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Introduction to the Special Issue: The Centre of the Americas – An ethnopharmacology perspective



With this special issue we want to draw attention to the numerous ethnopharmacological studies from México, Guatemala, Honduras and other Central American countries, all based in a region of great biocultural diversity. The title makes reference to the fact that there is no single term covering this region. Mesoamerica is an anthropological term which excludes, for example, the North of Mexico. The Neotropis/Neotropics extend much further to the South, and do not include most of México. The Southern regions are a part of the tropical and subtropical belt, while the North is covered in desert and semi-desert vegetation. The region has historically been the home of a large number of indigenous groups, and pre-Columbian cultures flourished, most famously, in the Central Valleys of México (Aztecs) and on the Yucatán Peninsula (Maya). Today these indigenous groups are undergoing a fast and dramatic cultural change. As in other regions of the world non-communicable diseases are increasingly a crucial public health problem (WHO, 2016) and are now commonly treated using new plant based intervention (Andrade-Cetto and Heinrich, 2005, Andrade-Cetto et al., 2006, Andrade-Cetto and Heinrich, 2011; Giovannini et al., 2016; Jacobo-Herrera et al., 2016), which thus have become a part of what is often (mis-)labelled as 'traditional medicine'. Uses of plants to treat such non-communicable diseases remains a core challenge in the sociocultural and natural sciences as well as in medicine, which is being addressed only very slowly and is often not yet seen as being relevant in the context of research and development funding.

Over the last decades a large number of studies have focused most notably on local/traditional plant uses (cf. Heinrich et al., 1998) and on the phytochemistry of selected species (see Mata, 1993, Pereda-Miranda 1995, Heinrich et al., 2014). The region played an important part in the early development of ethnopharmacology, most importantly due to research on hallucinogenic plants. From the 1960s to the 1980s the uses of mushrooms (Agaricales) like *Psilocybe* spp. and higher plants like *Turbina corymbosa* (L.) Raf., or *Salvia divinorum* Epling & Játiva in rural Mexico had a tremendous impact on the development of ethnopharmacology (Schultes and Hoffmann, 1979), but as this issue shows today has been superseded by other important topics.

Famously, in the 1930s Richard Evans Schultes (later professor at Harvard University) conducted research which led to his Ph.D. dissertation in Oaxaca, and most importantly with Mixe Indians. Modern ethnopharmacological research in the Centre of the Americas really started with Bernard Ortiz de Montellano's (1975) seminal paper 'Empirical Aztec Medicine (1975), which also offered a modern look at the important historical documents

providing insight into 16th century Aztec plant usage. Fray Bernardino de Sahagún's famous *Codex Florentino* (ca. 1570), and Francisco Hernandez's 'History of the Plants of New Spain' 1571–1576) are clearly predecessors to today's ethnopharmacological studies, and the Centre of the Americas remains one of the few regions of the world where such historical knowledge is documented in written historical documents. Numerous plants with local and traditional uses are known from the region, including many sold on herbal markets (see Bye and Linares (2015)). As Leonti (2011) poignantly argued, 'the future is written', implying that oral transmission is no longer the main form of knowledge transmission. However, this is just one aspect of the changing framework under which ethnopharmacological research in the region is developing. Overall, aside from one recent review (Heinrich et al., 2014) no comprehensive critical appraisal of the state of the art is available. With this special issue in the JEP we want to fill this gap.

Several of the papers included in the special issue review diseases and their generally plant based treatments like:

- Diabetes and its sequelae (Giovannini et al., 2016),
- Obesity (Alonso-Castro et al., 2015),
- Diseases associated with bacterial infections, i.e. the anti-bacterial effects of Mexican medicinal plants (Sharma et al. 2016).
- Colorectal cancer (Jacobo-Herrera et al., 2016), as well as for
- Anxiolytic or antidepressant effects of locally used medicinal plants (Lopez-Rubalcava and Estrada-Camarena et al., 2016).

Pérez-Ortega et al. (2016) contributed a review on *Tagetes lucida* Cav. and its tranquilizing properties from a multidisciplinary perspective. Other papers provides insights into some key research activities relating to plants from the Centre of the Americas including studies on:

- Hypoglycemic effect and phytochemical composition of *Ageratina petiolaris* (Moc. & Sessé ex DC.) R. M. King & H. Rob. (Bustos-Brito et al., 2016)
- Antinociceptive activity of the essential oil from *Artemisia ludoviciana* Nutt. (Anaya-Eugenio et al. 2016)
- Chrysoeriol and other polyphenols from *Tecoma stans* (L.) Juss. ex Kunth with lipase inhibitory activity (Ramirez et al. 2016)
- Anxiolytic activity and active principles of *Piper amalago* L., a medicinal plant used by the Q'eqchi' Maya to treat susto, a culture-bound illness (Mullaly et al., 2016)

Geck et al. (2016) compare medicinal plant knowledge among the Zoque in different regions of southern Mexico. The study not only contributes to the ethnobotanical research of the Macro-Mayan groups in Oaxaca, Veracruz and Chiapas, but also provides a fascinating comparison within the Zoque culture. Lastly, Hitziger et al. (2016) contributed another original article which presents a transdisciplinary and cooperative research project between indigenous representative and scholars from Guatemala, Switzerland and the UK and offers a large scale documentation and analysis of two indigenous groups in Guatemala.

With this special issue not only do we take stock of what is known today, but it also highlights the future needs. Clearly, *ethnopharmacology will need to incorporate the local needs* and in the Centre of the Americas as in many other regions *non-communicable diseases now stand out as such an important emerging need*. Local populations in the Americas now often use manufactured medicinal products and these are used for diseases, which were not important some decades ago. While the special issue highlights the implication of the changing patterns of diseases for ethnopharmacology, very little is known about the *quality of the materials sold throughout México*. In the context of the changing living conditions in the region and the subsequent increase in non-communicable diseases, better ways to develop collaborative links between all stakeholders need to be developed. And this needs to be embedded in fundamental phytochemical and phytopharmacological research on the region's biodiversity.

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