

The future of ethnobotany: moving fast, going where?

NINA L. ETKIN

University of Hawai'i, Honolulu, Hawai'i, USA.
etkin@hawaii.edu

Abstract. Ethnobotany overlaps closely the specialties ethnopharmacology and ethnomedicine. For the last two decades these fields have enjoyed a rapidly growing interest among the scientific community, paralleled by an explosion of public interest in botanical medicines and supplements. Professionally, we represent diverse intellectual traditions - most prominently pharmacology, botany, and anthropology. Our multivocality has been both an obstacle to a fully interdisciplinary inquiry, and a dynamic tension that promotes dialogue. One goal for a productive future is to reconceptualize our diverse objectives and methods into an inquiry that yields not only collaboration among different researchers but also the application of that knowledge for indigenous communities. The issue of research objectives is fundamental to an integrated ethnobotany. Some argue that, despite some very visible bio-prospecting, the pharmaceutical industry today is not

interested in natural products, and even less so in indigenous peoples. Is drug development the primary aim of ethnobotany? If so, who will be the chief recipients of those benefits - the West, where most of the research is conducted, or the developing world, which both bears the greater disease burden and is the source of plants tested for drug activity? Are we interested instead, or as well, in the implications of plant use in particular cultural and ecological circumstances? How can we reconcile that research conducted during the last two decades has yielded an enormous amount of information on plant constituents and activity, and on traditional uses, with virtually no practical application? It may be provident at this juncture to address how the results of sophisticated medical ethnography, field botany, and rigorous bioassays can be meaningfully integrated, translated, and applied to the traditional populations who use those plants.

Key words: CAM, Ethnobotany, Ethnopharmacology, Research objectives and application

INTRODUCTION

Ethnobotany overlaps closely the specialties ethnopharmacology and ethnomedicine. For the last two decades these fields have enjoyed a rapidly growing interest among the scientific community. That attention has been matched by an explosion of public interest in botanical medicines and supplements. Professionally, we represent diverse intellectual traditions - most prominently pharmacology, botany, and anthropology. Our multivocality has been both an obstacle to a fully interdisciplinary inquiry, and a dynamic tension that promotes dialogue (ETKIN 1996, 2001; ETKIN & ROSS 1997; HEINRICH & GIBBONS 2001; LAIRD 2002; STEPP *et al.* 2002). One goal for a productive future is to reconceptualize our diverse objectives and methods into an inquiry that yields not only collaboration among researchers of different

backgrounds but also the application of that knowledge for the benefit of local communities.

Research conducted during the last two decades has yielded an enormous amount of information on plant constituents and activities, and on traditional uses. This underscores the advances made in our respective fields. But that knowledge exists primarily as disembodied lists of plants used, constituents, and activities. How can we reconcile that there has been virtually no practical application of our findings? It is not clear from the catalogues of plant uses and chemical constituents how most botanists intend their data to be used. Is drug development the primary aim of ethnobotany? If so, who will be the chief recipients of those benefits - the West, where most of the research is conducted, or the developing world, which both bears the greater disease burden and is the source of plants tested for drug activity?

Some observers argue that today, beyond several research efforts in which bioprospecting is very visible, the pharmaceutical industry is barely interested in natural products, and even less so in indigenous peoples. The industry sees, instead, a brighter future in genetic engineering. This erosion of interest reflects the cost of drug development, the low success rate of bringing products to market, and the complexity of intellectual property rights and liability issues.

If neither botanists nor pharmaceutical companies exploit the findings of natural products research, what is the purpose? Anthropologists have been concerned instead with the implications of plant use in particular cultural and ecological circumstances. But, like our botany and pharmacology colleagues, few of us have applied our findings to practical ends. It is important to think about how the results of sophisticated medical ethnography, field botany, and bioassays can be meaningfully integrated, translated, and applied for the benefit of populations who use those plants.

My objective is to present an ethnobotanical case study that combines anthropological perspectives with the application of research findings for practical ends. I offer the background and preliminary findings of our current research to illustrate both a transdisciplinary methodology and the application of research results. This is a departure from much of the inquiry in ethnomedicine and ethnobotany, as it examines folk medicines in a western setting - specifically the use of complementary and alternative medicines in Honolulu, Hawai'i.

COMPLEMENTARY AND ALTERNATIVE MEDICINES (CAM)

As a category, complementary and alternative medicine (CAM) defies definition: it is unbounded and includes, uncritically, a great diversity of products, procedures, and philosophies that are united only because they are not part of conventional biomedicine. Increasingly, even that distinction is blurred, as allopathic physicians refer patients to food supplements, botanicals, and other modalities. Further, in an increasing num-

ber of cases, third party entities pay for CAM - especially acupuncture, naturopathic, and chiropractic services. Increasingly, then, it is important for health care providers to develop familiarity with CAM, including efficacy and risk (ERNST 2000; ETKIN *et al.* 1999; FAUTREL *et al.* 2002; FONTANAROSA 2000).

In the US today, CAM are extremely popular. Many of these products are botanicals that are promoted as "herbs" and food supplements. These are used for reasons that range among dissatisfaction with conventional treatments, desire to use "natural" products, and the attraction of such health philosophies as "holistic care". CAM are further specified as phytochemicals, nutraceuticals, and cosmeceuticals. The prefixes "phyto-" and "nutra-" mark these products as botanicals and as nutrients. This evokes their naturalness, compared to synthetic drugs. Similarly, the prefix "cosme-" diverts attention to other-than-drug qualities. Paradoxically, all three terms include the affix "-ceutical". This draws the consumer's attention back to drugs, but now to the positive attributes of pharmaceuticals - namely, the demonstrated success of biomedical technology. In this way, the language of the CAM industry plays on digression from the substance and style of biomedicine, at the same time that it maintains a link to the technology that has for so long captured the confidence of the consuming public (ETKIN & McMILLEN 2003; ETKIN & ROSS 2002).

Today, more than 800 companies manufacture botanical products that are advertised to have healthful properties. Estimated annual sales in the European Community approach 7 billion US, and in North America more than 3 billion (SMITH 2002). This number reflects several circumstances. Over the last 10 years there has been rapid growth in the marketplace for botanical health products. Further, there are more varieties of botanical preparations - infusions, tablets, injections, and so on. The consumer base has expanded on the shared perception that botanicals are "safe" alternatives to conventional medicines.

Numerous surveys suggest that 70-90% percent of North Americans use these products. A large percentage of consumers believe that these

products have been tested and approved by formal entities such as the US Food and Drug Administration (FDA). This is not at all the case, and for most popular botanicals we have no, or only emergent, knowledge of phytochemistry and clinical outcome. Even plants that have been chemically characterized offer no assurance of safety and efficacy, since these products are neither standardized for content and action nor otherwise regulated.

Why are CAM Popular?

Why are these unknown products so widely used? What accounts for the enormous popularity of botanicals whose use has not been empirically corroborated? The answer is that the use of CAM is driven primarily by market forces that fill existing consumer needs and create new ones. Consequently, a significant and growing percentage of people self-medicate with products that have not been characterized for safety, efficacy, and potential interaction with other medicines. Not only do consumers use these poorly characterized products, they also combine them with one another and with pharmaceuticals (DIXON *et al.* 1999; ETKIN *et al.* 1999; ETKIN & McMILLEN 2003). This simultaneous use of medications that have not been prescribed together presents health risks: interactions can affect drug uptake, bio-transformation, distribution, and elimination. Further, medications may antagonize one another, so that only one or neither is effective. Even if the effects are additive, which can be construed as benefit instead of risk, this has implications for calculating dosage. For these reasons, it is important to know not just why people seek CAM and what specific products they use, but also how those products are used - including simultaneous or serial use of CAM and pharmaceuticals (ETKIN & ROSS, 2002).

ETHNOBOTANICAL CASE STUDIES

Honolulu Study I

In 1993 I initiated a study of CAM use in Honolulu, Hawai'i where, as one finds throughout

the US, the use of CAM is commonplace. The 185 participants in our study were recruited by cluster sampling at diverse locations and represent 2 overlapping categories. (1) First are 51 community members who represent the diffuse and varied medical knowledge of contemporary Hawai'i. They were interviewed in their homes, practitioner waiting rooms, classrooms, community gardens, recreation centers, and CAM workshops. By drawing attention to community members, we emphasize that much medical decision-making occurs as self- and family-treatment, within household contexts. This community sample also included 9 CAM specialists: one chiropractor, an acupuncturist, 2 naturopaths, and 5 traditional Hawaiian healers. (2) The second category of study participants is 134 clinic out-patients who were interviewed at a comprehensive, conventional medical center (DIXON *et al.* 1999; ETKIN *et al.* 1999).

Semi-structured interviews focused on what individuals do to prevent or treat disease, besides seeking biomedical care. Questions accommodated the broadest range of health-related activities - such as botanical medicines, acupuncture, foods, and prayer. Data include preventive and/or therapeutic objectives; botanical identification; source of information about the product; source of the product itself; preparation; administration; dose or frequency; and expected outcome, including mode of action. Participant observation included presenting informal lectures on health issues at senior citizens' centers, attending seminars on traditional healing practices, joining language and traditional crafts classes, involvement in community gardens, frequenting the out-patient waiting room, visits to the offices of complementary practitioners, and patronizing a variety of "health food" stores and other sources of complementary medicines.

Interviews with the 185 study participants identified a total of 346 medicinals that ranged from treatments for specific illnesses such as diabetes, to more general outcomes such as "cleansing" or "strengthening". Seventy-five percent of the CAM used in Honolulu are plants. The concerns reported by study participants correspond to the principal health problems in Hawai'i today: cardiovascular disease, cancers, diabetes, respira-

tory disorders, and HIV/AIDS. The complementary, not "alternative" nature of the treatments is underscored by noting that specific diseases diagnosed by physicians are subsequently treated with CAM in conjunction with pharmaceuticals (DIXON *et al.* 1999; ETKIN *et al.* 1999).

Honolulu Study II

Two years ago we initiated another study of CAM use in Hawai'i, employing a refined methodology that restricted the sample to oncology patients, both hospitalized and out-patients (ETKIN & ROSS 2002). This feature of study design resonates the applied aspect of our research, as one of the primary objectives of the study is to make the findings available to hospital clinical staff and administrators. Insights from this and related studies will help them design better informed policy for the use of CAM, both in patient self-care and in integrated health management strategies that combine biomedical and other modalities.

As before, study participants were given sufficient latitude to discuss CAM in depth. In this way, interviews established both the context and objectives of use as well as specific products, preparations, and combinations. Data for the second study are currently being analyzed, but some summary statements offer insights into both the nature of CAM use by cancer patients and how that information can be translated into clinical practice and policy.

Results of Studies I and II

In both Honolulu studies, most of the CAM used are botanicals. The motivation and selection criteria applied by cancer patients closely overlap those of general CAM users in Hawai'i and elsewhere. As members of a society that promotes proactive health care, study participants feel responsible not only to get treatment but also to be involved in its design.

In the U.S. generally, the commodification and aggressive marketing of contemporary culture fosters the idea that patients should "shop around" to identify what best meets their needs. In Hawai'i, too, there exists a profusion of options that encour-

age people to seek "medical fixes". Significantly, study participants consider these options to have the same potential efficacy, so that experimenting among several is a coherent strategy.

Discontent with biomedicine also is a common theme and includes the recognition that biomedicine cannot cure, or even successfully manage, some chronic disorders. Further, study participants reported that "side" effects discourage the use of some drugs, and they use some CAM specifically to manage these secondary effects. CAM users consider botanical medicines to carry little risk because these are "natural" products, while pharmaceuticals are extracted, purified, and synthetic - thus, harmful in their "foreignness".

Several preventive and healing metaphors guide the interpretation of CAM. For the most part CAM users share a holistic understanding of health as physical and emotional well-being. They are concerned with balance - between physical qualities such as hot and cold, and between emotion and physiology. They are concerned as well with harmony between individuals and their communities, so that healing transcends the sick person and affects the social fabric as well. CAM users are also compelled by products that claim to cleanse and detoxify. Further, especially in the case of cancers, people seek so-called immune-boosters. "Immune boosting" is one of a handful of scientific terms that now permeate the lay vernacular but are poorly apprehended by the public - people may know their cholesterol or glucose status, but they do not understand the pathophysiology of fat and sugar metabolism. In this way, immune boosting is simply another word for strengthening. While it does not overlap knowledge of T-lymphocytes and antibodies, it is meaningful because it carries the weight of scientific argot.

It might seem paradoxical that in the face of the enormous popularity of CAM, very little is known scientifically about most of these products. Lately researchers have begun to characterize the physiologic effects of particular CAM. But we barely comprehend the use of these products in real-life circumstances that include health status, diet, daily activity patterns, and so on. Only in the last few years do we have a limited but growing body of literature that identifies interactions

among drugs, CAM and other botanicals, and foods. Most consumers understand even less; they tend not to be critical and to comprehend only through approximation and generalities.

The commodification of CAM includes the appropriation of general healing metaphors as well as refashioning those themes to render them both transculturally attractive and evocative of specific traditions. In multi-ethnic Hawai'i, the CAM industry plays on both collective and individual demographics, in some cases evoking Hawaiian identification, in other instances Japanese, Chinese, Filipino, and so on. At other times, the CAM industry markets Polynesia writ large, and exports the romance and mystique of this region beyond Hawai'i. Marketing schemes subtly diffuse those therapeutic metaphors into the public mind. In one strategy, multi-level marketing, the distributor enjoys a reduced cost on future purchases of the product he sells. Here, incentive transcends simple economy because the consumer who is assimilated into the advertising and retail aspects becomes invested in the culture of CAM. As agent cum educator, he is a well-intentioned entrepreneur tacitly disguised as a health provider.

In sum, then, our research establishes that cancer patients in Honolulu use a wide range of botanicals. This corroborates the findings of other studies of CAM use in North America. Those other studies were based on surveys rather than in-depth interviews, and are largely descriptive. Our studies add ethnographic depth to reveal how the popularity of botanicals is both culturally-constructed and market-driven. These findings yield insights into people's interpretations of illness, as well as give shape to the commodification of health and healing. This leads us to the applied dimension of our research, which links the use of CAM to clinical practice and institutional policy.

SIGNIFICANCE OF CAM ACTIONS AND CAM-DRUG INTERACTIONS FOR CLINICAL PRACTICE AND INSTITUTIONAL POLICY

The marketing claims for phytochemicals, food supplements, and related products has far

outstripped their scientific substantiation. In 1994 the US Dietary Supplement Health & Education Act (DSHEA) ushered in sweeping changes in the way that dietary supplements are regulated. That law is still evolving, but a primary effect was to remove CAM from the jurisdiction of the FDA. Consequently, evidence-based information about the efficacy, mode of action, and safety of most botanical products is limited. Although the DSHEA assigns to manufacturers the responsibility for marketing safe products, once products reach market, the burden of proof lies with the FDA to prove significant risk. Given their profit margin, CAM manufacturers have little motivation to standardize or otherwise regulate their products. In view of the widespread use of botanicals, physicians are concerned with the efficacy and safety of these products. In clinical settings this concern overlaps issues of good practice, medical ethics, and liability.

The concern is well-placed. After all, adverse drug reactions have been amply documented for pharmaceuticals, which have passed FDA scrutiny. One study estimated that in one year in the US 700,000 individuals were affected by drug-induced injury, 1.5 million were admitted to hospital, and 106,000 hospital deaths were attributed to adverse reactions from prescription drugs (LAZAROU *et al.* 1998). On the premise that plants may be pharmacologically active, which is one of the primary reasons that one uses them, the likelihood also is high for adverse reactions from CAM. Indeed, a sizeable number of botanicals have been linked in the scientific literature to a broad range of health problems (e.g., BROWN 2002; ELVIN-LEWIS 2001; MARKMAN 2002).

Potential interactions among CAM and between CAM and pharmaceuticals is a growing concern, but it is substantiated at present by only a limited amount of research. For example, plausible and reported cases of pharmaceutical-botanical interactions include (ELVIN-LEWIS 2001; IBIS 2002):

- potentiation of topical and oral corticosteroids by liquorice (*Glycyrrhiza glabra* L., Fabaceae)

- bleeding when coumarins (warfarin) are combined with garlic (*Allium sativum* L.,

Liliaceae), ginkgo (*Ginkgo biloba* L., Ginkgoaceae), and papaya (*Carica papaya* L., Caricaceae)

- decreased bioavailability of cyclosporin, oral contraceptives, indinavir, and digoxin when combined with St. John's Wort (*Hypericum perforatum* L., Guttiferae)

- potentiation of some antibiotics and chemotherapeutic agents by pineapple (*Ananas comosus* (L.) Merr., Bromeliaceae)

These examples are illustrative - many more exist. However, it is important to stress that most plant-drug reactions are poorly documented and not corroborated by laboratory analysis of the putative preparation. While these cases only represent potential, the point is to understand that potential and to convey its risk to both consumers and health care providers. The circumstances are far more complex than these lists of potential interactions suggest. The particulars of CAM manufacture, preparation, and use are confounded by a person's individual metabolism, health status, diet, and use of other drugs. Still, mounting evidence points to the significance of such interactions, and suggests that the use of CAM should be an integral element of medical histories and ongoing therapeutic design.

CONCLUSION

Our research finds that while patients have been reluctant (and have not been invited) to discuss CAM with health professionals, most respect their advice and would welcome the health professional in a resource role for CAM information. Finally, in the US, CAM has appeared on the radar screen of biomedicine. Having appeared, it generates concern as medical staff apprehend just how many patients use CAM, and the great variety of products.

Medical staff understand as well that we know very little about the clinical implications of CAM use. Like their European counterparts, medical institutions in the U.S. are responding by extending curriculum to include courses on CAM. However, there is considerable distance between teaching about complementary therapeutic modalities and incorporating them into an integrated care that assures good clinical practice, medical ethics, and clarity of liability.

The challenge is to refocus CAM research - to move beyond the catalogue stage that reports only descriptive data (X% use Y to treat Z). We need to reinforce the analysis of our findings and apply that for patient and staff education. In turn, clinical policy will be modified as health institutions move toward integrated health care.

LITERATURE CITED

- BROWN A.C., A.S. HUANG. 2002. Life-Threatening Herbs Causing Liver Toxicity, Renal Toxicity, Cardiotoxicity, Cancer and Death. Poster. Experimental Biology Meeting. New Orleans, LA . 20-24 April.
- DIXON A.R., H. McMillen, N.L. Etkin. 1999. Ferment This: The Transformation of Noni, a Traditional Polynesian Medicine (*Morinda citrifolia* L.). *Economic Botany* 53: 51-68.
- ELVIN-LEWIS M. 2001. Should we be Concerned about Herbal Remedies? *Journal of Ethnopharmacology* 75: 141-164.
- ERNST E. 2000. Prevalence of Use of Complementary/Alternative Medicine: A Systematic Review. *Bulletin of the World Health Organization* 78: 252-257.
- ETKIN N.L. 1996. *Ethnopharmacology: The*
- Conjunction of Medical Ethnography and the Biology of Therapeutic Action. In: C.F. Sargent and T.M. Johnson (Eds.). *Medical Anthropology: Contemporary Theory and Method*. Revised edition. Pp. 151-164. Praeger Publishers. New York.
- ETKIN N.L. 2001. Perspectives in Ethnopharmacology: Forging a Closer Link between Bioscience and Traditional Empirical Knowledge. *Journal of Ethnopharmacology* 76: 177-182.
- ETKIN N.L., A.R. DIXON, P.W. NISHIMOTO, P.J. ROSS. 1999. Medicinal Foods in Multiethnic Honolulu, Hawai'i. In: A. Guerci (Ed.). *Cultural Food*. Pp. 12-26. Erga Edizioni. Genova, Italy.
- ETKIN N.L., H.L. MCMILLEN. 2003. The

- Ethnobotany of Noni (*Morinda citrifolia* L., Rubiaceae): Dwelling in the Land between La'au Lapa'au and TestiNONIals. In: S.C. Nelson (Ed.). Proceedings of the 2002 Hawai'i Noni Conference. Pp. 11-16. College of Tropical Agriculture and Human Resources. University of Hawai'i. Honolulu.
- ETKIN N.L., P.J. ROSS. 1997. A Discipline Maturing: Past Trends and Future Direction in Ethnopharmacology. In: A. Guerci (Ed.). Salute e Malattia: Indirizzi e Prospettive. Pp. 85-95. Erga Edizioni. Genova, Italy.
- ETKIN N.L., P.J. ROSS. 2002. Polypharmacy and the Elderly Cancer Patient: Rethinking "Noncompliance". In: A. Guerci (Ed.). Ethnogerontology and Ethnogeriatrics: Living and Healing Old Age in the World. Pp. 21-32. Erga Edizioni. Genova, Italy.
- FAUTREL B., V. ADAM, Y. ST-PIERRE, L. JOSEPH, A.E. CLARKE, J.R. PENROD. 2002. Use of Complementary and Alternative Therapies by Patients Self-reporting Arthritis or Rheumatism: Results from a Nationwide Canadian Survey. *Journal of Rheumatology* 29 (11): 2435-41.
- FONTANAROSA P.B. (Ed.). 2000. *Alternative Medicine: An Objective Assessment*. American Medical Association. Chicago, IL.
- HEINRICH M., S. GIBBONS. 2001. Ethnopharmacology in drug discovery: an analysis of its role and potential contribution. *Journal of Pharmacy and Pharmacology* 53 (4): 425-432.
- IBIS (Integrative Body Mind Information System). 2002. *IBIS Guide to Drug-Herb and Drug-Nutrient Interactions*. Integrative Medical Arts./IBISmedical.com. Beaverton, OR.
- LAIRD S.A. (Ed.). 2002. *Biodiversity and Traditional Knowledge: Equitable Partnerships in Practice*. Earthscan. London.
- LAZAROU J., B.H. POMERANTZ, P.N. COREY. 1998. Incidence of Adverse Drug Reactions in Hospitalized Patients: a Meta-analysis of prospective studies. *JAMA* 279:1200-1205.
- MARKMAN, M. 2002. Safety Issues in Using Complementary and Alternative Medicine. *Journal of Clinical Oncology* 20: 39-41S.
- SMITH E. 2002. Nutraceuticals Market is \$86 Billion, Say Experts. *Drug Topics*. <http://www.fimdefilice.org>, 19 October.
- STEPP J.R., F.S. WYNDHAM, R.K. ZARGER. (Eds.). 2002. *Ethnobiology and Biocultural Diversity. Proceedings of the Seventh International Congress of Ethnobiology*. International Society of Ethnobiology. University of Georgia Press, distributor. Athens, GA.

