Dear Friends, Colleagues, and Herbal Enthusiasts,

The American Herbal Pharmacopoeia (AHP) cordially invites you to be at the forefront of GMP compliance issues by partnering with AHP as an integral part of your quality control processes. Whatever part of the botanical supply chain you belong to, GMP compliance all starts with botanical identity, quality assessment, and appropriate testing. AHP monographs provide all the information needed for establishing identity, purity, quality, and composition specifications, as well as informs regarding the potential adulterants and how these are detected. Additionally, each Therapeutic Compendium provides all the safety and efficacy data needed to guide and support the dosages and claims made for botanical ingredients. AHP monographs and Therapeutic Compendium takes the guesswork out of herbal quality control (QC) and provides scientifically valid and step-by-step identity and assaying criteria for most all aspects of botanical quality control and substantiation. We can honestly say that no monographs are as useful and complete as AHP's.

In addition to the AHP monographs being among the most comprehensive and useful quality control tools available, AHP, as an organization has a tremendous amount of experience to help address QC challenges, specifically related to botanical identification and quality assessment. Few organizations possess the botanical expertise encompassed by AHP and its network. Some AHP GMP Partners send us botanical samples for macroscopic and organoleptic assessment; others their botanical vouchers for confirmation of identification; others analytical results from internal or contract labs for assistance in interpreting the results. Partnering with AHP is like having a whole other QC department at your fingertips.

Partnering with AHP also supports our many other works that include the further development of monographs, the generation of educational textbooks like AHP's award-winning Microscopic Characterizations of Botanical Medicines. A second volume of this is in process. The text has been noted nationally and internationally for the unique contribution it makes to the botanical pharmacognosy literature, in 2013 winning the James A. Duke book of the year award by the American Botanical Council and receiving numerous accolades from regulators and academicians worldwide. A companion text, Macroscopic Characterizations of Botanical Medicines is also in process, sponsors of which are acknowledged in the text.

Monographs in active preparation include: Cranberry Revision (1st quarter 2016), Red Clover, Osha, Boneset, Yarrow, Triphala, and the individual fruits that make up Triphala; Amalaki, Bibhitaki, Haritaki, and the Cannabis Inflorescence Therapeutic Compendium. AHP has enlisted the help of some of the world's most renowned experts in all aspects of Cannabis science including researchers at the University of Mississippi and Cannabis expert Ethan Russo. The monograph will be co-edited by herbalist and AHP Director Dr. Aviva Romm and agronomy expert Lyle Craker, University of Massachusetts, among others. AHP also received sponsorship for the development of a monograph for Red Clover Blossom and Leaf from Linnea of Switzerland and the sponsorship to revise AHP's Cranberry Monograph from Pharmatoka of France. United Plants Savers is a collaborator for the monograph for osha. Numerous other monographs are at various stages of development.

AHP monographs provide independent, third-party information needed by research and development, marketing, purchasing, quality control, and sales departments to address regulatory, product development, and marketing needs, from physical and chemical identification tests to procurement issues, to safety and structure-function claim substantiation files.

AHP GMP Partners also receive AHP's quarterly Herbal QRS Bulletin. Each Herbal QRS Bulletin is designed to keep partners abreast of the most seminal Quality, Research, and Safety (QRS) information published regarding botanical ingredients. No other source has this focused attention on botanical ingredient research, GMPs,
and documentation. In 2016, we also launched a new service for AHP GMP Partners, AHP News and Views. Also exclusively designed for AHP GMP Partners, our AHP News and Views is designed to keep AHP Partners abreast of seminal news as it happens. Our goal is not to simply fill your boxes with meaningless news flashes, but rather judiciously forward to you what we consider to be of seminal value to you.

Please review the enclosed information pack, see what level is most appropriate for your company, view a complimentary issue of our Herbal QRS Bulletin, and consider becoming an AHP GMP Partner. If you have any questions, please do not hesitate to contact us. ahp@herbal-ahp.org or 831-461-6318.

Sincerely,

Roy Upton, Executive Director
American Herbal Pharmacopoeia®
Your AHP GMP Partnership Supports These Important Initiatives:

- Development of pharmacopoeial standards for herbal products.
- Development of critical reviews regarding the efficacy and safety of herbal supplements.
- Development of tools (macroscopic, microscopic, and chemical characterizations) to prevent adulterations in key herbal products.
- Development of quality control training programs for herbal product manufacturers.
- Development of up-to-date information on dosage and potential interactions of herbal products.

Your Annual AHP GMP Partnership Benefits Include:

**Bronze Member - $1,200**
- Annual electronic subscription to AHP Monographs (PDF).
- Annual electronic subscription to Herbal QRS (Quality, Research, Safety) Bulletin.
- Annual electronic subscription to AHP News and Views.
- 10% off AHP Verified Botanical Reference Materials (BRMs) & AHP publications.

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- Annual electronic subscription to AHP Monographs (PDF).
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- Annual electronic subscription to AHP News and Views.
- 10% off AHP Verified Botanical Reference Materials (BRMs) & AHP publications.

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- Access up to 40 hours of AHP technical support.
- Annual electronic subscription to AHP News and Views.
- 10% off AHP Verified Botanical Reference Materials (BRMs) & AHP publications.

See Reverse side
Platinum Member - $10,000

- Copies of all monographs plus annual subscription to AHP Monographs (PDF and hardcopy).
- Annual electronic subscription to Herbal QRS (Quality, Research, Safety) Bulletin.
- Access to members-only information (unpublished AHP quality control data).
- Access up to 90 hours of AHP Technical support.
- Annual electronic subscription to AHP News and Views.
- Notification of new botanical ingredients research.
- 10% off on AHP-Verified Botanical Reference Materials (BRM) & AHP publications.
Annual AHP GMP Partner Application

☐ Yes, Please Enroll Me at the Following Level

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Phone: 1-831-461-6318 • Fax: 1-831-438-2196 • E-mail: ahp@herbal-ahp.org • Website: www.herbal-ahp.org
MISSION

The mission of the American Herbal Pharmacopoeia ® (AHP) is to promote the responsible use of herbal medicines and insure they are used with the highest degree of safety and efficacy as is achievable.

The AHP accomplishes this through the development of standards of identity, purity, and analysis for botanicals. This also includes a critical review of traditional and scientific data regarding botanical efficacy and safety. AHP findings are disseminated through a variety of communications such as monographs, textbooks, workshops and conferences, and electronic media.

SCOPE OF AHP

The American Herbal Pharmacopoeia ® began developing qualitative and therapeutic monographs in 1994, and intends to produce 300 monographs on botanicals - including many of the Ayurvedic, Chinese and Western herbs most frequently used in the United States.

Monographs outline the quality control criteria needed for ensuring the identity, purity, and quality of botanical raw materials needed for compliance with good manufacturing practices. Each document also presents a complete and critical review of the traditional and scientific literature regarding efficacy and safety of herbal preparations for the appropriate marketing of herbal supplements.

Once completed, these monographs represent the most comprehensive and critically reviewed body of information on herbal medicines in the English language, and serve as a primary reference for academicians, health care providers, manufacturers and regulators.

While herbal medicines are well integrated into the health care systems of many other nations, this is not the case in the United States. Authoritative information regarding proper use and manufacture of herbal medicines is lacking. The American Herbal Pharmacopoeia ® and Therapeutic Compendium was founded to address this deficiency.

As botanical supplements are integrated into the health care programs of more people, it becomes necessary that information regarding their optimal use be made available. Information relative to their safe clinical use, toxicology, interactions with conventional drugs, etc., is especially important to safeguard the public health.

For more information contact: ahp@herbal-ahp.org, 831.461.6318 or visit the AHP website at: www.herbal-ahp.org
AHP Monographs

The American Herbal Pharmacopoeia® (AHP) began developing quality control standards for botanical materials and AHP Therapeutic Compendiums in 1994 to serve as an essential resource for academicians, health care providers, manufacturers and regulators. Presented as individual botanical monographs, these works serve to provide standards, guidance, and validated analytical methods needed for all aspects of botanical identification and quality control.

The Therapeutic Compendiums provide among the most critical and comprehensive review of the therapeutic and safety data for the botanical including proper use, pharmacology, accurate information regarding dosage, drug interactions, and all aspects of safety. AHP monographs are among the most critically reviewed works of herbal medicine in the English language.

AHP has set the goal of producing monographs on botanicals, including many of the Ayurvedic, Chinese, and Western herbs most frequently used in the U.S. These monographs are published individually and are widely accepted nationally and internationally as authoritative sources of third-party information and standards.

**AHP Monograph Development Process: A Focus on Quality**

The quality control standards contained in AHP monographs have been developed based on a review of the totality of available scientific evidence. As mandated by current and future good manufacturing practices (GMP), the fields of information provide industry with a scientifically valid means to ensure the authenticity, purity, and quality of botanical ingredients and dietary supplements.

- GMP Compliance: Identification (botanical, macroscopic, microscopic, chemical), Quality, Purity tests
- All standards based on nationally and internationally accepted protocols
- All tests "scientifically valid" per GMP requirements
- Critical information needed for product manufacturing, purchasing, quality control, product development, sales, and regulatory affairs

The AHP monograph format was developed from a review of pharmacopoeial monograph templates worldwide. A committee of medicinal plant experts was surveyed as to what constituted required and optional fields of information. AHP gained insights from medicinal plant experts including: botanists, herbalists, chemists, pharmacognosists, pharmacologists, industry representatives, physicians, pharmacists, and specialists in traditional Ayurvedic and Chinese medicine. Based on this input, a draft template was developed, subjected to broad review, and then finalized. Additional modifications have been incorporated in order to harmonize monographs with requirements established by the European Council directive 65/65, which governs the regulation of herbal medicines throughout the European community.
Analytical Methods

Critical to compliance with any monograph standard is the need for appropriate analytical methods for determining identity, quality and relative potency. Although there is a range of analytical methods available, it is often difficult to know which is the most appropriate. To meet this need, AHP has set a key goal to provide multiple methods of identification and testing by which all aspects of the botanical can be appropriately assayed in a manner that fosters the highest degree of harmonization with national and international standards.

Physical Identification

Each monograph contains detailed botanical, macroscopic, and microscopic descriptions of the physical characteristics of each plant that can be used to insure both identity and purity. Each description is accompanied by detailed illustrations and photographic images, which provide visual documentation of accurately identified material and potential adulterants when appropriate.

Chemical Characterization

Each monograph includes comprehensive chemical tests for both identification of crude botanical material and quantification of what the literature and industry suggests to be the most appropriate marker compounds for assuring the efficacy of raw material and finished product. Also included are validated analytical methods that were chosen from a broad review of the literature, other pharmacopoeias, and surveying of analytical labs. The selected method is then subjected to a validation by AHP laboratories. When the methods validation is completed, it is clear that the method has been broadly used in multiple laboratories and is appropriate for the intended end use and is reproducible. In an attempt to promote harmonization, primary consideration is given to those methods, which are already accepted in official pharmacopoeias or authoritative monographs of other nations.

Purity Determination

Each monograph includes standards of purity and other qualitative assessments that include: foreign matter, ash, acid-insoluble ash, moisture content, loss of moisture on drying, and extractives. Once completed, manufacturers and regulators can apply these multiple methods of identification to every aspect of botanical quality assessment that is needed.

For more information about AHP contact:
ahp@herbal-ahp.org, 831-461-6318 or visit the AHP website at: www.herbal-ahp.org.

American Herbal Pharmacopoeia® is an independent non-profit 501(c)(3) research organization dedicated to the development of Quality Control Standards for Medicinal Botanicals. PO Box 66809, Scotts Valley, CA 95067
GMP Compliance — AHP-Verified Botanical Reference Materials (BRMs) and Botanical Identification Services

To meet the needs of all those interested in purity of botanicals, the AHP has archived more than 240 authentic botanical reference materials to use in the development of internal quality control specifications.

For a complete list of AHP-Verified BRM see www.herbal-ahp.org

Not all Botanical Reference Materials (BRMs) are created equal

Why use AHP-Verified BRMs

- Independently verified using scientifically valid testing methodologies.
- Representative of material on the market.
- Meet specific identification criteria of compendial or authoritative standards.
- Multiple methods of identification including physical (botanical, macroscopic), chemical, and molecular techniques are used.
- All are as free of foreign matter as is practically attainable and are within or cleaner than pharmacopoeial standards.
- All are processed following GMP-compliant guidelines with clear chain of custody and process verification.
- Work cooperatively with clients to obtain hard to find BRMs.
- All carry the AHP-Verified seal of approval.

AHP Botanical Identification Services

- Identification verification and generation of AHP-Verified botanical voucher of cultivated plants.
- Macroscopic assessment of crude plant materials to verify and document the identity of whole or semi-whole plant materials.
- Generate your own in-house AHP-Verified herbarium

American Herbal Pharmacopoeia® is a non-profit 501 (c)(3) educational organization.
PO Box 66809, Scotts Valley, CA 95067, ahp@herbal-ahp.org, Phone: 831.461.6318, Fax: 831.438-2196, www.herbal-ahp.org
Cannabis Inflorescence
Cannabis spp.

Standards of Identity, Analysis, and Quality Control

Revision 2014
Purchase Monographs: Printed $44.95 or PDF $39.95

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Sub Total Price

$6.80 up to 2 prints , 3 or more $11.30 domestic mail

Contact ahp@herbal-ahp.org for CA Resident Tax 9.00%

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<td>Aristolochic Acid Characterization Adulteration Document: 103 pages +Appendices $125.00 +$13.45 sh</td>
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American Herbal Pharmacopoeia: BOTANICAL PHARMACOGNOSY
Microscopic Characterization of Botanical Medicines

Quick, accurate, and cost effective tools

When working with plant products, identification and quality control is crucial. Microscopic evaluation of plant material can provide a quick, accurate, and inexpensive tool for raw material authentication and assessment of purity. A combination handbook and atlas, compiled by the American Herbal Pharmacopoeia®, Botanical Pharmacognosy: Microscopic Characterization of Botanical Medicines includes detailed images, drawings, and photomicrographs of sectioned whole and powdered material of many important species currently lacking quality descriptions.

Co-edited by Roy Upton, herbalist and AHP executive director, this text contains original microscopic characterizations developed by Prof. Dr. Reinhard Länger, one of Europe’s pre-eminent microscopists. It supplies full instructions for setting up a microscopy laboratory and performing botanical microscopy for the identification of plant material. The book contains 140 medicinal plant species, the book covers plant anatomy at a level appropriate for the pharmacognostic analysis of plant tissues, offering extensive coverage of the history and importance of botanical microscopy. It provides the basis for restating the usage of botanical microscopy as a cost-effective tool to use in assessing botanical identity, purity, and quality.

Contents

Introduction to Botanical Microscopy
Classical Botanical Pharmacognosy: From Dioscorides to Modern Herbal Medicines
What’s in a Name? Nomenclature of Botanical Materials
To Be or Not To Be? A Focus on Botanical Adulteration
Microscopy for Identification of Botanical Raw Materials: Uses and Limitations
Setting Up a Microscopy Lab
Major Plant Groups
Structure of the Primary Plant Body
Basic Plant Anatomy
Diagnostic Characteristics of Tissues
Organization of Tissues in Medicinal Plant Parts
Preparation of Samples for Microscopic Analysis

Botanical Microscopy Atlas
Presented alphabetically. Go to www.ercpress.com to see the complete list of species of medicinal plants included.

Glossary of Botanical Microscopy Terminology
References and Bibliography

February 2011
c. 800 pp.
$169.95 / £108.00

American Herbal Pharmacopoeia: BOTANICAL PHARMACOGNOSY
Microscopic Characterization of Botanical Medicines

NEW!

Includes More Than 2000 Color Illustrations!

Edited by
Roy Upton
American Herbal Pharmacopoeia
Scotts Valley, California, USA

Alison Graf
BG-Logic, Inc., Montrose, Colorado, USA

Georgina Jolliffe
London, University, UK (retired)

Reinhard Länger
AGS PharmMed, Vienna, Austria

Elizabeth Williamson
University of Reading, UK

Supplies full instructions for setting up a microscopy laboratory and performing botanical microscopy

Features

• Provides microscopic descriptions of the major botanicals used in herbal products
• Includes descriptions based on authenticated materials and multiple samples of each species
• Discusses the microscopic anatomy of plant parts used, whole and powdered, for each species
• Contains line drawings, microphoto images, and more than 2000 color illustrations
• Supplies a guide to microscopy resources

...an excellent historical treatment … Roy Upton, the major driver for this work, has a long history of producing botanical monographs and his work and passion for botanists has been clear, thorough, and accurate … the major authority on the microscopic identification of crude botanical ingredients.”

—Norman R. Farnsworth, Ph.D., Dr. hc (mult.), UIC Distinguished Professor, Research Professor of Pharmacognosy, University of Illinois at Chicago

...ideal access to the method itself and to solutions of specific problems … the AHP and its director, Roy Upton, are helping to revitalize botanical microscopy as a unique, valuable, rapid, and cost-effective assessment tool.”

—Professor Dr. Wolfgang Kubitzka, Professor Emeritus, University of Vienna
American Herbal Pharmacopoeia: BOTANICAL PHARMACOGNOSY — Microscopic Characterization of Botanical Medicines

How to Use This Book

Format of the Text:
Part one provides a historical review and fundamental basis for the practical use and application of botanical microscopy as a quality assessment tool, as well as guidance on how to perform a botanical microscopic assessment and set up a botanical microscopy lab. Part two presents the complete microscopic characterization of some of the most common species of medicinal plants in trade in North America and abroad.

Nomenclature:
Each microscopic characterization is listed according to the Latin botanical binomial, including the botanical authority, followed by common name and plant part characterized, the appropriate Chinese pinyin or ayurvedic name when specifically applicable, the corresponding pharmaceutical name, and the plant family.

Microscopic Characterizations:
Each microscopic characterization includes a brief introductory paragraph on the primary medicinal use of the botanical, a detailed description of the microscopic characterization of the plant part in its relatively whole form, along with a listing of the primary tissues found in the same material when it is powdered; illustrations of the primary tissues that are most prominent and diagnostically relevant to the microscopist; and photographic images of the primary structures and tissues.

Use of Stains:
The microscopic characterizations provided were developed with a minimum of color reagents. Stains were only used when their use would supply diagnostic information that would not be gained without their use.

Glossary:
A glossary of terms used in botanical microscopy in general and the text specifically is included as an appendix.

To Order: American Herbal Pharmacopoeia®, 1-831-461-6318 or ahpadmin@got.net
AHP Botanical Pharmacognosy—Microscopic Characterization of Botanical Medicines Text

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OR  
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— Award Winning Textbook of Botanical Microscopy —
Get Your Company Name & Logo in Volume 2

In the few short months since its release AHP’s Microscopic Characterization of Botanical Medicines has won the James A. Duke Book of the Year Award—Technical References of the American Botanical Council and nominated for excellence by Harvard University for contributions in Botanical and Horticulture Literature 2012. Your company name can be in Volume 2 for an introductory offer of $1200!

— What The Experts Are Saying —

“...compiled by some of the leading experts in the field. In my view, this book will soon become a standard, universally accepted text in the area of pharmacognosy. Hence, this book should be on the shelves of every researcher of herbal medicine.” – Edzard Ernst, Exeter, UK

“This text will soon become the major authority on the microscopic identification of crude botanical ingredients.” – Norman Farnsworth, University of Illinois-Chicago

“The authors went to great lengths to ensure the accuracy of the information and to use the clearest images representative of both the authenticated plant species and what are currently being used in dietary supplement products on the market...As a text, the entire book provides the reader with a working understanding of the field of pharmacognosy woven together with the critical use of microscopy in the study of plants.” – Steve Casper, Food and Drug Administration

“AHP's microscopy reference book is a monumental contribution to the herb industry, to the natural products and natural medicine research and healthcare communities who research and/or recommend these products, and, eventually, to consumers who use herbal products for their health.” – Mark Blumenthal, American Botanical Council

The 2nd Volume of the Microscopy Atlas is intended for use by the herbal products industry, regulatory agencies, and academia. It will be 300-400 pages long and will include detailed descriptions of more than 125 medicinal plant species and their adulterants. Like the historic Volume 1, each description will include a narrative description of the microscopic anatomy of the plant part used (both whole and powdered), along with illustrations and original full color photomicrographs showing the diagnostic features of the species and part described.

Pre-publication Sponsorship is being offered at a initial discounted rate of $1,200 and offers a great opportunity to show your company’s support for quality assurance as well as advertising your company name and logo. The sponsorship page will be placed in a dedicated Sponsorship page. To take advantage of this sponsorship, please fill out the form on the reverse side or contact us at ahp@herbal-ahp.org or 831-461-6318.
— Textbook of Botanical Macroscopy Sponsorship —

AHP has begun development of *Macroscopic Characterization of Botanical Medicines* as a companion to its award winning *Microscopic Characterization of Botanical Medicines* (CRC Press 2011). The text will provide scientifically valid macroscopic and organoleptic characterizations of the same botanicals included in the microscopy text as well as new botanicals. As with the Microscopy Text, the focus will be on providing scientifically valid methods of identification, purity, and assessment, as well as to emphasize the detection of adulterations.

Pre-publication Sponsorship is being offered at an initial discounted rate of $1,200 and offers a great opportunity to show your company’s support for quality assurance as well as advertising your company name and logo. The sponsorship page will be placed in the front section of the Textbook of Botanical Microscopy. To take advantage of this sponsorship, please fill out the form below or contact us at ahp@herbal-ahp.org or 831-461-6318.

**Yes, I would like to sponsor the**

- [ ] Macroscopy Text: $1200.

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Welcome to the first issue of AHP's Herbal QRS Bulletin for 2014. Exclusively for AHP sponsors and contributors, the Herbal QRS Bulletin provides easy access to independently reviewed synopses of recently published information on Quality, Research, and Safety (QRS) issues pertaining to botanical ingredients and products as well as pertinent AHP comments on these issues.

With a focus on the needs of industry, healthcare providers, and the marketplace, the Herbal QRS Bulletin is an important resource for safety and substantiation files, quality control personnel, product development and marketing departments, clinical evaluations, structure and function claims, and regulatory compliance.

The Herbal QRS Bulletin is designed to keep readers current with emerging findings in herbal product Quality, Research, and Safety (QRS).

Sincerely,

Roy Upton RH, DipAyu
Executive Director, American Herbal Pharmacopoeia
Botanical Ingredient Authentication Testing Methodologies—One Size Does Not Fit All!

AHP recently completed an 8-part series of Botanical Pharmacognosy webinars focused on botanical authentication. Hosted by Bionetwork at AB Tech in Asheville, NC, the individual webinars were held once monthly from July 2013 and the last one was held on February 27. Each webinar focused on a different subject specific to botanical GMP compliance. The first session provided participants with an overview of testing techniques, identifying their strengths and limitations with an emphasis on how each is to be used in a scientifically valid manner as mandated by GMPs. This is perhaps the most important of the sessions as it highlights the fact that no one testing technique is appropriate for all botanical ingredients for purposes of GMP compliance. FDA similarly acknowledged this in the preamble of the Final GMP Rules. The second session focused on botanical authentication and how critical botanical identification is at the beginning of the supply chain. It provided guidance on how manufacturers can start increasing their confidence of proper identification through the supply chain with the collection of vouchers, pressings, and photographs. The third webinar focused on the macroscopic and organoleptic characterization of botanical ingredients. This technique is one of the fastest, surest, and most cost effective means for identification of a large number of plants in trade but requires that plant material be in whole or semi-whole form. Next, the microscopic assessment of botanical raw materials was addressed, focusing on botanical identity authentication and detection of filth and adulterants. The sessions that followed featured an in-depth look at other analytical techniques, most notably HPTLC, HPLC, IR, GC, and NMR technologies, with another session devoted exclusively to the identification and detection of
adulterants. The next session introduced participants to a host of pharmacopoeial and other authoritative references that can be used in the development of specifications and testing of raw materials for identity, quality, strength, and composition. The last session in February provided a detailed discussion of botanical reference materials (BRMs).

Based on the feedback received, analysts expressed frustration as manufacturers attempted to use a single technology, such as NIR or HPTLC as their primary identification tool for all materials. They also expressed frustration that an herbal extract often does not match botanical reference materials, leading to the rejection of a material, perhaps unnecessarily. A significant point in all discussions was the need to adopt an orthogonal approach, which means we must look at our botanical ingredients from distinctly different vantage points in making either qualitative or quantitative assessments. Testing in this manner increases the level of confidence in the analytical results achieved and is the most appropriate way to defend the scientific validity of all testing techniques and methodologies used.

AHP Advisor Profile

In most all nations, pharmacopoeias are considered to be essential in establishing the standards needed for assuring the purity and potency of products used for healing and medicine. At the heart and soul of every pharmacopoeia worldwide is the dedication of the numerous volunteers who contribute their time and expertise for the greater good of public health. AHP is no exception. The work of AHP would not be possible without the tireless and selfless efforts of countless individuals who believe that access to herbal products is of value to public health and that quality control standards are needed to ensure the benefits of herbal products are delivered. As a way to acknowledge and give thanks to these individuals, in each issue of Herbal QRS Bulletin we profile one or more of AHPs many writers, reviewers, and advisors who dedicate their time to making the goals and mission of AHP and quality in herbal medicine a reality.
Élan Mikel Sudberg, Alkemist Labs, Costa Mesa, CA

It is our pleasure to highlight Élan Sudberg of Alkemists Labs as one of AHP's long-standing advisors and contributors. Alkemists Labs specializes in botanical authentication services and both Élan and his father, Sidney Sudberg, have served as reviewers on a number of AHP monographs.

Élan Sudberg, CEO of Alkemist Labs, an analytical testing laboratory, brings over 15 years of experience to the organization in both a management and scientific capacity. Over the last decade Élan has grown the Alkemist Labs brand from a 2-person operation known only to local manufacturers to a name recognized and respected amongst government regulators and companies worldwide. He holds a degree in chemistry from California State University, Long Beach and has authored numerous journal articles on phytochemistry and analytical techniques for the natural products and nutraceutical industries.

At the age of 18 Élan began to study microscopy and is now the instructor for the American Herbal Products Association (AHPA) Seminar on Microscopic Identification of Popular Botanical Materials. He is a newly appointed board member of AHPA's Education and Research on Botanicals Foundation and is the former chairperson of the Hemp and Medical Marijuana committee. He also serves as a technical advisor for AHP. He lives in Long Beach, CA and enjoys crisp early morning boot camp, slack-lining, cooking, and playing chess.

AHP has greatly benefited from the tremendous authentication expertise of Élan and Alkemists Labs and is grateful for all the contributions they have made to the continued development and evolution of AHP monographs.

Quality

High-performance Liquid Chromatography for Schisandra Lignans

A high-performance liquid chromatography-ultraviolet (HPLC-UV) qualitative and quantitative method has been developed to simultaneously analyze 11 active lignins in the dried ripe fruits of schisandra (Schisandra chinensis; wuweizi). The method was tested on 22 samples from various sources throughout China. The authors report accuracy of 99.51% to 101.31% (average percent recoveries were evaluated by calculating the ratio of the detected amount versus the added amount) with good intra- and inter-day repeatability for determining schisandrin, gomisin J, schisandrol B, angeloylgomisin H, gomisin G, schisantherin A, schisantherin B, deoxyschisandrin, γ-schisandrin, schisandrin B, and schisandrin C. Results of analysis showed significant variation in total lignans dependent upon region of origin with 32.38 mg/g at the upper end of the range. Of the 11 lignans, schisandrin was the most prominent.

AHP Comments: The dried ripe fruit of schisandra is used in traditional Chinese medicine (TCM) to treat insomnia and as an astringent and tonic. In Western medicine, it is used for its antihepatotoxic, antitumor, anti-HIV, and central nervous system protective effects, among
others. Schisandra has also been integrated into Western herbal supplement products, predominantly for its adaptogenic and tonic properties. Schisandra lignans, the predominant bioactive constituents in the plant, vary quantitatively and qualitatively depending upon the source. According to Hu et al. (2013), previous analytical methods quantify total lignan content or limited combinations, but not all 11 major active lignans simultaneously. As many species of schisandra contain the same lignans, species differentiation requires the analyst to look at varying concentrations of specific lignans. For example, as noted in the AHP *Schisandra chinensis* monograph, *S. chinensis*, the primary species utilized as schisandra, is characterized by a prominence of schisandrin A & B; *S. sphenanthera*, a closely related species that has recently been approved as "schisandra" in the Pharmacopoeia of the People's Republic of China, is characterized by a relative lack of schisandrin A & B and higher concentrations of wuweizisu esters, such as schisantherin A, B, & C. The AHP monograph provides adequate HPTLC and HPLC profiles for distinguishing between the species. This paper is valuable for those manufacturing products containing schisandra.


**Rhodiola Species Identification**

Forty-seven rhodiola commercial samples from 13 provinces in China were analyzed using morphological and genotaxonomical methods to determine species identity. The samples were initially identified by root and rhizome morphological characteristics according to *Flora of China*. Seven species were identified, including *R. crenulata*, *R. sachalinensis*, *R. himalensis*, *R. serrata*, *R. fastigiata*, *R. rosea*, and *R. kirilowii*. The accuracy of the morphological results was verified using genetic taxonomic DNA sequencing; 34 samples were identified, 23 unambiguously and 11 tentatively. HPLC-DAD/UV analysis was then employed to identify 8 bioactive compounds (salidroside, tyrosol, gallic acid, [+]catechin, rosarin, rosavin, rosin, and rhodionin) commonly used as distinguishing reference markers. Results showed species identification by morphological characteristics was inaccurate for 3 of the samples.

*AHP Comments:* The use of genetically based analytical methods for identification of herbs is rapidly growing. With the potential to become a valuable tool, it is not without questions and concerns. In an American Botanical Council article, Gafner et al. (2013) provide an overview of current issues regarding the use of DNA-based analytical methods for herbal products, including application for species identification. This study highlights some of the challenges of how DNA is being applied. In this case, the identification of the species appears to have been done according to the caudex (the axis of the stem and root) as outlined in *Flora of China*. Many of the features given for the different species overlap and, therefore, may not be sufficient for distinguishing between species. This study would have benefited from a proper classical botanical identification that included identification of the flowering parts. A number of species of rhodiola are found in domestic trade, predominantly *R. rosea* and *R. crenulata*. While this study may be of value for those marketing a rhodiola product, the findings would have been more robust had a more comprehensive botanical identification been performed.


Ahmad et al. (2013) provide a detailed overview of the scientifically researched pharmacological activities of the seeds of black cumin (*Nigella sativa*). The extensive list of reported therapeutic activities includes the following: antibacterial and antifungal; antidiabetic; anticancer; anti-inflammatory and analgesic; immunomodulatory; gastro-, hepato-, nephro-, pulmonary- and testicular-protective; anti-asthmatic; antidepressive and anxiolytic; anticonvulsant; and contraceptive. All substantiating pharmacological data is either in vitro or in vivo with no reported human clinical studies. Reported traditional uses include treatment for disorders of the respiratory, digestive, cardiovascular, and immune systems, as well as for fatigue, dispiritedness, and for general well-being. In India, Southeast Asia, and the Middle East, black cumin has historically been used for asthma, bronchitis, rheumatism, indigestion, loss of appetite, diarrhea, amenorrhea and dysmenorrhea, the treatment of worms, and skin eruptions. Pharmacognostical characteristics, chemical composition, toxicology, and drug-herb interactions are also reviewed by Ahmed et al. According to the authors, while toxicology studies suggest black cumin to be safe when administered orally to animals, preclinical investigations show nigellae extracts to inhibit P-450 cytochromes and interact with amoxicillin availability.

**AHP Comments:** Black cumin seed has a long history of use in traditional medicines throughout the world and has been considered by some to be one of the greatest healing herbs of all time, having been used during the Roman Empire as a panacea and even having been found in King Tut's tomb. As of late, black cumin seed, also known as "blessed seed", has received much popular attention and has become somewhat of a cult herb for its many reported properties. Although the therapeutic activity outlined in this review is based on pre-clinical data, this paper is beneficial to include in the product substantiation and safety files of those manufacturers who use black cumin as an ingredient.


**Therapeutic Effects of Ginseng in Neurological Disorders**

In this study, Kim et al. (2013) comprehensively review the efficacy and pharmacology of 3 species of ginseng (Korean ginseng [*Panax ginseng*], American ginseng [*P. quinquefolius*], and Chinese notoginseng or san qi [*P. notoginseng*]), as well as the effects of ginsenosides on central nervous system (CNS) neurodegenerative and neurological diseases. Alzheimer's disease (AD), Parkinson's disease, Huntington's disease, cerebral ischemia, depression, anxiety,
schizophrenia, attention deficit hyperactivity disorder (ADHD), and autism, along with psychostimulant and opioid addiction, are among the disorders considered. The majority of investigations are pre-clinical. Human clinical trials, although limited, suggest potential therapeutic benefits, particularly with AD, schizophrenia, and ADHD. According to the authors, while potential pharmacological mechanisms of action are yet to be understood, anti-inflammatory effects and neuroprotection may be involved. They further note the effects of ginseng are likely due to its activity on a multitude of targets that regulate synaptic plasticity, neurogenesis, and neural transmission.

**AHP Comments:** The extensive use of ginseng worldwide, especially for its effects on the central nervous system, is well-known. This review provides an in-depth look at the current research on the neurological, neuropsychiatric, and neurodevelopmental mechanisms of action of the 3 most commonly used species of ginseng and of ginsenosides, the major active constituents. This is a valuable paper for anyone interested in understanding the pharmacology of ginseng, both for clinical therapeutic use and for research and product development. As well, it should be included in the substantiation files for all ginseng products.


**TCM Formula for Chronic Hepatitis B**

A multicenter, randomized, double-blind, placebo-controlled trial assessed the therapeutic effects of a TCM formula on hepatitis B virus (HBV). The study was conducted with 300 chronic HBV carriers (aged 20-65 years; HBV DNA >100,000 IU/mL) with mild inflammatory liver necrosis and fibrosis. The subjects were treated with an "invigorating kidney and strengthening spleen" herbal decoction, which was composed of epimedium (*Epimedium grandiflorum*), Chinese dodder (*Cuscuta chinensis*), eucommia (*Eucommia ulmoides*), achyranthes (*Achyranthes bidentata*), astragalus (*Astragalus membranaceus*), phyllanthus (*Phyllanthus amarus*), bai-zhu atracylodes (*Atractylodes macrocephala*), poria (*Poria cocos*), zhu ling (*Polyporus umbellatus*), bitter orange (*Citrus aurantium*), Chinese salvia (*Salvia miltiorrhiza*), san qi (*Panax notoginseng*), curcuma (*Curcuma longa*), and lycium (*Lycium barbarum*) (38.6 g dissolved in 200 mL warm water daily for 52 weeks), or placebo. According to the authors, the formula addresses the nature of kidney asthenia, clears heat evil, expels superficial evils, promotes blood circulation, and eliminates dampness. Efficacy was determined by virological response at weeks 24 and 52. Results included a greater mean reduction in serum HBV DNA levels from pretreatment values in treated than control groups, although treatment was not potent enough to facilitate clearance over the 52 weeks. A significant ($P = 0.0000$) increase in mean serum cytokine levels (interferon-$\gamma$ [IFN-$\gamma$] and interleukin-2 [IL-2]) was also seen, which according to the authors indicated an enhanced antiviral immune response. Treatment was considered generally safe and well tolerated. The most common reported adverse effects were gastrointestinal symptoms. The authors note that due to restrictions on time and funding, sustained effects of treatment could not be determined.

**AHP Comments:** The World Health Organization (WHO) reports that the hepatitis B virus affects 2 billion people worldwide, with 240 million people having chronic liver infections. Current conventional treatment with interferon and antiviral drugs, indicated for very specific criteria, is often inaccessible or non-efficacious. Although the results of this trial are mixed, it is an interesting study from a TCM approach for the treatment of chronic hepatitis B, and it is an addition to a host of other studies investigating the potential benefits of Chinese herbs for the treatment of hepatitis.

Brazillian Pepper Tree Treats Gingivitis

A randomized, controlled, triple-blind, phase II clinical trial investigated the efficacy and safety of a Brazilian pepper tree (*Schinus terebinthifolius*) mouthwash on moderate biofilm-induced gingivitis in children. Twenty-seven subjects aged 9-13 years were treated with either a mouthwash formulated from a stem bark tincture of Brazilian pepper tree at 0.3125% concentration or with a 0.12% chlorhexidine digluconate mouthwash, the gold standard according to the authors. The children rinsed under supervision with 10 mL for 1-minute daily for 10 days (30 minutes before an afternoon snack). Results showed statistically reduced (P < 0.05) gingival inflammation in both groups with no difference in efficacy (P < 0.05). Only the control group showed significantly (P < 0.05) reduced biofilm accumulation from baseline. No adverse effects were reported by either group. The authors noted that limitations to the study include a short intervention period and the lack of a microbiological analysis of the microorganisms responsible for gingivitis.

**AHP Comments:** Brazilian pepper tree, native to South and Central America and in the same family as poison ivy, poison oak, and poison sumac, was brought to Florida as an ornamental plant in the mid-1800s. Known for its antimicrobial, anti-inflammatory, antiseptic, and anti-ulcerogenic effects, the plant is commonly used in the tropics to treat skin wounds, urinary tract infections, venereal diseases, womb inflammation, diarrhea, and gastroduodenal ulcers.

Gingivitis is prevalent among children and adolescents, with the authors of this study reporting that 77% of 12-year-olds throughout the world affected. Despite methodological limitations to this study, it provides preliminary clinical evidence that Brazilian pepper tree stem-bark tincture is effective in reducing gingival inflammation. It should be noted that as a member of the Anacardiaceae family, skin sensitivity and dermatitis have been reported when in contact with the plant, as well as respiratory problems when the tree blooms.


Anti-obesity Herbals: An Efficacy and Safety Review

Hasani-Ranjbar et al. (2013) provide a systematic review of human studies conducted between 2008 and 2012 for the management of obesity with herbal medicines. Primary outcome measures included body weight, body fat, waist and hip circumference, and appetite. Among the botanicals considered were black cumin (*Nigella sativa*); saffron (*Crocus sativus*); psyllium (*Plantago psyllium*); garcinia (*Garcinia atroviridis*); ephedra (*Ephedra sinensis*); sea buckthorn (*Hippophae rhamnoides*); elderberry (*Sambucus nigra*); bilberry (*Vaccinium myrtillus*); Veldt grape (*Cissus quadrangularis*); African mango (*Irvinia gabonensis*); lycium (*Lycium barbarum*); and green, oolong, and black teas (*Camellia sinensis*). Plant compounds tested included epigallocatechin-3-gallate (EGCG) from green tea, quercetin, and capsinoids. Multi-herb formulas included "Slimax" (containing ginger [*Zingiber officinale*]) and "Weighlevel" (containing mugwort [*Artemisia vulgaris*], olive [*Olea europaea*], wild mint [*Mentha arvensis*], and cumin [*Cuminum cyminum*]). Results showed a number of botanicals significantly decreased body weight, body fat, and waist and hip circumference (e.g., black cumin, saffron, Veldt grape, and teas). Mechanisms of action for the effects included lipid absorption, reduced energy intake, increased energy expenditure, body-fat metabolism, and metabolic rate, among others. Antihyperglycemic, antihyperlipidic, and antioxidant effects were also seen. Abdominal bloating and upper respiratory tract infection were attributed to alginate-based brown seaweed (*Laminaria digitata*), with few other side effects reported.
**AHP Comments:** The Centers for Disease Control and Prevention report that one-third of US adults are obese, that obesity-related conditions are one of the leading causes of preventable death, and that the estimated annual medical cost of obesity in the US was $147 billion in 2008. In the quest to find effective and safe approaches to weight loss, in recent years herbal products have become a popular alternative or adjunctive to more conventional means. Some of the herbs investigated are warming aromatic carminatives, for example, cumin and ginger, that from a traditional herbal perspective possess a number of actions beneficial for weight loss. These actions include stimulating digestive functions and thermogenic activity (e.g., ephedra and green tea are well known for their thermogenesis effects, although ephedra is no longer available in the US) and slowing the absorption of sugar, thereby potentially lessening insulin spikes, as in psyllium. This article shows that botanicals provide a host of effects which may contribute to a comprehensive weight loss program. Ideally, mixing and matching herbs with these different actions would provide the most balanced approach to weight loss, in contrast to typical magic bullets. Anti-obesity is an area in which plants can potentially provide complementary support for a growing problem. This review is worthwhile for those developing weight loss products and should be included in the substantiation files of those marketing any of the included herbs.


http://www.jdmdonline.com/content/12/1/28

http://www.cdc.gov/obesity/data/adult.html

**Safety**

**Chokeberry Herb-Drug Interaction**

A 56-year-old man being treated for retroperitoneal liposarcoma with 4 cycles of the chemotherapeutic drug trabectedin was diagnosed with trabectedin-induced rhabdomyolysis. Rhabdomyolysis is a condition in which muscle fibers break down and the contents released into the bloodstream. In this report, a patient had been admitted into the hospital after presenting with sudden weakness, difficulty walking, and diffuse muscle pain. Laboratory findings included G4 pancytopenia and marked increases in liver enzymes and serum myoglobin, creatine phosphokinase, and lactate dehydrogenase. Cardiac and kidney function appeared normal. Trauma and muscle exertion were not reported; co-morbidities were not present. The patient reported having taken a commercial black chokeberry (*Aronia melanocarpa*) fruit juice extract daily (no further information available) during the last course of trabectedin and for 2 weeks prior. Toxicity markers slowly returned to normal and muscle strength progressively increased 1 week after hospitalization and cessation of chokeberry intake. The probability of drug interaction was determined to be probable based upon clinical evidence. It was further concluded that because cytochrome CYP3A4 is the principle enzyme responsible for mediating the degradation of trabectedin, and that there is evidence of chokeberry juice affecting CYP markers, there was a probable secondary herbal-chemotherapy interaction. The authors note a potential for other unknown pharmacokinetic interactions and encourage the development of a medical database to support identifying herbal-drug interactions in oncology.

**AHP Comments:** Chokeberry has a long history of traditional use in the Native American community. In contemporary Europe and the Soviet Union, it is used mainly in the food and wine industries. This is possibly the first report of an interaction with chokeberry and a pharmaceutical drug since chokeberry has entered the
Ting et al. (2013) investigated microbial and heavy metal levels in the 4 most popular TCMs consumed in Malaysia, as well as the effects of boiling on the detected contamination levels. As reported, the TCM formulas included Eight Treasure Herbal Tea (containing *Spica prunellae vulgaris*, *Herba lophatheri*, *Rhizoma imperatae*, *Flos bombacis*, *Herba plantaginis*, *Folium mori*, *Saccharum officinarum*, and *Flos dendranthematis*) and Herbal Tea (containing *Herba schizonepetate tenuifolia*, *Radix saposhnikoviae*, *Notopeterygium incisum*, *Radix angelicaepubescentis*, *Rhizoma chuanxiong*, *Radix bupleuri chinensis*, *Radix peucedani*, *Scutellaria baicalensis georgi*, *Radix ilicis asprellae*, *Fructus aurantii submaturus*, *Poria*, and *Radix glycyrrhizae*). Single herbal medicines included American ginseng [xiyangshen root] (*Radix panacis quinquefolii*) and codonopsis root (*Radix codonopsis*). Prior to boiling, microbes were found in all samples except xiyangshen. After boiling, microbial contamination was significantly (*P* < 0.05) reduced with no bacteria recovered in any of the samples. Six metals (manganese, lead, copper, cadmium, zinc, and iron) were analyzed and detected in all samples prior to boiling; cadmium was found at the highest concentration, cadmium at the lowest. The authors report that post boiling, only copper levels were significantly (*P* < 0.05) reduced, as indicated by before and after evaluation within the same sample. No differences were seen between formulas and single herbs.

**AHP Comments:** AHP's QRS Herbal Bulletin Volume 3, 2013 discussed the issue of microbial contamination as it naturally occurs in plants (see Milk Thistle Fungi and Mycotoxins). Drying, steam sterilization, and occasionally illegal irradiation are practices for reducing microbial contamination, while certain extraction processes also lower microbial loads. Since boiling has long been known to reduce microbial loads in plant material, this study does not provide anything novel in this regard. Similarly, many in industry recognize that boiling does not result in significant reduction in metals. Nevertheless, this paper is beneficial for quality control personnel and for all those responsible for adhering to GMPs.

Davidson et al. (2013) evaluated the 11 most relevant Cochrane reviews of herbal medicines for quality of reporting and level of evidence representation. Included in the reviews were studies with Western and Chinese single ingredient and combination herbal preparations. The authors report a number of areas in the reviews which were problematic and could be improved upon, including plant part characterization, plausibility for clinical use, lack of data completeness, effect and sample size calculations, and adverse effects and interactions reporting. They also recommend excluding studies with formulas that include non-herbal ingredients.

AHP Comments: Cochrane reviews are internationally recognized as the highest standard for systematic, comprehensive, and independent evaluation of evidence-based healthcare research. Nevertheless, it is important to review the reviewers. Davidson et al. (2013) provide valuable insight into what is necessary for the gold standard to become platinum.


American Ginseng Conservation

A recent television show, Appalachian Outlaws, highlighted and sensationalized American ginseng (Panax quinquefolius) harvesting practices, giving focus to the unlawful harvest and trade of the herb. Poaching of American ginseng, predominantly defined as either harvesting on national or state lands, on private property without permission, or harvesting without a permit, has been a continuing challenge in the American ginseng wildcrafting trade. Such illegal poaching practices have raised concerns about survival of the plant. As demonstrated on the show, some of the wildcrafters and the brokers displayed no regard at all for sustainable harvesting practices, stating, "I'm gonna get every root there is". The brokers seemed only to care about fulfilling their orders, even in seasons where the supply was limited. One picker was clearly picking ginseng and planting unripe seeds, as well as misidentifying the potentially toxic white baneberry (Actaea pachypoda) and calling it "black cohosh". While the show is scripted, designed for sensationalism, and only portrays one side of the ginseng wildcrafting story, the attitude and practices of the individuals were clear in that there was little regard for the plant itself. American ginseng is currently listed in the Convention on International Trade in Endangered Species (CITES) Appendix II. Poaching this year seems to be on the rise as Asian markets are recovering economically and driving up the cost of American ginseng.
Finalization of Historic *Cannabis* Monograph

The AHP has finalized and released the long-awaited and much anticipated quality control monograph on *Cannabis*, otherwise known as marijuana. Like all AHP monographs, the publication provides standards of identity, purity, analysis, and quality, as well as information on the cultivation and storage of the botanical and its preparations.

According to AHP President Roy Upton, "*Cannabis* has been used medicinally pretty much throughout the entire timeline of written history, and from archeological evidence, far beyond into antiquity. Virtually every culture that has had access to it either from local flora or trade, which was widespread, has used it medicinally and recreationally."

The initial idea of developing an AHP monograph for cannabis came from AHP medical director Aviva Romm MD, who reported that patients, first in her medical residency at Yale and then at Tufts, benefited from cannabis when other medications failed. This was followed by the recognition by 20 states of the medicinal utility of the botanical through passage of medical marijuana laws. Soon after, Americans for Safe Access (ASA), a Washington DC-based advocacy organization for the medical use of cannabis, expressed the need for such standards.

Upton states, "This monograph is historic in that it is the first formal pharmacopoeial monograph on cannabis developed in the US in more than 70 years. The first monograph was introduced into the United States Pharmacopoeia in 1850 and was removed from the 12th edition in 1942. Considering the widespread use of cannabis, it is important for there to be quality control guidance whether used for medicinal or non-medicinal purposes."

According to Steph Sherer, executive director of ASA, "The AHP monograph creates much needed quality assurance standards for states that have medical access laws. The adoption of these standards will create confidence in the quality and reliability of cannabis therapies for patients and their physicians."

The various bodies of information contained in the monograph include: standards for identification, quality, and purity; cultivation and processing guidance; constituent profile; and a variety of analytical methodologies for the identification of the plant, as well as quantitation of specific cannabinoids. Much of this information was developed in collaboration with numerous researchers at the University of Mississippi (UMiss) under the guidance of Dr. Mahmoud ElSohly, professor of pharmaceutics and one of this country's foremost cannabis experts. UMiss is the only federally legal source of medical marijuana in the US. They have been analyzing their own cultivated material, as well as products seized by the Drug Enforcement Administration (DEA), for more than 30 years. They are among the most expert in the world on all things cannabis.

The information provided in the monograph will be of value to a wide range of those involved in the medical use of cannabis including growers, caregivers, patients, practitioners, analytical labs, state regulators, and researchers. This pharmacopoeial monograph will be followed by a *Therapeutic Compendium*, which will present a comprehensive review of the world's historical and scientific data on the use of the plant.

To order the AHP Cannabis QC Monograph, go to: [www.herbal-ahp.org](http://www.herbal-ahp.org)

**Botanical Ingredient GMP Compliance:**

**Botanical Pharmacognosy Webinar Series Recordings Now Available**

**Session 1:** Quality Control Assessment Techniques: Their Strengths and Weaknesses - Botanical, Macroscopic, Microscopic, Chemical, IR, DNA Techniques
Presenters: Roy Upton, RH, DipAyu, American Herbal Pharmacopoeia and James Neal-Kababick, PhD, Director, Flora Research Laboratories
Session 2: Botanical Identification: The Foundation of Herbal Ingredient Identification and How to Work with Suppliers to Ensure Botanical Authenticity. 
Presenters: Roy Upton, RH, DipAyu, American Herbal Pharmacopoeia and Steven Yeager, Laboratory/Quality Control Manager, Mountain Rose Herbs

Session 3: Macroscopic and Organoleptic Assessment of Botanical Ingredients
Presenter: Roy Upton, RH, DipAyu, American Herbal Pharmacopoeia

Session 4: Microscopic Assessment of Botanical Ingredients

Session 5: Chemical Assessment of Botanical Ingredients
Presenters: Roy Upton, RH, DipAyu, American Herbal Pharmacopoeia and James Neal-Kababick, PhD, Director, Flora Research Laboratories

Session 6: Botanical Ingredient Adulteration: Review and Detection of Common and Uncommon Adulterants in the Marketplace and How to Detect Them

Session 7: Quality Control Reference Standards: Monographs of AHP, Ayurvedic Pharmacopoeia, EP, PPRC, USP, WHO and How to Apply them to Specifications Development and GMP Compliance
Presenters: Roy Upton, RH, DipAyu, American Herbal Pharmacopoeia and Josef Brinckmann, Traditional Medicinals

Session 8: Botanical Reference Materials (BRMs)

The entire series or individual webinars can be ordered at: https://www.eventbrite.com/e/botanical-pharmacognosy-and-gmp-compliance-webinar-series-registration-6233631961

AHP-Verified™ Botanical Reference Materials (BRM) Update

The AHP-Verified™ Botanical Reference Materials (BRM) program continues to grow with the addition of the following herbs (see list below). BRMs are critical to botanical GMP compliance, each AHP-Verified™ BRM is verified as to its authenticity to both genus and species and is accompanied by an AHP Certificate of Authenticity denoting the manner in which authenticity was determined. The identity and purity of these standards have been confirmed through botanical, macroscopic, microscopic, HPTLC, and/or specific chemical methods of analyses. The use of botanical reference material is critical both for compliance with GMPs and to assure the botanicals used in the manufacture of botanical dietary supplements are authentic, pure, and reflect the desired quality.
New BRMs

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<th>Common Name</th>
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<td><em>Mangifera indica</em> fruit</td>
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<td><em>Citrus sinensis</em> blossoms</td>
<td>orange</td>
</tr>
<tr>
<td><em>Amaranthus caudatus</em> seed</td>
<td>amaranth</td>
</tr>
<tr>
<td><em>Pennisetum glaucum</em> seed</td>
<td>pearl millet</td>
</tr>
<tr>
<td><em>Fagopyrum esculentum</em> seed</td>
<td>buckwheat</td>
</tr>
<tr>
<td><em>Vigna angularis</em> seed</td>
<td>azuki, adzuki</td>
</tr>
<tr>
<td><em>Cicer arietinum</em> seed</td>
<td>garbanzo, chickpea</td>
</tr>
<tr>
<td><em>Lens culinaris</em> seed</td>
<td>green lentil</td>
</tr>
<tr>
<td><em>Chenopodium quinoa</em> seed</td>
<td>quinoa</td>
</tr>
<tr>
<td><em>Salvia hispanica</em> seed</td>
<td>chia</td>
</tr>
</tbody>
</table>

See [http://www.herbal-ahp.org](http://www.herbal-ahp.org) for a full list of available *AHP-Verified™ BRMs*, including prices. Or contact ahp@herbal-ahp.org if you are looking for a particular BRM.

BRMs In Verification Process

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acorus calamus</em> root and rhizome</td>
<td>calamus</td>
</tr>
<tr>
<td><em>Aletris farinosa</em> rhizome</td>
<td>aletris</td>
</tr>
<tr>
<td><em>Aristolochia serpentaria</em> root</td>
<td>Virginia snakeroot</td>
</tr>
<tr>
<td><em>Asclepias tuberosa</em> root</td>
<td>butterfly weed or pleurisy root</td>
</tr>
<tr>
<td><em>Borago officinalis seed</em></td>
<td>borage</td>
</tr>
<tr>
<td><em>Ceanothus americanus</em> root</td>
<td>red root</td>
</tr>
<tr>
<td><em>Cephaelis ipecacuanha</em> root</td>
<td>ipecac</td>
</tr>
<tr>
<td><em>Chimaphila umbellata</em> leaf</td>
<td>pipsissewa</td>
</tr>
<tr>
<td><em>Chionanthus virginicus</em> root</td>
<td>fringe tree</td>
</tr>
<tr>
<td><em>Frangula purshiana</em> bark</td>
<td>cascara</td>
</tr>
<tr>
<td><em>Gelsemium sempervires</em> root</td>
<td>gelsemium</td>
</tr>
<tr>
<td><em>Geranium maculatum</em> rhizome</td>
<td>cranesbill</td>
</tr>
<tr>
<td><em>Hydrangea arborescens</em> root</td>
<td>hydrangea</td>
</tr>
<tr>
<td><em>Indigofera tinctoria</em> aerial part</td>
<td>indigo</td>
</tr>
<tr>
<td><strong>Iris versicolor</strong> rhizome</td>
<td>blue flag</td>
</tr>
<tr>
<td><strong>Iris virginica</strong> rhizome</td>
<td>blue flag</td>
</tr>
<tr>
<td><strong>Juglans cinerea</strong> hull</td>
<td>butternut or white walnut</td>
</tr>
<tr>
<td><strong>Juglans regia</strong> hull</td>
<td>English walnut</td>
</tr>
<tr>
<td><strong>Morella spp.</strong> bark</td>
<td>bayberry</td>
</tr>
<tr>
<td><strong>Pinus strobus</strong> bark</td>
<td>white pine</td>
</tr>
<tr>
<td><strong>Podophyllum peltatum</strong> root</td>
<td>mayapple</td>
</tr>
<tr>
<td><strong>Polygala senega</strong> root</td>
<td>seneca snakeroot</td>
</tr>
<tr>
<td><strong>Polygonatum biflorum</strong> rhizome</td>
<td>Solomon's seal</td>
</tr>
<tr>
<td><strong>Rhodiola rosea</strong> root</td>
<td>rhodiola</td>
</tr>
<tr>
<td><strong>Sanguinaria canadensis</strong> rhizome</td>
<td>bloodroot</td>
</tr>
<tr>
<td><strong>Stillingia sylvatica</strong> root</td>
<td>stillingia</td>
</tr>
<tr>
<td><strong>Symlocarpus foetidus</strong> root</td>
<td>skunk cabbage</td>
</tr>
<tr>
<td><strong>Trillium erectum</strong> root</td>
<td>bethroot</td>
</tr>
<tr>
<td><strong>Veratrum viride</strong> root</td>
<td>American hellebore</td>
</tr>
<tr>
<td><strong>Veronicastrum virginicum</strong> root</td>
<td>Culver's root</td>
</tr>
<tr>
<td><strong>Zanthoxylum americanum</strong> bark</td>
<td>northern prickly ash</td>
</tr>
<tr>
<td><strong>Zanthoxylum clava-herculis</strong> bark</td>
<td>southern prickly ash</td>
</tr>
</tbody>
</table>

*If there is a BRM you are looking for and do not see it on our list, ask us. We may have it in process or can procure it through our domestic and international relationships.*

**AHP-Verified™ Chemical Reference Materials Update**

There are numerous sources of chemical reference materials on the market. However, many of these do not accurately disclose the level of purity of the compound, the means by which purity was assessed, or utilize accurate means for assessing purity. A number of investigations by AHP-collaborating laboratories have revealed numerous and significant inaccuracies in the declaration of the purity of commercial reference materials. Each **AHP-Verified™ Chemical Reference Material (CRM)** has been verified as to its identity and level of purity and is accompanied by a full documentation package with the level of purity and the method for determining purity clearly indicated.

Characterization AHP Botanical Pharmacognosy Microscopic of Botanical Medicines.

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