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Summary

The use of medicinal plants played an important role in the lives of the Ancient Maya. Also today, more than 450 years after the conquest of the New World, medicinal plants are an essential part of the medical system of the lowland Maya of Yucatan.

During 18 months of field work in three Yucatec Mayan communities (Mexico) information about medicinal plants, the concepts of disease and methods of treatment were collected. Based on the knowledge of 40 healers and midwives, 360 medicinal plants and 1828 single use reports could be documented. In a quantitative approach, the most frequent illnesses of this region were evaluated. Gastrointestinal problems (32 %) and dermatological conditions (19 %) were the most important medical problems, followed by illnesses associated with pain and/or fever (13 %), respiratory illnesses (11 %), "women's medicine" (8 %), other uses (5 %), bites and stings of venomous animals (5 %), urological problems (4 %) and eye disorders (3 %). To better understand the selection criteria for medicinal plants, 12 healers and midwives were interviewed about ten plants that in their opinion have no medicinal value. The characteristics of these non-medicinal plants were compared with those of the medicinal ones. The results showed that odor and taste are essential criteria for plant characterization. Also humoral classification plays an important role. In general, illnesses are classified as hot or cold and the medicinal plants ought to have the opposite humoral classification. Color, form and texture are also important criteria in the selection of medicinal plants.

In the second part of the study, 48 medicinal plants were evaluated in several bioassays. All plant extracts were tested for their antibacterial (gram-negative and gram-positive bacteria), cytotoxic (KB cells) and anti-inflammatory (NF-κB) activity. In addition, they were tested in further bioassays based on their indigenous uses. Plant species used against gastrointestinal problems were evaluated for antiparasitic *(Giardia duodenalis)* and additional antibacterial *(Helicobacter pylori*

and *Campylobacter jejuni)* activity. The plants of the group used for skin conditions were also tested for their anti-fungal effects *(Candida albicans)*. For the plants traditionally used against pain and fever the antimalarial activity *(Plasmodium falciparum)* was examined. Plants used in the treatment of type II diabetes were tested for α-amylase inhibitory effect and the dopamine D_2 receptor test was applied for the taxa used in the group "women's medicine". Different activities were evaluated that substantiate the traditional use of the herbal remedies.

In a third step, one plant species -*Crossopetalum gaumeri* (Celastraceae)- was investigated phytochemically. The roots of this plant were chosen due to their oral and local use against diarrhea and snake bites, and on the basis of the positive results obtained in the above mentioned bioassays. From the methanol extract one known and four new highly cytotoxic cardenolides and the known ourateacatechin were isolated. The dichloromethane extract afforded a new diterpene of the abietane type and a new pentacyclic triterpene. Three known triterpenes (pristimerin, celastrol and friedelane-3-on-29-ol) were also isolated and examined in different bioassays. Pristimerin and celastrol showed high antibacterial activity and remarkable cytotoxicity against KB cells. In some respects, the activities of the isolated compounds substantiate the indigenous uses of *C. gaumeri*. However, the plant should be used with caution due to its high cytotoxicity.