had the perseverance and vision to make it and the entire herbal industry grow into the respected entities they each are today."

"Thinking back to the first early black-and-white, stapled-together *HerbalGram*," Brevoort continued, "it reminds me so much of a parallel with the evolution and growth of the entire herbal industry: small, sincere, ready to share the 'new/old' knowledge about our newly discovered herbal treasures."

Founding ABC Board of Trustees member Dr. Duke also congratulated *HerbalGram* on its momentous birthday. "Here at the Green Farmacy Garden," said Dr. Duke, "the garden crew eagerly awaits the arrival of the new issues, always seemingly improving. Mark Blumenthal and *HerbalGram* have admirably done a great job of keeping the quality and rigor of the science in *HerbalGram* A#1."

"I consider *HerbalGram* the preeminent journal on medicinal herbs," said Ed Smith, founder of herbal extract manufacturer Herb Pharm, "and it is invaluable in my work in the medicinal herb industry and herbal medicine education. It is both an entertaining magazine and a peer-reviewed academic journal. I liken it to other prestigious periodicals like *Nature*, *Scientific American*, and *National Geographic*."

Renowned herbalist Rosemary Gladstar noted that she has in her library "one very long sturdy shelf completely devoted to *HerbalGrams*."

"That's a lot of magazine power filled with an intensive number of articles, research papers, conference announcements, and arguably the most comprehensive as well as thoughtfully written tributes to those herbalists and plant lovers who have passed away during these past 30 years," said Gladstar. "To me this history alone makes *HerbalGram* by far and away the most outstanding magazine devoted to herbs in the country, perhaps the world. I simply love this magazine. I love the way it challenged me to think, presented cutting edge articles on a huge variety of topics, provided an amazing number of resources, and balanced scientific research with traditional and empirical wisdom. Congratulations to you hard-working honey bees that gather the pollen and are so devoted to the cross-pollination of herbal wisdom!" HG

—Lindsay Stafford Mader



Celebrating Cecelia Thompson's 25th Year at ABC

Cecelia Thompson is the only employee at the American Botanical Council (ABC) who has been in the herbal community for as long as the organization's founder and executive director. She came to ABC 25 years ago to fill the position of finance administrator after almost two decades of owning and running several natural food stores with her husband, Gary. These businesses, Harthomp & Moran Natural Foods Store — later shortened to H&M Natural Foods Store — and a natural foods restaurant, played an instrumental role in bringing the natural food and organic produce movements to Dallas, one of Texas's largest and most straitlaced cities.

"We started the first of our two natural food stores back in '71," Cecelia recounted over a Tex-Mex lunch and binders of old black-and-white photographs of the early days and newspaper clippings on the stores' successes. "The Good Food Store was here in Austin, and we shopped there and we loved it, in fact we loved everything to do with natural foods. There were not any natural foods grocery stores in Dallas at the time, only vitamin shops that did not sell groceries."

Cecelia's stores specialized in providing bins full of bulk herbs and foods, such as brown rice, whole-wheat flour, and granola. She even had organic vegetables flown in from California, and eventually piqued the interest of one of the oldest produce house buyers to have shipments delivered by truck for less money. At the time, the produce house brought in produce from California on a weekly basis, and Cecelia convinced them to bring organic produce at the same time.

"Long before the advent of the organic foods movement, Cecelia would purchase organic fruits and vegetables via air freight from California, specifically for the patients of a local physician who 'prescribed' organic food for his chemically sensitive patients," ABC's Founder and Executive Director Mark Blumenthal wrote in a 2004 *HerbalGram* profile on Cecelia. "He was one of the pioneers in environmental medicine, and Cecelia and her store were part of the therapeutic program."

It was during this time that Cecelia met Mark at the H&M Natural Foods Store in



Cecelia Thompson and Margaret Wright. Photo ©2013 ABC

Dallas's Lower Greenville Avenue neighborhood. She estimates it was around 1974.

"The first time Mark came to the store, he came in his van," she recounted. "He was a traveling merchant. And he traveled in his van and pulled into the back parking lot of the store, he opened it up, and we would shop for merchandise, buying various items like bulk herbs, Korean and Chinese ginseng extracts and pills, herbal incense, and sandalwood soap. It was great. Mark used to say we were the first [store] to buy two pounds of goldenseal powder from him. He was fabulous."

In 1978, Cecelia and Gary started their second store — this one in North Dallas — and not too long after that, opened the first natural foods restaurant in Dallas to serve



H&M Natural Foods, Dallas, TX, 1974. Photo ©2013 Johnny Hayes

wine and beer. They later decided to start selling franchises of the store, including one that opened in an old Safeway location.

"We worked seven days a week," she said. "All seven days. And then at night I would do all the accounting. I had an office at home. I'd get home at night around 10, and I'd do accounting until two or three in the morning, and then get up and get the kids off to school and head back to the stores or the restaurant. It was the pioneer days in the natural foods business. And it was great."

Eventually, Whole Foods Market came into the Dallas area and talked the various franchise owners into joining their company network of stores. Around that time, Cecelia and Gary decided to move back to Austin. When they moved back to Austin in 1986, she and Mark crossed paths again at his CPA's office where she happened to be working. It wasn't long until Cecelia joined his team. She started as part of Bee Creek Botanicals, one of Mark's former herbal products businesses, which merged with ABC in 1989 shortly after the nonprofit was founded. She brought with her the invaluable knowledge gained while running her natural foods stores, including considerable accounting skills, as well as previous experience in data-processing. Back then, as now, every ABC employee wore many hats. So Cecelia was the finance administrator who also packaged bulk Bee Creek herbs for shipment, fixed broken toilets, and stapled together publication mailings.

"It was just Margaret, myself, one other lady, and George," Cecelia said. "George would bottle oils. Mark had an almost 5,000-square-foot house on Spicewood Parkway, and when we started we were working in two rooms. When we moved to the Case Mill Homestead [ABC's current location], we had occupied the entire house — including Mark's master bedroom."

"Cecelia is an old friend and a trusted employee; she is a true blessing for me," Mark said. "Not only was she (and her husband, Gary) my biggest and most loyal customer in Dallas in the 1970s and 1980s when I owned Sweethardt Herbs, Inc., one of my former herb-wholesaling businesses, but she has become an integral and highly valued part of ABC since its inception. The successes and longevity of ABC are due, in part, to Cecelia's (and Margaret's) invaluable contributions."

Cecelia and Margaret Wright, ABC's accounting administrator (who was profiled in *HerbalGram* issue 98), soon became lifelong friends who go out for happy-hour margaritas and meet on the weekends for brunch. In 25 years of working together, they have seen each other's children and grandchildren grow up, and they both share memories of the same funny stories, like the reason they make sure there is never an extra chair in their shared office (to discourage all-too-easy-yet-distracting chat sessions) and the time a new receptionist went out for a Coke on her first day and never came back.

"Anytime anybody says they're going out for a Coke, we're like, 'No! You can't go out for a Coke!'" Cecelia joked. "The good part about ABC is we're like a family. [Margaret

"Cecelia is an old friend and a trusted employee; she is a true blessing for me," Mark said. "Not only was she (and her husband, Gary) my biggest and most loyal customer in Dallas in the 1970s and 1980s when I owned Sweethardt Herbs, Inc., one of my former herb-wholesaling businesses, but she has become an integral and highly valued part of ABC since its inception. The successes and longevity of ABC are due, in part, to Cecelia's (and Margaret's) invaluable contributions."

and I are] great friends. We always have been; we've always gotten along. It's been such a joy to work with her. Margaret is incredible."

Throughout the years, Cecelia continued to serve as the organization's finance administrator. Because accounting principles largely stay the same, so has her job, although aspects of it have become more sophisticated, such as using various software programs. She also co-manages ABC's human resources operations.

Cecelia is known around the office for having a keen eye for picking out unique and personal birthday cards for staff members, cooking addictive spinach pies for staff luncheons, and giving on-the-mark recommendations for Austin restaurants or cocktail bars. When not at work, Cecelia enjoys being out and about in Austin, cooking at home, and spending time with her children and grandchildren. And on special occasions, such as her 25th anniversary at ABC, she likes to sip on Veuve Clicquot, her favorite champagne.

"To know that I've been working here for 25 years," she said, "it's just amazing to me because it seems like it's gone by so fast." HG

—Lindsay Stafford Mader



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ABC Volunteer of the Year: Clark Dufour

Over the past 25 years, the American Botanical Council (ABC) has been fortunate to have the participation of local volunteers who help maintain and improve ABC's grounds and extensive herb and medicinal plant gardens and assist with administrative tasks, among many other areas of the organization's activities. ABC's 2013 Volunteer of the Year is Clark Dufour.

Just after moving to Austin from Conroe, in East Texas, Clark decided to dedicate his spare time to volunteering while he was searching for a job. "I was looking for somewhere to volunteer that was enjoyable and enlightening, and where my time would benefit someone," said Clark. "I was looking for a way to improve myself when I found ABC online."

While volunteering at ABC, Clark — a hard worker and a humble human being — began to develop a botanical education that helped him secure a position in the garden department of a Lowe's Home Improvement store, a retail chain for which he had previously been employed. "I learned more in six months at ABC than I had learned in a year and a half working in Lowe's garden department," said Clark. "Now I can recommend homemade organic pesticides knowing that they work, based on what I've seen at ABC."

Clark also gained a more defined sense of his long-term life plan while volunteering at ABC.

"I've learned a lot about horticulture and gardening and what I really want to do with my life," continued Clark. "I didn't have a clear idea in high school or after, but I knew it wasn't to do what was best for me, but something that was best for the rest of the people on the planet."

"Now I know I want to buy some land in Washington or Canada and start a hemp farm," said Clark. "I'd like to see the plants be fully utilized through the manufacture of all types of hemp products as well as teaching people the value of the plant."

Clark's enthusiastic attitude struck a chord with many among ABC's staff. "When I met Clark and he told me that he 'needed some time to donate,' I had no idea that it would go on for over a year and his help would be so valuable to us," said ABC Gardener Toby Bernal. "I can do it," "What's next?," and "Yessir" became his slogans around here." According to Bernal, Clark's volunteerism at ABC



Clark Dufour. Photo ©2013 ABC

also has been illustrative of the friendships plant cultivation encourages.

"It feels good to do good, honest work for an excellent organization that is doing good in the world. I appreciate ABC's mission and that the organization works hard to get credible information about medicinal plants out to the world at-large," said Clark. "I would recommend that people read ABC's publications and think about helping out in some way, whether it is by joining or volunteering."

"Clark Dufour is one of those people who exemplifies the many benefits and true spirit of volunteerism," said Mark Blumenthal, ABC's founder and executive director. "Without a cadre of volunteers, many nonprofits would find it more challenging to survive in difficult economic times, much less flourish. In his own meaningful way, Clark has propelled ABC's unique nonprofit educational mission by helping ensure that our grounds and gardens are beautiful, providing educational opportunities for visiting school children, senior citizens, and many others."

Clark has recommended ABC as a volunteer site to a number of people, and one of his friends also has started volunteering at ABC. HG

—Gayle Engels and Ash Lindstrom



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North America's Largest Professional Society of Medicinal Plant Research Experts Endorses Botanical Adulteration Education Program

American Society of Pharmacognosy Lends Support to ABC-AHP-NCNPR Botanical Adulterants Program

The American Society of Pharmacognosy (ASP) has announced its endorsement of the ABC-AHP-NCNPR Botanical Adulterants Program. This is an educational program designed to increase the herb, dietary supplement, and natural products industries' awareness of the need for enhanced scrutiny via laboratory analysis of herbal raw materials, extracts, and essential oils that may be accidentally or purposefully adulterated with lower-cost, non-disclosed ingredients. The Program is headed by three nonprofit groups focused on research and education on medical herbs and other beneficial plants: the American Botanical Council (ABC), the American Herbal Pharmacopoeia (AHP), and the National Center for Natural Products Research (NCNPR) at the University of Mississippi.

ASP is North America's leading organization of scientists involved with research on medicinal plants, fungi, marine organisms, and other natural materials used in the production of new medicines, comprising the essence of the science of pharmacognosy. Founded in 1959, ASP consists of more than 1,100 pharmacognosists, natural products chemists, botanists, molecular biologists, and other medicinal plant research experts from around the world.

Bradley Moore, PhD, president of ASP and a professor at the Scripps Institution of Oceanography at the University of

California at San Diego, wrote in a letter to ABC Founder and Executive Director Mark Blumenthal:

"ASP is making this endorsement in recognition of the laudable goals and purpose of the Program that has helped increase the quantity and quality of scientific information on the relatively widespread problem of adulteration of botanical raw materials, botanical extracts, essential oils, and other plant-derived materials, which are used in dietary supplements and possibly

The ABC-AHP-NCNPR Botanical Adulterants Program is a wide-scale, multi-year international program designed to educate global members of the herbal, dietary supplement, and allied industries about accidental and intentional adulteration of botanical raw materials, extracts, and essential oils.

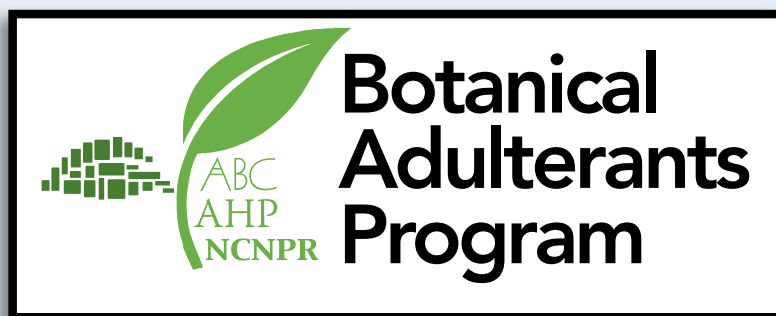
With the participation of more than 100 responsible companies, analytical laboratories, nonprofits, trade associations, media outlets, and others in the international herb and natural products/natural medicine community, this unique and vitally necessary supply-chain integrity educational program has already produced the following 5 articles on this critically important topic.

- **"A Brief History of Adulteration of Herbs, Spices, and Botanical Drugs"** in the past two millennia by Steven Foster, published in *HerbalGram* #92.
- ***The Adulteration of Skullcap with American Germander***, by Steven Foster, published in *HerbalGram* #93.
- ***The Adulteration of Commercial "Grapefruit Seed Extract" with Synthetic Antimicrobial and Disinfectant Compounds***, by John H. Cardellina II, PhD, published in *HerbalGram* #94.
- ***The Adulteration of Commercial Bilberry Extracts***, by Steven Foster and Mark Blumenthal, published in *HerbalGram* #96.
- ***Exploring the Peripatetic Maze of Black Cohosh Adulteration***, by Steven Foster, published in *HerbalGram* #98.

Please visit the Program's webpage at www.herbalgram.org/adulterants for free access to these articles and to learn more about the ABC-AHP-NCNPR Botanical Adulterants Program.

For information on how your company or organization can become part of this important program, please contact Denise Meikel at denise@herbalgram.org.

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in therapeutic products like non-prescription medicines.

As a Society, we recognize the paramount importance of the proper identification and authentication of medicinal materials and that they be adulterant free. Such materials are regularly used for research purposes and as ingredients in consumer-based products that promote health and remedy disease.

We further recognize that the history of pharmacy and pharmacognosy acknowledges many cases in which

natural products used for medicinal purposes have been adulterated, either by accident due to inadequate quality control measures, or intentionally by fraudulent sellers. Such practices are contrary to the goals of responsible pharmacy, medicine, and public health education practices.”

Guido Pauli, PhD, associate professor of medicinal chemistry and pharmacognosy at the University of Illinois at Chicago College of Pharmacy and treasurer of ASP, wrote, “Botanical adulteration is one of the reasons why botani-

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cal research can sometimes be difficult to be reproduced. The [ABC-AHP-NCNPR] Program will raise awareness of the topic, and many global experts in this area are ASP colleagues, so it is only logical for our Society to endorse this welcome effort."

ASP joins over 100 nonprofit organizations, independent laboratories, industry members, trade associations, and others that are financially underwriting and/or endorsing the Botanical Adulterants Program. These groups are located in the United States and abroad, reflecting the global nature of the botanical material supply chain.

"Those of us working on the ABC-AHP-NCNPR Botanical Adulterants Program are especially honored by ASP's recognition of the value and significance of our work in this vitally important area," said Blumenthal. "We hope to continue to merit the trust and confidence that ASP has placed in the Program as we continue to publish extensively peer-reviewed articles and laboratory guidance documents to help members of the industry deal with this serious problem."

According to AHP Executive Director Roy Upton, "It is wonderful to have the endorsement of ASP, as it was yesterday's classical pharmacognosists who were primarily responsible for ensuring that adulteration did not occur. Botanical

pharmacognosy skills are exactly what are needed to ensure botanical supplement quality control."

Bill Keller, PhD, longtime secretary of ASP, wrote,

"I was quite pleased to vote for ASP's endorsement of the ABC-AHP-NCNPR Botanical Adulterants Program. As Vice President and Chief Scientific Resource Officer at Nature's Sunshine Products, I am continually faced with the possibility of having our product ingredients or our finished products being adulterated with illicit substances and/or prescription drugs. The Botanical Adulterants Program is definitely providing a unique and highly valuable service to the dietary supplement industry in addressing this serious problem."

Stefan Gafner, PhD, chief science officer of ABC, noted that ASP "has become the most prominent organization of researchers interested in all aspects of natural products research in North America. I believe that it is the first time in the history of ASP that the organization supports a program through an endorsement, and it is a privilege that ASP chose to do so for the Botanical Adulteration Program." HG

—Mark Blumenthal

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Dr. Sanjay Gupta's *WEED* Documentary: A Critique

Editor's Note: We were keenly interested in Dr. Sanjay Gupta's one-hour CNN special called WEED that aired in August of 2013. We asked Lindsay Stafford Mader to view the documentary, compose a report on its contents, and to offer a response, if warranted, regarding the adequacy and factual accuracy of CNN's coverage. We present her critique below. (A previous version appeared in the September issue of HerbalGram.)

Having researched and written about medicinal cannabis (*Cannabis sativa*, Cannabaceae) for more than four years for the American Botanical Council and its journal *HerbalGram*, I watched CNN's recent TV documentary *WEED* with a heavy dose of skepticism. While I am well aware of the plant's promising medicinal properties, I did not fully expect Sanjay Gupta, MD, to "get it right." Others in the medicinal cannabis community understandably expected much from *WEED*, considering the media hype leading up to its premiere, which was stimulated by Dr. Gupta's much-publicized editorial stating that he had reversed his position and is now in favor of medicinal cannabis.

Dr. Gupta's *WEED* documentary gave an interesting and often touching overview of the situation and left many viewers enlightened on how effective cannabis can be for treating conditions such as young Charlotte Figi's Dravet Syndrome. Other sources and I agree that *WEED*, which admirably attempted to cover significant ground, was better than almost everything else the mainstream media has produced on cannabis. Unfortunately, Dr. Gupta disappointed in many areas by failing to investigate important issues at the heart of the medicinal cannabis discussion and by quietly perpetuating false details on cannabis to the Americans who have grown to trust his expertise.

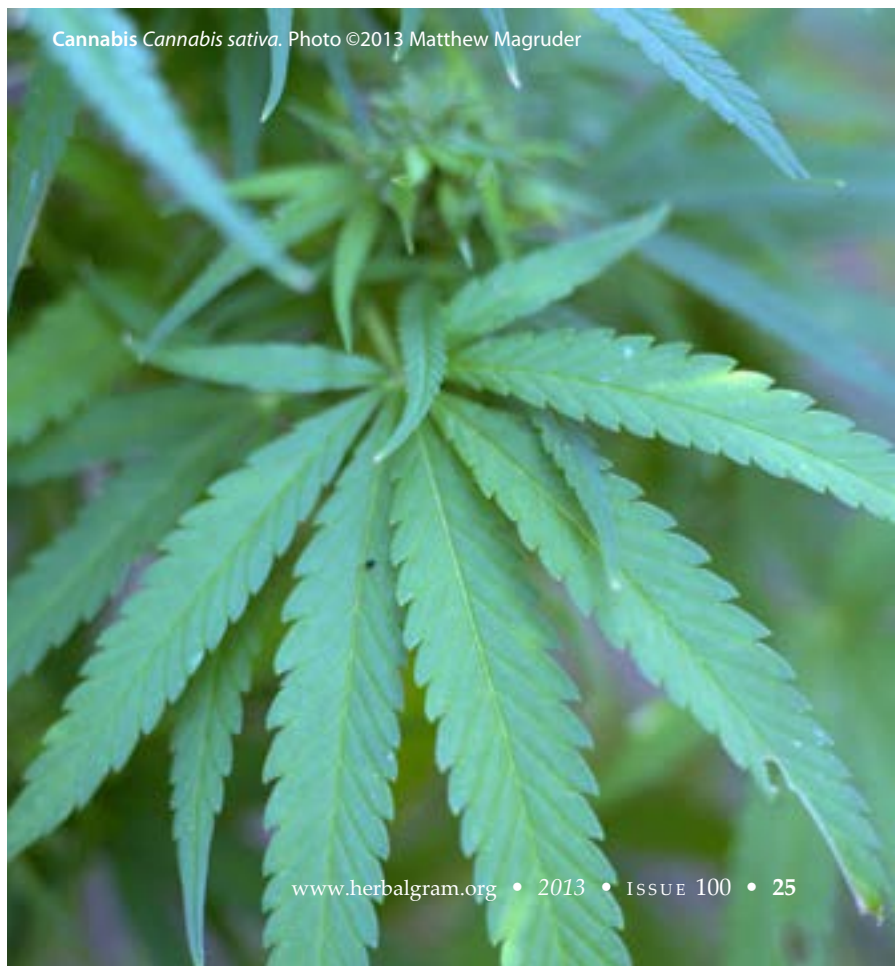
Filling in Gupta's Gaps

In the beginning of *WEED*, Dr. Gupta noted that cannabis is currently considered a Schedule I drug as "the government was saying it had no medicinal value and a high potential for abuse."¹ To illustrate the inappropriateness of cannabis's current scheduling, Dr. Gupta could have listed other substances classified as Schedule I, such as heroin and LSD.² He additionally should have mentioned that the American Medical Association (AMA) and nonprofit Institute of Medicine have recognized the medicinal potential of cannabis for certain conditions and that AMA has called for a review of cannabis's Schedule I status.³ Furthermore, he may have explained that the US government seemingly recognized cannabis as medicine in 2003, when scientists for the US Department of Health and Human Services wrote in a patent abstract that cannabinoids are useful as antioxidants and neuroprotectants.⁴ Moreover, in 2011, the US National Cancer Institute's PDQ Complementary and Alternative Medicine (CAM) Editorial Board acknowledged medicinal uses of cannabis by publishing an online summary of cannabis and cannabinoids as CAM treatments for cancer patients.⁵

A great deal of Dr. Gupta's *WEED* program focused on the story of the Figis, a Colorado

family whose young daughter Charlotte has a rare epileptic condition called Dravet Syndrome.¹ Later, he introduced Chaz Moore, a young man with an even more uncommon condition called diaphragmatic flutter. Most viewers, including myself, likely found Charlotte's and Chaz's experiences poignant. I particularly appreciated that their stories illustrated how well cannabis can work and prompted questions about a system in which such a beneficial medicine is not accepted by all states and not covered by insurance companies.

The rarity of these two conditions, however, could have alienated many viewers, considering the multitude of more common conditions that cannabis has been shown to help, such as cancer symptoms, glaucoma, multiple sclerosis,



Cannabis *Cannabis sativa*. Photo ©2013 Matthew Magruder



Cannabis *Cannabis sativa*. Photo ©2013 Matthew Magruder

post-traumatic stress disorder, and more.⁶ Unfortunately, Dr. Gupta oversimplified the medicinal impact of cannabis by speaking with just two uncommon patients out of the many who are benefiting from cannabis through US state-based programs.

“He has these two bizarre conditions that may be benefited by CBD [cannabidiol], not THC [tetrahydrocannabinol], and then in the last five minutes, he goes off to Israel and shows cancer patients benefiting,” said Donald Abrams, MD, chief of oncology at San Francisco General Hospital, professor of clinical medicine at the University of California at San Francisco (UCSF), and an integrative oncologist at the UCSF Osher Center for Integrative Medicine (oral communication, August 13, 2013). “You certainly don’t have to go to Israel to find cancer patients that benefit. That’s what I do and see all day long.”

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Misleading Portrayal of Science

Upon hearing Dr. Gupta’s most erroneous statement that “marijuana is made up of two ingredients,”¹ I had concerns for the accuracy of his reporting. (Anybody with basic knowledge of cannabis science knows that, in fact, THC and CBD are just two of the more than 100 different cannabinoids and approximately 400 other chemicals in the plant.⁷) Indeed, Dr. Gupta made the most mistakes when discussing cannabis’s effects on the brain, particularly its effects on the child brain and addiction.

Dr. Gupta stated in *WEED* that there is a clear effect of marijuana on the young brain, although the evidence is anything but conclusive. Neuroscientist Stacy Gruber, PhD, claimed that brain white matter is impaired and white matter highways are more disrupted in those who start smoking before age 16. But Dr. Gruber’s work has examined only the brains of a small number of heavy, chronic cannabis smokers — not the brains of patients using therapeutic dosages.

Dr. Gupta then went on to say, “Preliminary research shows that early onset smokers are slower at tasks, have lower IQs later in life, higher risk of strokes, and increased risk of psychotic disorders...” which concerns some scientists because 35% of high school seniors have used cannabis and many fear “a generation of kids with damaged brains” as well as “a generation of marijuana addicts.”¹

Although he recognized that “studies are inconclusive,” Dr. Gupta subsequently referred to this information as “the truth and the science” of a growing epidemic. In contrast, however, an expert peer reviewer of this article noted that these statements seem to have been largely based on animal research,⁸ that many studies on cannabis and white matter within the last 30 years have had flawed methodology,⁹ and that heavy recreational cannabis usage has more cognitive impact than measured and monitored therapeutic usage. Indeed, research has shown that “some cognitive deficits appear detectable at least seven days after heavy cannabis use but appear reversible and related to recent cannabis exposure, rather than irreversible and related to cumulative lifetime use.”¹⁰ So, while adolescence is a very sensitive time for the brain, the notion of permanent cognitive impairment simply has not been substantiated.^{8,10}

“The show and folks like Nora Volkow seem to suggest that legalization advocates are advocating that young people use marijuana, which is, of course, not true,” said Amanda Reiman, PhD, California policy manager of the Drug Policy Alliance (email, September 13, 2013).

Later, Dr. Gupta accurately stated that there have been zero cannabis overdoses, which likely led many viewers to believe the widely held notion that cannabis is safe. But he then interviewed Christian Thurstone, MD — a psychiatrist and director of a youth substance-abuse treatment clinic — who told Dr. Gupta, “There is no longer any scientific debate that marijuana is not just psychologically addictive, but also physically addictive.”¹ Dr. Thurstone’s statement was an exaggeration at best, considering the very low risk for physical and psychic dependency on cannabis.¹¹ In

fact, while many cannabis and addiction experts agree that psychological dependence is possible, physical dependence “is much less convincing on the basis of the published literature,” according to the book *The Medicinal Uses of Cannabis and Cannabinoids* (Pharmaceutical Press, 2004).¹²

Dr. Gupta did compare the lower risk of cannabis addiction with that of other drugs, citing a figure that 9% of marijuana users become addicted, while 23% of heroin users do, 17% of cocaine users, and 15% of alcohol users. But these numbers are based on a 1994 epidemiological study consisting of interviews with participants asked to gauge their self-description of dependence symptoms.¹³ A peer reviewer of this article similarly noted that the 9% rate was likely much too high as many individuals are in court-mandated cannabis-abuse treatment programs, and others who find it difficult to stop smoking are often using cannabis to self-treat an underlying condition, such as depression; thus, when the depression improves, so does the dependence on cannabis. Thankfully, this segment was somewhat balanced by a clip, although much too short, of psychopharmacologist and editor of *The Pot Book* (Park Street Press, 2010), Julie Holland, MD, clarifying that cannabis withdrawal is nowhere near as serious as withdrawal from alcohol dependence and is more about learning new behaviors.¹

As an additional disappointment, Dr. Gupta traveled some 5,000 miles to Israel to discuss human research and ignored all of the clinical studies on cannabis that have been carried out in the United States, conducted by researchers such as Dr. Abrams and Barth L. Wilsey, MD. The Center for Medicinal Cannabis Research (CMCR) in California, for example, completed 13 human studies on whole-plant cannabis, which found that the plant benefited conditions such as neuropathic pain, spasticity in multiple sclerosis, pain in HIV patients, and more.¹⁴

In fact, Dr. Gupta ignored the vast majority of human research on medicinal cannabis. According to a 2010 review of clinical studies, “In the period from 1975 to current, at least 110 controlled clinical studies have been published, assessing well over 6,100 patients suffering from a wide range of illnesses.”¹⁵ Dr. Gupta failed to mention, for example, the work that has been done in Canada, Austria, and the United Kingdom, the majority of which has been led by GW Pharmaceuticals (Salisbury, England) on its product Sativex®, a cannabis whole-plant extract oromucosal spray containing predominantly THC and CBD, that has been approved as a medicine for multiple sclerosis spasticity in the United Kingdom, Spain, Germany, Denmark, the Czech Republic, Sweden, New Zealand, and Canada.¹⁶ (Sativex for cancer pain is currently in Phase III clinical trials in the United States.) Although *WEED* makes it seem as if the Stanley Brothers in Colorado were the first to produce high-CBD cannabis, GW has had similar material since 1998,¹⁷ and even they were not the first to create high-CBD strains.

“The claims made by the Stanley Brothers that they couldn’t ‘give away’ the high CBD medicine is false,” said

Dr. Reiman. “There is high demand for it, at least in [California]. It also gave off the impression that no one is interested in weed that doesn’t get you high — even if it helps your symptoms — which is false.”

Gupta’s Failure to Investigate Stalled Research

Although some human research has been conducted in the United States, all parties agree that more needs to be carried out, a point that was expressed throughout *WEED*. But what many Americans do not know is that there is an intricate federal roadblock preventing much of this research from happening. In *WEED*, Dr. Gupta visited the University of Mississippi to interview Mahmoud ElSohly, PhD, a research professor of pharmaceutical sciences, about the Marijuana Potency Project. But viewers would have been better served if Dr. Gupta also had discussed the contract between Ole Miss’s National Center for Natural Products Research (NCNPR) and the National Institute on Drug Abuse (NIDA) to produce cannabis for all research in the United States. Although NIDA puts the contract up for bid every five years, it has awarded this contract solely to Ole Miss since 1968. NCNPR is thus the only federally permitted source of cannabis, and before a cannabis researcher can proceed with a study, NIDA must first decide that it has sufficient cannabis available — a situation frequently referred to as a monopoly.¹⁸

Additionally, cannabis research proposals must receive

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scientific merit approval from the Public Health Service (PHS), although research protocols for no other controlled substance require PHS review.¹⁸ Oftentimes, cannabis studies — especially those whose aim is to produce prescription medicines — approved by the US Food and Drug Administration (FDA) and by relevant institutional review boards are then rejected by PHS or have difficulty obtaining the material from NIDA. (As an alleged conflict of interest, Dr. ElSohly and NCNPR have a separate DEA permit to grow cannabis for production of the generic version of synthetic THC pharmaceutical drug Marinol® (AbbVie, Inc.; Chicago, IL), which makes him the only person in the country who can legally grow marijuana for commercial purposes.)¹⁸

The documentary did feature Dr. Holland noting that, although FDA has approved many medicinal cannabis studies, NIDA has stonewalled therapeutic research. But the Director of NIDA — Nora Volkow, MD — later appeared, quickly dismissing this accurate assertion and claiming that they deal only with studies looking to investigate drug abuse. Although it is true that NIDA reviews studies that deal with drug abuse, it still has the power to reject any kind of cannabis research proposal based on supposed unavailability of NCNPR material. Instead of investigating the truth and the involvement of NIDA/PHS, Dr. Gupta took Dr. Volkow's word at face value and chocked it up to "bureaucratic hoops that researchers simply don't want to jump through." To the contrary, researchers desperately want to study cannabis, and many have attempted to, but they have become overwhelmingly frustrated with the NIDA/PHS process or they have been rejected. Although Dr. Gupta seemed to have touched very lightly on this subject in his online editorial,¹⁹ he failed to give it anything near adequate time and effort in his special report.

Impact

While many medicinal cannabis supporters were pleased with Dr. Gupta's *WEED* documentary, others have expressed more satisfaction with his online editorial, "Why I Changed my Mind on Weed."¹⁹ As only a few months have passed since the documentary aired, its impact is uncertain.

Dr. Abrams noted that it probably will not change the minds of average Americans, as the majority of the coun-

try already supports cannabis legalization,²⁰ and it is the Obama Administration that needs to be persuaded. But when asked if the President (who several years ago was rumored to have selected Dr. Gupta as one of his top choices for US Surgeon General) had a response to Dr. Gupta's essay, Deputy Press Secretary Josh Earnest said he hadn't read it and couldn't comment.²¹ A day later, Earnest told reporters that the President does not currently advocate a change in cannabis laws.

Nonetheless, Dr. Gupta's prominence as one of the country's most respected and well-known physicians could be important for the medicinal cannabis movement.

"Dr. Gupta is very influential and perhaps his endorsement will lend moral strength to physicians who are often reluctant, even in medical states, to recommend [cannabis] to their patients," said Mariann Garner-Wizard, who frequently writes about cannabis for ABC's HerbClip publication. "That's really the most positive thing that I hope the documentary may achieve."

Although the following parties have not said what encouraged their recent decisions, New Jersey Governor Chris Christie, considered a potential Republican candidate for the 2016 Presidential election, issued a decision to allow cannabis recommendations for children just several days after the documentary aired,²² and on September 10, 2013, the US Senate Judiciary Committee held an "unprecedented" congressional hearing on the conflict between state and federal medical cannabis laws. In a breaking news press release, Steph Sherer, the executive director of patient organization Americans for Safe Access, described this as a potential "springboard for new legislation and a turning point for federal policy."²³ HG

—Lindsay Stafford Mader

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Assessment of Systematic Reviews Concerning Adverse Effects of Herbal Medicines

Reviewed: Posadzki P, Watson LK, Ernst E. Adverse effects of herbal medicines: an overview of systematic reviews. *Clin Med.* February 2013;13(1):7-12.

For decades, members of the herbal medicine and conventional medical communities have debated the relative safety of herbs and phytomedicines as a class of consumer goods. Herbal advocates have generally stated that herbs and their medicinal preparations are relatively safe, as evidenced by low adverse events (AEs) in clinical trials, as well as infrequent reporting of AEs to poison control centers and other pharmacovigilance vehicles.

A group of European researchers have attempted to gain further insight into the relative safety of herbal medicines (HMs) by reviewing published systematic reviews (SRs) of controlled clinical trials on numerous herbs and phytomedicines. The authors examined the evidence regarding AEs of HMs used in humans for any clinical condition, as identified in SRs. A search of electronic databases identified 4,366 potentially relevant publications; of those, the authors identified 50 SRs of 50 different HMs that met the study criteria. If an HM was the subject of more than one SR, then the most recent, sound, and independent SR was selected. SRs of multi-herb mixtures were excluded.

SRs were independently rated for quality by two authors using a modified Oxman score, which is an assessment of SRs using a checklist published by Andrew Oxman aimed at evaluating sources of bias involved in a review process.¹ Most SRs had only minor methodological weaknesses, although the authors state that quality was “frequently not optimal.” Of SRs with scores < zero (n=five), all scored negative five, the lowest possible Oxman score.

The selected SRs originated from Canada, Denmark, Germany, Italy, South Africa, the United Kingdom, and the

United States. They raised a range of safety concerns. The number of primary studies included in the SRs varied from one to 216. The types of primary reports used also varied widely. Some used other SRs as primary reports. One SR used a meta-analytical method.

Mild AEs cited ranged from the most-mentioned AEs, including gastrointestinal upset, nausea, and allergic reactions, to comparatively rare AEs, including pain, constipation, dry mouth, poor appetite, menstrual disorders, muscle spasm, muscle weakness, fatigue, and others. The SRs found that 31 HMs were safe, with only mild, transitory AEs. These include the herbs in Table 1.

Moderately severe AEs cited for 15 HMs included anorexia, blood coagulation abnormalities, severe nausea, electroencephalogram (EEG) changes, inhibition of platelet aggregation, and other conditions. HMs with moderately severe AEs are listed in Table 2.

Severe AEs noted for four HMs included acute psychosis, cerebral hemorrhaging, coma, respiratory arrest, tachycardia, hallucinations, convulsions, renal failure, acute lung injury, hepatitis, hyperkalemia, liver damage or failure, congestive heart failure, carcinoma, seizures, and other conditions up to and including death. The SRs for the following HMs concluded that they were unsafe: belladonna (standardized herb powder; *Atropa belladonna*, Solanaceae), chaparral (*Larrea tridentata*, Zygophyllaceae), kava (*Piper methysticum*, Piperaceae), and senna (*Senna alexandrina* syn. *Cassia senna*, Fabaceae). Chaparral was associated with cases of liver dysfunction; kava was presumably included due to reports of liver

Table 1. Herbs Deemed Safe, with Mild Transient AEs.

Thyme	<i>Thymus vulgaris</i> , Lamiaceae
English lavender	<i>Lavandula angustifolia</i> , Lamiaceae
Boswellia	<i>Boswellia serrata</i> , Burseraceae
Calendula	<i>Calendula officinalis</i> , Asteraceae
Devil's claw	<i>Harpagophytum procumbens</i> , Pedaliaceae
Asian ginseng	<i>Panax ginseng</i> , Araliaceae
Chaste tree	<i>Vitex agnus-castus</i> , Lamiaceae
Hawthorn	<i>Crataegus</i> spp., Rosaceae
Cinnamon	<i>Cinnamomum</i> spp., Lauraceae
Butterbur	<i>Petasites hybridus</i> , Asteraceae
Century plant	<i>Agave americana</i> , Asparagaceae
St. John's wort	<i>Hypericum perforatum</i> , Hypericaceae
Echinacea	<i>Echinacea</i> spp., Asteraceae
Milk thistle	<i>Silybum marianum</i> , Asteraceae
Pepper	<i>Capsicum</i> spp., Solanaceae
	<i>Phyllanthus</i> spp., Phyllanthaceae
Ginkgo	<i>Ginkgo biloba</i> , Ginkgoaceae
Valerian	<i>Valeriana officinalis</i> , Caprifoliaceae
	Hippocastanaceae
Lemon balm	<i>Melissa officinalis</i> , Lamiaceae
Fenugreek	<i>Trigonella foenum-graecum</i> , Fabaceae
Banaba	<i>Lagerstroemia speciosa</i> , Lythraceae
Blessed thistle	<i>Cnicus benedictus</i> , Asteraceae
Chia	<i>Salvia hispanica</i> , Lamiaceae
Bilberry	<i>Vaccinium myrtillus</i> , Ericaceae
Spearmint	<i>Mentha spicata</i> , Lamiaceae
Rosemary	<i>Rosmarinus officinalis</i> , Lamiaceae
Saffron	<i>Crocus sativus</i> , Iridaceae
Gymnema	<i>Gymnema sylvestre</i> , Asclepiadaceae
Noni	<i>Morinda citrifolia</i> , Rubiaceae
Turmeric	<i>Curcuma longa</i> , Zingiberaceae

toxicity associated with some kava preparations; and curiously, despite being included here, senna leaf and/or fruit extracts are widely approved as safe and effective nonprescription stimulant laxative ingredients by regulatory authorities in many developed countries, including the United States.

Some included SRs were not designed as SRs, but as monographs. Nevertheless, according to the authors, an SR of poor quality may have value in raising potential risks. In justifying their use of SRs only, the authors note that a review of all information to date about AEs and HMs would be far beyond the scope of a single journal article. They propose that SRs should also include AEs mentioned in anecdotal data like case reports. While of no use in establishing cause and effect, such evidence may be relevant in assessing safety issues. HG

—Mariann Garner-Wizard

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Table 2. Herbs with Moderately Severe AEs, According to 15 SRs.

South African geranium	<i>Pelargonium sidoides</i> , Geraniaceae
Aloe	<i>Aloe vera</i> , Xanthorrhoeaceae
Peppermint	<i>Mentha × piperita</i> , Lamiaceae
Alfalfa	<i>Medicago sativa</i> , Fabaceae
Black cohosh	<i>Actaea racemosa</i> syn. <i>Cimicifuga racemosa</i> , Ranunculaceae
Blue cohosh	<i>Caulophyllum thalictroides</i> , Berberidaceae
Saw palmetto	<i>Serenoa repens</i> , Arecaceae
Dandelion	<i>Taraxacum officinale</i> , Asteraceae
Tea	<i>Camellia sinensis</i> , Theaceae
Guggul	<i>Commiphora mukul</i> , Burseraceae
Hoodia	<i>Hoodia gordonii</i> , Apocynaceae
European mistletoe	<i>Viscum album</i> , Viscaceae
Red clover	<i>Trifolium pratense</i> , Fabaceae
Stevia	<i>Stevia rebaudiana</i> , Asteraceae
New Zealand green-lipped mussel	<i>Perna canaliculus</i> , Mytilidae

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Meta-Analysis of Chinese Clinical Trials Suggests Berberine Efficacy in Lowering Blood Lipids

Reviewed: Dong H, Zhao Y, Zhao L, Lu F. The effects of berberine on blood lipids: a systemic review and meta-analysis of randomized controlled trials. *Planta Med.* 2013;79(6):437-446.

Hyperlipidemia is characterized by excess cholesterol and triglycerides (known collectively as lipids) in the blood. Hyperlipidemia increases the risk of stroke and heart attack. Berberine is an isoquinoline alkaloid isolated from several medicinal plants* and is used in China to treat hyperlipidemia and type 2 diabetes. The purpose of this meta-analysis was to evaluate the efficacy and long-term safety of berberine in the regulation of blood lipids.

The following electronic databases were searched from their establishment through April 2012: Medline[®], Embase[™], the Cochrane Library, the China Hospital Knowledge Database (CHKD), the Wanfang database, and various databases of ongoing trials. There were no language restrictions, but the search was limited to clinical trials. The following search terms were used: berberine, lipids, human, *Huang Lian Su*, *Xiao Bo Jian*, *Xue Zhi*, and *Zhi Xue*. *Huang Lian Su* and *Xiao Bo Jian* are the names of a single chemical entity of berberine in Chinese. *Xue Zhi* and *Zhi Xue* mean “blood lipids” in Chinese. Reference lists from articles also were searched. Two independent reviewers selected articles. The inclusion criteria were (1) trials whose subjects consumed a berberine monopreparation alone or with other pharmaceutical agents for $\geq$ four weeks; (2) randomized controlled trials (RCTs) with either a parallel or crossover design; (3) trials in which berberine was used as the active treatment intervention; and (4) trials in which the data of berberine impact on blood lipid profiles — including triglycerides (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL), and high-density lipoprotein cholesterol (HDL) — could be obtained from the study publication. Studies using berberine-containing herbs or extracts in lieu of berberine as a single chemical entity were excluded. Study quality was assessed using the Jadad scale. The effects of berberine intake on blood lipids were calculated as differences between the berberine group and the non-berberine control group.

Eleven studies, with a total of 874 patients, met the inclusion criteria and were incorporated into the meta-analysis. They were published between 2004 and 2012, and all studies originated in China (four written in English and seven in Chinese). The primary diagnoses for patients in the studies were type 2 diabetes (four studies), type 2 diabetes plus hyperlipidemia (one study), impaired glucose tolerance plus hyperlipidemia (one study), hyperlipidemia (two studies), hypercholesterolemia (two studies), and polycystic ovarian syndrome plus insulin resistance (one study). One of two berberine formulations were used for all of the stud-

ies — berberine chloride tablets (10 studies, manufacturer not reported) and berberine chloride liposome capsules (one study, manufacturer not reported). The dose and duration typically ranged from 0.9 g to 1.5 g for eight to 16 weeks, with one study using 0.6 g daily and one study having a duration of 52 weeks. Nine studies were of poor quality (Jadad score $<$ three), and only two were of high quality.

The pooled results for the 11 studies show that the berberine groups, compared with the control groups, had statistically significant reductions of TC ($P < 0.00001$), TG ($P < 0.00001$), LDL ($P < 0.00001$), and HDL ($P < 0.001$). In a subgroup analysis, berberine plus the pharmaceutical statin drug simvastatin — compared with simvastatin alone (two pooled studies) — significantly improved TC ($P=0.02$), TG ($P 0.02$), LDL ($P=0.02$), but had no effect on HDL. The individual studies did not report whether the effect size was large enough to reduce the risk for coronary heart disease (CHD). The pooled data showed a 25 mg/dL reduction in LDL that is statistically significant compared to control. The authors argue that this level of reduction is clinically meaningful based on ATPIII (Adult Treatment Panel III) guidelines (i.e., CHD relative risk is reduced by 30% for every 30 mg/dL reduction in LDL). Pooled adverse effects in patients taking berberine included mild diarrhea, abdominal distention, bitter taste, and mild-to-moderate constipation; there was no significant difference with controls for the incidence of adverse effects. Three studies reduced the dose during the study due to gastrointestinal discomfort.

The authors conclude that berberine may be effective in controlling blood lipid levels. Repeated oral administration of 0.3 g berberine three times per day decreased the liver enzymes cytochrome P450(CYP)2D6, CYP2C9, and CYP3A4 activities in healthy subjects, and the doses used in three of the included studies were as great and in seven were higher; therefore, potential herb-drug interactions should be considered. The safety of berberine needs additional evaluation. An important limitation of this meta-analysis was that nearly all of the included data came from studies of relatively poor quality (nine studies out of 11), which limits the reliability of the conclusions of the meta-analysis. Also, the authors note that these studies, performed exclusively on subjects of Chinese ethnicity, might not be applicable to populations of other ethnic origins. HG

—Heather S. Oliff, PhD

*Berberine is found in the following medicinal plants: the roots of barberry (*Berberis* spp., Berberidaceae), goldthread (*Coptis* spp., Ranunculaceae), and goldenseal (*Hydrastis canadensis*, Ranunculaceae).

Anti-Anxiety Activity of Zembrin® Sceletium Extract in Humans

Reviewed: Terburg D, Syal S, Rosenberger LA, et al. Acute effects of *Sceletium tortuosum* (Zembrin), a dual 5-HT reuptake and PDE4 inhibitor, in the human amygdala and its connection to the hypothalamus. *Neuropsychopharmacology*. August 2013; [epub ahead of print]. doi: 10.1038/npp.2013.183.

Sceletium (*Sceletium tortuosum*, Aizoaceae) is a plant indigenous to South Africa with psychotropic (mood-altering) properties. Preliminary studies suggest that it may help alleviate anxiety and depression. Sceletium has been reported to work by inhibiting serotonin (5-hydroxytryptamine; 5-HT) reuptake transporters and selectively inhibiting phosphodiesterase-4 (PDE4) enzyme subtypes in the central nervous system (CNS). These actions may be synergistic. Many conventional pharmaceuticals that treat anxiety and/or depression work on the 5-HT transporter; however, inhibition of PDE4 enzymes would be a new mechanism for psychotherapeutic drugs, and preliminary animal data look promising.

The amygdala is an area of the brain associated with threat detection and regulation of fear and anxiety. Researchers can assess acute anxiety by conducting functional magnetic resonance imaging (fMRI) of the brain to measure anxiety-related amygdala activation, and the subsequent connectivity of the amygdala with the cortical and/or subcortical threat circuit. Hence, the purpose of this small, double-blind, placebo-controlled, crossover study was to evaluate the acute anxiolytic effects of a single dose of sceletium extract during amygdala neurocircuitry stimulation.

The study included healthy undergraduate students (n=16, aged 18 to 21 years, with equal participants of both sexes) from the University of Cape Town in South Africa

Sceletium Sceletium tortuosum. Photo ©2013 Tommi Nummelin



who were right-handed, non-medicated, had no history of neurological disease or psychopathology, and had normal or corrected-to-normal vision. Subjects received either sceletium (25 mg Zembrin®; HG&H Pharmaceuticals; Bryanston, South Africa) or placebo two hours prior to undergoing the fMRI scan.

Zembrin is a standardized extract of the aerial plant parts of sceletium extracted with 70% ethanol, which is spray-dried onto maltodextrin. It contains four active alkaloids, including: mesembrenone, mesembrenol, mesembranol, and mesembrine. Each tablet contains the equivalent of material derived from 50 mg of the dried aboveground plant. There was a five-to-nine day washout period between treatments for each subject. During the scan, subjects performed the two following tasks: the perceptual-load task (PLT) and the emotion-matching task (EMT). The PLT assesses anxiety-related amygdala activity (subjects identify letters on faces that are either neutral or with a fearful expression to induce anxiety). The EMT is a reliable amygdala activator (subjects match either ovals or faces expressing anger or fear) and is used to assess amygdala-hypothalamus coupling.

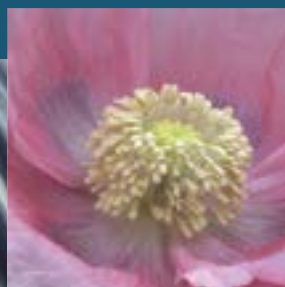
During the PLT test, amygdala reactivity to facial fear under low-load conditions was significantly reduced after sceletium administration compared with placebo

($P=0.020$). As expected, the EMT test showed activation of the midbrain, hypothalamus, amygdala, and ventro-medial prefrontal cortex/orbitofrontal cortex (vmPFC/OFC). During the EMT test, there was a significant decrease in functional connectivity between the amygdala and the hypothalamus after sceletium administration compared with placebo ($P=0.034$). Sceletium treatment did not affect the connectivity between the amygdala and the midbrain or vmPFC/OFC. No general subjective mood effects were observed.

The authors conclude that Zembrin, compared to placebo administration, reduces anxiety-related amygdala reactivity and decreases amygdala-hypothalamus coupling in the subcortical threat circuit. Although there were no general subjective mood effects, the authors state that the effects reflect a reduction of responsiveness of the threat system related to the anxiolytic properties of sceletium. These results help support sceletium's proposed neurological mechanism of action and provide further rationale for exploring potential therapeutic efficacy in future clinical trials. HG

—Heather S. Oliff, PhD

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American Ginseng Root Clinically Safe and Effective for Reducing Cancer-Related Fatigue

Reviewed: Barton DL, Liu H, Dakhil S, et al. Wisconsin ginseng (*Panax quinquefolius*) to improve cancer-related fatigue: a randomized, double-blind trial, N07C2. *J Natl Cancer Inst.* August 2013;105(16):1230-1238.

Cancer-related fatigue (CRF) can severely disrupt the lives of both those recovering from cancer and patients currently receiving cancer treatment. Although standard medications such as psycho-stimulants have been studied for the treatment of CRF, clinical studies have not confirmed their efficacy. Both American ginseng (*Panax quinquefolius*, Araliaceae) and Asian ginseng (*P. ginseng*) have been used in Traditional Chinese Medicine as adaptogens, among other uses. Compounds known as ginsenosides, found in ginseng, are broadly bioactive.¹ This randomized, double-blind, placebo-controlled study was based on a prior clinical pilot study of American ginseng for patients with CRF. In the pilot study, American ginseng with 5% ginsenoside content was given to participants in 750, 1000, or 2000 mg doses for eight weeks versus a placebo. The results from that trial showed that 1000 and 2000 mgs of *P. quinquefolius* were most efficacious at four and eight weeks compared to placebo.² Based on these results, this larger study investigated the efficacy and tolerability of 2000 mg daily of American ginseng with a reported level of 3% ginsenosides in patients with CRF. (The ginseng root material was further assessed for “quality” and “potency” by an unnamed company.)

Enrolled patients were randomly assigned to either active treatment (2000 mg daily of ground American ginseng root commercially cultivated in Wisconsin) or a rice powder placebo for eight weeks, taken in the morning and noon. American ginseng and placebo were procured from the Ginseng Board of Wisconsin (Wausau, WI) and produced with good manufacturing practices (GMPs) by Beehive Botanicals in Hayward, WI.

Patients with CRF (having a score $\geq$ [greater than or equal to] four using a scale ranging from 0=no fatigue to 10=severe fatigue) present one month or more prior to the study were included as long as their cancer diagnosis was made within the preceding two years. Patients with brain tumors or central nervous system lymphoma and those with a score of four or higher for pain or insomnia using the scale above were excluded. Also excluded were those taking steroids, opioids, ginseng, or other treatments for fatigue. The randomization process controlled for baseline fatigue, recurrent fatigue, cancer treatment type and length, and tumor characteristics.

An impact score on the Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF) at four weeks was the primary outcome. This scale rates fatigue from 0 (no fatigue) to four (extreme fatigue). Change in scores on the Profile of Mood States (POMS) fatigue-inertia and vigor-activity subscales and the Brief Fatigue Inventory (BFI) scale were secondary outcomes. These assessments were administered at baseline, four, and eight weeks into the study. Patients described the type and severity of adverse side effects at the study's start and weekly thereafter. Study administrators also gauged adverse side effects during clinic visits. Scales from 0-10 were used to assess fatigue, pain, and sleep quality.



American Ginseng *Panax quinquefolius*.
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Initially, 364 patients were enrolled, with 133 patients in the treatment group and 128 patients in the placebo group completing the study (n=261). At the four-week primary endpoint analysis, 147 patients were in the treatment group, and 153 patients were in the placebo group (n=300). At baseline, no differences were observed between groups' fatigue assessments or demographic measurements. At four weeks into the study, the change in the MFSI-SF in those in the treatment group was a non-significant difference of 14.4 ± 27.1 as compared with 8.2 ± 24.8 for those in the placebo group ($P=0.07$). The difference in score change at eight weeks, however, was significant (20 ± 27 vs. 10.3 ± 26.2 , treatment group vs. control group, respectively; $P=0.003$).

After eight weeks of treatment, the MFSI-SF physical subscore change from baseline was significantly greater in those in the treatment group as compared to the placebo group (3.0 ± 17.9 vs. -1.7 ± 18.2 , $P=0.004$). This also was observed with MFSI-SF total score change from baseline at the end of the study (6.7 ± 4.0 vs. 3.7 ± 14.6 , $P=0.02$). The change from baseline in POMS fatigue inertia scores after eight weeks of treatment also was significantly greater in the treatment group as compared to the placebo group (18.6 ± 24.8 vs. 10.2 ± 26.1 , $P=0.008$).

While the BFI total score was not significantly different between groups, the subscores for "worst fatigue" and "fatigue now" after eight weeks of treatment in the ginseng group were significantly improved as compared to the placebo group (P value and data not reported). Additionally, when only those patients undergoing cancer treatment were compared in both groups, the percentage change in MFSI-SF score

from baseline of those in the treatment group was significantly more than that of the placebo group after both four and eight weeks ($P=0.02$ and 0.01 , respectively).

Adverse side effects that occurred more frequently than 1% included agitation, anxiety, insomnia, nausea, and vomiting, while nervousness, sleep disturbances, and loose stools were also noted. The adverse effects of greater frequency were not significantly different between groups, suggesting that American ginseng supplementation seems well tolerated but does not alleviate adverse side effects inherent to this population. Both loose stools and pain were worse after baseline but occurred only in the placebo group over the course of the study.

In conclusion, this study reports the safety and efficacy of eight weeks of American ginseng supplementation for the alleviation of CRF. The authors state that these results were “clinically meaningful” (more than 10 points difference using a scale from 0 to 100). Due to the significant improvement in fatigue in those undergoing current cancer treatment versus those who had completed chemotherapy, American ginseng may be a possible treatment for CRF. Stated strengths of the study include its randomized and double-blind design, and that fatigue was distinguished from sleep deficit or pain. The authors cited the study’s limited duration and general difficulty of measuring fatigue as weaknesses.

Variations among studies of efficacy measures — such as improvement of BFI — may be due to variable concentrations of ginsenosides, which can result from agricultural inconsistencies and lack of content standardization during processing. Ideally, future studies also should investigate potential herb-drug interactions with chemotherapy. In summary, this study suggests that American ginseng may be a well-tolerated treatment of CRF, particularly during cancer treatment, for which no other pharmacotherapy has shown significant clinical benefit. HG

—Amy C. Keller, PhD

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American Ginseng *Panax quinquefolius*. Photo ©2013 Steven Foster



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Pelargonium Extract Safe and Effective as Adjunct in Managing Chronic Obstructive Pulmonary Disease

Reviewed: Matthys H, Pliskevich DA, Bondarchuk OM, Malek FA, Tribanek M, Kieser M. Randomised, double-blind, placebo-controlled trial of EPs 7630 in adults with COPD. *Respir Med.* 2013;107(5):691-701.

Chronic obstructive pulmonary disease (COPD) is a condition that entails persistent and usually progressive airflow blockage. It is not fully reversible, and it is associated with an abnormal inflammatory response of the lungs to noxious particles or gases. Acute exacerbations (worsening of symptoms like breathlessness, cough, and/or sputum production) can lead to death.

EPs 7630 (Umckaloabo®, Dr. Willmar Schwabe GmbH & Co. KG; Karlsruhe, Germany) is an herbal preparation from *Pelargonium sidoides* (Geraniaceae) root. EPs 7630 is an 11% per weight ethanol extract of the dried root (plant-solvent ratio 1:8-10) that has been shown in vitro to have anti-infective and immunomodulatory activity. In addition, a systematic review and meta-analysis of randomized controlled clinical trials revealed that EPs 7630 is more effective than placebo in treating acute bronchitis.¹ The purpose of this multicenter, randomized, placebo-controlled, double-blind study was to evaluate whether EPs 7630, as an add-on therapy, prolongs time to first exacerbation and reduces exacerbation frequency compared to placebo in patients being treated for moderate-to-severe COPD.

The study was conducted in 18 centers in Kiev and Lugansk, Ukraine. It included patients (n=200, 18 years and older) with a history of chronic bronchitis (characterized by cough and sputum production on most days for $\geq$ [greater than or equal to] three months per year for at least two consecutive years), stable disease, $\geq$ three exacerbations in the prior 12 months, and a forced expiratory volume during one second

(FEV1) less than 80% and $\geq$ 30% of predicted normal value (COPD-II/III). The spirometry for grading and reversibility testing of patients with COPD was performed $\geq$ six hours after the last inhalation of the combined conventional pharmaceutical drugs ipratropium bromide and fenoterol. Only patients with an improvement of FEV1 $\leq$ [less than or equal to] 0.3 liters after two puffs of ipratropium bromide/fenoterol were included in the study.

There were numerous major exclusion criteria: relevant cardiac diseases; pneumonia; active pulmonary tuberculosis; cystic fibrosis; bronchiectasis; lung cancer; asthma; infiltrates or other abnormalities of the lungs; COPD-IV; acute exacerbation within 4 weeks; known concomitant bacterial infection or respiratory tract infections; AIDS; concomitant medication with beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, regular inhalative glucocorticoids (except COPD-III) or oral glucocorticosteroids (except during exacerbation); use of anticholinergics (except ipratropium bromide), beta-2-agonists (other than salmeterol or fenoterol), analgesics (except acetaminophen), mucolytics and antitussives (other than dextromethorphan/bromhexine/ammonium chloride), immune modulators (e.g., bacterial vaccines) or coumarin derivatives; known alcohol or drug abuse; tendency to bleed; gastrointestinal disorders; immunosuppression; and severe heart, renal, or liver diseases.

Patients received standard treatment for COPD. Specifically, inhalation baseline-treatment for COPD-II included regular salmeterol, and ipratropium bromide/

fenoterol as needed; for COPD-III, treatment included salmeterol and budesonide regularly and ipratropium bromide/fenoterol as needed. In the event of exacerbations, additional oral prednisolone and the antibiotics amoxicillin/clavulanic acid or ofloxacin were prescribed. As an add-on therapy, patients received either 30 drops three times a day of placebo orally or EPs 7630 for 24 weeks. The primary efficacy variable was time to first exacerbation of COPD. Exacerbations were defined as a subjective increase in $\geq$ one chronic symptom over baseline; these included increased sputum production, sputum purulence (yellow pus), and/or dyspnea (shortness of breath) that required an extra visit to the doctor (moderate exacerbations) or an increased use of $\geq$ two-fold mean doses of ipratropium bromide/fenoterol for five consecutive days due to increased respiratory symptoms, self-managed by the patient (mild exacerbations). Secondary efficacy variables were number and duration of exacerbations during treatment, health status, patient satisfaction with treatment, and duration of inability to work.

Compliance was nearly 100% in both groups. The median time to first exacerbation was 57 days in the EPs 7630 group and 43 days in the placebo group ($P=0.005$). When evaluating mild and moderate exacerbations separately, the time to moderate exacerbation was significantly greater with EPs 7630 than with placebo ($P<0.0001$), whereas the time to mild exacerbation was not significantly different between groups. The probability of remaining free of exacerbations was significantly greater for the EPs 7630 group than the placebo group ($P=0.005$). The median duration of moderate exacerbations was about one day shorter in the EPs 7630 group.

Additionally, significantly fewer patients in the EPs 7630 group needed antibiotic treatment during exacerbations compared to placebo patients ($P<0.0001$; 37.8% and 73.3%, respectively), and antibiotic

treatment had a shorter mean duration ($P=0.0466$; 8 days and 9.8 days, respectively). After 24 weeks, patient satisfaction with treatment was significantly higher with EPs 7630 compared to placebo ($P<0.0001$). The EPs 7630 group had a significantly lower average number of missed work days during a mild or moderate exacerbation compared with the placebo group ($P=0.004$; 1.97 and 4.08 days, respectively). Also, the mean total number of days off work due to exacerbations during the study was significantly less in the EPs 7630 group than placebo ($P<0.001$; 2.96 vs. 7.17 days, respectively).

A total of 51.5% of patients taking EPs 7630 suffered from adverse events (AEs) compared with 40.0% of patients taking placebo. A causal relationship between AEs and EPs 7630 could not be excluded for 18 patients but was assessed as unlikely. Gastrointestinal disorders were the most frequently reported system organ class for which a causal relationship could not be excluded.

The authors conclude that EPs 7630 add-on therapy was superior to placebo, particularly for moderate exacerbations, as measured by less consumption of antibiotics, improved quality of life, and fewer days of missed work. Health economic studies are needed to determine whether using EPs 7630 as an add-on therapy provides a benefit in terms of both patient outcomes and financial concerns (i.e., taking into consideration cost of treatment, healthcare utilization, loss of productivity, and mortality rate). HG

—Heather S. Oliff, PhD

Reference

1. Oliff HS. *Pelargonium sidoides* use for acute bronchitis. *HerbClip*. September 15, 2008 (No. 050583-360). Austin, TX: American Botanical Council. Review of *Pelargonium sidoides* for acute bronchitis: a systematic review and meta-analysis by Agbabiaka TB, Guo R, Ernst E. *Phytotherapy* 2008;15(5):378-385.

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ADOPT - AN - HERB

HerbMedPro™

P R O G R A M

Cranberry *Vaccinium macrocarpon*. Photo ©2013 Steven Foster



The American Botanical Council's Adopt-an-Herb Program provides a mutually beneficial opportunity to support ABC's nonprofit educational efforts and promote a company's most important herbs.

One of the benefits of supporting the Adopt-an-Herb Program is that it ensures that the most current information on the adopted herb is available through ABC's powerful HerbMedPro® database.

HerbMedPro provides online access to abstracts of scientific and clinical publications on nearly 250 commonly used medicinal herbs. A free version, HerbMed, is available to the general public. HerbMed features 20 to 30 herbs from HerbMedPro that are rotated on a regular basis with an emphasis on adopted herbs. HerbMedPro is available as a member benefit to all ABC members at the Academic Membership level and up.

In addition to ensuring that recently published information on an adopted herb is up to date on HerbMedPro, another benefit adopters enjoy is being included among their peers in each issue of ABC's acclaimed quarterly peer-reviewed scientific journal, *HerbalGram*, on the ABC website, and at scientific, medical, and other educational conferences. Press releases also are issued on new adoptions, bringing attention to the program, the adopted herb, and the adopting company. Each adopted herb is featured on its own page on the ABC website.

Beginning in 2008, the Adopt-an-Herb Program has grown to include more than 22 companies and 24 adopted herbs. Parties interested in taking part in the Adopt-an-Herb Program are invited to contact ABC Development Director Denise Meikel at 512-926-4900, extension 120, or by email at denise@herbalgram.org.



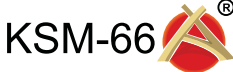
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Founding Herbal Adopters

 HERBALIFE	 Aloe <i>Aloe vera</i>	 THE ACTIVE FACTORY	 Birch <i>Betula, spp.</i>
 CRANE HERB PHARMACY	 Ephedra <i>Ephedra sinica</i>	 Natac Science to Market	 Olive <i>Olea europaea</i>
 THE MEANING OF TEA A TEA-INSPIRED JOURNEY	 Tea <i>Camellia sinensis</i>	 Organix SOUTH INC.	 Neem <i>Azadirachta indica</i>
 NATUROPATHICA HOLISTIC HEALTH	 Arnica <i>Arnica montana</i>	 PHARMATOKA	 Cranberry <i>Vaccinium macrocarpon</i>
 FUTURE CEUTICALS	 CoffeeBerry [®] <i>Coffea spp.</i>	 ECOSO DYNAMICS	 Devil's Claw <i>Harpagophytum procumbens</i>
 KSM-66	 Ashwagandha <i>Withania somnifera</i>	 EuroPharma	 Turmeric <i>Curcuma longa</i>
 INDFRAG	 Garcinia Cambogia <i>Garcinia cambogia</i>	 HG&H Pharmaceuticals (Pty) Ltd.	 Sceletium <i>Sceletium tortuosum</i>
 SCHWABE NORTH AMERICA  Nature's Way  Enzymatic Therapy  INTEGRATIVE THERAPEUTICS	 Black Cohosh <i>Actaea racemosa</i>	 MARS botanical	 Chocolate <i>Theobroma cacao</i>
	 Ginkgo <i>Ginkgo biloba</i>	 RFI	 Hibiscus <i>Hibiscus sabdariffa</i>
	 Hawthorn <i>Crataegus spp.</i>	 SAN FRANCISCO HERB & NATURAL FOOD CO.	 Peppermint <i>Mentha x piperita</i>
	 Umckaloabo <i>Pelargonium sidoides</i>	 SFI	 Bacopa <i>Bacopa monnieri</i>
	 Lavender <i>Lavandula angustifolia</i>	 vitaTECH	 Cinnamon <i>Cinnamomum verum</i>

AMERICAN BOTANICAL COUNCIL

Reflections on 100 Issues of HERBALGRAM

By Steven Foster

In contemplating the 100th issue of *HerbalGram*, I engaged in a process of consecutively looking back through each journal issue, page by page. It was a personal journey, as I have been involved with this publication and its predecessors for my entire adult life, stretching back to 1978. To the twenty-some-things of the current editorial *HerbalGram* staff, who know me as an aging, balding, slightly overweight guy past his mid-50s, please realize that I've been with the publication since I was younger than you are now.

The process of my personal *HerbalGram* retrospective took much longer than originally anticipated. I often stopped to reread an article or, in some instances, read an article for the first time. *HerbalGram* indirectly grew out of an occasional newsletter issued by the then-fledgling, now-defunct Herb Trade Association (HTA), which issued its first *HTA Newsletter* in March of 1978 with Fred Hathaway and Myron Keene as co-editors. By 1979, the *HTA Newsletter* had become *Herb News*, edited by Mark Blumenthal from the Herb Trade Association's office in Austin, Texas, where it had moved from Santa Cruz, California, when Blumenthal became the third president of HTA. Postal distribution of the 32-page publication was limited as evidenced by the fact that the copy in my archives, postmarked January 9, 1980, is hand-addressed in the penmanship of the publication's editor and publisher, Blumenthal.

Herb News quickly evolved. In the summer of 1981, Blumenthal wrote:

"HERB NEWS started about two and a half years ago when I was President of the Herb Trade Association. I

wanted to start a newsletter for the membership to apprise them of what was going on in the association, what new information was available about herbs, new books on the scene, herbal and related conferences, industry and regulatory news, etc... The feedback thus far has been highly favorable. . . . Since the herb movement has gained so much momentum in the past few years, there has been an increasing need for a publication which attempts to funnel much of the information about the herb industry and related matters into one space. We are quite confident that this endeavor will continue to grow, just as the herb movement seems to have no end in sight."*

Blumenthal seemed to be on to something.

By then, *Herb News* was 34 pages with a two-color cover. Blumenthal wanted a mechanism to inform readers about breaking news between issues of *Herb News* (long before the Internet). As a result, in 1983, *HerbalGram* was born as an eight-page newsletter.

To make a long story short, the Herb Trade Association folded, the American Herbal Products Association (AHPA) filled the void, and Blumenthal remained as editor and publisher of *HerbalGram*, with Rob McCaleb as associate editor. *HerbalGram* was published as a joint publication of the Herb Research Foundation (founded by McCaleb and Blumenthal) and AHPA (of which they were founding board members). This arrangement continued until the Summer 1988 issue 17, which became the first issue jointly published by the Herb Research Foundation and the newly formed American Botanical Council. Issues 18 through 53 continued to be jointly published by the two organizations.

* Publisher's Note in *Herb News*, Volume 2, No. 2, Summer, 1981, p. 5.

AMERICAN BOTANICAL COUNCIL HISTORY & HIGHLIGHTS

1983	<i>HerbalGram</i> launches.
1984	South Texas Unit of the Herb Society of America doesn't allow speakers to discuss herbs' medicinal properties; rejects Mark Blumenthal as an "unqualified" speaker.
1988	ABC is one of the first US organizations to write up science-based literature reviews on herbs, beginning with <i>HerbalGram</i> #17's cover story, a sarsaparilla (<i>Smilax</i> spp.) literature review, which dispelled the myth that the herb is an effective source of testosterone as a bodybuilding supplement.
	Blumenthal incorporates ABC as a nonprofit organization.
	James A. Duke, PhD, Norman R. Farnsworth, PhD, and Blumenthal are first Trustees of ABC Board.

In the spring of 2002, with issue 54, *HerbalGram* became solely the journal of the American Botanical Council.

Since its inception as an eight-page newsletter in 1983 to its current iteration as an 80-page, four-color, quarterly hybrid of a scientific/professional journal and attractive magazine, Blumenthal has guided the editorial pen across the published pages of *HerbalGram*.

HerbalGram reflects the diversity of what Blumenthal envisioned as “an herb movement that seems to have no end in sight.” Within the estimated 7,500 published pages of the first 100 issues of *HerbalGram*, one essentially finds the golden key for unlocking the full spectrum of herbal knowledge for the past, present, and future. *HerbalGram* provides an important historical record of the evolution of laws and regulations affecting herbs, herbalists, and herb products over the last 30 years. The evolution of modern herbal science also is reflected in its pages. The coverage has been definitive and often has affected the direction of contemporary herbal thought.

When *HerbalGram* was first published, the late medicinal plant research giant, Prof. Norman R. Farnsworth, PhD, used a rubber stamp on his correspondence that stated “Save the Endangered Species Pharmacognosy.” Now the study of natural products — along with complementary and alternative medical modalities — are normal undergraduate, graduate, and post-graduate education programs at hundreds of universities. *HerbalGram* has been at the forefront of information in a time period during which herbs have emerged from obscurity and fading folk traditions to part of mainstream public healthcare policy developments on a global basis.

Reflective of Blumenthal’s ahead-of-the-curve vision of the herb industry, *HerbalGram* was there to anticipate and reveal trends often before they

were realized elsewhere. For example, adulteration issues were first highlighted in *HerbalGram* in 1983 (in a short piece I wrote warning industry members of the adulteration of skullcap [*Scutellaria lateriflora*, Lamiaceae] with germander [*Teucrium* spp., Lamiaceae]). The publication reflects scientific consensus and controversy in a wide range of academic disciplines and interests — botany, history of pharmacy, history of medicine, ethnobotany, ethnobiology, conservation, sustainable development and right livelihood, phytochemistry, pharmacology, and clinical traditions (mainstream and alternatives: traditional, historical, contemporary) — all in one place, all on one planet. (When *HerbalGram* was first published, very little, if any, of the subjects covered by the journal were covered by the natural food and dietary supplement industry trade magazines of the day. Nowadays, such publications carry articles on herbs and herb-related issues in every edition.)

A unique blend of review articles, public interest pieces, and original peer-reviewed research, *HerbalGram* has been variously referred to as the *Scientific American*, *National Geographic*, and *Reader’s Digest* of herbal periodicals.

HerbalGram is the source for visually rich, scientifically sound, and engaging reading that reflects the depth, breadth, and diversity of the herbal renaissance of the late 20th and early 21st centuries — one of the most important 50 years in the evolution of human understanding of herbs and medicinal plants.

The table below is a subjective list of the items found in each issue that struck me as having an impact, at least on my thinking, and the highlights of what strikes me as most useful or still of interest in each issue. Other readers may have completely different lists, and that’s part of the beauty of *HerbalGram*. There’s something of interest for everyone in each issue. HG



HISTORY & HIGHLIGHTS

1989	Varro E. Tyler, PhD, retires as executive vice-president & provost of Purdue University; joins ABC Board of Trustees.
	ABC publishes “Classic Botanical Reprints,” making available seminal articles on ethnobotany and pharmacognosy.
	The term “nutraceutical” is coined by Stephen DeFelice, MD.
	Bastyr College (now University) becomes first accredited naturopathic school.
	ABC continues to publish important science-based literature reviews on herbs in <i>HerbalGram</i> #18/19, with a cover story on St. John’s wort.
1990	Nutritional Labeling and Education Act (NLEA) passed.
1991	ABC launches HerbClip™ providing summaries and critical reviews of what will eventually amount to thousands of herbal studies.

Issue	Impact	Highlights
#1 <i>Herb News/HerbalGram</i> , Summer 1983 (8 pages)	• "Eucalyptus Repels Fleas"	• US Food and Drug Administration (FDA) reviewed over-the-counter menstrual and aphrodisiac product claims.
#2 <i>Herb News/HerbalGram</i> , Fall/Winter 1983-1984 (8 pages)	• "Celestial Seasonings Recalls Comfrey Tea"	• The Ninth Circuit Court of Appeals struck down the FDA's longstanding interpretation of the "Grandfather Clause," exempting common foods from food-additive status, which was viewed as the most significant legal decision affecting herbs in 25 years.
#3 <i>HerbalGram</i> , Spring 1984 (8 pages)	• <i>Sassafras</i> (<i>Sassafras albidum</i>) has antibacterial activity.	• World Health Organization studied antifertility plants. • Feverfew (<i>Tanacetum parthenium</i>) revealed for migraine alleviation.
#4 <i>HerbalGram</i> , November 1984 (12 pages)	• "Mislabeled Remedy Recalled"	• Report on FDA recall of "SupHerb," an "herbal product" containing indomethacin, hydrochlorothiazide, and diazepam. • James A. Duke, PhD, presented a special report on alternative approaches to treating gout.
#5 <i>HerbalGram</i> , Spring 1985 (12 pages)	• "Herb Traders Beware!" • FDA sues retailer General Nutrition Centers (GNC).	• A brief notice suggesting that <i>Echinacea purpurea</i> root products may be adulterated with <i>Parthenium integrifolium</i> published; the first modern notice on this important adulteration issue of the late 1980s and early '90s. • Lead article by Loren Israelsen detailed how FDA indicted GNC executives and retail-store managers on conspiracy to defraud the FDA and its regulatory authority, revealing a pattern of FDA overstepping its authority.
#6 <i>HerbalGram</i> , Summer 1985 (12 pages)	• "Ginseng Trade Association Formed"	• Report that 25 ginseng growers in Wausau, Wisconsin, form The Ginseng Trade Association. • In a related story, the Ginseng Research Institute (of South Korea) declined to hold an International Ginseng Symposium in the United States.
#7 <i>HerbalGram</i> , Fall 1985 (12 pages)	• "Meeting with Senator's Staff"	• On August 29, 1985, representatives from AHPA met with a staffer of Sen. Orrin Hatch (R-Utah) to explore a legislative initiative in the public interest regarding the use of herbs. This led to 28 years of a close working relationship between Sen. Hatch and the herbal community.
#8 <i>HerbalGram</i> , Winter 1986 (12 pages)	• "High Pharmaceutical Prices Call for Government-Sponsored Natural Drug Research"	• James A. Duke, PhD, profiled.
#9 <i>HerbalGram</i> , Spring 1986 (12 pages)	• "Canadian Panel Makes Recommendations on Herb Usage" • "Methods in Phytochemistry"	• Loren Israelsen reported on the Expert Advisory Committee on Herbs and Botanical Preparations, established in 1986, along with an analysis of the legal issues and opportunities. • Canadian expert panel on herb use formed.
#10 <i>HerbalGram</i> , Summer/Fall 1986 (16 pages)	• "Major FDA Policy Shift on Herbs"	• Loren Israelsen reported that on July 1, 1986, FDA issued a new policy guidance replacing the infamous and widely criticized November 1, 1980 "List of 27 Unsafe Herbs" used to enforce regulatory actions. It shifted to a "case-by-case" regulatory strategy.

HISTORY & HIGHLIGHTS

1991	ABC begins producing "Botanical Booklets" covering popular herbs for consumers, journalists, et al.
1992	ABC creates herbal notecards.
	ABC initiates the Pharmacy Continuing Education Program.
1993	ABC initiates Ginseng Evaluation Program to review North American ginseng products to determine if product contents meet label claims.
	ABC begins translation, editing, and databasing for <i>The Complete German Commission E Monographs</i> (1998).
	ABC creates extensive mail-order catalog containing science-based, technical, and hard-to-find medicinal plant books, videos, etc. Of the catalog, Dr. Farnsworth said, "Just reading the ABC Catalog is an education in itself."
	ABC offers first on-site Pharmacy Continuing Education Program courses on herbal medicine.

Issue	Impact	Highlight
#11 <i>HerbalGram</i> , Winter 1987 (16 pages) • First consecutively numbered issue.	• "Plant Drugs in the 21st Century"	• <i>HerbalGram</i> issued a special six-page reprint of the Varro E. Tyler, PhD, article, "Plant Drugs in the 21st Century," originally published in <i>Economic Botany</i> in June 1986. Dr. Tyler introduced <i>HerbalGram</i> readers to the German regulatory doctrine of reasonable certainty of safety and efficacy based on historical use and product experiences.
#12 <i>HerbalGram</i> , Spring 1987 (16 pages)	• Introduced "Father Nature's Pharmacy" column by James A. Duke, PhD.	• ABC founding board member and longtime ABC ally, Dr. Duke outlined why he believes multi-herbal preparations are preferable to synthetic "silver-bullets."
#13 <i>HerbalGram</i> , Summer 1987 (16 pages)	• Court ruled on evening primrose (<i>Oenothera biennis</i>).	• An invited article on the economic impact of herbs by Portia Meares, the late publisher and editor of <i>BuSiness of Herbs</i> , detailed economic factors impacting herb markets (such as the Chernobyl disaster). This was the first of many important articles on herbal economic issues in <i>HerbalGram</i> .
#14 <i>HerbalGram</i> , Fall 1987 (16 pages)	• "Celestial Seasonings Sold to Lipton, Inc."	• This front-page story portended the now well-entrenched trend of herbal and natural product companies being purchased by mainstream corporate giants and investment groups.
#15 <i>HerbalGram</i> , Winter 1988 (24 pages)	• "Major Herb Conference in Thailand"	• Much of the issue was devoted to a report by Rob McCaleb on the First Princess Chulabhorn International Congress on Natural Products with more than 1,000 attendees from around the globe.
#16 <i>HerbalGram</i> , Spring 1988 (24 pages)	• Interview with I. I. Brekhman, MD.	• Rob McCaleb conducted the first American press interview with Dr. Brekhman, then the world's leading authority on adaptogens and eleuthero (<i>Eleutherococcus senticosus</i>).
#17 <i>HerbalGram</i> , Summer 1988 (28 pages)	• Interview with Professor Hildebert Wagner, PhD.	• Herbalist Christopher Hobbs wrote a literature review on sarsaparilla (<i>Smilax</i> spp.) in what was to become the first of many comprehensive literature reviews on various herbs, elevating <i>HerbalGram</i> to an important go-to source for definitive herbal information. It also debunked the market claims that the herb contained testosterone.
#18-19 <i>HerbalGram</i> , Fall 1988/Winter 1989 (two issues combined, 48 pages) • This was the first issue published under the aegis of the American Botanical Council, founded in November 1988. It was also the first issue to transform <i>HerbalGram</i> from black-and-white to a color publication; a completely new look was introduced to <i>HerbalGram</i> readers.	• St. John's wort reviewed by Christopher Hobbs. 	• Nearly a decade before St. John's wort grew to mass-market fame in the United States, Christopher Hobbs presented a comprehensive review of the botany, history, chemistry, pharmacology, and clinical applications of this important herb.
#20 <i>HerbalGram</i> , Spring 1989 (52 pages)	• Review of feverfew and its modern rediscovery.	• Following reports of clinical trials on the successful use of feverfew for the treatment of migraines in the UK, Christopher Hobbs provided readers with a comprehensive review of the herb's botany, history, chemistry, pharmacology, clinical studies, and more.
#21 <i>HerbalGram</i> , Fall 1989 (52 pages)	• Valerian (<i>Valeriana officinalis</i>) literature review.	• Christopher Hobbs presented a comprehensive review of the historical and scientific literature on valerian as it gained popularity among herb consumers.

HISTORY & HIGHLIGHTS

1993	ABC begins co-sponsoring ethnobotanical eco-tours to the Peruvian Amazon, Machu Picchu, and Costa Rica for continuing education credits for health professionals.
1994	Dietary Supplement Health and Education Act (DSHEA) passed by US Congress.
1995	ABC publishes <i>Common Herbs & Health</i> pamphlets, the first "third-party literature" published in accordance with DSHEA; over one million copies distributed.
	ABC offers first Pharmacy Continuing Education Program home-study courses in herbs and phytomedicines.
1996	ABC initiates Traditional Medicine Research Project to document regulation and approval of herbal medicines in six industrialized nations. Presents the Executive Summary before the President's Commission on Dietary Supplement Labeling.
	ABC produces and co-edits the 1994 proceedings of the National Institutes of Health's Office of Alternative Medicines "Botanicals: A Role in US Healthcare?" Conference.

Issue	Impact	Highlight
#22 <i>HerbalGram</i> , Spring 1990 (52 pages) • <i>HerbalGram</i> was enhanced with new design elements including the addition of four-color photography.	• “Black Pearls Lose Luster” • Hawthorn (<i>Crataegus</i> spp.) literature review. • Canadian regulators indicated development of traditional medicine category within current drug category.	• In an investigative piece, Rob McCaleb and Blumenthal revealed that a Chinese arthritis remedy posing as an all-natural product since the late 1970s contained various prescription drugs not listed on label. • Christopher Hobbs and Steven Foster teamed up for 15-page review of hawthorn. • Blumenthal reported on a Canadian Health Protection Branch policy to develop a “Traditional Herbal Medicines” category under drug regulations.
#23 <i>HerbalGram</i> , Summer 1990 (52 pages)	• “FDA Declares 258 OTC Ingredients Ineffective” • “FDA Collecting Information on Herb Products to Assess Safety” • Comprehensive review of Traditional Chinese Medicine.	• Blumenthal reported on an FDA announcement that 258 over-the-counter (OTC) ingredients were declared ineffective, including prune (<i>Prunus domestica</i>) juice as a laxative. • Blumenthal, in a separate piece, reported on FDA district offices’ collection of information on herb products to assess safety, with comfrey (<i>Symphytum</i> spp.) as the primary target. • Albert Leung, PhD, authored an 11-page review of Chinese herbal medicine.
#24 <i>HerbalGram</i> , Winter 1991 (54 pages) 	• “Harvesting Medicinals in the Wild: The Need for Scientific Data on Sustainable Yields” • “The Need for Cooperation Between Modern and Traditional Medicine” • “European Harmony in Phytotherapy”	• In a report by Steven Foster, <i>HerbalGram</i> took the lead in introducing the need for comprehensive conservation and data collection on wild medicinal plants. • Since its inception, <i>HerbalGram</i> was at the forefront of advocating the importance of science as the underpinning of traditional herb use. Ara H. Der Marderosian, PhD, penned an essay for this issue on the need for cooperation between modern and traditional medicine systems. • Blumenthal introduced <i>HerbalGram</i> readers to the European Scientific Cooperative for Phytotherapy (ESCOP), reporting on its October 20, 1991 symposium; Blumenthal introduced readers to the concept of phytomedicines and phytotherapy from a European perspective. Reprint of proposed ESCOP monograph on chamomile flowers (<i>Matricaria recutita</i>) is included.
#25 <i>HerbalGram</i> , Summer 1991 (54 pages)	• “Comfrey Updates” • Editorial policy statement. • Perspectives on foods as medicine.	• <i>HerbalGram</i> stated and clarified its editorial policy in a one-page statement that applied to the first 25 issues and the 75 issues that followed. • Dennis Awang, PhD, provided clear, scientific detail on the potential toxicity of comfrey pyrrolizidine alkaloids. • Reprinted interviews with the late Herbert F. Pierson, PhD, of the National Cancer Institute. • Dr. Duke discussed designer foods and meals that heal, highlighting the potential of food choices in preventive healthcare.
#26 <i>HerbalGram</i> , Winter 1992 (62 pages)	• “Herbal Cure for the Greenhouse Effect?” • “AHPA Petitions FDA for Approval of Stevia Leaf Sweetener” • Review of mistletoe (<i>Viscum album</i>) and the cardiovascular system.	• <i>HerbalGram</i> published article by Georgia Persinos, PhD, on the potential of various <i>Vernonia</i> species as diluents in oil-based paints to reduce ozone release of volatile organic compounds. • Review article by Inci A. Bowman, PhD, on the effects of European mistletoe is reprinted. • <i>HerbalGram</i> reported on AHPA’s FDA petition to approve stevia (<i>Stevia rebaudiana</i>) as a sweetener.

HISTORY & HIGHLIGHTS

1996	ABC produces Pharmacy Continuing Education teleconference modules commissioned for Wal-Mart pharmacists nationwide.
	ABC’s Mark Blumenthal begins teaching herb class at University of Texas College of Pharmacy.
	ABC initiates internship program for graduating pharmacy and dietetic students.
	California becomes the first state to legalize medicinal cannabis.
1997	<i>Nutrition Business Journal</i> published.
	ABC launches Capital Campaign to purchase Case Mill Homestead for new headquarters.
	ABC purchases the 140-year-old Case Mill Homestead in Austin, Texas.
	ABC publishes “Popular Herbs in the US Market” for pharmacy continuing education; over 100,000 copies published, underwritten by Pharmavite.

Issue	Impact	Highlight
#27 <i>HerbalGram</i>, Summer 1992 (62 pages) • First issue of <i>HerbalGram</i> printed on recycled paper.	• “Focus on Rain Forest Remedies” • “Conservation and Tropical Medicinal Plant Research” • Special issue on New World medicinal plants. • Aztec herbs of 1552. • Herb industry self-regulation.	• Blumenthal highlighted various media stories focusing on medicinal plants of tropical rainforests. • Steven R. King, PhD, presented a contextual story on tropical medicinal plant research and conservation. • The 1552 Aztec herbal, <i>The Badianus Manuscript</i> , was explored by Foster. • Blumenthal reported on AHPA’s efforts at herb industry self-regulation.
#28 <i>HerbalGram</i>, Winter 1993 (70 pages) • <i>HerbalGram</i> printed on recycled, semi-gloss stock to accommodate more pages per issue. 	• “Summary of WHO Guidelines for the Assessment of Herbal Medicines” • Petition to FDA to expand drug policy to include European phyto-medicines. • Moratorium on NLEA regulations. • FDA and AHPA warn of chaparral (<i>Larrea tridentata</i>) toxicity. • Overview of natural products and medicine.	• Olayiwola Akerele’s, MD, summary of World Health Organization (WHO) Guidelines for Herbal Medicines reprinted in this issue. • Blumenthal reported on the European-American Phytomedicines Coalition petition to FDA to expand OTC drug category to include phytomedicines with significant market experience. • US Congress implemented a moratorium on FDA regulations under the Nutritional Labeling and Education Act of 1990 (NLEA). • FDA and AHPA issued warnings on chaparral for potential toxicity. • Dr. Varro E. Tyler placed the need for a new regulatory paradigm in a historical and scientific context.
#29 <i>HerbalGram</i>, Spring/Summer 1993 (70 pages)	• Continued disputes between herb industry and FDA. • Dennis Awang, PhD, on feverfew. • Professor Norman Farnsworth, PhD, on herb safety.	• Blumenthal provided editorial context for disputes between FDA and the herb industry, stating it is incumbent on the FDA to make fundamental changes in attitude while the industry needs to initiate stricter standards. • Dr. Awang sorted out the regulatory and clinical truth on feverfew as a headache treatment following approval for use in the UK. • In a special section, the late Prof. Farnsworth highlighted herb safety, concluding that based on a survey of the scientific literature, herbal medicines do not present a major problem with regard to toxicity.
#30 <i>HerbalGram</i>, Winter 1994 (78 pages)	• Dr. Varro E. Tyler on phytomedicines in Western Europe and their potential in the United States. • Christopher Hobbs’ literature review on echinacea.	• Dr. Tyler presented his thesis on the potential of Western European phytomedicines and their impact in the United States. • In the most comprehensive <i>HerbalGram</i> single-herb monograph to date, Christopher Hobbs presented a 16-page literature review on echinacea in a special supplement section.
#31 <i>HerbalGram</i>, Summer 1994 (78 pages)	• This issue offered insights into traditional herbal medicine with stories on Africa, the Amazon, China, Japan, Polynesia, and Tibet.	• <i>HerbalGram</i> included a collection of articles on various traditional medicine systems from around the world. • Blumenthal reported on the first of many Amazon ethnobotanical tours in which ABC has sponsored or participated.
#32 <i>HerbalGram</i>, Fall 1994 (78 pages)	• US Congress passed Dietary Supplement Health and Education Act of 1994 (DSHEA). • Urine tests for drug use; poppy (<i>Papaver somniferum</i>) seed muffins implicated.	• The US Congress passed DSHEA, creating the regulatory framework in which most herb products are sold in the United States today. Blumenthal’s breaking news report outlined what’s in DSHEA and its implications. • John P. Morgan, PhD, provided an interesting and important report on illicit drug testing urinalysis and metabolite cross-reactivity leading to potential false positives.

HISTORY & HIGHLIGHTS

1997	ABC receives national media attention by addressing two major stories on adulterants in herbal products, including plantain and a product labeled “kava” that contained no kava.
	ABC launches website.
	US Botanic Garden donates truckload of tropical plants to help establish the gardens at ABC headquarters.
	Andrew Weil appears on cover of <i>TIME Magazine</i> .
1998	ABC moves headquarters to Case Mill Homestead.
	ABC hosts 450 people at industry and local community inaugural events of ABC’s new Herbal Education and Research Center.
	ABC publishes <i>The Complete German Commission E Monographs</i> .

Issue	Impact	Highlight
#33 <i>HerbalGram</i> , Spring 1995 (78 pages)	- Follow-up reports and perspectives on regulation following passage of DSHEA. - A special supplement section on remedies from the rainforest.	<i>HerbalGram</i> focused on legal and regulatory perspectives following passage of DSHEA. President Bill Clinton's official statement is reprinted, in which he suggested the legislation brought "common sense" to supplement regulation. - Attorney William R. Pendergast provided a perspective of problems and solutions for FDA and herb industry antagonisms (with comments from Blumenthal). - A special section, "Pharmacy from the Rainforest," reported on the first ABC-co-sponsored trip to the Peruvian Amazon.
#34 <i>HerbalGram</i> , Summer 1995 (86 pages)	<i>Ephedra sinica</i> weight-loss controversy highlighted. - Jamaican ginger adulteration leading to "Jake-leg" paralysis recounted. - European phytomedicines market analysis.	- Blumenthal co-authored a comprehensive review of the botany, chemistry, medicinal uses, and safety concerns of ephedra and its alkaloids. - Reprinted article by John Parascandola on the Jamaica ginger paralysis episode of the 1930s. - Jörg Grünwald presented a comprehensive analysis of the economics and trends of the European phytomedicine market.
#35 <i>HerbalGram</i> , Fall 1995 (86 pages)	"FDA Lifts Import Alert on Stevia" "Pharmacy from the Rainforest," Belize highlighted.	- By 1995, <i>HerbalGram</i> had emerged as the go-to source for perspective on herbal legal and regulatory developments. In this issue, Blumenthal discussed the legal status of stevia. - ABC reported on a "Pharmacy from the Rainforest" trip to Belize. - Rosita Arvigo profiled. - Michael Balick, PhD, National Cancer Institute (NCI) collection efforts in Belize.
#36 <i>HerbalGram</i> , Spring 1996 (78 pages)	"The US Botanical Market: An Overview" - History of Chinese rhubarb (<i>Rheum</i> spp.).	- Peggy Brevoort (longtime ABC Board of Trustees member) wrote an often-cited comprehensive market report on the US botanical market. - Clifford M. Foust, PhD, provided a remarkable overview of the history of Chinese rhubarb and its circuitous route to European markets.
#37 <i>HerbalGram</i> , Summer 1996 (78 pages) 	- Chocolate (<i>Theobroma cacao</i>) and tea (<i>Camellia sinensis</i>) elevated to herbs. - Dr. Tyler elected to ABC Board of Trustees.	- Robert L. Gutman, PhD, and Beung-Ho Ryu, PhD, introduced the health benefits of tea in "Rediscovering Tea: An Exploration of the Scientific Literature." - Leanna K. Potts provided a comprehensive introduction to the emerging health benefits of chocolate in "Chocolate: Past, Present, and Future of Cacao." - Late-breaking news for the issue included an announcement that Dr. Tyler joined founding board members, Blumenthal, Dr. Duke, and Dr. Farnsworth on the ABC Board of Trustees.
#38 <i>HerbalGram</i> , Fall 1996 (78 pages)	<i>HerbalGram</i> covered FDA's power to protect public from unsafe dietary supplements, and other legal issues. - Excerpts from book on the late Harvard ethnobotanist Richard Evans Schultes, PhD.	- By 1996, the often-repeated mantra, "herbs [and dietary supplements] are unregulated," began to resonate from FDA to the American media. Dr. Stephen H. McNamara debunked this myth in his article, "FDA has Adequate Power and Authority to Protect the Public from Unsafe Dietary Supplements." - In this issue, Blumenthal suggested that FDA would soon publish Good Manufacturing Practices (GMPs) required under DSHEA, but a decade would pass before FDA promulgated draft GMPs. - The now-classic Wade Davis, PhD, book, <i>One River: Explorations and Discoveries in the Amazon Rain Forest</i>, is excerpted, detailing the life of Dr. Schultes.

HISTORY & HIGHLIGHTS

1998	"Herbal Medicine Boom" on cover of <i>TIME Magazine</i> .
1999	Doody Publishing, the leading reviewer of medical titles, ranks ABC's <i>The Complete German Commission E Monographs</i> as #2. The title was chosen from more than 3,500 published during 1998 and was the first alternative medicine book to qualify for this award.
	ABC publishes HerbClip-on-CD, 1996-1998.
	Consortium of Academic Health Centers for Integrative Medicine founded.
	ABC hosts 600 people from Austin for a city-wide rainwater harvesting system demonstration at ABC's Case Mill Homestead.
	Michael Balick, PhD, Steven Foster, and Fredi Kronenberg, PhD, join ABC Board of Trustees.
	ABC establishes herbal workshop series for local Austin community.

Issue	Impact	Highlight
#39 <i>HerbalGram</i> , Spring 1997 (86 pages)	• "Kava: An Overview"	• Yadhu N. Singh, PhD, and Blumenthal presented a comprehensive, 24-page overview of kava covering the geographical distribution, mythology, botany, culture, chemistry, and pharmacology of the South Pacific's most important herb.
#40 <i>HerbalGram</i> , Summer 1997 (70 pages)	• "Herbal Monographs" • First American Herbal Pharmacopoeia (AHP) monograph on St. John's wort.	• As the herb market began to mature and become more sophisticated, quality issues became paramount. In a thorough review, Blumenthal explored comprehensive monographs developed by WHO, USP, ESCOP, ABC, and AHP. • <i>HerbalGram</i> reprinted the newly formed AHP's monograph on St. John's wort.
#41 <i>HerbalGram</i> , Fall 1997 (72 pages)	• "President's Commission on Dietary Supplement Labels Issues Final Report" • "Herbs and Healing on Nicaragua's Atlantic Coast"	• McCaleb and Blumenthal provided a detailed analysis of the findings, policy guidance, and recommended proposals to the US Congress in the final report of the President's Commission on Dietary Supplement Labels. • Bruce Barrett, MD, PhD, contributed an extensive original paper on "Herbs and Healing on Nicaragua's Atlantic Coast."
#42 <i>HerbalGram</i> , Spring 1998 (80 pages)	• Special reprint section on the history of botanicals in medicine and pharmacy. • 100 years of botanical medicine in American naturopathy reviewed.	• Excerpt from Barbara Griggs' <i>Green Pharmacy</i> on the Herbalist's Charter of Henry VIII. • Pictorial excerpts from <i>Great Moments in Pharmacy: A History of Pharmacy in Pictures</i> . • Original paper by Francis Brinker, ND, on "The Role of Botanical Medicine in 100 Years of American Naturopathy."
#43 <i>HerbalGram</i> , Summer 1998 (80 pages) 	• Special issue highlighted herbal medicine in Africa.	• Philippe Rasoanaivo and Philippe De La Gorce contributed an extensive original article on essential oils in Madagascar. • Report and photo essay on the ABC "Pharmacy on Safari" workshop in South Africa. • Original article on the harvest, regulation, chemistry, market, cultivation and conservation of pygeum (<i>Prunus africana</i>). • McCaleb reported on US Agency for International Development (USAID)-sponsored hibiscus (<i>Hibiscus sabdariffa</i>) project in Mali and West Africa.
#44 <i>HerbalGram</i> , Fall 1998 (80 pages)	• "Botanical 'Discoveries' of Lewis and Clark" • Issue focused on North American herbs. • Herb Market Review	• Longtime ABC Board of Trustees member Peggy Brevoort contributed her second major market analysis: "The Booming US Botanical Market: A New Overview."
#45 <i>HerbalGram</i> , Winter 1999 (84 pages) • This issue marked a new era for an expanded <i>HerbalGram</i> , introducing a "perfect bound" magazine (allowing for printing on spine). All previous issues of <i>HerbalGram</i> since 1986 had a "saddle-stitched" (stapled) binding.	• "Flax: Ancient Herb and Modern Medicine" • Review of black cohosh for menopause.	• Longtime contributor Steven Foster presented an extensive 16-page literature review of black cohosh (<i>Actaea racemosa</i> , syn. <i>Cimicifuga racemosa</i>). • William J. Haggerty, PhD, detailed the history and science of flax (<i>Linum usitatissimum</i>).

HISTORY & HIGHLIGHTS

2000	ABC publishes <i>Herbal Medicine: Expanded Commission E Monographs</i> .
	ABC publishes HerbClip-on-CD 1996-1999 with a greatly expanded search function.
	ABC establishes electronic content licensing program, expanding the reach of ABC's herbal information through others' websites.
	ABC's <i>Herbal Medicine: Expanded Commission E Monographs</i> receives a four-star rating from Doody Publishing.
	ABC publishes its 50th issue of <i>HerbalGram</i> .
	ABC initiates claim-reviewed advertising in <i>HerbalGram</i> , whereby advertising claims are critically reviewed by ABC staff, Advisory Board members, et al., requiring advertisers to substantiate claims.
2001	ABC launches redesigned website.

Issue	Impact	Highlight
#46 <i>HerbalGram</i> , Spring 1999 (82 pages)	• Contrasted alternative medicine reporting in <i>JAMA</i> and <i>NEJM</i>. • Variations in diversity of forms of botanical products.	• Blumenthal reported on contrasting coverage of herbs and alternative medicine in the <i>Journal of the American Medical Association (JAMA)</i> and the <i>New England Journal of Medicine (NEJM)</i>. <i>JAMA</i> was positive; <i>NEJM</i> was negative. • Dr. Brinker contributed an extensive original paper, "Variations in Effective Botanical Products: The Case for Diversity of Forms for Herbal Preparations as Supported by Scientific Studies."
#47 <i>HerbalGram</i> , Fall 1999 (80 pages) 	• "Issues in Commercialization of Medicinal Plants" • "Heavenly Herbs and Earthly Ailments: Africa as an Ethnopharmacological Treasury" • Update on FDA proposed regulations on ephedrine-containing dietary supplements. • Herbal monographs. • A five-year DSHEA retrospective.	• Steven R. King, PhD, and colleagues provided an insightful analysis of the problems and prospects of the commercialization of medicinal plants as it relates to indigenous rights, intellectual property rights, and conservation issues. • Peter A.G.M. De Smet, PhD, presented a visually rich article on an exhibition of ethnopharmacological objects from Sub-Saharan Africa displayed at the Afrika Museum in Berg en Dal, Netherlands. • Blumenthal covered FDA's proposed regulation on ephedrine-containing dietary supplements, an update on various herbal monograph publications, and a retrospective of DSHEA after five years.
#48 <i>HerbalGram</i> , Spring 2000 (82 pages)	• FDA issued final rules for structure/function claims. • Report on silphium, an extinct contraceptive herb from the ancient world.	• Loren Israelsen and Blumenthal apprised a confused herb industry of the nuance of allowable structure/function claims under DSHEA after FDA issues final rules. • Henry C. Koerper, PhD, and Daniel E. Moerman, PhD, asked if silphium (<i>silphion</i>), an over-exploited Mediterranean plant known as a contraceptive in the ancient world, offered lessons for today. The plant was harvested to extinction.
#49 <i>HerbalGram</i> , Summer 2000 (82 pages)	• Herb/drug interactions. • Excerpt from <i>When Healing Becomes a Crime</i>, the story of Harry Hoxsey's cancer treatment.	• As herb/drug interaction concerns were raised in medical journals and popular media, Blumenthal provided introductory consideration for understanding herb/drug interactions. • An extensive excerpt from Kenny Ausubel's <i>When Healing Becomes a Crime: The Amazing Story of the Hoxsey Cancer Clinics and the Return of Alternative Therapies</i>.
#50 <i>HerbalGram</i> , Fall 2000 (82 pages)	• USP publishes saw palmetto (<i>Serenoa repens</i>) monograph. • Original research on herbal tonics used by cancer patients.	• Blumenthal reported on USP's saw palmetto monograph, with positive comments on the herb from <i>Consumer Reports</i>. • Mary Ann Richardson and colleagues published original findings of an NCI/National Center for Complementary and Alternative Medicine (NCCAM) funded study on patterns of use of Flor-Essence® and Essiac® by cancer patients.
#51 <i>HerbalGram</i> , Winter 2001 (82 pages)	• Focus on fungi. • History of echinacea. • Herbs from Ukraine and Georgia. • Amazon Village Green Pharmacy.	• Paul Stamets contributed to articles on fungi including "New Anti-Viral Compounds from Mushrooms" and "The Ancient Noble Polypore: A Mushroom of Many Mysteries." • Michael Flannery contributed a piece on the history of echinacea leading to its modern use. • Tanya Kuritz, PhD, wrote about medicinal plants from Eastern Europe: Ukraine and Georgia. • Roger Mustalish, PhD, and Rebecca L. Baxter profiled a remarkable green pharmacy in Sucuari in the Peruvian Amazon.

HISTORY & HIGHLIGHTS

2001	ABC becomes a non-voting, member-based organization with new Charter Membership Program.
	ABC's Media Education Campaign launches with distribution of three North American Precis Syndicate (NAPS) releases for ginkgo, saw palmetto, and St. John's wort.
	<i>Natural Health Magazine</i> inducts Blumenthal into its Hall of Fame with 30 international leaders.
	<i>Nutraceuticals World</i> lists Blumenthal among its top-10 innovators in natural health.
2002	ABC launches HerbClip Online and <i>HerbalGram</i> Online.
	Herb Society of America names Blumenthal its honorary president (2002-2004).
	ABC selects Thieme Medical Publishers as the exclusive international distributor of <i>The ABC Clinical Guide to Herbs</i> .
	ABC's Media Education Campaign continues with major press releases on kava and St. John's wort.

Issue	Impact	Highlight
#52 <i>HerbalGram</i> , Spring 2001 (80 pages)	• "AHPA Publishes Guidelines for Botanical Extracts" • FDA and AHPA warn of toxicity associated with <i>Aristolochia</i> species.	• Included papers introducing the Ginseng Evaluation Program and the consistency of standardized ginseng extracts, along with an editorial by Blumenthal on "What is Herb Standardization?" • Dr. Richard Evans Schultes (1915-2001), the "Father of 20th-Century Ethnobotany," remembered by colleagues and students.
#53 <i>HerbalGram</i> , Summer 2001 (80 pages)	• Federal Trade Commission (FTC) cracks down on Internet health claims. • FDA and FTC acted on comfrey as most manufacturers had discontinued selling comfrey products.	• Noel Porter, PhD, introduced manuka oil (<i>Leptospermum scoparium</i>) as a native New Zealand antibacterial. • Michael McGuffin contributed a paper on analytical tools for ensuring herb quality. • Kerry Bone in "Standardized Extracts: Neither Poison nor Panacea" outlined the pros and cons of chemically standardized extracts.
#54 <i>HerbalGram</i> , Spring 2002 (80 pages)	• AHPA announced self-regulation policies on safety labeling and patient disclosure. • Alcoholic herbal extracts deemed not a health problem, as herb industry wins California Prop 65 case.	• Dr. Varro E. Tyler (1926-2001), ABC board member and leading pharmacognosist remembered by friends and colleagues; interspersed with Dr. Tyler's paper, "Herbal Medicine at the Crossroads: The Challenge of the 21st Century" • Subhuti Dharmananda, PhD, presented an extensive essay, "The Nature of Ginseng: Traditional Use, Modern Research and the Question of Dosage." • Paul Stamets contributed an original paper on "Novel Antimicrobials from Mushrooms."
#55 <i>HerbalGram</i> , Summer 2002 (74 pages)	• Paul D. Rubin tackled legal implications of "failure to warn" for herb/drug interactions and suggested guidelines for appropriate labels.	• As the kava liver safety controversy heated up, Blumenthal turned to expert analyses of case reports that showed insufficient evidence to make causal connections. • Eric Yarnell, ND, and Kathy Abascal discussed variability of natural products in an essay on "Dilemmas of Traditional Botanical Research."
#56 <i>HerbalGram</i> , Fall 2002 (74 pages)	 • "White House Commission on Complementary and Alternative Medicine Issues Final Report" • Farm Bill restricted use of the name "ginseng" in commerce to <i>Panax</i> species; "Siberian ginseng" (<i>Eleutherococcus senticosus</i>) relegated to "eleuthero" in the US herb trade.	• In a cover article, Richard P. Brown, MD, Pat Gerbarg, MD, and Zakir Ramazanov, MD, reviewed the traditions and science on <i>Rhodiola rosea</i>. • New science on the emerging field of medicinal mushrooms is reviewed by Solomon P. Wasser, PhD.
#57 <i>HerbalGram</i> , Winter 2003 (74 pages)	• "USP Establishes Botanical Advisory Panel" • "Assessment on Herb-Drug Interactions in Literature Shows Many Case Reports Lack Adequate Information to Determine Reliability" • "European Union Passes Traditional Herbal Medicines Directive"	• Dr. Dennis Awang explored the etymology and definition of "ginseng." • Dr. Bruce Barrett offered a definitive review on the safety of echinacea.

HISTORY & HIGHLIGHTS

2002	ABC adds HerbMedPro™ to content licensing program and as a benefit of membership.
	<i>HerbalGram</i> #56's cover story on <i>Rhodiola rosea</i> introduces the herb to the public.
	ABC receives North American Precise Syndicate Certificate of Excellence for Superior Achievement in Media Relations.
2003	ABC debuts <i>The ABC Clinical Guide to Herbs</i> as reference book and continuing education module.
	Blumenthal makes presentation on herbal medicine to the Herb Society of America, one of the first presentations by HSA on medicinal herbs.
	ABC hosts first Medicinal Herb Fest at its headquarters.
	ABC donates the American Botanical Council Heber Youngken Sr. Medicinal Plant Herbarium (salvaged from the Massachusetts College of Pharmacy) to the Botanical Research Institute of Texas (BRIT).

Issue	Impact	Highlight
#58 <i>HerbalGram</i> , Spring 2003 (74 pages) 	- FDA issued proposed rules for current Good Manufacturing Practices (cGMPs) for dietary supplement manufacturers. - Bioterrorism Act overview and implications reported. - Analysis of 5,700-year-old peyote (<i>Lophophora williamsii</i>) button retained active levels of mescaline.	- Stephen Harrod Buhner offered a guest commentary on arguments against standardization of professional herbalist practice. - Loren Israelsen and Thomas D. Aarts presented a reality check for the herb industry on the possibilities of a post-DSHEA world. - Blumenthal reported on FDA's proposed <i>Ephedra</i> warnings and their implications. - Chapter on chamomile excerpted from <i>The ABC Clinical Guide to Herbs</i>.
#59 <i>HerbalGram</i> , Summer 2003 (80 pages)	- Industry concerned about alleged drug-like manufacturing requirements of FDA's proposed Good Manufacturing Guidelines under DSHEA. - FDA censorship of health claims eroded by court cases supporting free speech.	- An extensive survey of kava use in traditional societies of Pacific Islands by seven experts revealed no links between kava and liver toxicity. - Laurie Erickson, PhD, reviewed research on antioxidant and anti-mutagenic activity of South Africa's rooibos (<i>Aspalathus linearis</i>) tea. - In a guest commentary, Cindy Bloom, PhD, discussed why collections of native spiritual objects for intellectual pursuits are unacceptable.
#60 <i>HerbalGram</i> , Fall 2003 (80 pages)	- Adverse event reports overstated. - FDA adopted AHPA's <i>Herbs of Commerce</i>, 2d ed. as officially recognized source of common names.	- Blumenthal and Richard Kingston untangled the issue of adverse event reporting on herb products, particularly <i>Ephedra sinica</i> and flaws in how data is manipulated and reported. - FDA published notice to adopt AHPA's <i>Herbs of Commerce</i>, 2d ed. as guidance for common names.
#61 <i>HerbalGram</i> , Winter 2004 (80 pages)	- FDA banned ephedra. - St. John's wort served as example of challenges in herb farming; perspective of the late herb grower Marlin Huffman.	- FDA announced ban on ephedra-containing dietary supplement products, which, as Blumenthal stated in his "Dear Reader" column, illustrated that FDA has power to enforce DSHEA. - Peter J. Houghton, PhD, revealed the potential of sage (<i>Salvia officinalis</i>) in Alzheimer's disease research. - Marlin Huffman described challenges in herb farming — the case of St. John's wort.
#62 <i>HerbalGram</i> , Spring 2004 (80 pages)	"British Government Calls for Regulation of Herbal Practitioners and Acupuncturists in UK" - FTC weighed in on deceptive weight-loss advertising.	- Definitive ethnobotanical review of devil's club (<i>Oplopanax horridus</i>), an important medicinal and spiritual plant among indigenous people of the Pacific Northwest. - Review of lycopene (from tomatoes) and its function in human health. - Rakesh M. Amin provided legal perspective on FDA's ephedra ban.
#63 <i>HerbalGram</i> , Summer 2004 (80 pages)	- Tenth anniversary of the passage of DSHEA highlighted. - University of Exeter celebrated 10 years of reviewing scientific studies on complementary and alternative medicine.	- Four original papers detailed botanical standards, chemical references standards, developing standards, and using bioassays for testing activity. - In a guest editorial, Edzard Ernst, MD, lead author of numerous meta-reviews of herbal clinical studies, defended good science on herbs and phytomedicines.

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2003	Consumers receive the first mass-market herb products bearing labels through ABC's Safety Labeling Program, on Pharmavite's Nature's Resource herb line.
	ABC's Media Education Campaign generates 90 million impressions in national media coverage.
	Aveda sponsors fundraiser in New York City to launch <i>The ABC Clinical Guide to Herbs</i> .
	Peggy Brevoort and Morris Shriftman join ABC Board of Trustees.
	Tai Sophia offers its first classes of new masters programs in Herbal Medicine and Applied Healing Arts.
2004	ABC launches ABC Herbal Information Course online with the collaboration of Virgo Publishing.
	ABC launches HerbalEGram, ABC's monthly electronic newsletter for members.
	ABC Safety Assessment Program expands to offer companies marketing herbal dietary supplements the use of ABC's peer-reviewed Safety Assessment Reports.



Issue	Impact	Highlight
#64 <i>HerbalGram</i> , Fall 2004 (80 pages)	• FDA issued final guidance for industry for developing botanical drugs. • WHO approved artemisinin for treatment of malaria in Africa.	• Marie K. Whybark reviewed the growing trend of dietary supplement manufacturers subscribing to third-party independent certifications of manufacturing quality. • Josef Brinckmann informed readers about the creation of social and environmental responsibility in herbal supply chains.
#65 <i>HerbalGram</i> , Winter 2005 (80 pages)	• Tieraona Low Dog, MD, appointed Director of Botanical Medicine at University of Arizona. • Naturally occurring DHEA exempted from ban on dietary supplement designer steroids.	• Kenneth Jones informed readers of the antioxidant and antiobesity potential of purple corn. • Robin DiPasquale, ND, introduced the Aboca Museum's history of herbal medicine in a beautiful photographic essay. • WHO Guidelines on Good Agricultural and Collection Practices reviewed.
#66 <i>HerbalGram</i> , Spring 2005 (80 pages) 	• ABC filed comments on FDA's New Dietary Ingredients draft. • Herb sales reported to be down 7.4% in mainstream markets. • Survey showed 36% of American adults use medical alternatives.	• Dr. Wade Davis shared a sampling from Richard Evans Schultes' <i>The Lost Amazon: The Photographic Journey</i>. • Wolfgang Kathe, PhD, provided details on the revised WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants.
#67 <i>HerbalGram</i> , Summer 2005 (80 pages)	• German government reconsidered kava ban. • Survey showed women want more information on alternative menopause therapies from their doctors.	• Major feature reviewed clinical trials on effectiveness of ginkgo (<i>Ginkgo biloba</i>) preparations in healthy, mentally intact adults.
#68 <i>HerbalGram</i> , Fall 2005 (80 pages)	• Echinacea is the focus of media attention following a negative clinical trial. • St. John's wort extract found to be safer and as effective as Paxil®.	• An article highlighted the history of Ayurvedic medicinal plants and conservation strategies for long-term sustainability. • Historical frescoes from an ancient Greek site revealed saffron's (<i>Crocus sativus</i>) history as a medicinal herb.
#69 <i>HerbalGram</i> , Winter 2006 (80 pages)	• AHPA initiatives on self-regulation announced. • ABC announced the first American Botanical Celebration at Expo West in Anaheim, California.	• AHPA's Michael McGuffin provided a guest editorial on herb industry initiatives to self-regulate herb products against a backdrop of negative press. • Feature on herbal medicines in Belarus looked at post-Soviet-era herb use and development.

HISTORY & HIGHLIGHTS

2004	The average number of monthly visitors to www.herbalgram.org through direct access and ABC electronic content licensees exceeds 85,000, an increase of 59% over 2003.
	ABC adds Herbal Body Care data set to website, underwritten by Tom's of Maine.
	Blumenthal co-authors and edits <i>Rational Phytotherapy</i> 5 th ed., based on the leading text in Germany.
2005	HerbClip™ launches FasTrak articles to deliver timelier studies and articles from the scientific and clinical literature.
	ABC's HerbClip™ launches HerbClip News.
	The average number of monthly visitors to www.herbalgram.org through direct access and our licensees exceeds 165,000.
	ABC introduces Healthy Ingredients online database.
	ABC launches ABC Herbal Information Course 2.

Issue	Impact	Highlight
#70 HerbalGram , Spring 2006 (80 pages) 	Guest editorials: • Dr. Edzard Ernst on “the unaffordable cost of not funding research in herbal medicine.” • Dr. Bruce Barrett on echinacea—a reasonable choice for prevention or treatment of the common cold, but a meta-analysis reinvigorates debate over benefits. • EU Quality Control Guidelines for Traditional Herbal Medicinal Products proposed.	• Blumenthal wrote on government restrictions on wild ginseng root harvest. • Dr. Dennis Awang on star anise (<i>Illicium verum</i>) as the starting material for the flu drug Tamiflu® and securing adequate supplies.
#71 HerbalGram , August - October 2006 (80 pages)	• First warning for liver association with products labeled “black cohosh” issued by Australian regulatory authorities. • Supreme Court upheld the right of religious groups to access the psychoactive South American herb mixture ayahuasca. • WHO surveyed global herbal regulatory schemes.	• Vincent Lebot provided a detailed original article on the diverse factors affecting the quality and safety of kava preparations, exploring the practices in South Pacific communities. • Original paper by J. J. Gagnier, ND, et al. on the CONSORT guidelines to improve the quality of reporting and evaluating randomized controlled trials on herbs.
#72 HerbalGram , November 2006 – January 2007 (80 pages)	• Appeals court upheld ephedra ban. • EU and Health Canada issued liver warnings for “black cohosh” labeled products. • FDA denied medicinal value of smoked marijuana.	• Feature on herbs of Montenegro by Steven Foster. • Review and justification by taxonomists who re-wrote <i>Echinacea</i> taxonomy. • An editorial asked if <i>Echinacea</i> taxonomic reclassification was warranted.
#73 HerbalGram , February – April 2007 (80 pages)	• President signed law requiring reporting of serious adverse events of dietary supplements and OTC drugs. • AHPA developed database of “old dietary ingredients.” • International standards for sustainable harvest of wild medicinal plants developed.	• More on quality criteria for kava by Mathias Schmidt, PhD, and where quality issues may have led to alleged adverse liver events. • Feature on Brazilian women’s efforts to promote sustainable harvest of wild rosewood (<i>Aniba rosaeodora</i>).
#74 HerbalGram , May – July 2007 (80 pages)	• “FDA Approves Special Green Tea Extract as a New Topical Drug for Genital Warts.” • <i>HerbalGram</i> stopped including “authority” citations with botanical names.	• Feature by Kevin Spelman and Jill Yesko on Jamaica’s forgotten Cinchona gardens. • Courtney Cavaliere reported on conservation and illegal harvest of slippery elm (<i>Ulmus rubra</i>) bark.

HISTORY & HIGHLIGHTS

2005	ABC completes Virtual Garden Tour and posts the tour on its website.
2006	ABC coordinates and helps launch first HerbDay event on October 14, 2006, with the HerbDay Coalition of five herbal nonprofits planning grass-root activities nationwide.
	First annual American Botanical Celebration held. ABC gives out inaugural ABC James A. Duke Excellence in Botanical Literature Award and ABC Norman R. Farnsworth Excellence in Botanical Research Award.
	Neil Blomquist joins ABC Board of Trustees.
	ABC publishes new book with the Missouri Botanical Gardens, <i>The Identification of Medicinal Plants: A Handbook of the Morphology of Botanicals in Commerce</i> .
	ABC embarks on a strategic planning process and long-range plan.
	FDA approves the first botanical prescription drug, Veregen® (sinecatechins), from green tea extract.



Issue	Impact	Highlight
#75 <i>HerbalGram</i> , August - October 2007 (80 pages)	• 300th anniversary of the birth of Carl Linnaeus honored by Paul A. Cox, PhD. • US Supreme Court denied appeal of ephedra ban.	• Josef Brinckmann on Peruvian allegations of biopiracy of maca (<i>Lepidium meyenii</i>) and the ethical and legal implications. • Wisconsin American ginseng (<i>Panax quinquefolius</i>) growers fought to protect product reputation and remain in business.
#76 <i>HerbalGram</i> , November 2007 - January 2008 (80 pages)	• "Review of FDA's Final GMPs for Dietary Supplements" • Worldwide growth of naturopathic profession highlighted.	• Extensive featured book review on Paul Stamets' <i>Mycelium Running: How Mushrooms Can Save the World</i>, and implications of the groundbreaking research. • Feature on the revival of traditional healing by Mayans in southern Belize.
#77 <i>HerbalGram</i> , February - April 2008 (80 pages) 	• "USP Opens Facility in China to Test Raw Materials for Dietary Supplements" • Comments on FDA's cGMP interim rule filed by trade organizations.	• Feature on the Botanical Garden of Padua, the world's oldest continuing botanical garden dating from 1545. • ABC released its first Product Specific Monograph on CVT-E002 (COLD-fx™). • Fascinating original pictorial article by Dr. Daniel Moerman on Native American herbal prescription sticks revealed an attempt to record plant prescriptions in the face of genocide.
#78 <i>HerbalGram</i> , May - July 2008 (80 pages)	• ABC acquired HerbMed databases. • Survey found that most physicians and nurses use and recommend dietary supplements. • AHPA provided tools for manufacturers to test for bilberry (<i>Vaccinium myrtillus</i>) adulteration.	• Bradley C. Bennett, PhD, contributed a major feature on the theory of the Doctrine of Signatures through two millennia, providing evidence of its utility as a mnemonic tool, especially in pre-literate societies. • Review on history and principles of Japan's Kampo traditional medicine system and modern research on its ancient formulas.
#79 <i>HerbalGram</i> , August - October 2008 (80 pages)	• Albert Hofmann (1906-2008) eulogized. • Wisdom Natural Brands first to market stevia (Sweetleaf™) as a natural sweetener (rather than dietary supplement) based on GRAS self-determination.	• Feature by Katie Welch, PhD, on the potential of herbs in adjunct treatment of thyroid disease. • Review article on the use and properties of marula (<i>Sclerocarya birrea</i>) oil from southern Africa for cosmetic natural products.
#80 <i>HerbalGram</i> , November 2008 - January 2009 (80 pages)	• ABC released research monograph on POM Wonderful® pomegranate (<i>Punica granatum</i>) juice. • <i>HerbalGram</i> celebrated 25 years!	• Dr. Dennis Awang detailed differences of ginsenosides in both American and Asian ginseng and various product forms. • Lena Bezman, MD, reviewed the quality and content of herbal clinical trials in 21st-century Russian journals.

HISTORY & HIGHLIGHTS

2008	ABC announces first Varro E. Tyler Commercial Investment in Botanical Research Award.
	<i>Natural Foods Merchandiser</i> names Blumenthal a "Natural Legacy."
	ABC acquires HerbMed and HerbMedPro databases from Alternative Medicine Foundation.
	Bernadette Marriott, PhD, joins ABC Board of Trustees.
	ABC's Adopt-an-Herb Program begins; companies underwrite compilation for specific herbs on ABC's HerbMedPro database.
2009	ABC releases series of beautiful, educational e-cards, which are free to members and registered users of the ABC website.
	ABC publishes 4,000th HerbClip.
	HerbClip goes paperless, completely online.

Issue	Impact	Highlight
#81 <i>HerbalGram</i> , February – April 2009 (80 pages)	• “FDA Accepts Safety of Two Stevia Preparations for Food and Beverage Use” • Indiana Botanic Gardens celebrated 100 years. • Enzymatic Therapy becomes part of Schwabe and Nature’s Way.	• Courtney Cavaliere wrote a major original feature on the effects of climate change on medicinal plants. • Researchers surveyed traditional herbal use in border communities of Ciudad Juarez, Mexico, and El Paso, Texas, finding the highest use of herbs for medicinal purposes in any part of the United States.
#82 <i>HerbalGram</i> , May – July 2009 (80 pages)	• Herbal community mourned the loss of three important figures: Madalene Hill, Nina Etkin, PhD, and Michael Moore. • Barriers erected on the rise and fall of <i>Hoodia gordonii</i> as a weight-loss supplement.	• Dr. Francis Brinker provided perspective on managing and interpreting the complexities of herbal research. • Courtney Cavaliere explored the growing market for dietary supplement products for pets and their regulatory challenges.
#83 <i>HerbalGram</i> , August – October 2009 (80 pages)	• “WHO Congress Passes Beijing Declaration on Traditional Medicine” • Survey shows newspapers under-report positive herbal clinical trials, tending toward sensationalizing negative biases.	• Original paper by A. Boesi, PhD, and F. Cardi, PhD, on the use and harvesting techniques among Tibetan people for <i>Cordyceps sinensis</i>. • England’s Royal Botanic Gardens, Kew, celebrated 250th anniversary.
#84 <i>HerbalGram</i> , November 2009 – January 2010 (80 pages)	• Impact of FDA’s cGMPs on dietary supplements on small manufacturers highlighted. • Trade associations comment on FDA’s proposed policy on economically motivated adulteration.	• Major feature on “Ramuan,” the traditional medicine of Malaysia, by Steven Foster. • Kevin Spelman, PhD, reviewed perspective on traditional malarial treatments vs. “silver bullet” drugs. • Feature on the sustainable development of dragon’s blood (<i>Croton lechleri</i>) in the Peruvian Amazon.
#85 <i>HerbalGram</i> , February – April 2010 (80 pages)	• 2009 US government stimulus money funded new herbal research. • Traditional medicine in Cuba explored.	• Anthony B. Cunningham and Josef Brinckmann revealed schisandra (<i>Schisandra chinensis</i>) production project in China linking sustainability and right livelihoods. • Original review on safety and efficacy of <i>Garcinia cambogia</i>’s hydroxycitric acid. • Ian B. Cole and Dr. Michael Balick explored the effect of lunar influence on chemical variations in botanicals.
#86 <i>HerbalGram</i> , May – July 2010 (80 pages)	• “European Union Prepares for Full Enforcement of Traditional Medicine Regulations”	• Courtney Cavaliere’s cover story on conservation of animals used in traditional remedies and possible herbal alternatives. • In a related feature, Matthew Cimino, PhD, explored the power of DNA testing to ensure the identity and quality of herbal products.

HISTORY & HIGHLIGHTS

2008	Margaret Wittenberg joins ABC Board of Trustees.
2009	Dr. Oz Show premieres.
2010	ABC launches “Herbal Insight” segments on popular public television series “Healing Quest,” co-hosted by Olivia Newton-John; reaches millions of viewers.
	Blumenthal receives the prestigious Varro E. Tyler Prize from the American Society of Pharmacognosy.
2011	Blumenthal is awarded the 2012 Jean Andrews Visiting Faculty Fellowship at the University of Texas.
	CNN article reports that half of Americans use supplements.
2012	PDF access to <i>HerbalGram</i> becomes available online.
	New Hope Natural Media inducts Blumenthal into its Hall of Legends.
	The Lloyd Library and Museum names Blumenthal as its first Honorary Advisory Board Member.

Issue	Impact	Highlight
#87 <i>HerbalGram</i> , August – October 2010 (80 pages)	• Efforts to increase sustainable harvest of Ayurvedic medicinal plants highlighted. • Blumenthal receives Varro E. Tyler Prize from the American Society of Pharmacognosy.	• Rafael Ocampo and Dr. Michael Balick featured <i>Semillas Sagradas</i>, the Sacred Seed Sanctuary at Finca Luna Nueva in Costa Rica (an idea that has since emerged as a global program). • Uwe Koetter, PhD, and Martin Biendl, PhD, provided a definitive review of the historic and modern medicinal uses of hops (<i>Humulus lupulus</i>).
#88 <i>HerbalGram</i> , November 2010 – January 2011 (80 pages)	• Bypassing the dietary supplement route, a Chinese cardioprotective patent medicine enters FDA-approved Phase II clinical trials.	• Josef Brinckmann and Kerry Hughes presented an original feature on ethical trading and fair trade certification for botanicals. • Lindsay Stafford Mader reviewed the potential of essential oils against drug-resistant bacteria.
#89 <i>HerbalGram</i> , February – April 2011 (80 pages)	• Guest editorial by Dr. Dennis Awang on the history of regulating herbal products from a Canadian perspective. • Andrew Shao, PhD, explains dietary supplements cGMP requirements for ingredient-supplier qualifications.	• Review on the safety of bitter orange (<i>Citrus x aurantium</i>) and <i>p</i>-synephrine. • Review of ethnobotany of <i>Ligusticum</i> spp., featuring osha, in North America.
#90 <i>HerbalGram</i> , May – July 2011 (80 pages) 	• “UK Herbalists to be Licensed” • WHO implemented traditional medicine classification. • South Africa’s Council for Scientific and Industrial Research rights granted to Phytopharm for hoodia handed back to South Africa.	• The continuing story for development of standard reference materials for analysis of dietary supplements. • Alexander Panossian, PhD, and Hildebert Wagner, PhD, reviewed the history, biological activity, and clinical benefits of adaptogens.
#91 <i>HerbalGram</i> , August – October 2011 (80 pages)	• Sustainable harvesting programs for wild medicinal herbs developed in four Eastern European countries. • National Cancer Institute acknowledged therapeutic benefits of cannabis.	• Longtime contributor Josef Brinckmann explored reproducible herb quality as the key ingredient for reproducible safety and efficacy.
#92 <i>HerbalGram</i> , November 2011 – January 2012 (80 pages)	• Dr. Norman R. Farnsworth (1930-2011) fondly remembered. • The American Botanical Council, American Herbal Pharmacopoeia, and the University of Mississippi’s National Center for Natural Products Research announced the ABC-AHP-NCNPR Botanical Adulterants Program.	• A tribute to renowned medicinal plant researcher and longtime ABC Trustee, Dr. Norman R. Farnsworth, who died September 10, 2011, at age 81. • Steven Foster reviewed the history of adulteration of herbs, spices, and botanical drugs, the first publication from the ABC-AHP-NCNPR Botanical Adulterants Program.

HISTORY & HIGHLIGHTS

2012	ABC introduces online database of <i>The ABC Clinical Guide to Herbs</i> .
	Thomas Newmark joins ABC Board of Trustees.
	ABC launches “Herbal News & Events” weekly online newsletter.
	ABC Publishes 5,000th HerbClip.
	FDA approves second botanical drug (first oral botanical drug), crofelemer — derived from South American croton tree bark sap — for chronic diarrhea.
2013	<i>HerbalGram</i> turns 30!
	ABC celebrates 25th anniversary.
	ABC celebrates 20th anniversary of HerbClip.
	ABC publishes 100th issue of <i>HerbalGram</i> .

Issue	Impact	Highlight
#93 <i>HerbalGram</i> , February – April 2012 (80 pages)	• “ABC, AHP, and AHPA Provide Identify Information on Star Anise Confusion” • Center for Science in the Public Interest’s petition for St. John’s wort label warning deemed inaccurate by herb experts.	• Second article in the Botanical Adulterants Program by Steven Foster published on the adulteration of skullcap with American germander. • The myth of the “unregulated herb industry” dispelled in an extensive, definitive article by R. William Soller, PhD, Holly J. Bayne, and Christopher Shaheen.
#94 <i>HerbalGram</i> , May – July 2012 (80 pages)	• Greg Cumberland presented a Guest Editorial on economically motivated integrity vs. economically motivated adulteration. • ABC <i>Clinical Guide to Herbs</i> became available online.	• A major feature reviewed the health benefits of medicinal Chinese teas, with an emphasis on fermented teas. • John H. Cardellina II, PhD, exposed adulteration of commercial “grapefruit seed extract” with synthetic disinfectants.
#95 <i>HerbalGram</i> , August – October 2012 (80 pages)	• Project for sustainable production of schisandra (profiled in <i>HerbalGram</i> #85) awarded a United Nation’s “Equator Prize.”	• Excerpt from the English translation of <i>The Ambonese Herbal</i> of Rumphius. • Singapore’s oldest TCM manufacturer, Eu Yan Sang, profiled. • DMAA, a stimulating chemical claimed by marketers as being a plant-derived chemical, confirmed synthetic.
#96 <i>HerbalGram</i> , November 2012 – January 2013 (80 pages)	• UK and Irish governments required warning labels for echinacea products with no scientific justification. • Meta-analysis of clinical studies confirmed that cocoa and chocolate provide cardiovascular benefits.	• In the fourth paper in the ABC-AHP-NCNPR Botanical Adulterants Program, Steven Foster and Blumenthal explored the adulteration of commercial bilberry extracts. • Hüsni Can Başer, PhD, and colleagues contributed an extensive review of the history, ethnobotany, and modern uses of Turkish roses (<i>Rosa</i> spp.) and their commercial products. • Lindsay Stafford Mader explored the use and misuse of herbs and dietary supplements in sports an article that included evidence, regulations, and doping controversies.
#97 <i>HerbalGram</i> , February – April 2013 (80 pages)	• <i>HerbalGram</i> cover depicted cannabis for the first time; ABC reported on marijuana, medicinal cannabis, compassionate use, and legalization. • FDA approved crofelemer (from dragon’s blood) as the first oral botanical drug for the treatment of HIV-related diarrhea.	• Lindsay Stafford Mader explored the successful, discreet medical cannabis program, a pioneering Israeli effort. • Dr. Francis Brinker explored the differences of traditional use of <i>Echinacea angustifolia</i> and modern trials of <i>E. purpurea</i> extracts. • Yuan-Chun Ma, PhD, and colleagues discussed the potential of DNA barcoding as an increasingly important tool in authenticating botanicals.
#98 <i>HerbalGram</i> , May – July 2013 (80 pages)	• More than 100 groups supported the ABC-AHP-NCNPR Botanical Adulterants Program. • ABC celebrated Margaret Wright’s 25 years of service.	• In another Botanical Adulterants Program publication, Steven Foster explored the botanical, economic, chemical, and safety concerns of adulterated black cohosh. • Leading phytomedicine manufacturer, Dr. Willmar Schwabe Pharmaceuticals, founded in 1866, is profiled.
#99 <i>HerbalGram</i> , August–October 2013 (80 pages)	• “Botanical New Drug Applications: The Final Frontier” • Stefan Gafner, PhD, joined ABC staff as Chief Science Officer.	• Linda Woolven and Ted Snider reviewed traditional and modern uses of botanicals for erectile dysfunction. • Paula Brown, PhD, Joe Betz, PhD, and Frank Jaksch, Jr., explained the concept of “dry labbing” and how to qualify a reputable contract analytical lab.
#100 <i>HerbalGram</i> , November 2013 – January 2014 (104 pages)	• ABC celebrates 30 years of <i>HerbalGram</i> with 100th issue. • Cecelia Thompson celebrates 25 years at ABC. • Lindsay Stafford Mader smokes out shortcomings of Dr. Sanjay Gupta’s CNN <i>WEED</i> special. • Barry Meltzer, Andrew Marston, PhD, and Cascade Anderson Geller remembered by ABC staff, friends, and colleagues.	• In a groundbreaking original research paper Arthur O. Tucker, PhD, and Rexford H. Talbert unlock the geographic origin of the Voynich Manuscript, linking identification of plants and animals to species found primarily in Mexico. Their analysis reveals exciting new research directions for deciphering the cryptic illuminated manuscript. • Tyler Smith’s “Rooted in History” tells the story of ABC’s Case Mill Homestead, illustrated with extraordinary original 8X10 wet plate collodion photographs by <i>HerbalGram</i> Art Director, Matt Magruder.





8x10in. Wet Plate Collodion Photographs by Matthew Magruder

Rooted in History

The Story of ABC's Case Mill Homestead

By Tyler Smith

Perched atop a grassy hilltop in East Austin, the original owners of the historic Case Mill Homestead had uninterrupted vistas of the vast countryside from their third-story lookout tower. In 1853, when the house and accompanying gristmill were constructed and the State of Texas was just eight years old, the view would have included the not-yet-completed Capitol building five miles east in what was to become downtown Austin. Several owners and 160 years later, the Case Mill Homestead serves as the distinct setting for the headquarters of the nonprofit American Botanical Council (ABC), now celebrating a quarter century of promoting the responsible, science-based use of herbal medicine.

A Connecticut Clock Peddler Named Case

In the mid-19th century, the independent Republic of Texas (1836-1845) purchased the tiny frontier community of Waterloo, set on the banks of the winding Colorado River. Roughly a decade later, the settlement was officially incorporated and named after the "Father of Texas," Stephen F. Austin,¹ and pioneers

were making their way to the humid subtropical climate of Central Texas. Although the city's population was less than 1,000, an article published in *The Texas Monument* newspaper on October 12, 1853, boasted about the city's promising future.^{2,3}

"Ere many believe it is probable Austin will be one of the most flourishing cities in the area, as it is in [a] location decidedly one of the most beautiful and



interesting,” the editors wrote. “The country around is also fast improving.”²

Among the early settlers of the Austin area was Sherman Case, a clock peddler from Connecticut who, in the early 1850s, made his home on Little Walnut Creek, miles outside the Austin city limits.⁴ Case and his wife, Rachel, lived amongst a sweeping expanse of rolling farmland, an area comprising three separate land grants. Anson Jones, the last president of the Republic of Texas, presented one grant in 1845 — just months before Texas became the 28th state of the Union — while the others were conferred by the State of Texas in the late 1840s and early 1850s.⁵ It was a time of change, and entrepreneurship was in the air.

As *The Texas Monument* article noted, “New farms are continually being opened. Much wheat will be sown [in] the ensuing season. Mr. Case is building a flour mill and expresses himself confident, that out of Texas wheat he will be able to make good and white flour.”²

Case and his business partner, William Burditt, operated the mill until 1866, when Burditt’s son Giles took over the duties. During this time, Case — known locally as a carpetbagger from up North — was involved in a series of lawsuits with landowners and city merchants, with one dispute reaching the Texas Supreme Court. Although the exact reasons are unknown, Case eventually gave up his share of the mill and returned to his northern home. Giles Burditt continued operating the mill until his death in 1903.^{3,5}

Sometime in the early 1900s, a flash flood reportedly destroyed the mill on Little Walnut Creek (K. Cook, oral communication to T. Smith, September 20, 2013), and today, there is no trace of the once-thriving mill.

After a string of different occupants around the turn of the 20th century, a wealthy couple, Edwin and Maggie Frame, purchased the homestead in 1906. Years later, Maggie had her husband committed as a lunatic to the Austin State Hospital where he died shortly thereafter. By this time, the Frame estate encompassed a 451-acre patchwork of the three original land grants. After Maggie’s death in 1947,^{4,5} the Colonial Revival-style house was left vacant for a brief period, and its grandeur turned to ruin.

The Cook Legacy

Jesse “Vernon” Cook, a produce and real estate salesman from Austin, and his wife, Betty, purchased the property in 1949, and it stayed in the Cook family for roughly the next half century. After nearly two years of vacancy following Mrs. Frame’s death, repairs were badly needed. Vernon and Betty’s son, Jesse Vernon “Bubba” Cook, Jr., explained that the house — which was still on the far outskirts of Austin at the time — was frequented by vandals and became a party destination for University of Texas students (oral communication, September 20, 2013).

Ada “Fay” Peters, one of Bubba’s three sisters, recalled the state of the house when her parents moved in in the late 1940s. “I can remember walking through its abandoned rooms,” she wrote (email, September 17, 2013). “Most had been vandalized and were in disrepair with floor planks pulled up and wallpaper stripped. The four fireplaces had been completely destroyed. My father

said it was because rumor had it that Mrs. Frame had hidden her fortune somewhere in the house. To my knowledge, no one ever recovered any such thing.”

In 1955, the Cooks built a two-story addition on the east side of the house, greatly increasing its square footage. Mr. Cook also constructed an oversized garage adjacent to the homestead’s original carriage house. Included in the carriage house was a water-collection tank in the roof that, at one point, powered toilets in the main house.

“The original [carriage] house had what they called a cistern in it,” Bubba said. “We called [it] the play house; it was just a big party room.”

A photograph featured on the front page of the *Austin American-Statesman* on March 23, 1953, captured the gaiety and beauty of the Cook siblings’ childhood home. “The Vernon Cook family ... [has] one of the finest expanses of bluebonnets yet seen around Austin this Spring,” the caption noted. “Their house is surrounded by the wonderful flowers which make several acres a lake-like stretch of blue. Picking some of the blossoms are Ada Fay Cook and Carol Ann Cook.”⁶

“The house was the center of our social lives,” wrote Fay. “The most fun room by far was the widow’s walk, a third story that sat like a square hat box on top of the house. I thought it was mysterious and dangerous. ... From those small quarters, I believe to this day that Mrs. Frame kept her look out while I lived in the house. There was always a ‘presence’ when I ventured up there.”

Other members of the Cook family, in addition to current and past ABC staff members, have reported similar “supernatural” experiences at the Case Mill Homestead. However, Bubba explained that the house itself was probably to blame for such reports.

“The house creaked when [the wind] blew hard or when it rained ... so [the noises] could have come from a variety of places,” he said. “But whatever it was, it gave the ‘heebie jeebies’ to people.”

Until the mid-1960s, the Cooks used the surrounding land primarily for horses and cattle, in addition to hosting polo tournaments and “coon dog trials,” in which spectators watched dogs attempt to catch live raccoons. Over the years, Mr. Cook began to sell and develop large sections of the property, out of which grew the East Austin neighborhood of Walnut Hills, now known



Image courtesy of *Austin American-Statesman*. Photo ©1953 Neal Douglass.



as University Hills. Today, the Case Mill Homestead includes 2.5 acres, a small fraction of the Frame's 451-acres of Texas land grants.

Bubba and his wife, Kathy, purchased the property from his parents in 1979 and continued to make improvements, such as installing a metal roof, consolidating bedrooms, and painting the house a vibrant yellow. A longtime volunteer for the Lady Bird Johnson Wildflower Center and a former member of the Austin Herb Society, Kathy's interest in herbs and gardening prompted the couple to create extensive stone-bordered herb and vegetable gardens encircling the house.

"When we bought it, there were no gardens at all," she said (oral communication, September 20, 2013). "We grew all of our own vegetables ... and we never used any pesticides. The girls, they would just eat anything in the yard."

Much of what they added — a large patio with built-in planting spaces, two fish ponds, sidewalk pavers, fruit trees, and more — still exists today. Over the years, however, some spaces, such as the pond next to what is now ABC's southwest pollinator garden, have been damaged and are in need of repairs.

In the late 1980s, realizing the property's potential, Bubba decided to turn the homestead into a space for weddings and private events. He and Kathy, while trying to come up with a name for the venue, delved into historical records to learn more about the house.

"All we had known was that the house was the Frame house," he said. "It never really went back, so we started going back through the abstracts, looking at different things, and found that the guy who actually built it ... was Sherman Case."

With that, the name Case Mill Homestead was born.

By the mid-1990s, crime in the surrounding neighborhood pressured Bubba and Kathy to reconsider their future at the homestead. Reluctantly, they put their long-treasured family home on the market. But with offers coming in from only half-way houses and drug rehabilitation centers, the Cooks did not immediately find a suitable buyer.

"We had friends that lived here; we couldn't do that to them," said Kathy. "We couldn't do that to the neighborhood."

A Home for ABC

From its founding in 1988 and for much of the 1990s, the American Botanical Council was based in Founder and Executive Director Mark Blumenthal's roughly 5,000-square-foot home in a Northwest Austin residential neighborhood. Throughout this time, consumer awareness and acceptance of herbal medicine was increasing, and the organization was outgrowing its home.

"There were about 17 people working there, and we covered every inch of his house," said ABC's long-time finance administrator, Cecelia Thompson (oral communication, October 7, 2013).



With limited space and increasing pressure from the homeowners' association, the organization began looking around Austin for a new headquarters. After considering numerous options — including a century-old building downtown, an art-deco building that formerly housed the Texas Medical Association, a former Nissan dealership on the increasingly popular South Congress Avenue, and a location in a strip center — Glen Stranahan, a commercial realtor and neighbor and friend of Blumenthal's, took a group of ABC employees to 6200 Manor Road, the Case Mill Homestead.

"The day we drove out here to look at it, I remember some people complaining about the side of town," said ABC Special Projects Director Gayle Engels (oral communication, October 7, 2013). "But when we pulled in there, ... that first bed ... was full of echinacea, and it was in bloom. And I know I for one just went, 'Yeah, this is probably the place, finally. That's a sign — blooming echinacea — our logo plant.'"

"Despite the generally run-down condition of the big house, I think that all of us who visited the Case Mill Homestead on that first day in May 1997 realized that this place had the right kind of energy for ABC's new home," said Blumenthal.

On June 6, 1997, Blumenthal finalized the purchase of the homestead. Members of the ABC staff planted an olive (*Olea europaea*, Oleaceae) tree on the property to mark the occasion.⁷

Although the location initially gave some staff members pause, East Austin was just beginning a period of revitalization. An article published in the Commentary section of the *Austin American-Statesman* on June 7, 1998 — just before ABC moved into the renovated property in July — provided an almost prophetic glimpse into the future of the area.

"Change is in the air, and smart people are looking differently at East Austin, a term once associated with crime, poverty, and decline," the editor wrote. "The people who take advantage of that now will truly be the pioneers and the settlers, and they will be pleased with their choice," a man was quoted as saying in the article.⁸

Today, East Austin continues to gentrify as Austin's population has boomed, making it the 11th largest city in the United States.⁹ "We were on the outskirts really," Thompson said. "What Austin has done is it's grown around us. Right now, we're an oasis in the middle of the city."

After closing on the property, Blumenthal approached several banks seeking a loan to provide the organization with much-needed funds for renovation. Each bank, including a banker with whom Blumenthal had previously done business, rejected ABC's loan request, citing the neighborhood's general condition as the primary reason. Accordingly, ABC embarked on a capital campaign to raise funding for renovations, landscape development, and the addition of a new annex building and greenhouse, among other changes necessary to turn a residential home into a functioning headquarters for a growing nonprofit.⁷ By the end of the campaign, almost a million dollars was raised, providing sufficient funding for first-phase improvements to the property.

As part of the renovation process, ABC assembled numerous experts — the so-called "botanical brain trust" — including experienced gardeners, herbalists, a security systems advisor, and even a feng shui specialist to advise on the master plan for the property. Their vision was to create a space dedicated to health and healing through nature — a welcoming environment available to students and scholars, families, and the community. From these conversations, the idea to plant themed educational gardens on the grounds was born. Today the property boasts seven medicinal plant gardens organized by body system, seven international cuisine gardens, a Sacred Seeds garden





featuring locally significant medicinal plants, a large vegetable garden for employees, and more.

In addition to being available for public tours, the gardens have been used as a resource for dietetic and pharmacy interns from local universities since the internship program started in 1998. "It's an educational environment, and it really proves itself with the intern program," said Thompson. "They come on campus, research medicinal herbs, work in the gardens, ... and prepare presentations for staff in the ABC kitchen on their research. To me, that's what we're all about."

Cook family members, who still visit their longtime former home, have expressed their appreciation and support for the work that ABC has done to Case Mill Homestead. "I don't know if you'd say God was watching over us or what, but ... I was really glad [ABC] got it and they kept our gardens," said Kathy. "They've expanded, but our stuff is still here, and it makes me feel really good that they didn't erase what we did."

Engels, who regularly travels to conferences and presentations across the country, said she is often reminded of the significance of ABC's setting.

"I started thinking about how unique our place is too; that we have this old Republic of Texas land grant homestead, that we've got gardens on it that you will never see anywhere else," she said. "Nobody does it quite like we do. ABC is a very unique organization, and we are headquartered in a very unique locale." HG

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The Wet Plate Collodion Process

Photography's very beginnings can be traced back to 1826, when Joseph Nicéphore Niépce captured the first permanent photograph — or heliograph — on a pewter plate coated with the light-sensitive material called bitumen of Judea.¹

Following the early photo-chemical efforts of Niépce was the Frenchman Louis Jacques Mandé Daguerre, who patented the Daguerreotype photographic process in 1839.² The Daguerreotype process created a unique, one-of-a-kind photographic image on a polished copper plate that was created by sensitizing the plate with silver nitrate and developing it with mercury vapors. The Daguerreotype process was the first widely available and practiced photographic process. However, it proved to be prohibitively expensive as well as extraordinarily dangerous for the photographers using this method due to the nature of the chemistry and necessary procedures.

Safety concerns led to the creation of the collodion process in 1851 by the British sculptor Frederick Scott Archer, who sought a means by which to create photographs to use as inspiration for his sculptures.³ Archer's drive in creating the collodion process was one based on ease of use, capturing fine detail, economy, and reproducibility.

There are two main types of images — or plates — created in the wet plate collodion process: the ambrotype and the tintype (also referred to as the ferrotype). The ambrotype is created on a piece of clear or colored (often ruby or blue) glass and can be used as either a negative to create prints or can be backed with a substrate such as black velvet to create a positive image. The tintype/ferrotype is a positive image created on a piece of blackened metal. Historically, these tintypes were created on japanned (blackened) iron plates and contemporarily they often are created on pieces black trophy aluminum (often referred to as aluminotypes). The plates included in this article are all positives made on black trophy aluminum.

The positive image on the black metal plate is actually an optical illusion created by light reflecting off the exposed and developed silver salts in the areas that were exposed to light when the shot was made. This optical illusion can be illustrated best by taking a "positive" ambrotype that is backed by black velvet and holding the clear glass plate up to a window in order to view the "negative."

In modern terms, the wet plate process itself is complicated and labor-intensive, using complex chemicals that — when not handled responsibly — are potentially dangerous. However, historically, it became widely popular due to its simple, safe, and economical steps — especially when compared to the then-popular Daguerreotype process.

The photographer starts by thoroughly cleaning and then "flowing the plate" with a collodion mixture. These collodion recipes vary from photographer to photographer, but generally contain a combination of nitrocellulose (gun cotton), 190-proof grain alcohol, and salts (potassium iodide, cadmium bromide, ammonium iodide, etc.). While under a shroud illuminated by red safelight — often a darkroom tent or portable darkbox — this coated plate is quickly immersed in a bath of saturated silver nitrate and left to sensitize for approximately four minutes. During this sensitizing step, the

bromides and iodides in the collodion mixture react with the silver nitrate, creating light-sensitive silver iodide/bromide. While still under the red safelight, the photographer wipes the back of the plate clean of excess silver and then loads the sensitized plate into a specialized film holder. This is loaded into the already-composed, focused, and set-up camera. The photographer then removes the darkslide from the holder, fires the shutter, and exposes the plate for a few seconds to a few minutes.

This exposed plate is taken back to the darkroom/box and the development process begins. A developer solution that contains iron (ferrous sulfate), water, glacial acetic acid, and alcohol is poured over the plate similar to the collodion "flowing" step. The developer is left on the plate for 10+/- seconds for a tintype or 30+/- seconds for an ambrotype. After development, the plate is thoroughly washed in plain water. At this stage the image looks like a milky blue-white negative. The plate is then immersed in a fixing bath that, historically, contained very dilute potassium cyanide.* Then the fixed plate is washed thoroughly in either running water or successive trays. One item of note — all of the above steps in the process must be completed while the plate remains wet, hence the wet plate collodion name, as the light-sensitive nature is rendered null if the plate dries. This gives the photographer a finite amount of time in order to complete these steps, usually 10 minutes or so, depending on weather conditions. After fixing, the final stage is to wash the plate thoroughly and then dry and varnish the plate. The varnish mixture is a combination of gum sandarac, 190-proof alcohol, and lavender (*Lavandula* spp., Lamiaceae) oil. Fixing protects the plate as the dried collodion is susceptible to scratching and damage. The plate is heated over an alcohol lamp until warm to the touch, and then the varnish is "flowed" over the plate similar to the collodion. The excess is drained off and the plate is given a few moments to allow the alcohol to evaporate. It is then warmed over the lamp again in order to facilitate the hardening of the varnish, after which the plate is left to dry on a plate rack.

As is likely evident, wet plate collodion photography is a complicated process requiring patience, dedication, and passion on the part of the practitioner. The process requires a good deal of experience and mastery of chemistry and equipment in order to become proficient. This proficiency can be elusive and tenuous in its successes. One week, the chemistry can be used to great success, while only days later it can create nothing but failures in the developing tray. The process is susceptible to failure even as it simultaneously affords the photographic artist an inherently unique and creative process that can be utilized to create truly one-of-a-kind images. HG

—Matthew Magruder

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* This is one of the most potentially dangerous chemicals used in the wet plate process due to the risk of the presence of residual glacial acetic acid on the recently developed plate, as this can combine with the potassium cyanide to create deadly hydrogen cyanide gas. Contemporary practitioners often opt to utilize ammonium/sodium thiosulfate as a fixer, as it is far safer, although it requires longer final washing times.



Phase 2 of ABC's Case Mill Homestead Capital Campaign

In 1998, ABC completed the repairs and renovations necessary to move into its permanent home at the historic Case Mill Homestead in Austin, Texas. The new space, carved out of a lovely old home and its surrounding 2.5 acres, contains offices, a small library and meeting room, a carriage house that acts as a warehouse, a greenhouse, and beautiful gardens.

Now, nearly 16 years later, ABC is preparing for the second phase of the renovations needed to make its homestead more productive, more energy- and water-efficient, and better able to meet the working and learning needs of ABC staff, pharmacy and dietetic interns, volunteers, and the community.

Below are just a few of the improvements on ABC's current wish list:

- Repair ABC's pond using a new rainwater collection system. The pond would provide water for wildlife and create a meditation area. The serene spot will be dedicated to ABC's founding Board Members – James A. Duke, Norman R. Farnsworth, and Varro E. Tyler.
- Install a carport with a solar array and an electric car recharging station to provide shade while creating energy, thereby saving ABC money, particularly during the hot summer months.
- Repair or replace worn materials, e.g., rotting screens, holes in floors, broken tiles, etc.
- Reconfigure spaces inside the building to create improved offices. This includes creating space in Mark Blumenthal's tiny office for his many books and herbal products collection.
- Upgrade lighting within the buildings for increased energy efficiency and ease of work.
- Upgrade kitchen appliances for increased energy efficiency and ease of use. The kitchen is frequently in use teaching interns to create herbal medicines and selfcare products; many of the appliances are in need of replacement.
- Upgrade technology, e.g. phones, alarms, etc.
- Upgrading outside lighting for aesthetic and security purposes.

You can participate in this exciting process to make ABC more efficient and sustainable. To learn more about these upcoming efforts, please look on ABC's website at www.abc.herbalgram.org/capital. You also can contact Denise Meikel, ABC's development director, at denise@herbalgram.org.



A PRELIMINARY ANALYSIS OF THE BOTANY, ZOOLOGY, AND MINERALOGY

of the

VOYNICH MANUSCRIPT

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h a v ^ 2 c r i p p

By Arthur O. Tucker, PhD, and Rexford H. Talbert

Unless otherwise noted, images courtesy of Beinecke collections:
Cipher manuscript (Voynich manuscript). General Collection, Beinecke
Rare Book and Manuscript Library, Yale University

Introduction

In 1912, Wilfrid M. Voynich, a Polish-born book collector living in London, discovered a curious manuscript in Italy. This manuscript, written in an obscure language or, perhaps, code, is now housed at the Beinecke Rare Book and Manuscript Library at Yale University,¹ which acquired it in 1969. Since 1912, this manuscript has elicited enormous interest, resulting in books and Internet sites with no sound resolution on the manuscript's origin. Even the US National Security Agency has taken an interest in its cryptic contents, and doctoral theses have been written on attempts to decipher the language of the Voynich Manuscript (hereinafter abbreviated Ms.). With such voluminous published information, its history can be easily found elsewhere and need not be repeated here *ad nauseum*.¹⁻⁵ However, what appears to be a reasonably reliable introduction for the novice is provided at Wikipedia.⁶

Information is continually updated on the website of René Zandbergen,⁷ a long-term researcher of the Voynich Ms., and, along with Gabriel Landini, PhD, one of the developers of the European Voynich Alphabet (EVA) used to transcribe the strange alphabet or syllabary in the Voynich Ms. As Zandbergen relates, past researchers primarily have proposed — because the Voynich Ms. was discovered in Italy — that this is a European manuscript, but some also have proposed Asian and North American origins. As such, almost every language, from Welsh to Chinese, has been suspected of being hidden in the text. Of course, aliens also have been implicated in the most bizarre theories. These theories with no solid evidence have clouded the whole field of study, and many scholars consider research into the Voynich Ms. to be academic suicide. Recently, however, Marcelo Montemurro, PhD, and Damián Zanette, PhD, researchers at the University of Manchester and Centro Atómico Bariloche e Instituto Balseiro, have used information theory to prove that the Voynich Ms. is compatible with a real language sequence.⁸

The Voynich Ms. is numbered with Arabic numerals in an ink and penmanship different from the work's text portions. The pages are in pairs ("folios"), ordered with the number on the facing page on the right as *recto*, the reverse unnumbered on the left as *verso* (thus folios 1r, 1v, 2r, 2v, etc. to 116v). Fourteen folios are missing (12, 59, 60, 61, 62, 63, 64, 74, 91, 92, 97, 98, 109, and 110). By convention of Voynich researchers, the manuscript includes the following:

- “Herbal pages” or a “botanical section” (pages with a single type of plant);
- “Pharma pages” or a “pharmaceutical section” (pages with multiple plants and apothecary jars, sometimes termed “maiolica”);
- “Astrological pages” (circular volvelles with nymphs, folios 70v2-73v);
- “Astronomical pages” (other circular designs, folios 67r1-70r2, etc.);
- “Balneological pages” or “biological section” (nymphs, baths, plumbing, folios 75r-84v);
- “Magic Circle page” (folio 57v);
- “Fertilization/Seed page” (folio 86v); and a
- “Michiton Olababas page” (folio 116v).

Our Introduction to the Voynich Manuscript, Backgrounds, and Pattern of Investigation

While we had known of the existence of the Voynich Ms., we, like so many others, probably dismissed it as a fantastic, elaborate hoax. Scattered, intersecting evidence may trace it back to ca. 1576-1612 to the court of Rudolf II (1552-1612) in Austria.¹⁻⁷ Any origin prior to this time is strictly conjecture, but such spurious claims have channelized scholars’ thinking and have not been particularly fruitful. We had to face the facts that (so far) there was no clear, solid chain of evidence of its existence prior to ca. 1576-1612.

Thus, with our varied backgrounds and viewpoints as a botanist and as an information technologist with a background in botany and chemistry, the authors of this *HerbalGram* article decided to look at the world’s plants without prejudice as to origin in order to identify the plants in the Voynich Ms. With the geographical origins of the plants in hand, we can then explore the history of each region prior to the appearance of the Voynich Ms. The authors of this article employ abductive reasoning, which consists of listing of all observations and then forming the best hypothesis. Abductive reasoning (rather than deductive reasoning normally practiced by scientists in applying the scientific method) is routinely used by physicians for patient diagnosis and by forensic scientists and jurors to determine if a crime has or has not been committed. In abductive reasoning, it is necessary to record all facts, even those that may seem irrelevant at the time. This is well illustrated by physicians who have misdiagnosed patients who were not fully forthcoming with all their symptoms because they interpreted some as trivial, unrelated, or unnecessary to share with the physician.

We were both immediately struck by the similarity of *xiuhhamolli/xiuhhamolli* (soap plant) illustrated on folio 9r in the 1552 Codex Cruz-Badianus⁹⁻¹² of Mexico (sometimes known as the “Aztec Herbal”) to the plant in the illustration on folio 1v of the Voynich Ms. Both depictions have a large, broad, gray-to-whitish basal woody caudices with ridged bark and a portrayal of broken coarse roots that resemble toenails. The plant in the Codex Cruz-Badianus is in both bud and flower with leaves that have a cuneate (wedge-shaped) base, while the plant in the Voynich Ms. has only one bud with leaves that have a cordate (heart-shaped) base. The illustration in the Codex Cruz-Badianus is accepted by

numerous commentators⁹⁻¹² as *Ipomoea murucoides* Roem. & Schult. (Convolvulaceae); the illustration in the Voynich Ms. is most certainly the closely related species *I. arborescens* (Humb. & Bonpl. ex Willd.) G. Don. However, the portrayals of both of these Mesoamerican species are so similar that they could have been drawn by the same artist or school of artists.

This possible indication of a New World origin set us down a path that diverges from most previous Voynich researchers. If our identifications of the plants, animals, and minerals are correct as originating in Mexico and nearby areas, then our abductive reasoning should be focused upon Nueva España (New Spain) from 1521 (the date of the Conquest) to ca. 1576 (the earliest possible date that the Voynich Ms. may have appeared in Europe with any documentation). If the Voynich Ms. is, as one reviewer of this article indicated, “an invention by somebody in, let’s say Hungary, who invented it based on images of early printed books,” then this forger had to have intimate



The illustration of *Ipomoea murucoides* from the Codex Cruz-Badianus (fol. 9r) is in an identical style as that of *I. arborescens* in the Voynich Ms. (fol. 1v). Note the similar bud (A) and the woody caudex with rootlets (B).



Top image courtesy of Biblioteca Nacional de Antropología e Historia, Mexico City, Mexico.

knowledge of the plants, animals, and minerals of Mexico and surrounding regions, in addition to its history, art, etc. Some of this knowledge, such as the distinction of *Viola bicolor* (Violaceae; which is not illustrated in earlier books to our knowledge) vs. *V. tricolor*, was clarified only in the 20th century. A forgery is certainly possible, but applying the principle of Occam's Razor (which says that the hypothesis with the fewest assumptions should be selected), attention should be focused upon Nueva España between 1521 and ca. 1576, not Eurasia, Africa, South America, or Australia (or alien planets).

Names

Names as keys to decipher lost languages

The most fruitful, logical approach to initially decipher ancient languages has been the identification of proper names. Thomas Young (1773-1829) and Jean-François Champollion (1790-1832) first decrypted Egyptian hieroglyphics with the names of pharaohs that were found in cartouches, coupled with a study of Coptic (the later Egyptian language that used primarily Greek script). The initial attempts by many researchers to decipher Sumerian, Babylonian, and Assyrian cuneiform were the names of kings, in conjunction with links to ancient Persian. Michael Ventris (1922-1956) and John Chadwick (1920-1998) initially deciphered Minoan Linear B as Mycenaean Greek by identifying cities on Crete and finding links of these names to ancient Greek. Heinrich Berlin (1915-1988) initially deciphered Mayan logograms by connecting "emblem glyphs" with cities and ruling dynasties or territories, which allowed the breakthroughs of Yuri Knorosov (1922-1999), coupled with a study of Mayan dialects. Michael Coe (b. 1929) and others later found the names of gods in logograms repeated in the *Popol Vuh*, the Mayan holy book.¹³

Plant, Animal, and Mineral Names in the Voynich Manuscript

None of the primary folios with plant illustrations (the so-called "herbal pages") have a name that can be teased out (yet). However, of the approximately 179 plants or plant parts or minerals illustrated in the "Pharma pages," about 152 are accompanied by names. We were initially drawn to plant No. 8 of the 16 plants on folio 100r; this is obviously a cactus pad or fruit, i.e., *Opuntia* spp., quite possibly *Opuntia ficus-indica* (L.) Mill. (Cactaceae) or a related species. Thus, **2a11g** is quite easily transliterated as *nashtli*, a variant of *nochtli*, the Nahuatl (Aztec) name for the fruit of the prickly pear cactus or the cactus itself. Then we looked at plant No. 4 on folio 100r, which appears to be a pressed specimen of a young *Yucca* spp. or *Agave* spp., quite possibly *Agave atrovirens* Karw. ex Salm-Dyck (Agavaceae). Here **ccofa2g** transliterates to *magueoy*, or *maguey*. These initial keys of proper names allowed us to uncover further names, and details are listed in the Appendix of this article.

Not many of the names beyond *nochtli* and a few

others have correspondences in the nine manuscripts,¹⁴ which include portrayals and discussions of 16th century Mesoamerican plants, particularly Codex Cruz-Badianus of 1552,⁹⁻¹² Hernández of ca. 1570-1577,¹⁵ and Sahagún's Florentine Codex of ca. 1545-1590.¹⁶ It should be remembered that Hernández and his associates took surveys from all over Mexico, and these works and their Nahuatl names are not monolithic, i.e., representing only one ethnic group.¹² Thus, it is useful to distinguish the four classes of Nahuatl plant names as outlined by Clayton, Guerrini, and de Ávila in the Codex Cruz-Badianus:¹²

1. **primary 'folk-generic' names** that cannot at present be analysed [sic] but which are likely to have been known widely and to be present as cognates in the modern Nahua languages...
2. **compound 'folk-generic' names**...
3. **'folk-specific' names**, composed of a generic term plus a qualifying epithet (which may be compounded into the name), a class less likely to be widespread...
4. **descriptive phrases**, which may have been coined by Martin de la Cruz himself (see below) and which are

This illustration (fol. 100r) is obviously a cactus pad or fruit, i.e., *Opuntia* sp., quite possibly *Opuntia ficus-indica* or a related species. Thus, the name accompanying the illustration is quite easily transliterated as *nashtli*, a variant of *nochtli*, the Nahuatl (Aztec) name for the fruit of the prickly pear cactus or the cactus itself.



least likely to have been shared widely and to have been preserved in contemporary languages....

Thus the Nahuatl *nochtli* and the Spanish loan-word *maguey* fit the primary ‘folk-generic’ names of Number 1 above, but the use of the Nahuatl *tlacanoni* (𐑿𐑿𐑿𐑿𐑿𐑿) — “bat” or “paddle” — for *Dioscorea remotiflora* Kunth (Dioscoreaceae) in No. 28 on folio 99r, fits the descriptive phrase of Number 4.

Further attempts at identifying the plants and their Nahuatl names, when given, are presented in the Appendix. Many of the identifications still need refinement. Also, because we have been trained as botanists and horticulturists, not linguists, our feeble attempts at a syllabary/alphabet for the language in the Voynich Ms. must be interpreted merely as a key for future researchers, not a *fait accompli*. Much, much work remains to be done, and hypotheses will be advanced for years.

Minerals and Pigments in the Voynich Manuscript

In 2009, McCrone Associates, a consulting research laboratory hired by Yale University, filed a report on the pigments in the Voynich Ms. with analyses done by chemist Alfred Vendl, PhD. They found the following:¹⁷

- Black ink = iron gall ink with potassium lead oxide, potassium hydrogen phosphate, syngenite, calcium sulfate, calcium carbonate, mercury compound (traces), titanium compound, tin compound (particle), bone black, gum binder
- Green pigment = copper-organic complex, atacamite (possible to probable), calcium sulfate, calcium carbonate, tin and iron compounds, azurite and cuprite (traces), gum binder
- Blue pigment = azurite, cuprite (minor)
- Red-brown pigment = red ochre, lead oxide, potassium compounds, iron sulfide, palmierite
- White pigment = proteinaceous, carbohydrate-starch (traces).

This analysis was more thorough than the analysis done on 16th century maps from Mexico, which did not identify the chemical nature of the particles.¹⁸ These pigments found by McCrone Associates in the Voynich Ms. differ from those of European manuscripts.^{19,20} In particular, atacamite is primarily from the New World (it was named after the Atacama Desert in Chile), and the presence of this New World mineral in a European manuscript from prior to ca. 1576 would be extremely suspicious.

However, these analyses remind us that the artist for the Voynich Ms. had a very limited palette and thus one blue pigment was used for all the hues, tints, and shades of blue, i.e., colors from blue-to-purple, dark-to-light. Likewise, one red pigment was used for colors from red-to-coral, dark-to-light, etc.

Folio 102r includes a cubic (isometric) blue mineral (No. 4) resembling a blue bouillon cube. This might be boleite ($\text{KPb}_{26}\text{Ag}_9\text{Cu}_{24}\text{Cl}_{62}(\text{OH})_{48}$); the morphology of the primitive drawing certainly matches very closely. The only sources for large crystals of this quality and quantity are three closely related mines in Baja

California, Mexico, principally the mine at Santa Rosale (El Boleo).^{21,22} These crystals, 2-8 mm on the side, typically occur embedded in atacamite. Copper compounds have been used historically to treat pulmonary and skin diseases and parasitic infections (e.g., shistosomiasis and bilharzia).²³

The presence of five drop-like circles on the surface of this blue cube alludes to the Aztec logogram for water, *atl*,^{9-12,16} and the name accompanying this, 𐑿𐑿𐑿𐑿, we transliterate as *atlaan*, or *atlan*, “in or under the water.” Some minerals, e.g., tin (*amochitl*) and lead (*temetstli*), in the Florentine Codex¹⁶ also are illustrated with the *atl* logogram in allusion to the color of mist and foam. The translation of the accompanying text might tell us whether this blue cube and its name are referring to a mineral, a watery color, water itself, a technique of preparation, or even a calendar date.

Artistic Style: Emphasis of Plant Parts and So-Called “Grafted” Plants

The senior author of this article taught Horticultural Plant Materials at Delaware State University (DSU) for 36 years. Students had to learn the scientific name, the common name, a field characteristic, and uses of major horticultural plants ranging from significant conifers to houseplants (within one semester!). The class involved frequent field trips to collect living specimens. The students would inevi-

This illustration (fol. 99r) is most probably *Dioscorea remotiflora*, which is native from northern to southern Mexico. The large root is paddle- or bat-like, and the name attached to this illustration is *tlacanoni*, Nahuatl (Aztec) for paddle or bat.



tably gravitate to a type of plant illustration that is depicted in the Voynich Ms. For example, when they encountered bird's nest spruce (*Picea abies* (L.) H. Karst. 'Nidiformis,' Pinaceae) in every class that was taught, one student would inevitably remark that the tips of the hooked needles of this conifer resembled Velcro®. The students would then start calling the bird's nest spruce the "Velcro plant" and illustrate it in their notebooks with a circular bird's nest outline and needles that were far out of proportion with the rest of the plant (a 0.5 inch needle was portrayed as a colossal one foot grafted onto three-foot plant). That is to say, the students omitted insignificant parts and enlarged important portions accordingly, often seemingly grafting them together. From a diversity of hundreds of students from various ages and ethnic backgrounds at DSU, this proved to be a common human pattern for notation and memorization, at least among university students in 20th century North America.

Thus, on folio 33v of the Voynich Ms., the illustration matches *Psacalium peltigerum* (B. L. Rob. & Seaton) Rydb. (Asteraceae) in botanical characters except for the size of the flowers. This may allude to the importance of the flowers, either for identification or use.

Also, following the same avenue of thought, in the case of the so-called "grafted" plants, e.g., *Manihot rubricaulis* I. M. Johnst. (Euphorbiaceae) on folio 93v, the artist may have merely left out the unimportant parts to condense the drawing to the limits of the paper size. This type of illustration also occurs in Hernández,¹⁵ e.g., *tecpatli* (unknown, perhaps a *Smallanthus* spp., Asteraceae), *teptepehoila capitxochitl* (unknown, probably an *Ipomoea* sp., Convolvulaceae) and *tlalmatzalín hocxotzincensi* (*Brazoria arenaria* Lundell, Lamiaceae), and uses the same sort of artistic device to compress a large plant into a small illustration. However, in Hernández, the cut portion is skillfully hidden from view, facing the back of the page. For *chimalatl peruina* (*Helianthus annuus* L., Asteraceae) in Hernández, the top and bottom are shown side-by-side rather than attached.

Plants, Language, and Other Evidence of a Post-Conquest Central American Origin

The plants, animals, and minerals identified so far are primarily distributed from Texas, west to California, and south to Nicaragua, indicating a botanic garden somewhere in central Mexico.

Sources of Calligraphy in the Voynich Ms.

In 1821, Sequoyah (George Gist) created the Cherokee syllabary by modifying letters from Latin, Greek, and Cyrillic that he had encountered. Following this example, what was the inspiration for the calligraphy in the Voynich Ms.? Focusing upon the four most unique symbols (𐌒, 𐌔, 𐌕, 𐌖) in the Voynich Ms. and perusing documents from Nueva España 1521-ca. 1576, only one document reveals some calligraphy that might have served as inspiration for the Voynich Ms.: the Codex Osuna.²⁴ In the Codex Osuna, there consistently is a broken version of "tl" in the Nahuatl that matches the same symbol "𐌒" in the Voynich Ms., and on folio 12v of the Codex Osuna, there is an identical

version of "𐌒" on the lower left. Throughout the Codex Osuna (e.g., folio 37v), the "s" in the Nahuatl is often written as a large, conspicuous, backward version of that from the Voynich Ms. "𐌔". On folios 13v and 14r of the Codex Osuna, the florid Spanish signatures have several inspirations for the "𐌒" in the Voynich Ms. On folio 39r of the Codex Osuna, the "z" is written in a very similar manner to the "𐌔" in the Voynich Ms.

The Codex Osuna²⁴ was written between 1563-1566 in Mexico City and actually consists of seven books; it is not a codex in the strict definition. According to the Biblioteca Nacional, Madrid (Control No. biam00000085605), where it is listed as *Pintura del gobernador, alcades y regidores de México*, the Codex Osuna was:

A 16th century pictographic manuscript, written in Mexico. It contains the declarations of the accused and the eye witnesses made in New Spain by Jerónimo de Valderrama, by order of Philip II between 1563-1566, to investigate the charges presented against the Viceroy, Luis de Velasco, and the other Spanish authorities that participated in the government of said Viceroy. These people and their testimonies are represented by pictographs, followed by an explanation in the Nahuatl and Castilian languages, as the scribes translated the declarations of the Indians by means of interpreters or Nahuatlato.

The Codex Osuna was donated in 1883 to the Biblioteca Nacional by the estate of Don Mariano Téllez-Girón y Beaufort-Spontin (1814-1882), 12th Duke of Osuna and 15th Duke of the Infantado.

The use of "tl" and "chi" endings places this dialect of Nahuatl in central or northern Mexico.^{25,26} The use of Classic Nahuatl, Mixtec, and Spanish loan-words for some plant names (see Appendix) also indicates an origin in central Mexico.

Other Indications of a 16th Century Mexican Origin

A number of other features of the Voynich Ms. also point to a Mesoamerican origin. For example, a "bird glyph" (folio 1r) as a paragraph marker is not known by the authors of this paper to exist in European manuscripts but as common in Post-Conquest Mexican manuscripts, e.g., the Codex Osuna²⁴ and the Codex Mendoza²⁷ (among many others).

A volcano is pictured on the top left side of folio 86v, within the crease. Mexico has roughly 43 active or extinct volcanoes, most centered near Mexico City. The most famous in recent centuries has been Popocatepetl in Morelos, southeast of Mexico City, a World Heritage Site of 16th century monasteries.

Animals in the Voynich Ms.

The fish illustrated on folio 70r are most definitely the alligator gar [*Atractosteus spatula* (Lacepède, 1803)]. This fish is very distinctive because of its pointed snout, length/width ratio, prominent interlocking scales (ganoid scales), and the "primitive" shape and distribution of the rear fins. The alligator gar is found only in North America.²⁸ The Nahuatl name accompanying this illustration, otolal, transliterated to *atlacaaca*, means someone who is a fishing folk (*atlaca*, "fishing folk" + *aca*, "someone"). Curiously, there



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is an addition with this illustration of what seems to be “*Mars*” (French for March, perhaps?) in darker ink and different handwriting.

The dark-red bull illustrated on folio 71v is the Retinta breed of cattle (*Bos taurus taurus* Linnaeus, 1758), while the pale red is an Andalusian Red. Both of these types of cattle are notable for their upward curved antlers. The Spanish introduced Andalusian, Corriente, and Retinta cattle to North America as early as 1493 with Ponce de León in Florida. Cortés introduced cattle to Mexico some 30 years later. These breeds were chosen for their ability to survive the long sea voyage and later to endure grazing on just minimal “scrub lands.” Descendants of these cattle in North America, albeit with later interbreeding with dairy cattle, are Texas Longhorn cattle and Florida Cracker/Scrub/Pineywoods cattle.²⁹ Curiously, on the illustration in the Voynich Ms., there is an addition in a darker, different ink and handwriting that seems to read “*Ma*.”

The crustaceans illustrated on folio 71v match the morphology of the Mexican crayfish, *Cambarellus montezumae* (Saussure, 1857). *Acocil* (from the Nahuatl *cuitzilli*) are found in a broad section across Mexico.²⁸

The cat illustrated on folio 72r is the ocelot [*Leopardus pardalis* (Linnaeus, 1758)]. The stripes across the face, the rounded ears, and the gray spotting (illustrated with the blue pigment) are all characteristic of this cat. This species ranges from Texas to Argentina.²⁸ Oddly, “angst” is written in a darker ink and different handwriting.

The sheep on folios 70v and 71r are bighorn sheep (*Ovis canadensis* Shaw, 1804). The hooves (two-cleft and hollow to clasp rocks) indicate that this might be the desert bighorn sheep (*O. canadensis mexicana* Merriam, 1901), which are found in deserts in southwestern North America and across Mexico.²⁸ What seems to be the word “*abime*” (French for chasm or abyss) is attached to this illustration in a different handwriting and a darker ink.

A black Gulf Coast jaguarundi [*Puma yagouaroundi cacomitli* (Berlandier, 1859)] is portrayed on folio 73 (with what appears to be “*noūba*,” French for spree, written over the original writing with a darker, different ink). This cat, which has brown and black phases, is very distinctive in profile with a flatter face than most cats; the overall

aspect of the face almost resembles a monkey. The tail is also notable, very long and particularly bushy at the base.

Additional tiny animals apparently are used as decorative elements and are difficult to identify: (1) a chameleon-like lizard (quite possibly inspired by the Texas horned lizard, *Phrynosoma cornutum* [Harlan 1825]) nibbling a leaf on folio 25v, (2) two caecilians [wormlike amphibians, probably inspired by *Dermophis mexicanus* (Duméril & Bibron, 1841)] in the roots of the plant on folio 49r, and (3) five animals at the bottom of folio 79v.

Other Evidence of Mexican Origin: The Influence of the Catholic Church

Besides Spanish loan-words, other indications of the European influence on Post-Conquest Mexico are the so-called “*maiorica*” or pharmaceutical containers in the “Pharma pages.” The sharp edges, filigree, lack of painted decoration, and general design allude to inspiration by metal objects, not ceramic or glass. The immediate suggestions for inspiration were the ciboria and oil stocks of 16th century Spanish Catholic church ceremonies. The former consists of a capped chalice, often on a highly ornamented stand, which stores the Eucharist. The latter consists of a cylindrical case comprising three compartments that screw into each other and hold the holy oils. Using these holy objects as designs for pharmaceutical containers would have been a mockery of the religion forced upon the conquered natives and thus another reason for writing in code. A ciborium also appears on folio 67r of the Codex Aubin.³⁰

Future Avenues for Research

The Aztec elite were highly educated and hygienic. Cortés reported libraries, called *amoxcalli* (Nahuatl for book house), complete with librarians and scribes. The Spanish conquistadors, along with the office of the Holy Inquisition burnt them all because of their “superstitious idolatry” (translated words of Juan de Zumarraga, first Archbishop of Mexico).¹⁴

Axiomatically, the Spanish priests established schools for children of the Aztec elite, teaching them European writing methods, painting, and Latin. Probably one of the most famous products of these schools, the Codex Cruz-Badianus, was completed by two students educated

The plants, animals, and minerals identified so far are primarily distributed from Texas, west to California, and south to Nicaragua, indicating a botanic garden somewhere in central Mexico.

ዘኒሮ ቸጽላቸደ, ልዝካጽጊ, ልወጽ
ክሳርጋጽጊ ሰርሳቸደጊ ጌወ ቸጽ
ላጊሮ ቸጊክላጊጽጊ ጸረቸደጊ ጊሮጽ
ዘኒሮጊ, ረቸቸ ስወ ርጽጊጽጊ, ልወጽ
ጌወቸደ ስወ ልሮጊጽጊ, ልወጽጊጽጊ
ላ ሰቸጊጽ ጽጊጽጊ ጌወጽጊጽጊ ል
ረረቸደጊ ጽጊጽጊ.

at the College of Santa Cruz in Tlatelolco. It was written in Nahuatl by Martín de la Cruz — a native convert and practicing physician at the College of Santa Cruz — and translated into Latin by Juan Badiano, another native convert and student of the College. Two versions of this manuscript exist, the original Codex Cruz-Badianus, formerly in the Vatican, returned in 1990 by Pope Paul II to Mexico (now at the Biblioteca Nacional de Antropología e Historia in Mexico City [F1219 B135 1940]), and a later copy at the Royal Library of Windsor Castle (RCIN970335).⁹⁻¹²

The Aztecs also were the first to establish comprehensive botanic gardens, which later inspired those in Europe. Gardens were in Tenochtitlan, Chapultepec, Ixtapalapa, el Peñón, and Texcoco, as well as more distant ones such as Huaztepec (Morelos). Some of these botanic gardens, such as Huaztepec, included water features for ritualistic bathing. Coupled with this was the use of the *temezcalli*, or sweatbaths.^{31,32}

Besides outright destruction of the libraries by Spanish invaders, much of this accumulated indigenous knowledge also was destroyed by diseases, both imported and endemic. According to epidemiologist Rodolfo Acuña-Soto and colleagues,³³ the population collapse in 16th century Mexico — a period of one of the highest death rates in history — shows that not only were European diseases devastating, but an indigenous hemorrhagic fever also may have played a large role in the high mortality rate. On top of the smallpox epidemic of 1519-1520, when an estimated 5-8 million natives perished in Mexico, the epidemics of 1545 and 1576 were due primarily to *cocoliztli* ("pest" in Nahuatl). These latter epidemics occurred during moist years following devastating droughts, providing food for a surge of rodents, which eventually killed an additional estimated 7-17 million people in the highlands of Mexico, roughly 90% of the population.³³ This pattern is similar to the sudden, severe epidemics of other zoonoses (diseases of animal origin that can be transmitted to humans).³⁴ Thus, the author(s) and artist(s) (*tlacuilo*, the native painter-scribes) of the Voynich Ms. may have perished in one of these epidemics, along with the speakers of their particular dialect.

Questions in the following paragraphs are particularly pertinent to fully establish this as the work of a 16th century *ticitl* (Nahuatl for doctor or seer).^{35,36}

Interpretation of the flora and languages of Mexico is a difficult task even today. Mexico is extremely diverse in both floristics and ethnic groups, with approximately 20,000 plants and at least 30 extant dialects of Nahuatl.¹² We are confident that our attempts at a preliminary syllabary for the Voynich Ms. can be refined. What are the linguistic affinities of this dialect to extant dialects of Nahuatl? Is this dialect truly extinct?

A six- to eight-pointed star, especially in the latter folios of the Voynich Ms. (103r-116r, where it often is dotted with red in the center), is used as a paragraph marker. Is this reminiscent of the eight-pointed Mexica Sun Stone or Calendar Stone? On the top center of folio 82r, the eight-pointed star is quite strikingly similar to this stone. This stone was unearthed in 1790 at El Zócalo, Mexico City, and is now at the capital's National Museum of Anthropology.

One interpretation of the face in the center of this stone is Tonatiuh, the Aztec deity of the sun. Another interpretation of the face is Tlatechutli, the Mexica sun or earth monster. An identical eight-pointed star also appears on folio 60 of the Codex Aubin.³⁰

What is the influence of the sibyls in the murals at the Casa del Deán (Puebla) on the portrayal of the women in the Voynich Ms.? The Casa del Deán originally belonged to Don Tomás de la Plaza Goes, who was dean of Puebla from 1553 to 1589 and second in command to the bishop. The murals were executed by native artists, *tlacuilo*, whose names are unknown. Undoubtedly, much was destroyed through the centuries, and only two restored rooms remain. In *La Sala de las Sibillas*, or Room of the Sibyls, female prophets from Greek mythology narrate the passion of Christ. The women in the murals at the Casa del Deán have short hair and European features, and the friezes include nude angels and satyrs.

How was the parchment, which may date to animals killed in the first half of the 15th century, used over a full century later for this manuscript?³⁷ How did putative medieval German script on folio 166v (the so-called "Michiton Olababas page") get integrated into this manuscript? Was this a case of European parchment being repurposed?

Copal resins (most commonly used for incense) were often used as binders in Mesoamerican pigments.^{18,38} McCrone Associates supposedly documented the IR spectrum of the resin.¹⁷ Is this a copal resin from a Meso-American species, such as *Protium copal* (Schltdl. & Cham.) Engl., *Hymenaea courbaril* L. (Fabaceae), or *Bursera bipinnata* (Moç. & Sessé ex DC.) Engl. (Burseraceae)?

What was the chain of evidence from post-Conquest Mexico to the court of Rudolph II? The circuitous route of the Codex Mendoza is perhaps illustrative of the fact that materials did not always flow directly from New Spain (present-day Mexico) to Spain, and European materials were quite often used for writing (rather than the native *amate* paper, *amatl* in Nahuatl). The Codex Mendoza was created in Mexico City on European paper about 20 years (ca. 1541) after the Spanish conquest of Mexico for Charles V, Holy Roman Emperor and King of Spain. It was sent by ship to Spain, but the fleet was attacked by French corsairs (privateers), and the Codex, along with the other booty, was taken to France. From there it came into possession of André Thévet, cosmographer to Henry II of France. Thévet wrote his name in five places in the Codex, twice with the date of 1553. It was later sold to Richard Hakluyt around 1587 for 20 francs (Hakluyt was in France from 1583-1588 as secretary to Sir Edward Stafford, English Member of Parliament, courtier and diplomat to France during the time of Queen Elizabeth I). Sometime near 1616 it was passed to Samuel Purchas, then to his son, and then to John Selden. The Codex Mendoza has been held at the Bodleian Library at Oxford University since 1659, five years after Selden's death.²⁷

Another question is the involvement of John Dee (1527-1608/1609), if any. Dee — a Welsh mathematician, astronomer, astrologer, occultist, navigator, imperialist, and consultant to Queen Elizabeth I — purchased an Aztec obsidian "shew-stone" (mirror) in Europe between 1527-1530 (this

object was subsequently owned by Horace Walpole). Dee was in Paris in the 1550s, and a letter dated 1675 quoted Arthur Dee, son of John Dee, saying that he had seen his father spending much time over a book “all in hierolyphicks.” Dee also is suspected of being the sales agent to Rudolf II, ca. 1584-1588.²⁻⁵

Conclusion

We note that the style of the drawings in the Voynich Ms. is similar to 16th century codices from Mexico (e.g., Codex Cruz-Badianus). With this prompt, we have identified a total of 37 of the 303 plants illustrated in the Voynich Ms. (roughly 12.5% of the total), the six principal animals, and the single illustrated mineral. The primary geographical distribution of these materials, identified so far, is from Texas, west to California, south to Nicaragua, pointing to a botanic garden in central Mexico, quite possibly Huaztepec (Morelos). A search of surviving codices and manuscripts from Nueva España in the 16th century, reveals the calligraphy of the Voynich Ms. to be similar to the Codex Osuna (1563-1566, Mexico City). Loan-words for the plant and animal names have been identified from Classical Nahuatl, Spanish, Taino, and Mixtec. The main text, however, seems to be in an extinct dialect of Nahuatl from central Mexico, possibly Morelos or Puebla.

Appendix: Plants Identified to Date

Beyond the approximately 172 plants, plant parts, and minerals in the “pharma section,” the “herbal section” includes about 131 plants. In the following, we have indicated only identifications that immediately “jumped out” to us with seemingly sound identifications. We have many more putative identifications, but these still are questionable, so they have been reserved for later publication. Unless financing could be procured for a large-scale project with leading scholars in botany, linguistics, and anthropology, decades of research remain. After all, we indicate only 37 plant identifications in the following pages (and boleite mineral) from a total of roughly 303 taxa (a meager 12.5% approximation of the total). And the text, bathing practices, astrology/astronomy, chain of evidence, etc., also need explanation.

Throughout this *HerbalGram* article, nomenclature and plant distributions follow the United States Department of Agriculture’s GRIN taxonomic database,³⁹ and/or The Plant List produced by the Missouri Botanical Garden and Royal Botanic Garden, Kew,⁴⁰ and/or the Integrated Taxonomic System (ITIS),²⁸ unless otherwise indicated. The plants are listed below, alphabetically by family.

Apiaceae (Carrot Family)

Probably the most phantasmagoric illustration in the Voynich Manuscript is the *Eryngium* species portrayed on folio 16v. The inflorescence is colored blue, the leaves red, and the rhizome ochre, but the features verge on a stylized appearance rather than the botanical accuracy of the *Viola bicolor* of folio 9v, immediately suggesting that more than one *tlacuilo* (painter, artist) was involved. This lack of technical attention makes identification beyond genus difficult, if not impossible. However, a guess might be *E. heterophyl-*

lum Engelm.⁴¹ This species, native to Mexico, Arizona, New Mexico, Louisiana, and Texas, has similar blue inflorescences, blue involucral bracts (whorl of leaves subtending the inflorescence), and stout roots, and it also develops rosy coloring on the stems and basal leaves. However, *E. heterophyllum* has pinnately compound leaves (leaflets arranged on each side of a common petiole), not peltate (umbrella-shaped) leaves. This lack of specificity on the shape of the leaves also plagues identifications in the Codex Cruz-Badianus.¹² Today, *E. heterophyllum*, Wright’s eryngo or Mexican eryngo, is used to treat gallstones in Mexico and has been found in in vivo experiments to have a hypocholesteremic effect.⁴²

Apocynaceae (Dogbane Family)

Plant No. 14 on folio 100r appears to be the fruit of an asclepiad, possibly the Mexican species *Gonolobus chloranthus* Schltdl. The name *oxccox* transliterates as *acamaaya*, a variant of *acamaya*, “crab” or “crayfish,” and the fruit of *G. chloranthus* does have a resemblance to knobby, ridged crab claws. The *tlallayoptli* in Hernández,¹³ with a similar illustration of the fruit (but with smooth ribs), is nominally accepted as the related species *G. erianthus* Decne., or *Calabaza silvestre*. The roots of *G. niger* (Cav.) Schult. are used today in Mexico to treat gonorrhea.⁴³

Araceae (Arum Family)

Plant No. 7 on folio 100r appears to be the leaf of an aroid, most likely the Mexican species *Philodendron goeldii* G. M. Barroso. The name *coxlan* transliterates as *macanol*, which refers to the wooden sword, *macana* (a Taino word, called *macuahuitl* by some authorities for the Aztec version), studded with slices of razor-sharp obsidian.

Plant No. 2 on folio 100r also appears to be a vine of an aroid, ripped from a tree, most probably *Philodendron mexicanum* Engl. The name *zocoxet* transliterates as *namaepi*, which may incorporate a loan-word from Mixtec referring to soap, *nama*, which is a plant that produces soap.⁴⁴

Author Deni Bown writes of the Araceae in general: “Most of the species of Araceae which are used internally for bronchial problems contain saponins, soap-like glycosides which increase the permeability of membranes to assist in the absorption of minerals but also irritate the mucous membranes and make it more effective to cough up phlegm and other unwanted substances in the lungs and bronchial passages.”⁴⁵

Asparagaceae (the Asparagus Family, alternatively Agavaceae, the Agave Family)

Plant No. 4 on folio 100r appears to be a pressed specimen of a young *Yucca* species or *Agave* species. Here *coxlan* transliterates to *maguoey*, or *maguey*, a name that entered Spanish from the Taino in the middle of the 16th century,⁴⁶ rather than the Nahuatl *metl*. Thus, this may quite possibly be *Agave atrovirens* Karw. ex Salm-Dyck, which was a source for the beverages pulque, mescal, and tequila in 16th century Nueva España.^{47,48} Maguey was the female goddess associated with the maguey plant as outlined in the Codex Rios of 1547-1566.⁴⁹

Rios 15 (20v) Eighth Trecena: Mayaguil (Mayahuel)

They feign that Mayaguil was a woman with four hundred breasts, and that the gods, on account of her fruitfulness, changed her into the Maguei (Maguey plant), which is the vine of that country, from which they make wine. She presided over these thirteen signs: but whoever chanced to be born on the first sign of the Herb (Grass), it proved unlucky to him; for they say that it was applied to the Tlamatzatzguex, who were a race of demons dwelling amongst them, who according to their account wandered through the air, from whom the ministers of their temples took their denomination. When this sign arrived, parents enjoined their children not to leave the house, lest any misfortune or unlucky accident should befall them. They believed that those who were born in Two Canes (Reed), which is the second sign, would be long lived, for they say that sign was applied to Heaven. They manufacture so many things from this plant called the Maguei, and it is so very useful in that country, that the Devil took occasion to induce them to believe that it was a god, and to worship and offer sacrifices to it.

Asteraceae (Daisy Family)

In 1944, the Rev. Hugh O'Neill at Catholic University wrote that the plant illustrated on folio 93r is sunflower, *Helianthus annuus* L. He wrote that six botanists agreed with him,⁵⁰ but, in spite of this, non-botanists disagreed. This is most certainly the sunflower, called *chimalatl peruiana* in Hernández.¹⁵ The difficulty of portraying an exceedingly tall annual is conveyed in Hernández by having cut stems side-by-side, but in the Voynich Ms. the features are deeply compressed, possibly confusing non-botanists, but perhaps more difficult is the admission that the Voynich Ms. may be post-1492 or possibly from the New World!

The plant illustrated on folio 13r is probably a *Petasites* sp. The closest match might be *P. frigidus* (L.) Fr. var. *palmatus* (Aiton) Cronquist, the western sweetcoltsfoot. This is native to North America, from Canada to California. *Petasites* spp. are used in salves or poultices as antiasthmatics, antispasmodics, and expectorants.⁵¹

The plant illustrated on folio 33v is likely *Psacalium peltigerum* (B. L. Rob. & Seaton) Rydb., possibly var. *latilobum* Pippen.^{52,53} This is a fairly good match to this New World asterid genus as to

its lobed peltate (umbrella-shaped) leaves, inflorescence, and fleshy subterranean tubers, except that the flowers are shown in larger size than reality, perhaps to emphasize the identification or use. *Psacalium peltigerum* is known from the Mexican states of Jalisco, Guadalajara, and Guerrero, but the variety *P. latilobum* is restricted to Guerrero. *Psacalium peltatum* (Kunth) Cass. is used for genito-urinary tract/reproduction treatment and for rheumatism in Mexico.⁵⁴

Boraginaceae (Borage Family, Alternatively Hydrophyllaceae, the Waterleaf Family)

The plant illustrated folio 56r is almost certainly *Phacelia campanularia* A. Gray, the California bluebell. The blue flowers, dentate (toothed) leaves, scorpioid cyme (inflorescence coiled at the apex), and overlapping leaf-like basal scales are all good matches. This species is native to California.

Brassicaceae (Mustard Family)

The plant illustrated on folio 90v is most probably *Caulanthus heterophyllus* (Nutt.) Payson, San Diego wild

The plant illustrated on fol. 90v is most probably *Caulanthus heterophyllus* (Nutt.) Payson, San Diego wild cabbage or San Diego jewelflower.



cabbage or San Diego jewelflower. The flowers of *C. heterophyllus* are four-petaled, white with a purple streak down the center, with four protruding, dark purple anthers. Leaves vary from dentate (toothed) to lobed. It is native to California and Baja California.

Cactaceae (Cactus Family)

Plant No. 8 on folio 100r is obviously a cactus pad or fruit, i.e., *Opuntia* spp., quite possibly *Opuntia ficus-indica* (L.) Mill. or a related species (e.g., *O. megacantha* Salm-Dyck or *O. streptacantha* Lem.).⁴⁷ Thus, **20119** quite easily is transliterated as *nashтли*, a variant of *nochtli*, the Nahuatl name for the fruit of the prickly pear cactus or the cactus itself (the pads are called *nopalli*). *Opuntia ficus-indica* is widely cultivated but apparently native to central Mexico. *Nopalea cochenillifera* (L.) Salm-Dyck also is cultivated widely for the insect that is the source for cochineal.⁵⁵

Caryophyllaceae (Carnation Family)

The plant illustrated on folio 24r is probably a *Silene* sp., possibly *S. menziesii* Hook., Menzie's catchfly. This grows natively from Alaska to California and New Mexico. The flowers are a good match, even showing the infection with the fungus *Microbotryum violaceum* (Pers.) G. Deml & Oberw., anther smut fungus, which turns the anthers purple. However, the leaves are shown as hastate (arrow-head-shaped), and *S. menziesii* has attenuate (gradually narrowing to the base) leaf bases. Is this another case of disparity of the leaves between reality and portrayal, or is there another *Silene* species that is closer to the illustration?

Convolvulaceae (Morning Glory Family)

As mentioned previously, the plant illustrated on folio 1v is *Ipomoea arborescens* (Humb. & Bonpl. ex Willd.) G. Don, found from northern to southern Mexico. It is overwhelmingly similar to the *xiuhamolli/xiuhhamolli* (soap plant) in the Codex Cruz-Badianus⁹⁻¹² of Mexico from 1552. Both trees have a large, broad, gray-to-whitish basal woody caudex (base) with ridged bark, portrayed here with broken coarse roots that resemble toenails. The plant in the Codex Cruz-Badianus is in both bud and flower with leaves that have a cuneate (wedge-shaped) base, while the plant in the Voynich Ms., has only one bud with leaves that have a cordate (heart-shaped) base. The illustration in the Codex Cruz-Badianus is nominally accepted as *I. murucoides* Roem. & Schult. by leading commentators.⁹⁻¹²

The plant illustrated on folio 32v is probably *I. pubescens* Lam., silky morning-glory. This vine is native to Arizona as well as New Mexico to Argentina. The blue flowers, deeply lobed leaves, and tuberous roots are all characteristic of silky morning-glory.

Species of *Ipomoea* are known for their resin glycosides and use in treating several conditions, such as diabetes, hypertension, dysentery, constipation, fatigue, arthritis, rheumatism, hydrocephaly, meningitis, kidney ailments, and inflammation.⁵⁶⁻⁵⁸ In addition, the arborescent *Ipomoea* species, *I. murucoides* and *I. arborescens*, are used in hair and skin care, especially the ashes, which are used to prepare soap.^{55,58} While the bases of both of the arborescent species are portrayed somewhat accurately, Clayton, Guer-

rini, and de Ávila¹² state that, "The blue patch with small, white ovate glyphs at the base of the plant is the symbol for flowing water." This may be related to the story relayed by Standley for *I. arborescens*: "In Morelos there is a popular belief that the tree causes imbecility and other cerebral affections [*sic*], and for this it is necessary only to drink the water running at the foot of the trees."⁵⁵

Dioscoreaceae (Yam Family)

The vine illustrated as No. 28 on folio 99r is likely *Dioscorea remotiflora* Kunth, native from northern to southern Mexico. The large root is paddle- or bat-like, and the name attached to this illustration is **tlacanoni**, Nahuatl for paddle or bat.

The vine illustrated on folio 17v may very well be *Dioscorea composita* Hemsl., barbasco, native from northern to southern Mexico. The root quite often is segmented as shown in the Voynich Ms. and is a major source of diosgenin, a hormone precursor.

The vine illustrated on folio 96v is almost certainly *Dioscorea mexicana* Scheidw., Mexican yam. This also is native from northern to southern Mexico. This is another source of diosgenin.

Euphorbiaceae (Spurge Family)

The plant illustrated on folio 6v is very likely a *Cnidoscolus* sp., either *C. chayamansa* McVaugh or *C. aconitifolius* (Mill.) I. M. Johnst. Both are called *chaya* and are widely cultivated from Mexico to Nicaragua. The characteristic leaves and spiny fruit are both good fits, but because of the variability in both species (especially cultivated selections), it is difficult to tell for sure from the crude illustration that is portrayed.⁵⁹

The plant illustrated on folio 5v is most probably *Jatropha cathartica* Terán & Berland., *jicamilla*. The palmately dentate (toothed) leaves, red flowers, and tuberous roots are all good fits for the species. Its native habitats are from Texas to northern Mexico. As the scientific name implies, this is cathartic and poisonous.

The plant illustrated on folio 93v is most likely *Manihot rubricaulis* I. M. Johnst. from northern Mexico. This close relative to the cassava, *M. esculenta* Crantz, has thinner, more deeply lobed leaves. *Manihot rubricaulis* is illustrated in Hernández¹⁵ as *chichimecapatl* or *yamanquipatlis* (gentle or weak medicine).

Fabaceae (Bean Family)

Plant No. 11 on folio 88r is almost certainly *Lupinus montanus* Humb., Bonpl., & Kunth of Mexico and Central America. This lupine is noted to contain alkaloids.⁶⁰ The name attached to this is **aguacacha**, which we translate as watery calluses. The compound peltate leaves and soft, callus-like, nitrogen-fixing root nodules (knobs) on one side of the roots are typical of this species.

Grossulariaceae (Gooseberry Family)

The plant illustrated on folio 23r is probably *Ribes malvaecum* Sm., chaparral currant. This woody, stoloniferous shrub has purple-magenta flowers and palmately (arranged like a hand) lobed leaves and is endemic to California south to Baja Norte, Mexico.⁵⁵

Lamiaceae (Mint Family)

The plant illustrated on folio 45v is very possibly *Hyptis albida* Kunth, *hierba del burro*. The gray leaves, blue flowers, and stout root all match the characteristics of the species. This shrub is native to Sonora and Chihuahua to San Luis Potosí, Guanajuato, and Guerrero. Standley⁵⁵ relates that “the leaves are sometimes used for flavoring food. In Sinaloa they are employed as a remedy for ear-ache, and in Guerrero a decoction of the plant is used in fomentations to relieve rheumatic pains.”

The plant illustrated on folio 32r is most likely *Ocimum campechianum* Mill. (*O. micranthum* Willd.). This suffrutescent (low-shrubby) annual basil grows indigenously from Florida to Argentina; in Mexico it is found from Sinaloa to Tamaulipas, Yucatán, and Colima.⁵⁵ The inflorescence and leaves are both good matches. Standley⁵⁵ relates, “In El Salvador bunches of the leaves of this plant are put in the ears as a remedy for earache.”

Plant No. 5 on folio 100r has three flowers that match *Salazaria mexicana* Torr., or bladder sage. This species also seems to match the description of *tenamaznanapoloa* (carrying triplets?) of Hernández¹⁵ (alias *tenamazton* or *tlalamatl*). This shrub, native from Utah to Mexico (Baja California, Chihuahua, and Coahuila), exhibits inflated bladder-like calyces that vary in

color, depending upon maturity, from green to white to magenta, with a dark blue-and-white corolla emerging from it.⁵⁵ We have transliterated the name accompanying these three flowers, *2a2 2ca2 8aun 89*, as *noe, moe-choll-chi*. The name *choll-chi* we translate as skull-owl (Spanish *cholla* plus Nahuatl root *chi*), and, indeed, the flowers do bear an uncanny resemblance to the white skull and black beak of the great horned owl (*Bubo virginianus* Gmelin 1788).

The plant on folio 45r most likely is *Salvia cacaliifolia* Benth., endemic to Mexico (Chiapas), Guatemala, and Honduras. The blue flowers in a tripartite inflorescence (branching in threes) with distantly dentate (toothed) deltoid-hastate (triangular-arrowhead-shaped) leaves are quite characteristic of this species.⁶¹

Marantaceae (Prayer Plant Family)

The plant illustrated on folio 42v is a crude representation of a *Calathea* spp., probably allied to *C. loeseneri* J.

This illustration from the Voynich Ms. (fol. 23v) is quite definitely *Passiflora* subgenus *Decaloba*. The flower (A) with prominent petals and reduced sepals and the paired petiolar glands in the upper third of the leaf (B) fit quite well. The dentate (toothed) leaves that are deeply cordate (heart-shaped) only seem to match the variability of *P. morifolia* Mast. in Mart., although the artist has made the leaves slightly more orbicular (round) than they normally occur in mature foliage (young plants, i.e., root suckers, sometimes exhibit orbicular, entire leaves in cultivation).



F. Macbr., which yields a blue dye. The crudeness of the illustration, coupled with inadequate surveys of the genus *Calathea* in Mexico, impede an easy identification at this time.

Menyanthaceae (Buckbean Family)

The obviously aquatic plant illustrated on folio 2v is undoubtedly *Nymphoides aquatica* (J. F. Gmel.) Kuntze, the so-called banana plant or banana lily. This is native to North America, from New Jersey to Texas.

Moraceae (Mulberry Family)

The plant illustrated on folio 36v is probably a *Dorstenia* sp., likely the variable *D. contrajerva* L., tusilla. The inflorescence is quite distinct and is genus-appropriate. Leaves for this species vary “in spirals, rosulate (in the form of a rosette) or spaced; lamina broadly ovate (egg-shaped) to cordiform (heart-shaped) to subhastate (tending towards arrowhead-shaped), pinnately (arranged on opposite sides of a petiole) to subpalmately (tending to be arranged as a hand) or subpedately (tending to be two-cleft), variously lobed to parted with three-to-eight lobes at each side or subentire (tending to have a smooth edge).”⁶²

Passifloraceae (Passionflower Family)

The plant illustrated on folio 23v is definitely a *Passiflora* sp. of the subgenus *Decaloba*. This is primarily a New World genus (some species occur in Asia and Australia) and cannot be confused with any other genus. The paired petiolar glands in the upper third of the leaf, blue tints in the flower, and dentate (toothed) leaves that are deeply cordate (heart-shaped) seem to match only the variability of *P. morifolia* Mast. in Mart.,⁶³ although the artist has made the leaves slightly more orbicular (round) than they normally occur in mature foliage (young plants such as root suckers sometimes exhibit orbicular, entire leaves in cultivation).

Penthoraceae (Ditch-Stonecrop Family)

The plant illustrated on folio 30v is easily identifiable as *Penthorum sedoides* L., the ditch stonecrop, a New World species that grows indigenously from Canada to Texas. The cymose inflorescence (convex flower cluster), dentate leaves, and stolons (trailing shoots) are characteristic of the species. The artist, though, apparently has illustrated this in very early bud (or glossed over the details of the flowers) because the prominent pistils emerge later, and are very obvious in fruit, often turning rosy.

Polemoniaceae (Phlox Family)

The plant illustrated on folio 4v is quite definitely a *Cobaea* sp., a New World genus. The best match is *C. biaurita* Standl., which is closely related to the cultivated *C. scandens* Cav., the cup and saucer vine. This vine is native to Chiapas, Mexico, and possesses acute (tapering to the apex, sides straight or nearly so) to acuminate (tapering to the apex, sides more-or-less pinched) leaflets and flowers that emerge cream-colored but later mature to purple.^{64,65}

Ranunculaceae (Buttercup Family)

The plant illustrated on folio 95r is quite definitely an *Actaea* sp., probably the white-fruited *Actaea rubra* (Aiton) Willd. f. *neglecta* (Gillman) B. L. Rob. *Actaea rubra* is native to Eurasia, and in North America from Canada to New Mexico.⁶⁶ As the common name baneberry indicates, this species is poisonous.

Urticaceae (Nettle Family)

As first postulated by the Rev. Hugh O'Neill, the plant on folio 25r is clearly a member of the Urticaceae, or nettle family.⁵⁰ The best match, because of the dentate, lanceolate (lance-shaped) leaves and reddish inflorescences, seems to be *Urtica chamaedryoides* Pursh, commonly known as heart-leaf nettle. This is native in North America from Canada to Mexico (Sonora). *Urtica* and the closely related genus *Urera* also occur in the Codex Cruz-Badianus⁹⁻¹² and Hernández.¹⁵

Valerianaceae (Valerian Family)

The plant illustrated on folio 65r is probably *Valeriana albournervata* B. L. Rob. The palmately or cleft-lobed leaves, inflorescence, and napiform (turnip-shaped) to fusiform (spindle-shaped), often forked taproots, are a good match. This is native to the Sierra Madre of Mexico.⁶⁷

Violaceae (Violet Family)

The plant illustrated on folio 9v has been identified previously as *Viola tricolor* of Eurasia,⁶⁸ but we claim that it is not this species. If the illustration in the Voynich Ms. is correct (and the illustration is actually quite decent), the terminal stipular lobes are linear (narrow and flat with parallel sides), as characteristic of the North American native *V. bicolor* Pursh (*V. rafinesquei* Greene), not spatulate (spatula-shaped) as in *V. tricolor*. Also, the flowers of *V. bicolor* are uniformly cream to blue, while the flowers of *V. tricolor* usually have two purple upper petals, three cream-to-yellow lower petals. *Viola bicolor*, American field pansy, is native to the present-day United States from New Jersey to Texas, west to Arizona, although Russell mysteriously says “originally derived from Mexico” even though its center of diversity seems to be eastern Texas.^{69,70} HG

Arthur O. Tucker, PhD, is emeritus professor and co-director of the Claude E. Phillips Herbarium at Delaware State University in Dover, an upper-medium-sized herbarium and the only functional herbarium at an historically Black college or university, graced with a few type specimens of Mexican plants collected by Ynes Mexia, Edward Palmer, et al.⁷¹ He has had a special interest in identifying plants from period illustrations utilizing flora and herbarium specimens, e.g., the “Blue Bird Fresco” at Knossos.⁷² Because of his expertise, he was hired by CPHST/PPQ/APHIS/USDA (Center for Plant Health Science Technology/Plant Protection & Quarantine) to identify botanicals imported to the United States and to construct a Lucid key.⁷³ The latter research was particularly challenging because these botanicals encompass parts of everything “botanical”—from fungi (though not truly botanical), to mosses and lichens, to gymnosperms and angiosperms that had been greatly modified (bleached and/or dyed, scented, and sometimes reconstructed into new botani-

This illustration from the Voynich Ms. (fol. 9v) is most definitely *Viola bicolor* of North America by the terminal stipular lobes (A), which are linear (narrow and flat with parallel sides), not spatulate (spaula-shaped) as in *V. tricolor* of Europe. Also, the flowers (B) are uniformly a pale blue, as in *V. bicolor*, not tricolored as in *V. tricolor*.



cal) — collected in India, China, Southeast Asia, Australia, Brazil, etc. Dr. Tucker also has published widely on the systematics and chemistry of herbs in both scientific and popular journals and is the co-author of *The Encyclopedia of Herbs* (Timber Press, 2009), which attempts to summarize the latest scientific information on herbs of flavor and fragrance for the average reader.⁷⁴

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Will ‘Obamacare’ Affect Natural Healthcare in the United States?

More than three years after the US Congress passed the Patient Protection and Affordable Care Act (ACA), popularly known as “Obamacare,” the controversial law maintains an undeniable presence in the lives of most Americans. Some Republican members of Congress and non-governmental groups are continuing their efforts to orchestrate the ACA’s demise, while Democrats and other organizations are still defending the law and promoting its potential benefits.^{1,2}

While ACA-related discussions often divide politicians and citizens along party lines, one aspect of the Act that blurs these boundaries is its potential impact on natural and integrative healthcare. Some in the complementary and alternative medicine (CAM) community claim that the ACA removes freedom of choice in healthcare. Other organizations celebrate the inclusion of CAM and integrative health in various parts of the ACA and particularly embrace a provision that calls for non-discrimination against licensed healthcare providers. Most of this discussion centers on two aspects of the ACA: the individual mandate and Section 2706, both of which take effect in January 2014.

Individual Mandate

Although the US House of Representatives voted in July 2013 to delay the individual mandate portion of the ACA,³ the Senate has held no vote on the matter. As of press time, all Americans must have health insurance at the start of 2014.^{4,5} The mandate means that individuals without employer-based insurance who choose not to purchase a plan on their own are required to pay a penalty fee when filing their annual income taxes.

The individual penalty fee for 2014 is 1% of a person’s yearly income or \$95, whichever amount is higher.⁴ So if a person made \$40,000 per year and was without health insurance, he or she would pay a fee of \$400. An uninsured person who made just \$5,000 in one year would pay the \$95 minimum fee. The fee increases each year; in 2016, for example, it will be the higher of 2.5% of a person’s yearly income or \$695.⁴ Some persons are exempted from this requirement, including very low-income individuals and those whose religious beliefs are contradictory to purchasing healthcare insurance plans (e.g., Christian Scientists, the Amish, etc.).

The ACA legislation explains that the requirement is expected to increase the demand for healthcare services and thus will increase supply and encourage competitive prices; to reduce the \$207 billion cost that the national economy sustains from the “poorer health and shorter lifespan of the uninsured”; and to lower health insurance premiums for all customers by reducing the “cost of providing uncompensated care to the uninsured,” which was calculated at \$43 billion in 2008.⁵

Various conservative and libertarian-leaning commentators and groups have criticized the individual mandate for infringing on “basic” notions of freedom and liberty. Some CAM customers and organizations, including Citizens for Health (CFH) and the policy-focused nonprofit Alliance

for Natural Health-USA (ANH), also disagree with this tenet of the ACA.^{6,7}

In 2010, CFH Chairman Jim Turner and Curt Levey, the executive director of the nonprofit Committee for Justice that promotes constitutionalism, published a joint editorial against the ACA before its passage. “Consumers of alternative medicine are used to health insurance plans that offer little or no coverage for holistic treatments and thus don’t meet their needs,” wrote Turner and Levey. “That’s why many of them choose not to purchase health insurance. What they’re not used to — but will have to get used to if the proposed ‘reforms’ become law — is being forced to purchase the very insurance plans that fail to meet their needs. And therein lie the dire consequences of the impending legislation.”⁷

But, to some, Turner and Levey’s preferred option of purchasing no health insurance whatsoever ignores the benefits that CAM supporters can experience from purchasing even a low level of coverage.

“Talking about CAM without talking about catastrophic coverage is to make the same error that medicine makes when it deals with one organ system without thinking of the whole,” said John Weeks, publisher and editor of the popular Integrator Blog who has been writing about and consulting on CAM issues for more than two decades (email, September 13, 2013). “I speak as a person who is an avid user of non-covered [CAM] services who would have been in a disastrous position had the \$200,000-plus for my cancer treatment not been covered.”

Similar to CFH, ANH purports that many Americans’ lifestyles and values disagree with typical insurance plans that generally cover only conventional healthcare services and prescription drugs; the organization instead favors enabling health consumers to spend their money on CAM products and services, such as buying dietary supplements and herbs, having acupuncture or massage, being treated by naturopathic physicians, and more.⁶ According to Darrell Rogers, ANH’s campaigns and communications director, these people often forgo the purchase of health insurance or choose a catastrophic health plan, which has a lower premium (the amount of money one must pay each month for the insurance) but a very high deductible (the amount of money a customer must spend out of their own pocket before the health insurance begins its coverage of services and medicines).⁶ The individual mandate, however, will require both groups to purchase non-catastrophic, more standard health insurance, theoretically leaving them with less money in their monthly budget for their preferred

CAM options. (Consumers can retain existing “grandfathered” health plans if they were enrolled in the plan before the date of ACA’s enactment on March 23, 2010.) *For how the ACA might increase coverage for these services, read on to section titled “2706: A Provision for Non-Discrimination?”*

“While catastrophic plans are permitted under ACA, they are restricted to certain populations,” explained healthcare law attorneys Ryan Abbott, MD, a professor at Southwestern Law School in Los Angeles, and Michael Cohen of the Michael H. Cohen Law Group in Beverly Hills (email, December 3, 2012). “They are available only to individuals who are under 30 years of age or who are exempt from the individual responsibility requirement due to the affordability exemption or the hardship exemption.”⁸

ANH noted that losing the catastrophic plan option will affect millions of consumers. It bases this on the number of people who are enrolled in Health Savings Accounts (HSAs), which are accounts for putting aside money tax-free that can be used on certain medical expenses, similar to flexible spending accounts (FSAs). HSAs are available only to individuals who have catastrophic or other high-deductible plans. As of January 2013, 15.5 million Americans were enrolled in HSA plans.⁹ This is up from 13.5 million in 2012 and 11.4 million in 2011. It is unclear, however, if these people purchase high-deductible plans because it is their preferred option, because it is the only option they can afford, or because it is the only plan offered by their employer.

Although most Americans will not be able to purchase catastrophic insurance, they do have the option to purchase a high-deductible health plan (HDHP) that meets specific requirements, such as a minimum deductible of \$1,250 a year for an individual and \$2,500 for a family (as of 2013).¹⁰ Unlike catastrophic coverage, however, these plans typically have premiums similar to standard plans.

Customers who purchase HDHPs can take part in HSAs, which are attractive for CAM consumers because (1) funds roll over at the end of each year, (2) some insurance plans allow portions of the premium payment to go into the HSA, and (3) certain CAM therapies are approved, such as acupuncture, chiropractic care, and osteopathy. HSA funds also can be used to purchase herbal dietary supplements and conventional nutritional dietary supplements (vitamins, minerals, etc.), although these must “be recommended by a medical practitioner as treatment for a specific medical condition diagnosed by a physician.”¹¹

“An HDHP with HSA is CAM consumers’ next best option,” said attorney Dr. Abbott, “but they still have

premiums which, yes, should be higher than catastrophic plans. So, for someone really not wanting conventional coverage, they’re stuck with a premium based on coverage they don’t want. Their premium is based on the cost of treating other policyholders with conventional care.”

ANH says that HDHPs still are not a great option for CAM-focused individuals. “What will be the cost to the consumer?” asked Rogers. “The monthly premiums for allowed high-deductible/HSA qualified plans are still unknown. If users of natural health have to spend significantly more for insurance plans, they have less to spend on natural health practitioners and products.”

Dr. Abbott and attorney Cohen noted that those who wish to rely only on CAM have two additional, yet limited, options: simply forgo insurance and pay the annual penalty fee or purchase an unapproved plan (such as a catastrophic plan for non-exempt individuals) and likewise pay the annual fee.

Dr. Abbott and attorney Cohen noted that those who wish to rely only on CAM have two additional, yet limited, options: simply forgo insurance and pay the annual penalty fee or purchase an unapproved plan (such as a catastrophic plan for non-exempt individuals) and likewise pay the annual fee.

2706: A Provision for Non-Discrimination?

One of the facets of Obamacare most celebrated by natural medicine consumers is Section 2706, known as the non-discrimination provision, due to its potential impact on insurance coverage of CAM services and conventional services provided by CAM practitioners. This legisla-

tion states that “a group health plan and a health insurance issuer offering group or individual health insurance coverage shall not discriminate with respect to participation under the plan or coverage against any health care provider who is acting within the scope of that provider’s license or certification under applicable State law.”⁵

Leonard Wisneski, MD, chair for the Integrative Healthcare Policy Consortium (IHPC), noted that patients are shifting from a focus on reactive medicine involving drugs and surgery to more natural approaches with a greater focus on adopting healthier lifestyles and preventive care.

“The inclusion of provisions in the ACA that are supportive of integrative healthcare, such as Sec. 2706, is an important step toward patient-centered care,” he said (email, September 16, 2013).

Weeks of the Integrator Blog — who served as a paid consultant on 2706 matters for several CAM-centered organizations, healthcare companies and clinics, and state agencies — told *HerbalGram* that 2706 is the “potentially most far-reaching” provision for the CAM community (email, November 19, 2012). As Weeks wrote in a recent Huffington Post column, this section was authored by Senator Tom Harkin (D-Iowa), a longtime champion of natural health causes in the US Congress, with input from various natu-

ral health organizations, such as IHPC and the American Chiropractic Association.¹²

Weeks explained that the provision language seems to entail that if a certain service is covered by an insurance plan, this plan cannot limit coverage to the service performed by just MDs, and thus also must cover the service when performed by other licensed practitioners. So if acupuncture is covered by a person's insurance plan, that person's acupuncture treatment should be paid for whether carried out by a physician or a licensed acupuncturist. Likewise, if massage is covered, it must be covered when performed by a licensed massage therapist. According to a broader interpretation of 2706, if "care of back pain" is covered, it must be covered by any practitioner licensed to provide such care. Former Washington State Insurance Commissioner Deborah Senn, a consultant to IHPC, successfully had this perspective implemented in Washington State and, when challenged, upheld in federal court.¹²

Depending on how the provision is interpreted, licensed CAM practitioners — such as naturopathic doctors in the 18 states that have provided a path to licensure — could possibly have their services covered by insurance. Jud Richland, chief executive officer of the American Association of Naturopathic Physicians (AANP), has said that if 2706 is "implemented in the way its drafters intended, it will be really significant."¹³

"My position has always been that 2706 and the other points of inclusion in the research, delivery, health promotion, and workforce provisions of the law are historic in that they give integrative health and licensed so-called 'CAM' disciplines many points of legal standing inside the law," said Weeks. "This is historic. What is not historic is that with all legislation, this is just a beginning."

Weeks's optimistic-yet-cautionary attitude is warranted. The remainder of 2706 includes wording that makes the provision potentially less significant; it states, "This section shall not require that a group health plan or health insurance issuer contract with any health care provider willing to abide by the terms and conditions for participation established by the plan or issuer."¹⁴ This is, however, typical insurance lingo and not just when there is a discussion about CAM practitioners.

"While we were pleased to see the non-discrimination provision in ACA," said Rogers of ANH, "we also recognize that the provision has very limited ability to fold natural health practitioners into the standard of healthcare. Insurance companies are not required to contract with specific healthcare providers — even those willing to agree to an insurance company's more limited set of covered medical services."

Weeks retorted, "Listen, we have what we believe is similar language in Washington State and it has enhanced access for the entire, covered population."

In April of 2013, the US Department of Health and Human Services (HHS) confirmed that 2706 "does not require [insurance] plans or issuers to accept all types of providers into a network," and "does not govern provider

reimbursement rates, which may be subject to quality, performance, or market standards and considerations."¹⁴ But some parties remained unclear about the legislation's slightly ambiguous language or were in disagreement (2706 is said to have been created specifically so that CAM practitioners would not be excluded from coverage¹²).

In response, Senator Harkin voiced concern in a report from the Senate Health Education Labor and Pensions Committee that the HHS document apparently "advises insurers that this non-discrimination provision allows them to exclude from participation whole categories of providers operating under a State license or certification.... The Committee directs HHS to work with [the Department of Labor] and the Department of Treasury to correct the FAQ to reflect the law and congressional intent within 30 days of enactment of this act."¹⁵

Dr. Abbott and Weeks noted that 2706 likely would not see clarification unless it is challenged in court. "Insurers are just supposed to make a good faith, reasonable interpretation of the law," said Dr. Abbott. "Litigation over this provision is very likely."

Until then, the individual states hold the most power when it comes to deciding if and which CAM services and/or providers are covered. The ACA requires individual and small group market health plans to offer essential health benefits (EHBs), which each state is in charge of selecting.

"This will vary from state to state," said Rogers of ANH, "and whether or not CAM therapies will be covered depends entirely on the 'typical plan' selected by the state. While some states like California and Washington have decided to include acupuncture as one of services covered under the EHBs, most others have not."

Meanwhile, various CAM and integrative health organizations have been lobbying lawmakers in Washington, DC, in an attempt to ensure that the states implement 2706 with the level of nondiscrimination they hope for. IHPC, for example, has been leading a 2706 implementation campaign throughout 2013 led by Senn. IHPC's movement is supported by 14 healthcare organizations including the American Medical Student Association, the American Academy of Pain Management, the American Association for Acupuncture and Oriental Medicine, AANP, Bastyr University, and more.¹⁶ Although the American Medical Association has called for 2706 to be repealed, a bill proposing such legislation — US House Bill 2817, introduced in July 2013 — was not enacted.¹⁷

Conclusion

Other ACA provisions are expected to have small yet positive effects on natural healthcare. Joe V. Selby, MD, director of the new Patient-Centered Outcomes Research Institute (PCORI) — the creation of which was called for in the ACA — has said that CAM is a research area of interest.¹⁸ As of press time, PCORI had funded two CAM-related studies: one led by Dan Cherkin, PhD, director of the Bastyr University Research Institute, to identify the types of treatments that are most likely to help patients with

different pain experiences; and another led by chiropractic researcher Michael J. Schneider, DC, PhD, to compare non-surgical treatments (including physical therapy and chiropractic care) for lumbar spinal stenosis. Additionally, PCORI has appointed several integrative medicine practitioners to lead some of its workshops and panels.¹⁸

Dr. Abbott has proposed a reform to ACA called the Evidence-Based Complementary and Alternative Medicine Act, which he said would incentivize CAM private research and development through market exclusivity for CAM products approved by the Food and Drug Administration.¹⁹

ACA additionally requires all plans in the Marketplace — the “exchange” gathering all participating health insurance plans from which consumers can shop and apply for coverage — to cover a number of preventive services at no cost to the consumer, including blood pressure and cholesterol screening, diet counseling for adults with a high risk of chronic disease, obesity screening and counseling, folic acid supplements for women who may become pregnant, iron supplements for infants ages 6-to-12 months at risk for anemia, etc.²⁰ It also encourages employer-based wellness programs and mandates insurance coverage for certified midwives.

Unless Congress or the Obama Administration issue further delays or clarifications in the remaining weeks of 2013, the ACA's impact on natural healthcare in the United States will begin to take shape after implementation of the individual mandate and Section 2706 on January 1, 2014. HG

—Lindsay Stafford Mader

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Medicinal Plants: Biodiversity and Drugs edited by Mahendra Rai, Geoffrey A. Cordell, José L. Martinez, Mariela Marinoff, and Luca Rastrelli. Boca Raton, FL: CRC Press; 2012. Hardcover, 688 pages. ISBN: 978-1578087938. \$149.95.

When I first picked up this book, I imagined it would contain several chapters on the history of drugs developed from plants and the importance of biological diversity, a topic that has been the subject of numerous books and hundreds of articles and book chapters. As I read the foreword by Michael Heinrich, PhD, the preface by the editors, and the first chapter by Geoffrey Cordell, PhD, I quickly understood that this was not another book on the origin of plant-derived drugs, rather it is a collection of 21 chapters presenting state-of-the-art information on a wide range of important areas of medicinal plant research with a unifying theme of health and healing, rooted in many distinct and interrelated scientific disciplines.

The first chapter, by Professor Emeritus of Medicinal Chemistry and Pharmacognosy Dr. Cordell, titled “New Strategies for Traditional Medicine,” is destined to become a classic and is a must-read, 40-page masterpiece on many of the core issues of traditional medicine including, but not limited to, regulatory policies, use, ethics, development, quality, conservation, sustainable production, and global public health. The book is worth owning for that chapter alone. I am in no way slighting the excellent and rigorous contributions of the authors of the other 20 chapters in this volume. In fact, taken together, these are some of the best research papers and teams that I have read in the past few years. I was especially delighted to read the sections of Chapter 1 focusing on World Health Organization initiatives, declarations, policies and regulations — creating a voice for traditional medicine, information systems, debunking myths of traditional medicine, ethics in medicinal plant research — and, my favorite section of the chapter, a brief discussion of long-term accessibility and sustainability. The foreword by Dr. Heinrich also focuses on the whole-systems questions about value chains in the production of plant-based medicines, who benefits, how quality is maintained, and general questions/challenges to understand the complexity of “seed to product” in plant medicines, similar in many ways to the “cradle-to-the-grave” analysis that is the focus of ecologically oriented product manufacturers.

This book presents an array of medicinal plant research of great importance to global public health. The therapeutic areas of research presented include chapters on plants used to treat diabetes, malaria, inflammation, neurological disorders, cancer, and antibacterial and antiviral effects from plant-derived essential oils. Two chapters explore the biological activity and botanical origins of honey bee propolis. An integrated volume with a focus on biologi-



cal diversity should — and, in this case, does — contain several chapters focusing on the ethnomedical knowledge of specific cultural groups and regions, including Chapter 4, “Ethnobotanical Uses of the Native Flora from Brazilian North-Eastern Region;” Chapter 6, “Ethnomedical Knowledge Among the ‘Quilombolas’ from the Amazon Region of Brazil With a Special Focus on Plants Used as Nervous System Tonics;” and Chapter 7, “Advances in the Knowledge of Medicinal Plants of Eastern Andalusia, Spain.”

To complement such classic ethnomedical chapters are several papers on state-of-the-art tools that can be utilized to enhance medicinal plant research and development, including Chapter 2, “Developing Better Herbal Medicines in The Post Genomic Era,” and the final chapter on countercurrent chromatography, “Strategies of Solvent

System Selection for the Isolation of Natural Products by Countercurrent Chromatography.” These two chapters provide, as do all the chapters in this book, multiple pages of references. The book’s authors also provide many tables listing plant species, plant parts utilized, therapeutic activities, common names, and other data.

Unfortunately, the names of plant species are not linked to any specific voucher herbarium specimens, which is often the case in this type of publication. The book features very few photographs or illustrations, which is a pity, but also understandable given the already large size of the volume (688 pages). Only a few chapters contain chemical structures; one of them, Chapter 13, “Endophytes From Medicinal Plants as Novel Sources of Bioactive Compounds,” is a very thorough and well-presented paper on this fascinating source of new leads for drug discovery and development. I also was pleased to read Chapter 12, “Herbal Drugs Used for Domestic Animals,” as ethnoveterinary botanical medicine is a topic that is worthy of much more research around the world and was the subject of a CRC Press volume in 2010, *Ethnoveterinary Botanical Medicine: Herbal Medicines for Animal Health*.

The authors of the chapters in this book are from Latin America (especially Brazil and Mexico), Italy, India, Spain, Lebanon, Bangladesh, the United States, Germany, England, Saudi Arabia, and Australia. There are always limitations to the number of contributors and length of such a volume, but I found it a bit odd that there were virtually no contributions from scientific groups in Africa, much of Asia (with the exception of India and Bangladesh), or China. These excluded geographic areas have tremendous biological diversity; a deep, profound historical and current practice of traditional medicine; as well as highly skilled interdisciplinary research teams.

The authors do, however, represent a wonderful diversity of disciplines and research groups. These include pharmacy, botany, botanical gardens, integrative biology, biotechnol-

ogy, molecular biology, nature conservation centers, sustainable futures, biodiversity genomics, pharmacology, chemistry, molecular pharmacology, biochemistry, natural products sciences, plant genetics, neurosciences, genetic engineering, and health sciences. The dynamic integration of these disciplines in this volume makes the book a valuable tool for a many different audiences. I would highly recommend it for people working on medicinal plant research in all of the above areas of study. The book would be ideal for universities, public health specialists, international development agencies, conservation groups focusing on medicinal plants, specialists in any of the therapeutic areas mentioned earlier,

students, professors, policymakers, and anyone working on ethnomedical and ethnobotanical research. HG

—Steven King, PhD

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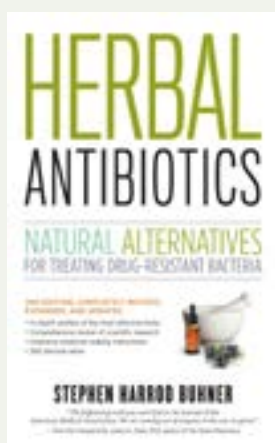
San Francisco, CA

Herbal Antibiotics: Natural Alternatives for Treating Drug-Resistant Bacteria, 2nd edition, by Stephen Harrod Buhner. North Adams, MA: Storey Publishing; 2012. Softcover, 914 pages. ISBN: 978-1603429870. \$24.95.

Herbal Antibiotics: Natural Alternatives for Treating Drug-Resistant Bacteria is by Stephen Harrod Buhner, author of 13 previous books. The second edition of *Herbal Antibiotics* is a fabulous, far-reaching book that is both terrifying and tantalizing. In addition to a new preface and prologue, the latest edition includes five extra chapters, more than tripling the length of the original text. I want to state immediately that this is an important book that should be read by as many people as possible. It should be on *The New York Times*' bestsellers list. The book has two messages, one short and one long. The short message is: We are running out of medicines that work against infection. The long message is: We can manage without them; let me tell you how.

The book is divided into nine chapters. The first two chapters cover what Buhner projects will be the end of conventional antibiotics and the concurrent rise of resistant organisms. Thereafter, the book concentrates on families of herbs suitable for treating drug-resistant bacteria. The herbs are divided into three categories: systematic antibacterials, localized antibacterials, and facilitative or synergistic herbs. Each category covers a small selection of herb families, the species used, the common names, the plant parts used, preparations, dosages, contraindications, side effects, and the main properties. There is also a section on habitat, appearance, cultivation, and collection, followed by a section on plant chemistry, traditional uses, and a précis of some clinical trials.

I really enjoyed reading this book. It is packed with a great deal of fascinating information. Did you know that all the water supplies in industrialized countries are polluted with minute amounts of antibiotics (and other pharmaceutical



drugs) or that honey has become medicalized? Yes, apparently in the United Kingdom, Medihoney® (Derma Sciences; Maidenhead, UK) is the only honey allowed in hospitals for use in treating wounds — to cleanse them of bacteria, dead tissue, dirt, and debris by drawing these particles into the dressing. As I currently live in the United Kingdom, I must remember to ask for it the next time I am unfortunate enough to find myself in a hospital with a wound.

Buhner clearly knows his subject. He has a wealth of experience to share, and he shares it with wisdom and humility — the signs of a great writer and healer. The book is written in an accessible way and, as a writer myself,

I really appreciated how easy it was to read the book. Buhner writes fluidly and clearly, and it is effortless to follow his train of thought. The main thrust of the book is that we need herbal systemic antibiotics*, we need to know them as a category, we need to *really* know how to use them, and time is not on our side.

There are some wonderful quotable sentences, such as, “In declaring war on bacteria we declared war on the underlying living structure of the planet, on all life-forms we can see, on ourselves.” Also, “The medical model used by the West is unworkable.” There were insights that had me gasping; for example, the suggestion that the plant genus *Sida* (Malvaceae) will be significantly useful for myeloma in the future, or that juniper oil (*Juniperus communis*, Cupressaceae) completely reverses tacrolimus (a drug used to prevent organ transplant rejection)-induced kidney damage in rats, or that bacteria can live in hospital cleaning fluid. As a one-time ICU nurse, this horrified me. However, Florence Nightingale would agree — she said if you are sick, don't go anywhere near a hospital!

The section on how bacteria learn from each other and evolve was fascinating. Apparently, bacteria are not competing with each other, but cooperating in shared survival. This is the stuff of science fiction, except it happens to be true. I also

*Editor's note: The author of the book review refers to herbs with topical and/or systemic antimicrobial activity as “antibiotic” herbs, per the book's title. The American Botanical Council's style in most of its articles is to refer to such herbs that have this range of pharmacological effects as being *antimicrobial*, based on the preference by the late ABC Trustee and pharmacognosy expert Varro E. Tyler, PhD, who noted that in pharmacy and conventional medicine the term *antibiotic* usually refers to antimicrobial drugs derived from fungi, bacteria, or other organisms.

loved the section on synergy and how plants can improve drug absorption. Buhner's wonderful sense of humor had me laughing out loud. Fecal transplants are actually happening, and this is modern medicine? Yes, you read that correctly. However, Buhner's sense of flippancy might put off some academics and lessen the seriousness of his message, which would be a shame. For example he writes, "Oops — sorry, got carried away again" on page 324. This is not the kind of thing readers of *The New England Journal of Medicine* or *The Lancet* expect, but that is where the readership of this information needs to go.

The book is well researched; there are 50 pages of references in the bibliography. It is a huge amount of work to list them in alphabetical order according to the chapter they relate to, but it was frustrating that references were not cited in the text. I think if they had been, this would have opened the reader-market to academics and medical personnel who are used to being able to look up a reference easily.

The book states that it is written for the layperson to "take control of your own health." I certainly think the book will inform the public, and yes, they may be empowered to help themselves when conventional antibiotics fail. But I am not sure how many laypeople would feel confident enough to go out and pick the correct herb. Still, the book is an inspirational way to make people think hard about how long conventional medicine can stave off mutating pathogens. I would recommend it as an excellent reference guide, and I think the book should be required reading for all herbalists and naturopaths, nurses and physicians, pharmaceutical companies, think tanks, and funding bodies. On the other hand, perhaps we should keep it all to ourselves and inherit the earth! HG

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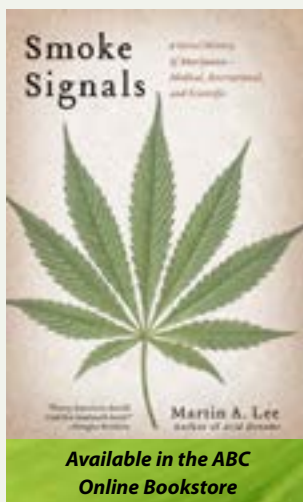
Smoke Signals: A Social History of Marijuana – Medical, Recreational, and Scientific by Martin A. Lee. New York, NY: Scribner; 2012. Hardcover, 519 pages. ISBN: 978-1-4391-0260-2. \$35.00.

[Editor's note: This book is the recipient of ABC's James A. Duke Excellence in Botanical Literature Award for 2012 in the consumer book category.]

The wrongheadedness of the US-driven war on drugs, particularly the prohibition of cannabis (marijuana; *Cannabis sativa*, Cannabaceae), has become so obvious that at times it seems the end must be near. Eighteen states and the District of Columbia now recognize medicinal marijuana; fourteen have decriminalized minor "pot" infractions. Two voted in 2012 to legalize cannabis for adults.

Yet the federal government refuses to remove cannabis from its list of medically useless, dangerous substances, and drug-war-initiated infringements on rights and due process continue to proliferate. United States police made 757,969 marijuana-related arrests in 2011, the last year for which data is available, comprising half of all drug-related arrests; 43% were for simple possession.¹ This contradictory moment is dynamically captured in Martin Lee's *Smoke Signals*.

Early chapters recount historical cannabis use, purged from textbooks and libraries in the 1930s' "Reefer Madness." Lee describes cultural, medicinal, and economic uses — especially of cannabis's non-psychoactive cultivar, collectively called "hemp." (Sixteen states have voted in recent years to allow hemp cultivation, only to be stymied by the feds.) While little here will surprise readers of Jack Herer's seminal *The Emperor Wears No Clothes* (Ah Ha Publishers, 2000), the variety and depth of cannabis lore bears retelling. However, it is not always told carefully in this book. For example, Leonhart Fuchs first assigned a Latin binomial in 1542 in the *New Kreuterbuch*,²



but Lee credits Linnaeus for doing so. And roughly two centuries later, in 1753, Linnaeus's quoted description of the sexual persistence of male-deprived female plants waxes almost as rapturous as a *High Times* report on *sensimilla*, potentially psychoactive seedless marijuana.

However, Lee's knowledge of the plant's binomial, *Cannabis sativa*, no matter who assigned it, makes the author's later casual use of "*Cannabis indica*" for a different marijuana "strain" inexplicably confusing. Indeed, some botanists hold out for cannabis's multi-speciesity. While it is clear that this extraordinarily variable plant has many different strains, and there is even some evidence for multiple geographic points of origin,² none of this meets the test for a separate species.

All cannabis varieties can be selected for fibrous stalks, oily seeds, psychoactive compounds — or more than one — and crossed with all others; *ergo*, there is one species by definition. In this age of patentable plants, and given the decriminalization movement's history of settling for less-than-complete legalization*, taxonomic clarity is greatly needed.

Smoke Signals' discussions of cannabis science, the endocannabinoid signaling system, and emerging knowledge of its functions are admirably clear. The subchapter "The Brain and Marijuana" should be required reading for everyone who recalls the prohibitionist cartoon of a frying egg captioned, "*This is your brain on drugs*" — and really, for anyone interested in brain function. Lee shines here, succinctly summarizing current research and some implications for human health while exposing unintended effects of government-funded research meant to discover marijuana's harms.

The most consistent thread in recent cannabis history is the ongoing attempted subjugation of science to ideology versus insistence on rational inquiry. The book's strict chronology

detracts somewhat from the ability to follow this story without frequent use of the Index. It might have been useful to separate the science more clearly from the surrounding matrix of cannabis-fueled music, activism, and increasing repression, with timelines illustrating synchronous events. (For example, Israeli researcher Raphael Mechoulam, PhD, isolated tetrahydrocannabinol [THC], cannabis's main psychoactive compound, on the same day, the author says, that Bob Dylan turned The Beatles on to grass. It is not an *important* confluence, but it is pretty neat!)

Unfortunately, perhaps because Lee concentrates on New World cannabis use, he skimps on nutritional aspects of hempseed and hempseed oil. Incompletely appreciating cannabis nutrition, he fails to make a connection with endocannabinoid support despite having the relevant facts. However, until after the book's publication there were no peer-reviewed studies linking hempseed with health benefits. In March 2013, researchers at Tabriz University of Medical Sciences in Iran reported that consuming hempseed, evening primrose (*Oenothera biennis*, Onagraceae) oils, and a "hot-natured" diet improved clinical symptoms in relapsing remitting multiple sclerosis (MS) patients.³ Key neuroprotective and cytokine-inhibiting roles for essential fatty acids, especially the omega-3s that hempseed contains in abundance and evening primrose's omega-6s, have been reported previously for treatment of MS. These findings may prove useful in other chronic diseases featuring spasticity.

Early concern about cannabis came from French colonial authorities disturbed by *hashish* use among their Egyptian subjects and French soldiers, who took the compressed cannabis flower resin back home. This is by now a familiar story: Marijuana spread throughout Western society via immigrants, slaves, veterans, and refugees, including refugees from a society found to be materialistic and void of personal meaning. Poet Alan Ginsberg, who linked asocial "beats" of the 1950s with 1960s activists, was a prime mover here, igniting succeeding generations with his vulnerable, indomitable spirit, proclaiming in the face of senseless repression, "Pot is Fun."

Exactly why the authorities were and are "disturbed" by cannabis is a matter of debate. Drug companies and regulators remain fixated in large part on developing patentable, non-euphoria-producing cannabis drugs. One researcher even suggested suppositories to prevent the "adverse effect" of euphoria from inhaled marijuana smoke or ingested cannabis flowers and buds! Researcher, physician, and professor of medicine Donald Abrams, MD, is quoted, "I am an oncologist as well as a specialist in AIDS, and I don't think that a drug that creates euphoria in patients with terminal diseases is having an adverse effect." Perhaps it isn't euphoria that raises authorities' hackles but another effect of cannabinoids, as yet imperfectly described, that promotes higher brain function over reflexive obedience?

California's complex history of resisting prohibition and of general social ferment sometimes crowds out experiences elsewhere. Weeks after *Smoke Signals* was published, voters in Colorado and Washington states approved measures legalizing cannabis for adults. Lee seems to have anticipated the Colorado

victory but not the one in Washington, despite acknowledging the success of Seattle's annual HempFest.

Readers will not learn much about "decriminalization" votes of the 1970s here. Eleven states eliminated criminal penalties for personal possession and use of marijuana then, but later recriminalized the plant. Alaska went further, actually legalizing limited cultivation, possession, and use for adults in 1975. Its Supreme Court struck down several attempts to dismantle the voters' decision. In 2006, the Alaska Legislature unilaterally recriminalized possession of more than one ounce of pot. Since then, prosecutors have declined to act against considerably greater amounts and the Court has declined to rule presumptively, leaving the law in conflict with previous decisions. This history is mentioned only in an endnote, and even it ignores the 2006 "recrim." Omitting Alaska, the state with the most experience with legal marijuana, is a shortcoming in Lee's history. Neither it nor Washington is even in the Index! While Alaska's 31-year *de jure* legalization was incomplete (no cannabis commerce was allowed), it has not yet been implemented fully in Colorado and Washington, and only medical marijuana has gained approval in California at this time. In August 2014, Alaskans will vote again on legalization, this time including commercial regulation and taxation.

The author bashes former US President George W. Bush repeatedly (probably unfair, given prohibition's bipartisan history!) and makes odd, inappropriate, anti-Southern jibes, like calling United States government-grown cannabis from the University of Mississippi "confederate weed." Anachronistic similes and faddish "street" expressions may mar the work's accessibility. Also troubling are assorted factual errors, i.e., characterizing acetaminophen as a non-steroidal anti-inflammatory drug (NSAID) used by children; it is *not* an NSAID, but it is used by children and adults who cannot tolerate NSAIDs.

Smoke Signals casts a broad net over recent events and hauls it up full; if not everything within passes historical muster in 50 years, it is a lively, provocative read today. One can only hope, however, that cannabis prohibition and its "entourage effects" (i.e., urine testing for employment and social benefits) are history by then! Deep investments in suppression glimpsed in this book will not easily be unmade, and passage of state "legalization" measures will not end the United States' longest-running war. HG

—Mariann Garner-Wizard
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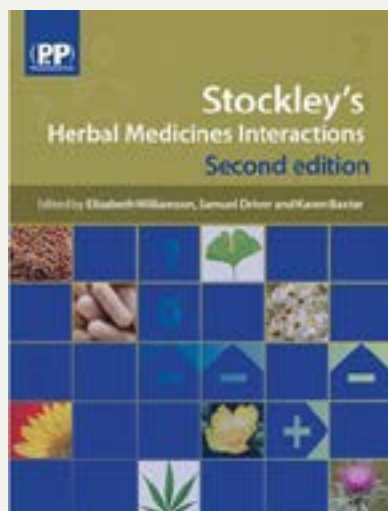
*As an example of such reformism, consider regulation and taxation of medical marijuana as compared to any other medical product; profound differences, clearly discriminatory, are not only tolerated, but often devised by medipot advocates. Activists have split often over legalization of low-THC (fiber) hemp only, medical-use only, and/or where to "draw the line" in decriminalization initiatives.

Stockley's Herbal Medicines Interactions, 2nd edition, by Elizabeth Williamson, Samuel Driver, and Karen Baxter. London, UK: Pharmaceutical Press; 2013. Hardcover, 512 pages. ISBN: 978-0857110268. \$99.00.

The first edition of *Stockley's Herbal Medicines Interactions* was published in 2009, and now, four years later, Pharmaceutical Press has issued a revised, expanded, and updated second edition. Inevitably, coming from the Stockley's stable, the book's approach is derived from their well-known *Drug Interactions* textbook — with consequent inbuilt limitations due to its pharmaceutical provenance and absence of botanically qualified co-authors. The original edition was reviewed in *HerbalGram* #87 by Francis Brinker, ND, and readers wholly unfamiliar with Stockley publications should refer to Dr. Brinker's review, which summarizes the approach of the book and adds valuable commentary on its strengths and weaknesses that remain entirely relevant to the second edition. Indeed, in their preface to the new edition, the authors emphasize how it retains the structure, organization, and conceptual approach of the original. Here, I will focus more on the novel aspects of the second edition.

The page count has increased from 423 to 512 pages, primarily due to the addition of 40 new monographs. Two of these are actually nutritional agents — alpha-lipoic acid and “carnitine derivatives” — a continuation from the first edition's incongruous inclusion of assorted nutritional dietary supplements among the herbs. For owners of the first edition, the addition of 38 new botanical monographs promises a significant increase in added value of the second edition over its predecessor. However, on closer inspection, 29 of the new herbs are listed as having “no interactions” at all, whilst several more document only one theoretical or clinically insignificant interaction each. In fact, the only new monograph of any substance is the one on kava (*Piper methysticum*, Piperaceae). Because such a large percentage of the new material actually contains no interactions data whatsoever, a purchaser updating their original edition would be justified in feeling some resentment at the lack of real informational value of the “new monographs.”

For the botanically trained reader, the rationale for including some of the new herbs seems curious. For example, does the addition of African potato (*Hypoxis* spp., Hypoxidaceae) imply a more inclusive ethnobotanical policy to the *materia medica* embraced by the text, or does it perhaps relate to the now bygone era of HIV/AIDS denialism in South Africa (since the only issue discussed is a clinically insignificant interaction between African potato and non-nucleotide reverse transcriptase inhibitors, a class of HIV medications)? Either way, African potato is hardly a



common medicinal plant in Europe and North America, and despite the claim of “international relevance” made in the preface, several South African plants are the only representatives suggestive of a wider ethnobotanical approach.

There are also inconsistencies in the presentation of potential or theoretical interactions extrapolated from the known pharmacology of any given botanical. For example, among the new monographs are two antimuscarinic herbs in the Solanaceae family — *Brugmansia* spp. and henbane (*Hyoscyamus niger*) — and both are listed as having no known interactions. Apart from the fact that *Brugmansia* species rarely are used clinically compared to their cousin *Datura stramonium* (Solanaceae)

— which is absent from the text — all of these plants are phytochemically dominated by the presence of the bioactive tropane alkaloids. It would therefore be relevant to at least discuss their potential interactivity with a variety of neurological and psychopharmaceutical drugs. Alternatively, since berberine has a separate entry from the berberine-containing herbs, and other secondary compounds such as “natural coumarins” [sic] also have their own monographs, it would have been consistent to have a similar entry for tropane alkaloids that exhibit clinically significant bioactivity. Many of the new herbs that have been added despite having no known interactions are reported as having a “bioflavonoid content,” and then the reader is referred to a general flavonoid monograph — presumably as a justification for including the “non-interactors” such as limeflower (*Tilia* spp., Malvaceae), raspberry (*Rubus idaeus*, Rosaceae) leaf, plantain (*Plantago major*, Plantaginaceae), and so on. This entirely begs the question of the actual effect of clinical exposure to any given flavonoid or combination of flavonoids in a given herb, extract, or formula, while many flavonoids are ubiquitous dietary ingredients. Such generic information lacks any real practical application.

In their preface to the second edition, the authors also state that there were substantial additions, revisions, and revalidations made to the existing monographs. A comprehensive evaluation of this claim for each herb is beyond the scope of this short review. However, since I have a clinical interest in and familiarity with interactions between herbs and oncological drugs, and because there has been recent discussion in the literature of a potentially important adverse interaction between green tea (*Camellia sinensis*, Theaceae) polyphenols and the proteasome inhibitor bortezomib (Velcade®), I used the tea monograph as a test case to check the authors' claims about revision and revalidation of the monographs.

The monograph for “Tea” (which includes the isolated extracts of green tea polyphenols such as epigallocatechin gallate [EGCG]) actually lists no new interactions and

critically omits any mention at all of the potential bortezomib-green tea interaction in which EGCG has been shown experimentally to irreversibly inactivate bortezomib,¹ although preclinical data suggest this interaction may not be clinically significant at “normal” levels of green tea consumption.² Equally concerning is that the only antineoplastic drug interaction mentioned is of a clinically insignificant effect on irinotecan (Camptosar) metabolism. In fact, a PubMed search of the recent literature reveals a plethora of both adverse and beneficial interactions between green tea polyphenols and many anticancer drugs, including antitumor antibiotics, antimetabolites, alkylating agents, microtubule inhibitors, and small-molecule tyrosine kinase inhibitors. It is disconcerting to find such extensive omissions for a widely available and popular botanical, especially in relation to the oncology setting where patients and providers need to be well informed about potential herb-drug interactions.

Finally, the discussion in the front matter of the book of the different mechanisms underlying or causing interactions has not been updated and now represents very limited coverage of the topic. There is a wealth of relevant new molecular and pharmacogenomic data available on how drug-metabolizing enzymes are regulated by different nuclear receptors, as well as a detailed understanding of the way in which polymorphisms of enzymes and receptors influence individual variability of response. At the very least, this has a significant impact on both clinical study design for interactions research and on the evaluation of anecdotal interaction case reports. Meanwhile, the capacity of many herbal remedies to influence drug responses through broad physiological mechanisms, such as altering biliary secretion, renal diuresis, pH, protein binding, and so on, is not discussed at all.

It is difficult to avoid the conclusion that the second edition of this book fails to measure up to the claims of its authors that it provides substantive additional coverage

and extensive revisions and updates to the first edition. As a reference text for clinicians lacking familiarity with herbs, the book presents some practical difficulties in ease of use due to inconsistent usage of botanical and pharmacopeial nomenclature. Admittedly, the authors offer a caveat on this point, but it would have been more helpful to provide an index of synonyms and botanical names at the front of the book. For example, a physician is unlikely to know that “ispaghula” is psyllium (*P. ovata*, Plantaginaceae), while there are separate entries for ribwort plantain (*P. lanceolata*) and plantain. Some of the common names used are not that common, such as karela for *Momordica* spp. (bitter melon; Cucurbitaceae), and in some cases there are typographical errors that are confusing (for example, in the title on page 387, *Asclepias tuberosa* [Asclepiadaceae] is mistakenly listed as a synonym for the sugar cane-derived supplement polysaccharide).

In mitigation, the subject of herb-drug interactions is not a tidy topic. There is no single source of information or approach that provides definitive and authoritative coverage. While concerned clinicians might consider adding a copy of *Stockley's* to their herb-drug-interactions library despite its flaws, owners of the first edition will find little benefit in this update. HG

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Chinese Herbal Medicine: The Formulas of Dr. John H. F. Shen by Leon I. Hammer and Hamilton Rotte. Stuttgart, Germany: Thieme; 2012. Hardcover, 312 pages. \$99.99.

Chinese Herbal Medicine: The Formulas of Dr. John H. F. Shen was written for practitioners of Traditional Chinese Medicine (TCM); the reader is expected to be conversant in Chinese medicine terminology and familiar with the names and properties of TCM herbs. Unlike most texts that present herbal formulas with the same intended audience, this book does not focus on well-known ancient preparations of famous scholar physicians, as does the frequently used text of a similar name, *Chinese Herbal Medicine: Formulas and Strategies* (Scheid et al., Eastland Press, 2009),



for example. Rather, the formulas presented here are from Dr. John Shen (1914-2000), a contemporary physician with a colorful past, described in the introductory text. He practiced Chinese medicine from about 1936 until 1971 in Hong Kong, Chongqing, Shanghai, and Taiwan; he then immigrated to the United States where he practiced until the late 1990s. As recounted in the preface by Efrem Korngold, Dr. Shen had been initiated into the Menghe lineage of Chinese physicians. The Menghe lineage is a tradition that began in the early 17th century and flourished at the beginning of the 20th century, influencing the development of modern TCM in the 1950s and '60s, the version that since has been studied worldwide. Dr. Shen, however, was maintaining and developing that tradi-

tion along a different path, which is an important aspect of this compilation of his formulas.

The book is subdivided into two parts, the first covering disease categories (with major sections on cardiovascular, gynecologic, musculoskeletal, and neurological conditions), and the latter following the stages of the life cycle, beginning with adults with intentions to conceive, and following through to pregnancy and childbirth, disorders in children, adolescents, young adults, and finally old-age disorders. The text also is divided into segments by two authors, the foremost being Leon Hammer, MD, who studied at Cornell Medical College and received further training in psychoanalysis and psychiatry, and was drawn to Chinese medicine in the early 1970s. When he encountered Dr. Shen, Dr. Hammer began an intensive apprenticeship that lasted more than 27 years and was the source of much of this book's material. In the text, Dr. Hammer focuses primarily on the diagnostic category for each formulation and provides an explanation of various syndromes that could be classified under a single heading (e.g., different types of insomnia). In addition, he conveys Dr. Shen's general ideas about disease causation and the steps a person must take in adjusting his or her lifestyle. Hamilton Rotte, a TCM herb specialist who works at Dr. Hammer's Dragon Rises College of Oriental Medicine in Gainesville, Florida, had the primary task of providing explanations of the role of each of the formulas ingredients intended effects and depicting the overall therapeutic strategy of the formula from the modern TCM perspective (his writing is available in only the first part of the book).

Because the prescriptions are from an individual practitioner, this author's first goal was to determine if they would be understandable for practitioners who received their training, as is standard practice today, by learning the collection of well-known historic formulas. I found that the formulas were comprised of commonly used ingredients that would be known to practitioners and that the formulations, though they have some distinctive characteristics, would make sense as well. As is expected from the work of any individual physician, the formulas contained certain herbs that the author clearly favored. I also checked whether these formulas could be imitated by practitioners working today, and found that most of them could be: Some ingredients are no longer readily available due to sourcing from endangered species or toxicity issues, but substitutes could be found in those cases. I noted, for example, that there were a number of prescriptions with *chenxiang* (*Aquilaria* spp., Thymelaeaceae), which comes from the seriously endangered *Aquilaria* tree, but other aromatic woods, such as *tanxiang* (*Santalum album*, Santalaceae), would serve a similar function. Also, several formulas included ingredients that require special processing, most often frying, which usually would require an ingredient accessible only by those who provide crude herbs to their patients. However, as long as the practitioner who might be using dried decoctions (granules, extract powders) in place of crude herb decoctions is aware of the changes in properties that frying causes for some of these herbs, substi-

tution may be possible. For example, the surface-relieving herb *jingjie* (*Schizonepeta tenuifolia*, Lamiaceae) is fried to become an astringent, so using ordinary *jingjie* would not do; another astringent would have to be chosen.

For ease of identity, the formulas' ingredient lists include the pinyin designation of the herbs, as well as the pharmacopoeial names and various common names. Additionally, the dosage for herbs used in decoctions is given, typically in the range of three-to-12 grams per day for each ingredient. While some of the formulas followed relatively closely a well-known traditional prescription such as *Wendan Tang* or *Longdan Xiegan Tang*, most of them were unique combinations that could inspire trained practitioners to consider these alternative formulation patterns. For example, Dr. Shen described a "formula for maladjustment of cardiac nerves (small heart)" that Dr. Hammer indicates likely would be used to treat a person with "spasm of the coronary arteries and temporary blood stagnation.... [E]motionally this person will experience deep unexplained fear with unexpressed anger." In my view, this is an excellent prescription that could warrant discussion about the basis for including the chosen ingredients and the way their actions contribute to the formula's effect.

My next concern was whether or not the information meant to introduce and explain the formulations to readers could be adequately informative. While I would have liked to see a presentation of Dr. Shen's approach to herbal prescribing, there is not an overview included, and it does not seem to have been part of Dr. Hammer's education from Dr. Shen. Rather, for several of the formulas (in the first part of the book only), there is first a brief description attributed to Dr. Shen about the disorder being treated. Certain characteristic thoughts of Dr. Shen came through clearly from the commentaries: It is evident that he was very concerned about overworked people or overused body parts (e.g., the digestive system), and he frequently recommended rest as part of the therapy. As an example, under the heading of uterine bleeding, which he perceived as a disorder caused by failure of the uterus to "close," he offered, among some other explanations, "working too much," and he recommended "for 1 week before [the] period, during, and 1 week after [the] period don't work too hard, no cold drinks, no sex." He continued: "Because the uterus is already working hard during the period, sex puts too much pressure on it and keeps it from closing properly" and that "[t]oo much work drains energy from the body that is already tired from the period."

Similar concerns are raised for several other types of disorders. Thus, Rotte, in his description of a formula for pain due to "lifting too much," explained that "Dr. Shen frequently mentioned the adverse effects of physical overwork, particularly in young people. Overwork and overuse of the body in general can be viewed as a form of trauma...." Also, Dr. Shen considered that "cold" was a primary factor in fatigue, such as chronic fatigue, and that coldness was a frequent cause of other chronic illnesses, including asthma and allergies; coldness as a pathological factor could have

been introduced earlier in life, he explained, by having “fondness for cold drinks” as a child, which manifests later as disease.

In the absence of an explanation of how the formulas were constructed, Rotte explains each formula by relying primarily on lists of ingredients that fall into different therapeutic categories (these herbs regulate *qi*, these herbs dry damp, etc.). He sometimes cites the actions of one of the ingredients according to what was conveyed by Ding Ganren (1865-1926), another key figure in the Menghe tradition; this information is not readily available elsewhere. Thus, he observes that, “According to Ding Ganren, *yuanzhi* (root of *Polygala tenuifolia* or *P. sibirica*, Polygalaceae) tonifies the kidneys and benefits the essence.” These, however, are not indications for *yuanzhi* taught in modern TCM training.

I believe most readers already familiar with TCM would recognize the type of TCM information Rotte provides, as I frequently sensed that he had missed key elements of the formula design, relying on a different perspective of herbal formulation than the one preserved by Dr. Shen. To get the most from studying Dr. Shen’s formulations, I think it is better to *not* use this approach; Rotte’s descriptions of herb therapeutic categories are correct, but unreflective of Dr. Shen’s insights, so they detract from learning a different and potentially valuable herbal perspective.

Dr. Hammer provides an extended explanation of the formulas’ uses, and how Dr. Shen described various disease processes or diagnostic interpretations. Dr. Hammer frequently points out that the categories that Dr. Shen used had no TCM equivalent; further, the pulse descriptions fit a “Shen-Hammer” style (explained in detail in Dr. Hammer’s book *Chinese Pulse Diagnosis: A Contemporary Approach*; Eastland Press, 2003) rather than the pulse-taking method and categories usually studied today, and Dr. Shen was keenly interested in facial diagnosis, so there are whole patterns based on subtle coloration in the face (e.g., blue-green color around the mouth, vertical discoloration below the eye, appearance of vessels in the inner part of the lower eyelid). I did not sense that one had to learn these diagnostic procedures to use the book and get some value from these explanations. Dr. Hammer was cognizant of the value of allowing other practitioners to remain in the realm of their TCM training — and to be able to pick up the gist of Dr. Shen’s teaching — as evidenced by his explanations.

While this book is ideal for students of Dr. Hammer’s diagnostic approach who want to learn about the herbal aspects of his mentor’s work, I also consider it of value to any TCM practitioner who feels ready to go beyond the standard TCM formula set. I liked the formulas, which were the central part of the book, and the explanations by Dr. Hammer put them in a proper perspective. I am thankful to Dr. Hammer for undertaking the huge amount of work involved in preserving these formulas for the Chinese medical profession. The publisher, Thieme, which always provides very well-organized books, has again attained a format that is easy to work with.

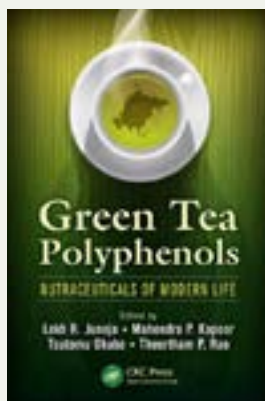
As with other formularies, this book is not one intended to be read through cover-to-cover; on the other hand, because of the unique diagnostic and therapeutic groupings and unusual formulations, it is not quite a ready-to-use reference book where one would simply look up a treatment and follow the pattern presented. Rather, I see this as a book best grasped by reading several formula sections and gradually absorbing the system of herb-prescribing it contains; a few weeks of reviewing the text will be sufficient, and the readings need not be in any special order. After that is accomplished, the text becomes a useful reference book, because when looking up disease conditions that one may encounter in the clinic, the formulas and explanations will be readily understandable. HG

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Green Tea Polyphenols: Nutraceuticals of Modern Life edited by Lekh R. Juneja, Mahendra P. Kapoor, Tsutomu Okubo, and Theertham P. Rao. Boca Raton, FL: CRC Press; 2013. Hardcover, 335 pages. ISBN 978-1-4398-4788-6. \$129.95.

This attractively presented, concise monograph on a well-known functional food and nutraceutical discusses green tea (*Camellia sinensis*, Theaceae) research over 16 chapters of fully indexed text. The chapters are written by global experts who are recognized researchers in the study of green tea.

The book cover shows green tea leaves steeped in water in a teacup, and the editors attempt to cover the *in vitro* and *in vivo* research supporting the health benefits of this very popular beverage. Each chapter presents a specific scientific theme, highlighting some of the available research studies up to 2011.



The book begins with a nod to the history and processing of green tea. Although the authors recognize that modern green tea production in China accounts for the largest volumes, the introductory comments do not reflect on ancient traditions of green tea’s health benefits in that country.

Subsequent chapters describe in detail, with accompanying figures of the various chemical structures, the chemical composition of tea varieties, and the bioactive catechin structures. The chapters on metabolism, bioavailability, and safety are well-written. The writing highlights the short half-life and low bioavailability of the key polyphenol — the catechin EGCG

— in the body upon ingestion of tea or an extract. Several chapters explore the current research on nanoparticulate preparations, which may affect changes in the absorption properties of the catechins.

The meat of the book is devoted to the biological and health properties of green tea and is presented in chapters four through 14. These deal with the numerous health benefits associated with consumption of green tea polyphenols and, in particular, their relationship to cancer risk and prevention. Although these chapters are quite comprehensive and numerous biological mechanisms of action are covered, it was surprising to find an absence of any reference to the numerous published studies by Morre et al. relating to the inhibition of ENOX2 (NADH oxidase) by the catechins at nanomolar potency. Morre has presented compelling data that the anti-tumor effects of the catechins can be explained by this reduction-oxidation mechanism.

The book could have discussed in more detail the first botanical drug to receive approval by the US Food and Drug Administration, a green tea extract known as Veregen® (MediGene AG; Planegg/Martinsried, Germany) for the topical treatment of genital warts. Furthermore, this preparation now is being used in clinical trials to examine its antiviral effects in participants with HIV. Additionally, absent in these chapters is a discussion on whether the effects of various combinations of the green tea catechins can offer synergistic effects.

There are detailed chapters reviewing studies on cardiovascular disease, bone and muscle health, allergies, oral care, inflammation, and gut health. The final chapters address the nutrigenomics and proteomics of green tea polyphenols and then examine food and nonfood applications such as supplements and skin and hair cosmetic products.

In conclusion, this book provides a welcome addition to the research on green tea and highlights the importance of linking biological activity to a chemical at a measurable concentration. This information is invaluable in order to prepare an appropriate dose regimen for clinical study. Published studies on green tea continue to explode in frequency, and within a short time it is hoped there will be a second edition of this book. HG

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Barry Meltzer 1945-2013

Barry Meltzer, longtime pioneer of the modern botanical industry and founder and owner of the San Francisco Herb & Natural Food Company, died on August 22, 2013. Established in 1969, his company was one of the oldest herb businesses in the United States and supplied bulk herbs, spices, tea ingredients, and tea blends to hundreds of customers around the world. He was a real gentleman and a gentle man.

During his last year, Barry was afflicted with a rare blood and bone marrow disease called myelodysplastic syndrome with atypical CML (chronic myelogenous, or myeloid, leukemia).

Barry was born in 1945 in Brooklyn, New York, to Ellie and Milton Meltzer. Both of his parents took an active role in Barry's business in the early days by running an East Coast warehouse and distribution center and by frequently accompanying him to trade shows and conferences. They were the only parents of any of my herb colleagues whom I met on a consistent basis during the 1970s and '80s before their respective deaths.

As industry veteran Caroline MacDougall — formerly of Celestial Seasonings and now president of her own company, Teeccino — wrote, "My professional relationship with Barry started in the early herbal renaissance days of the '70s when I was the buyer for Celestial Seasonings. Barry supplied us with some of the wild-harvested herbs from Appalachia where he had personal relationships with the collectors" (email, August 26, 2013).

As the herb industry was burgeoning in the mid-1970s, Barry was one of a group of herb company owners who founded the Herb Trade Association (HTA), a now-defunct trade organization created to develop standards for the herb industry and the predecessor of the American Herbal Products Association (AHPA). Meltzer was one of the first leaders of HTA, one of its "tri-presidents."

"We were such a raucous group of 20-to-30-year-olds," said MacDougall, referring to most of the younger members, "that we had to have a joint chairmanship of three people (Barry, myself, and Ben Zaricor of Fmali Herb, Inc.) because no one wanted any one person to hold all the power!"

Industry pioneer Drake Sadler, co-founder of herbal tea company Traditional Medicinals (TM), recalled his earliest interactions with Barry in an email to friends and colleagues on August 23:

"[T]he very early '70s success of Traditional Medicinals can be traced to our trusted friendship with Barry Meltzer. Through her small herb shop in Northern California, Rosemary [Gladstar, Drake's original partner at TM] had established credit with SF Herbs, and when TM was launched, Barry provided tremendous support through the extension of raw materials, credit, and knowledge of the herb industry. He was as much a co-founder of the company as we were, and a few years ago when Lynda [LeMole] and I shared the stage, honored to receive a lifetime achievement award from AHPA, we asked Barry to step out of the crowd and join us ... so meaningful and important was his early contribution!"

Some of the only photographs from the infancy of HTA and its officers and Board of Directors were taken by Meltzer, who kept an unofficial archive of the organization. As Sadler said in his email, "Barry always had a camera in



his hand, chronicling in black and white those early days of the industry ... a time when hippies, Mormons, Appalachian fur traders/root gatherers, rowdy women from Boulder, Texas cowboys, organic farmers, and New York traders would gather together to envision the future. We rarely agreed but we all admired Barry."

Pioneering San Francisco herbalist, aromatherapist, and author Jeanne Rose recalled Barry's early relationship with Nathan Podhurst, the Russian-Jewish pharmacist who owned an herb shop in San Francisco called Nature's Herbs:

"When Nathan died, Barry, in his most excellent generous spirit, saved Nature's Herbs' formulas and combinations and even the exact look of the store. He built a place in his business that looked exactly like the Nature's Herbs store from San Francisco. If you walked in there you might have burst into tears as I did when I first saw it. It was an ode to a more gentle graceful time. Barry found a place for Emma [Nathan's longtime assistant] in his own business. So for Emma, a new place that looked just like the old place was a great place to work. Barry was a kind and generous spirit whose kindness and love [were] not obvious to many — he worked quietly and helped many people" (email, August 31, 2013).

Meltzer's company carried a wide variety of herbs.

"I've relied on Barry to have the unusual herbs that no one else cares enough about," MacDougall continued. "His company always had the widest diversity of any herb supplier in the US. I tend to use the unique tasting herbs and could go to Barry to find just the variety, for instance, of a particular type of birch bark that tastes like wintergreen. Everyone else would send me bland, tasteless birch bark, but not Barry. He knew the variety of Black Birch that has this tasty bark and he could find the right person to collect it for him."

During the 44 years that Barry ran San Francisco Herb & Natural Food Company, he changed locations several times. His original herb shop was on Union Street. According to Denver food and drug law attorney Jim Prochnow, who did legal work for Meltzer in the past few years, as the specially prepared tea blends grew increasingly popular, customers wanted larger quantities, so a new location was chosen on Bluxom Street in 1975. In 1978, the processing part of the company was moved to Horton Street, in Emeryville, California. This warehouse was destroyed by the Loma Prieta Earthquake in 1989. A new location was established on 46th Street in Emeryville, and business was conducted there until moving to the current Kato Road facility in 1995.

Prochnow noted that during the past year, while Barry was dealing with his life-threatening illness and regulatory problems related to his business, "he was a true warrior who did all he could to protect the business he founded in 1969, and, in difficult times, to preserve employment for as many employees that he could" (email, August 29, 2013).

David Khang, president of Platinum Naturals Ltd. in Richmond Hill, Ontario, Canada, wrote to ABC, "Barry was truly a pioneer in our industry. Our family retail stores bought herbs from him since the mid 70s and later I bought herbs to distribute

in Canada. He was a gentle and kind-hearted man and I have so much respect and love for him. He conducted his business with passion and high ethical standards" (e-mail, Sept. 10, 2013).

Sadler of Traditional Medicinals shared another interesting anecdote about the time when his company started to experience rapid growth:

"We began buying herbs in large sacks from Barry and often the country of origin was printed on the sack. I knew Barry visited some of these supply areas and I began to ask him what it was like in the growing and collection regions. He would provide some description but always say something like 'you should go see for yourself.' In 1978, I went to Guatemala to see a lemongrass farmer but was very discouraged to see the horrible slave-labor-type conditions on the farms.

When I returned and saw Barry again, I told him that I was really conflicted with the poor working conditions I had found. Barry understood and explained that those conditions were prevalent almost everywhere the herbs came from, worldwide. I reminded him of my background in community service, and that I could not justify building a business whose success was dependent upon the exploitation of poor people.

Barry was quiet for a moment and then said to me in an unusual challenging voice, 'If you don't like how the world is, change it! If you don't like how the herb business operates, find a new way to do business!' That same message began to speak loudly in my head over the months ahead, and out of that conflict, the company's true purpose — the second part of its mission — emerged, and we have remained aligned with that mission for the last three decades" (Sadler D. email to Meltzer K., September 2, 2013).

The feelings of many of Barry's old friends are summed up by Sadler, who in an email to friends wrote, "How fortunate we were to pass this time with such a gentle man, pioneering brother, father, and husband. He knew our work with plants was noble, and I am grateful to have shared this sacred journey with him. Barry Meltzer's spirit lives!"

Barry is survived by his wife of 27 years, Kristi; a sister, Nancy, and her husband Les Ross, their son Dr. Michael and his wife Dr. Eleanor Ross, MDs; a daughter, Skye, her husband Duke Steffens, and their sons Devin and Hunter; a son, Greg, his wife Tracy, and their son Joshua; a son, Eli, and his wife Tamara; and son Kim (named for another herb industry pioneer, Kim Stern, of the former Green Mountain Herbs in Boulder, Colorado, who died in 1979).^{*} Memorial services were held October 20, 2013, at St. John's United Church in San Francisco.

Since Barry was committed to herbal education, an old friend and industry colleague of his, Frank D'Amelio, Sr., founder of Bio-Botanica, has contributed to the establishment of the Barry Meltzer Memorial Education Fund at the American Botanical Council to help fund ABC's ongoing pharmacy and dietitian internship programs. Inquiries can be sent to development@herbalgram.org. HG

—Mark Blumenthal

^{*}A hastily written Member Advisory sent by the American Botanical Council on August 23, 2013, informing the herb community that Barry had died, misspelled Kristi's and Skye's names, did not include mention of sons Greg and Kim, and erroneously stated that Barry's company started in the 1970s.

Andrew Marston 1953-2013

Internationally respected phytochemist Andrew Marston, PhD, passed away on March 26, 2013. The cause of death was cerebral bleeding that resulted from a brain surgery intended to manage his Parkinson's disease.¹

Dr. Marston was born November 16, 1953, in what is now the African country of Zambia (formerly Northern Rhodesia). He attended University College in London, where he earned his BSc in chemistry. In 1979, he obtained his PhD on peptide synthesis from Liverpool University, after which — through 1983 — he conducted his post-doctorate work at the German Research Centre in Heidelberg.¹

Dr. Marston was a natural products chemist for 26 years at the University of Lausanne in Switzerland. Beginning in October of 1983, Dr. Marston worked at the University of Lausanne's Institute of Pharmacognosy and Phytochemistry. In 1994, the Phytochemical Society of Europe bestowed upon him the Rhône-Poulenc Rorer Award. Dr. Marston published 35 review articles and book chapters as well as more than 150 research papers.¹

Stefan Gafner, PhD, the American Botanical Council's chief science officer, met Dr. Marston in 1994 when he commenced his graduate work at the University of Lausanne. "Andrew was one of the most knowledgeable people in matters of medicinal plants," said Dr. Gafner (email, October 3, 2013). "He was almost a living encyclopedia of phytochemistry and everything related to isolation of secondary metabolites, a topic in which he was one of the world's foremost experts."

"In particular," continued Dr. Gafner, "he was one of the pioneers in liquid-liquid separation. He was very passionate about his work, not only about the chemistry, but also the beauty of the plants the chemicals would come from, and he would take pictures of plants during his many trips, which culminated in a huge compilation of boxes with slides of medicinal plants from all over the world."



In 2009, Dr. Marston took a position in the University of the Free State's (UFS) chemistry department in South Africa. In a memorial article for UFS's website, Professor André Roodt, head of the university's chemistry department, said "[Dr. Marston] has made valuable contributions to the UFS in terms of teaching and postgraduate supervision, as well as research. In his short stay at the UFS, he already co-authored more than ten papers in international chemistry literature."²

"Beyond his many contributions as a scientist," Dr. Gafner recalled, "Andrew was a kind, generous, and caring person. I remember that he used to invite all the new graduate

students to his home to spend an evening with his family, his wife Christine, and his two sons Jonathan and Mark, whom he loved dearly."

Dr. Marston was an excellent mentor, according to Dr. Gafner. "He would be the person we would turn to for discussing matters of philosophy or to talk about personal things," he said. "He was always very polite and perfectly mannered, a true gentleman in every aspect of his life, but most of all, a wonderful human being and a true friend."

"Around two years ago, Andrew lost within four months his mother, his father, and his wife, and he was diagnosed to suffer from Parkinson's disease!" wrote Kurt Hostettmann, PhD — head of the pharmacognosy and phytochemistry research group at the Universities of Lausanne, and later, Geneva, in Switzerland, and who oversaw Dr. Marston for 26 years — in an obituary for Dr. Marston. "He was born in Africa and he died in Africa," continued Dr. Hostettmann. "He has always had special links to this continent and was a true friend of Africa throughout his life."¹

Dr. Marston is survived by his sons, Mark and Jonathan, and his brother Keith.¹ HG

—Ash Lindstrom

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Cascade Anderson Geller 1954-2013



Beloved American herbalist, educator, and environmental activist Cascade Anderson Geller died on Herb Day, May 4, 2013, at age 59. She died at her home in Portland, Oregon, surrounded by her family and loved ones, after a few months of illness.

The news of her passing was “like a big tsunami of grief rocking the green world,” said longtime friend Rosemary Gladstar. The large herbal social networking community was flooded for days with posts of loss, memories, gratitude, and loving tribute to a modern American herbal legend.

Cascade had been a full-time working herbalist, teacher, mother, wife, homemaker, wild-crafter, medicine maker, world traveler, eco-tour leader, and citizen-earth activist since the early 1970s. She was “one of the first generation of herbalists to rejuvenate herbalism in the 70’s during a time when it had been almost entirely pushed to the recesses in the US.”¹

She was a graduate of the Dominion Herbal College in Vancouver, BC, but her herbal roots began in Southern Appalachia where, from an early age, she picked herbs and wild foods with her family. “You don’t need to use too many herbs. My great grandmother, who used only a handful of plants on a regular basis, was a very good Herbalist,” she once wrote.²

Cascade’s teachers and mentors were some of the herb world’s great herbalists: Ella Birzneck, Norma Meyers, Juliette de Bairaccli Levy, Bernard Jensen, and Rosita Arvigo. Since 1994, she studied with Equadorian ethnobotanist Rocio Alarcon. But with her very earthy, down-home, back-to-the-land values, Cascade once said: “Of all the teachers I have had in my life, some of the most important are the common people who live close to the Earth. Living and working with them in their homes and on their land provided me with the most important education.”

She was a founding member of the Everett House Healing Center (now Commonweal) in Portland and associate professor and department chair of botanical medicine at the National College of Naturopathic (now Natural) Medicine (NCNM) from 1979-1992.

According to a tribute to Cascade from the Oregon Association of Naturopathic Physicians, many members of which were her former students, “Cascade’s passion for plant medicine ignited generations of NCNM students to cherish it as she did. She was awarded the prestigious NCNM Teacher of the Year in 1985. In 2012, NCNM awarded Cascade a Doctor of Laws degree for her lifetime of contributions to the field of botanical education.”³

Cascade served on the faculties of Bastyr University, Southwest College of Naturopathic Medicine, and the California School of Herbal Studies. Fellow Bastyr teacher Jared Zeff, ND, LAc, wrote: “Cascade was a woman of high integrity as well as gentle competence. As I write this, I am watching my dogwood

blossoms fall like a pink snow, their season ended. Cascade was a rare gift to the learning of many young naturopaths.”⁴

Additionally, Cascade was a consultant for the American Herb Association in its formative years, and she was on the United Plant Savers (UpS) Advisory Board since its inception in 1990. In *Planting the Future*, UpS’s collaborative compendium on at-risk North American herbs, she authored a chapter on lobelia (*Lobelia inflata*, Campanulaceae). Cascade also founded or co-founded two food co-ops and an herb store, as well as four political and social activism

groups as she worked to protect parks, preserve public lands, and protest against toxic herbicides.

Speaking to Cascade’s social and political activism, her family wrote:

“Cascade’s research skills translated well to her work as a civil and environmental activist. She spoke after much study in a direct and honest manner. She enjoyed many days in the [Portland] city archives with other community activists, discovering one clue after another in uncovering the facts to help save the Mt. Tabor Reservoirs. She loved a challenge and gave herself over to researching and writing the application that put Mt. Tabor Park on the National Historic Registry. Cascade’s love of history coupled with her belief in honest and transparent government made her a formidable watchdog and guardian of those things that she held dear.”⁵

As friend and fellow herbalist and educator Autumn Summers recalled:

“Cascade was one of the most tenacious and fiercest advocates for the earth. She worked tirelessly in her neighborhood in Portland against unnecessary herbicide spraying on Mt. Tabor and was a guidepost about the direction of herbalism in the US. Once she chose to investigate and learn about an issue, whether it has herbal, political, or environmental, watch out — as she would leave no stone unturned in her quest for understanding and truth, and then she would bring it all back to the community to share and discuss. She was a woman who did not mince words, and she always held to her convictions.”

Cascade traveled worldwide exploring, learning, teaching, foraging, and sharing herbal knowledge and her unique experience of the natural world. Having trekked the Himalayas extensively in the 1960s, later in her teaching years she took advanced herb students on memorable treks to Ecuador, the Amazon basin, Southern France, and Greece. “Cascade was a great adventurer and at an early age she made a commitment to see the world travelling with intensity and purpose,” noted a family tribute.⁵

Cascade's herb-walks, which can be viewed online in videos, were especially memorable. "Most of the important things I don't put into writing. I am more an oral teacher, more so than a writing teacher," she said.¹ When asked by close friend aromatherapist and herbalist Mindy Green why she had not written more, Cascade replied, "By the time it's published, I would have learned so much more about it!"

Cascade was a speaker, teacher, extraordinary storyteller, and attendee of many of the American herb conferences held during the last 40 years. After she passed on Herb Day 2013, memorials, tributes, and dedications were held in her honor at the 11th Annual International Herb Symposium, the New England Women's Herbal Conference, the Breitenbush Herb Retreat, and many more, including local Portland gatherings.

She will be deeply missed by many as a friend and one of the most fundamental American herbalists of our time. Many students, friends, and fellow herbalists commented on her passing.

Jane Boswell, her very close friend and fellow herbalist, wrote:

"Cascade had a truly unwavering dedication to all living things. She lived and taught with the utmost integrity, always keeping in mind the seventh generation. Fueled by her curious, far thinking mind, she was always questioning, embracing the many possibilities in any situation. Her scope was broad and her insights deep. Cascade was sad to leave this planet, but once she realized that was her path, she embraced death as she did life, with full commitment and the highest integrity. Her teachings will go on in all of us and we will be better people because of knowing and loving Cascade!"

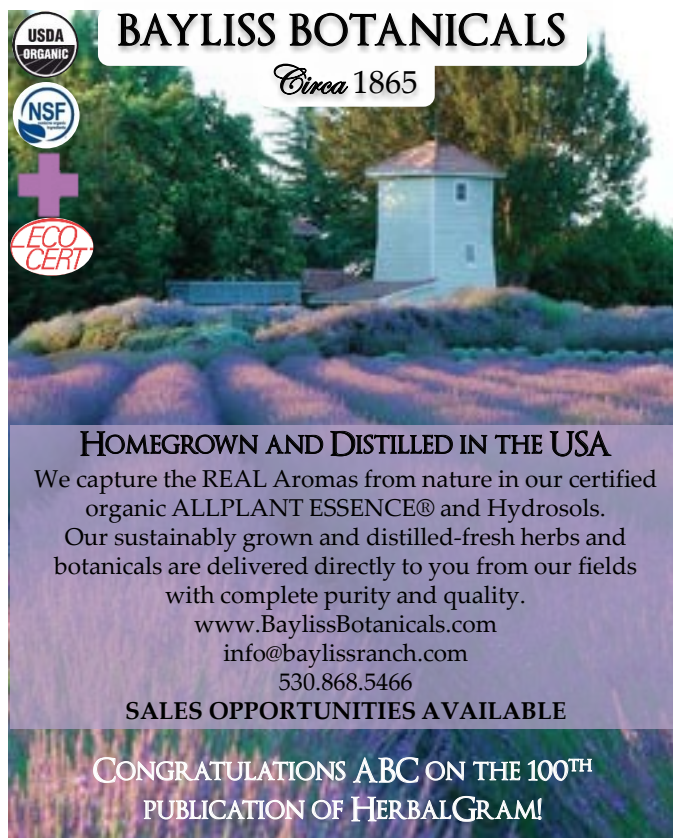
Rosemary Gladstar, so often the voice and heart of American herbalism, wrote:

"One of the things I always found so amazing about Cascade was her ability to see through things, beyond the obvious. She had a huge vision of how things should be, and fought endlessly towards that end, whether it was through her teachings, her advocacy work for the plants and nature, or her one-on-one work with people through her herbal practice. But in the midst of that grand vision, she was so totally personal, seldom failing to turn her full attention to the person in front of her and responding in depth to whatever the need, question or request might be. She could be ferocious like a Mother Bear when she felt what she loved was threatened, but I've seldom meant anyone as kind and compassionate. Her most important contributions to the herbal community were, and continue to be, her passionate message to us all to think for ourselves, to think big and out of the box, even if its a nice green fuzzy box. Always a step ahead, she taught about 'Herbalists at a Crossroads' and 'Giving Voice — Creating Social and Political Change within the Herbal Community' in her attempt to shed light on issues she felt were most important, especially for the future of herbalists. Who will teach this now, with the same depth, compassion, wisdom and humor? I'm not sure... perhaps one of those bright brave savvy youngsters who sat at her feet, listening and learning from Cascade."

The American Botanical Council's founder and executive director Mark Blumenthal wrote in an ABC Member Advisory, "Cascade's passing is like a huge hole being torn in the fabric of the American herbalist community. I don't know how it can be repaired."⁶

Cascade is survived by her husband Elliott, her son Lance, and her daughter Ayla. HG

—Lynda E. LeMole



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Field poppy (*Papaver rhoeas*, Papaveraceae)

The field poppy, also known as the corn or common poppy, characteristically has scarlet petals, although they sometimes can be pink or white. While the medicinal potential of the opium poppy (*P. somniferum*) is supported by immense scientific investigation into its sedative and analgesic properties, the field poppy has been studied to a considerably lesser extent, yet has been employed extensively in traditional medicine. The leaves, seeds, and seed oil of *P. rhoeas* have been added to food dishes for many years, and the colorful petals can be used as a dye.¹ The petals and juice extract have been used medicinally to induce sleep and sweating, to reduce pain and agitation, to treat pleurisy and other respiratory system conditions, and for most disorders traditionally treated with opium, such as whooping cough. Traditionally, field poppy also has been used for jaundice and to aid digestion.¹⁻³ HG

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