

Commentary

# Ethnobotany and ethnopharmacology—Interdisciplinary links with the historical sciences<sup>☆</sup>

Michael Heinrich<sup>\*</sup>, Johanna Kufer<sup>1</sup>, Marco Leonti<sup>1</sup>, Manuel Pardo-de-Santayana<sup>1</sup>

Centre for Pharmacognosy and Phytotherapy, The School of Pharmacy, University of London,  
29-39 Brunswick Sq., London WC1N 1AX, United Kingdom

Received 9 February 2006; accepted 30 May 2006

Available online 30 June 2006

## Abstract

In this paper we use three disparate examples to highlight the relevance of historical methods in the context of ethnobotany and ethnopharmacology. Unfortunately, in ethnopharmacology we have only very few examples where such historical depth is possible. On the other hand the first hand data available through ethnopharmacological research, may be of relevance for interpreting historical information. Three distinct methods were used successfully in the retrospective exploration of diachronic data. In order to gain an insight into historical developments in the use of plant species and evolution of pharmacopoeias we used a botanico-historical approach (*Rosmarinus officinalis*), one that combines linguistic and statistical methods (Popoluca/Mixe), and one that uses historical documentary evidence (Ch'orti). We hope that this methodological discussion encourages a wider use of such historical methods in ethnopharmacology and related areas of research.

© 2006 Elsevier Ireland Ltd. All rights reserved.

**Keywords:** Traditional medicine; Historical methods; *Rosmarinus officinalis*; Ch'orti' Maya (Guatemala); Popoluca (Mexico)

## 1. Introduction

Ethnobotany and ethnopharmacology have variously been seen as a tool for drug discovery (Schultes, 1962), a mode of ascertaining conservation (Cox, 1997), as threat to the integrity of indigenous cultures or as a field of research which will require the development of novel forms of partnership between indigenous peoples and researchers (Laird, 2002). While these approaches are highly diverse, they are united by a relatively static view of local and traditional medicinal plant use.

The lack of anthropologically oriented research in the Journal of Ethnopharmacology remains a point of discussion (see Etkin and Elisabetsky, 2005; Heinrich et al., 2005). Simultaneously, ethical aspects as highlighted in the work of Posey (2004) have been crucial to the discussion. Concepts and methods from

numerous disciplines are used and certainly the diversity of lines of research is one of its main strengths. *However, quite surprisingly little attention has been paid to the historical development of such orally transmitted, indigenous knowledge systems.* It is often apparent and argued that they are under the threat of disappearing, but continuity and change in traditional, orally transmitted knowledge systems about medicinal (and food) plants has only rarely been at the focus of research projects. Obviously, a core reason for this is the methodological approach of anthropological field-work which, by definition, is diachronic and only rarely has access to historical, written records. However, it can also be argued that the theoretical foci as outlined above prevent us from approaching the topic from a historical perspective: all three approaches sketched above rely on the *current or future needs and interests* of certain segments of the societies involved. Here we use three disparate examples to highlight the relevance and the potential of addressing historical questions and using historical and linguistic methods in the context of ethnopharmacology, ethnobotany and ethnopharmacy. The examples chosen are not intended as detailed descriptions of the work, which has been or will be published elsewhere (Kufer et al., 2005; Leonti et al., 2003; Pardo-de-Santayana et al., 2006), but as a methodological discussion on how to approach this topic.

<sup>☆</sup> This paper is based on an invited plenary lecture (MH) given at the 14th International Conference of the Italian–Latinamerican Society for Ethnomedicine held at the Mexican National University (UNAM), Faculty of Medicine, Mexico, D.F. from 25 to 28 September 2005.

<sup>\*</sup> Corresponding author. Tel.: +44 20 7753 5844; fax: +44 20 7753 5909.

E-mail address: [phyto@pharmacy.ac.uk](mailto:phyto@pharmacy.ac.uk) (M. Heinrich).

<sup>1</sup> These authors contributed equally.

Of course, for some phytotherapeutical traditions (esp. Chinese, Ayurvedic and European) written records exist and in the context of this discussion, they are only relevant as far as they impact on oral traditions. However, certainly for many centuries such oral traditions have been in close exchange with written or ‘learned’ traditions.

However, what can such an analysis show? Crucial to the argument here is the search for criteria for the relative socio-cultural importance of specific plant species. The different ways in which people use plants are complex and dynamic. However, our understanding of these processes is still rudimentary. While clear standards for biological methods exist (e.g. Cotton, 1994; Elisabetsky et al., 1996), they are often not followed. Also, the use of anthropological concepts (Etkin, 1988), tools and terminology in ethnopharmacology is now relatively well developed (even though one could certainly argue that it is not used widely enough) (Borgatti, 1992), but such methods have certainly been used more widely in ethnoecology and ethnoscience (e.g. Berlin, 1992), and misleading terms remain a problem in the field (McClatchey, 2005). We and others have proposed quantitative criteria (e.g. Heinrich et al., 1998) in order to better understand this relative socio-cultural importance, but again this only highlights the relative importance of plant species at one given point in time. The three examples we present in this commentary use different methods to add some historical depth to diachronic anthropo-biological data.

## 2. Modern medicinal plant use in Mexico and Guatemala: insight from historical data

Rosemary (*Rosmarinus officinalis* L., Lamiaceae) or *romero* (Span.) is native to the Mediterranean region, but is now widely used in Mexico, Guatemala and other American countries (Table 1). It has been argued that due to medical syncretism, mestizos and native Mesoamericans adopted rosemary and rue (*Ruta chalepensis* L., Rutaceae), two herbs deeply rooted in European medicine, as generic substitutes for the Aztec plants *yauhtli* (*Tagetes lucida* Cav., Asteraceae) and *iztauhyatl* [*Artemisia ludoviciana* subsp. *mexicana* (Willd. ex Spreng.) D.D.Keck]. Since rosemary and rue were classified as “hot” in the Galenic system, and *yauhtli* and *iztauhyatl* were considered “hot” and used against “cold” diseases by the Aztecs, the European species were logical substitutes for the Aztec ones (Ortiz de Montellano, 1990). In today’s popular medical systems in Mexico and Guatemala, *Rosmarinus officinalis* is used mainly as a postpartum remedy, e.g. in ‘baños de señoras’ (Puebla, Oaxaca, Morelos, Hidalgo, Morelos, Edo. de México; Chiquimula, Guatemala), but also to treat respiratory problems (e.g. Nuevo Leon, Michoacan, Chiapas), against ‘mal aire’ (“bad winds”) (D.F., Michoacan), and against (skin) infections (Hidalgo, Veracruz: Aguilar et al., 1994; Argueta, 1994; Kufer et al., 2005 and other sources). These core uses in Mexico and Guatemala are significantly different from the modern ethnopharmacological uses

Table 1  
Modern and historical medicinal uses of Rosemary (*Rosmarinus officinalis*) (data based on De Cleene and Lejeune, 2003; Aguilar et al., 1994; Argueta, 1994; Pardo-de-Santayana et al., 2006)

Categories of use	Mexican ethnopharmacology	Spanish ethnopharmacology	Historical ancient sources
Skeleto-muscular disorders	Against rheumatic, arthritic and traumatic muscular, joints and bone pains	Against rheumatic, traumatic, sciatic or other muscular, bones and joints pains. Usually as an anti-inflammatory and/or analgesic	To move benumbed joints, or extremities
Gastrointestinal disorders	Against colic and intestinal parasites, haemorrhoids	To stimulate appetite, to help digestion and against stomach pain and dyspepsia, ulcer, diarrhoea, jaundice and liver disorders, as a cholagogue and choleric, flatulence and bloating	To help digestion and against flatulence and bloating, against liver disorders
Skin disorders	To heal wounds, against skin infections, hair loss and dandruff	Against hair loss, emollient in boil and grains, as antiseptic, anti-infectious in wounds	To heal wounds, ulcers, gangrene, scabies and as a skin cleanser
Respiratory disorders	Against coughs, colds and catarrhs, bronchitis, and whooping cough	Against asthma, coughs, colds and catarrhs, bronchitis, pneumonia	Against coughs, colds, catarrhs, tuberculosis
Circulatory disorders	Against heart ache, varicose veins, weakness	To enhance blood circulation, and against cholesterol, as cardiogenic, antihypertensive, and blood depurative, tonic against anemia and weakness	Tonic, against weakness, sleepiness, as a blood purifier
Nervous system disorders	Against headaches, epilepsy	Sedative and relaxant, against depression and headaches	To enhance memory, to recover speech, hysterical attacks, epilepsy
Sense disorders	“Enfriamiento de ojos”		To enhance and procure a clear sight
Gynaecological disorders	For retaining placenta, as a post partum remedy, against vaginal infections, to enhance fertility and avoid abortion		To enhance menstrual flow
Other	Cultural disorders such as “dolor de aire”, “susto”, “mal de aire”, “caída de mollera”		Against pest and to expel pestilence, to freshen breath, for toothache, jaundice, diuretic

in Spain, the main region the plant originated from. Rosemary oil and alcoholic tincture, are very popular in Spain for many kinds of pain, including rheumatic and traumatic muscular pain and pain of the bones. It is also widely used for gastrointestinal and respiratory disorders and many people consider it to be a panacea (Pardo-de-Santayana et al., 2006).

Since Roman and Greek times, rosemary had a prominent devotional significance, at least from the 10th to the 15th century (i.e. before the Conquest of America by the Spaniards), whereas its role in medicine was not very prominent. As a love symbol, it was used in wedding ceremonies and in the cult of the goddess of love, called Aphrodite (Greek) or Venus (Roman). This highly relevant symbolic plant was later associated with Christian imaginary, and legends appeared linking it to the Virgin Mary. Rosemary has also been connected with death. It presumably played a role in death cults of ancient Egypt, as indicated by a twig of rosemary which was found with an Egyptian mummy. In ancient Rome, rosemary and olive branches were burned where the body was cremated. Rosemary was used as a kind of incense, and the name reported by Dioscorides, *libanotis coronaria* ('crown incense'), probably derives from this use (De Cleene and Lejeune, 2003). Today, it is still planted on graves in many countries (A. Dafni and E. Lev, pers. comm, 2005). As a medicinal plant, it was employed to cure jaundice, and its smoke was used against the plague, colds, coughs and other "cold" diseases. (De Cleene and Lejeune, 2003).

The Latin name *rosmarinus* is usually interpreted as derived from *ros* "dew" and *marinus* "belonging to the sea", although it usually grows far from the sea. It has been stated that this interpretation is a product of folk etymology, since possible candidates for the original name are Greek *rhops* "shrub" and *myron* "balm" (Katzner, 1998). Later, when the plant was 'Christianised' and associated with the Virgin Mary, the phonetic similarity between 'Mary' and '*marinus*' and its derivatives possibly reinforced this link, as indicated by local names such as the German *Mariareinigung*, 'Mary's Purification'. This certainly contributed to the popularisation of rosemary as a medicinal plant. As shown with this example, it is likely that the adaptation of the species in Mexico was at least in part based on its symbolic role in Europe, the religious connotations of its name making the alleged link with the hot–cold classification unlikely. Most importantly, it highlights that the use of *Rosmarinus officinalis* changed considerably during the process of adaptation to local Mexican needs.

The second quite different example uses linguistic arguments combined with a statistical analysis of the use of specific plant taxa in two cultures – the linguistically related Lowland Mixe and Zoque-Popoluca (Leonti et al., 2003)-in order to better understand the antiquity of medicinal plant use in the Olmec region in Mexico. The pharmacopoeias of these cultures, separated for about 2000 years, share 15 cognate names for medicinal plants, 123 medicinal plant species, and a similar usage of 62 plant species. For instance, the vernacular names for *Pinus oocarpa* Schiede ex Schltdl. (Pinaceae) in Popoluca (*tyiñcuy*) and Mixe (*tsiin*) are cognates, while the bark and the resin of the tree are used by both groups to treat dermatological conditions like wounds, pustules and infections, as well as respiratory

problems like cough. Moreover, the Popoluca as well as the Mixe use(d) the bark and leaves, respectively, in rituals/ceremonies (in case of the Popoluca specifically for rain-making).

It is a premise that statistical methods of evaluation are chosen before experiments are being designed. However, this is not possible in an anachronistic setting, hence the investigation has to be done retrospectively, and is then referred to as an "observation" instead of an "experiment". It is necessary to know the exact methods that were used to gain the set of data and which were the side-conditions or parameters that conditioned the results in order to decide whether a retrospective statistical analysis is feasible and if the data sets have to be reconstructed.

In this observation for instance it was essential to assign the use-reports which describe the two pharmacopoeias under the same criteria into 13 well-defined categories of use before allowing for the cross-cultural comparison. The statistical analysis was then chosen to test for the expected number of plant species with the same purpose i.e. category of use if the 123 species were assigned at random. This was achieved by summing up the probability (*p*) for every single of the 123 plant species of striking the same category of use in both pharmacopoeias on the base of the proportions of the use categories in each pharmacopoeia. The statistical analysis of a randomly distributed plant use predicted a value within the range of  $35 \pm 2 \times 4.5$  matches (95% confidence interval) which stood in contrast to the observed 62 species with at least one common use. This result together with the linguistic evidence is a highly significant indicator for a common cultural heritage and/or common selection criteria for plants used as a medicine. Overall this makes a transmission of such knowledge since the time of the Olmecs highly likely (Leonti et al., 2003). In sum, a linguistic-historical approach offers an interesting avenue to better understand the historical development of plant use. The potential of such a tool needs to be explored further and similar comparative analysis for other regions will hopefully provide us with a better assessment of the usefulness of this method.

The Ch'orti' of Eastern Guatemala provide a third interesting example of the relevance and potential of historical data. The US-American anthropologist Charles Wisdom, who worked in the region in the 1930s, left an unpublished MS with many tentatively identified species used in the region. Such information helps us to understand modern plant usage and shows continuity and change in the region—a rare chance for an ethnobotanist. A comparison between our own semi-quantitative data and the MS demonstrated that medicinal plant uses which were already recorded 70 years ago were also mentioned by a larger number of people, i.e. culturally more important (Kufer et al., 2005). This example also highlights the problems of multidisciplinary research projects, in particular, the hurdles to ascertain correct botanical identification (especially for information from historical sources). This is, of course, a very common problem when working with historical information not based on botanical collections. As a cultural anthropologist, Charles Wisdom did not collect voucher specimens, but used tentative plant identifications on the basis of vernacular plant names and descriptions. These identifications were provided by Paul Standlee, one of the authors of the Flora of Guatemala and a leading expert on the botany of Mesoamerica. Many of these "identifi-

cations” seem to be botanical misinterpretations which occurred mainly because of the local variability in vernacular plant names. While the culturally more important plants are more likely to be correctly identified, there are some notable exceptions such as the species most frequently mentioned by our informants for gastrointestinal complaints, *venadillo* (*Chromolaena glaberrima* (DC.) R.M. King & H. Rob, Asteraceae) which is listed in the MS without a botanical name. Even more surprisingly, chamomile, called *manzanilla* in most parts of Latin America and Spain (*Matricaria recutita* L., Asteraceae) and mentioned by our informants as an important remedy for fever and pain, obstetrical indications, and respiratory illnesses, was listed as a Malvaceae, i.e. as a member of a botanically unrelated family. In conclusion, our analysis shows some serious pitfalls of using such historical texts, which in general lack proper botanical authentication.

### 3. Conclusion

Unfortunately there exist only few examples in ethnopharmacology where the historical depth and the dynamics of plant uses can be analysed. The inherent impossibility of conducting experiments compels us as ethnobotanists/anthropologists to either compare data gathered at different moments in time or to compare data collected in different areas/cultures which may have had historical links (Heinrich et al., 1998; Pardo-de-Santayana et al., 2005).

In this article we discuss three distinct methods, which we successfully used in the retrospective exploration of diachronic data. In order to gain an insight into historical developments in the use of plant species and evolution of pharmacopoeias we used a botanico-historical approach (*Rosmarinus officinalis*), one that combines linguistic and statistical methods (Popoluca/Mixe), and one that uses historical documentary evidence (Cho’rti). We hope that this methodological discussion encourages a wider use of such historical methods in ethnopharmacology and related areas of research, since this may lead to a better understanding of the dynamics and evolution of human plant use.

### References

Aguilar, A., Camacho, J.R., Chino, S., Jáquez, P., López, M.E., 1994. Herbario Medicinal del Instituto Mexicano del Seguro Social. Instituto Mexicano del Seguro Social (IMSS), México, DF.

- Argueta, coordinador, V.A., 1994. Atlas de las plantas de la medicina tradicional Mexicana, vol. 3. Instituto Nacional Indigenista, México, DF.
- Berlin, B., 1992. Ethnobiological Classification. Principles of Categorization of Plants and Animals in Traditional Societies. Princeton University Pr, Princeton, NJ.
- Borgatti, S.P., 1992. ANTHROPAC 4.0: Methods Guide. Analytic Technologies, Columbia.
- Cotton, C.M., 1994. Ethnobotany. Wiley and Sons, Chichester.
- Cox, P.A., 1997. Nafanua: Saving the Samoan Rain Forest. W.H. Freeman.
- De Cleene, M., Lejeune, M.C., 2003. Compendium of Symbolic and Ritual plants in Europe. Man and Culture. Ghent, Belgium.
- Elisabetsky, E., Trajber, R., Chao Ming, L., 1996. Appendix: manual for plant collections. In: Balick, M., Elisabetsky, E., Laird, S.A. (Eds.), Medicinal Resources of the Tropical Forest. Columbia University Press, New York, pp. 409–420.
- Etkin, N., 1988. Ethnopharmacology: biobehavioral approaches in the anthropological study of indigenous medicines. Annual Review of Anthropology 17, 23–42.
- Etkin, N.L., Elisabetsky, E., 2005. Seeking a transdisciplinary and culturally germane science: The future of ethnopharmacology. Journal of Ethnopharmacology 100, 23–26.
- Heinrich, M., Ankli, A., Frei, B., Weimann, C., Sticher, O., 1998. Medicinal plants in Mexico: healers’ consensus and cultural importance. Social Science and Medicine 47, 1863–1875.
- Heinrich, M., Pieroni, A., Bremner, P., 2005. Medicinal Plants and Phytomedicines. In: The Cultural History of Plants. Taylor and Francis, New York, Routledge, pp. 205–238 (Consulting Editor: Ghilleen Prance, Scientific Editor: M. Nesbitt).
- Katzer, G., 1998. Gernot Katzer’s Spice Pages. Available at: <http://www.uni-graz.at/~katzer/engl/>.
- Kufer, J., Förther, H., Pöll, E., Heinrich, M., 2005. Ethnobotany of the Ch’orti’. Journal of Pharmacy and Pharmacology 57, 1127–1152.
- Laird, S.A. (Ed.), 2002. Biodiversity and Traditional Knowledge. Equitable Partnership in Practice. Earthscan Publ, London (UK) and Sterling, VA, USA.
- Leonti, M., Sticher, O., Heinrich, M., 2003. Antiquity of medicinal plant usage in two macro-mayan ethnic groups. Journal of Ethnopharmacology 88, 119–124.
- McClatchey, W., 2005. Exorcizing misleading terms from ethnobotany. Ethnobotany Research and Applications 3, 1–4.
- Ortiz de Montellano, B.R., 1990. Aztec Medicine, Health and Nutrition. Rutgers University Press, New Brunswick.
- Pardo-de-Santayana, M., Touwaide, A., Rey, M., Heinrich, M., 2006. Rosemary (*Rosmarinus officinalis* L.), symbol and remedy, a historico-ethnobotanical review. Manuscript, in preparation.
- Pardo-de-Santayana, M., Blanco, E., Morales, R., 2005. Plants known as té in Spain: an ethno-pharmaco-botanical review. Journal of Ethnopharmacology 98, 1–19.
- Posey, D.A., 2004. In: Kristina Plenderleith (Ed.), Indigenous Knowledge and Ethics. A Darrell Posey Reader Routledge, New York and London.
- Schultes, R.E., 1962. The role of the ethnobotanist in the search for new medicinal plants. Lloydia 25, 257–266.