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Exostema mexicanum A. Gray, Rubiaceae, *Stachytarpheta guatemalensis* Moldenke, Verbenaceae, *Momordica foetida* Schum., Cucurbitaceae, are plants traditionally used to treat symptoms of malaria in parts of Latin America and East Africa. Several substances of a variety of classes could be isolated by phytochemical methods.

From the leaves of *E. mexicanum* a new **4-phenylcoumarin glycoside** 5-*O*-D-glucopyranosyl-4'-hydroxy-7-methoxy-4-phenylcoumarin (**2**) and two acetylated **flavonoid glycosides** kaempferol-3-*O*- α -L-rhamnopyranosyl-(1 \rightarrow 6)-[2,4-diacetyl- α -L-rhamnopyranosyl-(1 \rightarrow 2)]-(4-coumaroyl- β -D-galactopyranosyl)-7-*O*- α -L-rhamnopyranoside (**6**) and kaempferol-3-*O*- α -L-rhamnopyranosyl-(1 \rightarrow 6)-[α -L-rhamnopyranosyl-(1 \rightarrow 2)]-(4-coumaroyl- β -D-galactopyranosyl)-7-*O*- α -L-rhamnopyranoside (**7**) were additionally isolated. Three already known 4-phenylcoumarin glycosides (**1**, **3**, **4**), a 4-phenylcoumarin aglycone (**5**), scopoletin (**8**), loliolide (**9**) and salicylic acid (**10**) were obtained, which were not previously isolated from *E. mexicanum*.

Five **phenylethanoid glycosides** could be identified out of the ethyl acetate extract of the previously non examined Verbenaceae, *S. guatemalensis*. Three of these phenylethanoid glycosides, leucosceptoside A (**13**), martynoside (**14**) and jionoside D (**15**) were detected for the first time in the genus *Stachytarpheta*.

Out of the hydrophilic butanol and ethyl acetate leaf extracts of *M. foetida* (belonging to the Cucurbitaceae), phenolic compounds like **flavanon** and **flavonol** as well as **chromone glycosides** were afforded. The lipophilic dichloromethane and petrol ether extracts, respectively, contained a chromone aglycone and salicylic acid.

Another aspect of this study was the evaluation of the cytotoxicity of three plants from Uganda: *Aspilia africana* (Pers.) C. D. Adams, Asteraceae, *Momordica foetida* Schum., Cucurbitaceae, and *Vernonia amygdalina* Delile, Asteraceae, whose antiplasmodial activity had been determined in earlier studies.

In endemic areas, inhabitants rely on traditional medicines and healers as the primary source of health care. In these regions, medicinal plants are frequently used although their ingredients are not entirely known and their pharmacological effects have not been

scientifically established. Therefore extracts of these plants used in Uganda to treat malaria were examined regarding the aspect of their cytotoxicity on a bladder cancer (ECV-304) and a liver cancer (HepG2) cell line in order to determine their ethnobotanical use might be dangerous or whether their antiplasmodial activity is due to a general toxicity. For the cytotoxicity test, crude extracts from leaves and roots of *A. africana* and *V. amygdalina* and the leaves of *M. foetida* were used. The leaves' extract of *V. amygdalina* showed the highest cytotoxicity towards the ECV-304 and the HepG2 carcinoma cell lines.

The lipophilic extract of *M. foetida* displayed IC_{50} values of 7.3 $\mu\text{g/mL}$ on the chloroquine-sensitive (PoW) and of 13 $\mu\text{g/mL}$ on the chloroquine-resistant *P. falciparum* strain (Jenett-Siems Habil., 2002). Due to its good antiplasmodial activity and low toxicity it was chosen for further investigations concerning its mode of action. One possible target for antimalarial drugs is the food vacuole of *P. falciparum*.

Having infected the human erythrocyte, *Plasmodium falciparum* feeds on the degradation of hemoglobin. Especially during the trophozoite and the early schizonte stages, the parasite ingests hemoglobin of host cells by pinocytosis into a specialized organelle, the cystosome, and transports it to the acidic food vacuole (pH 4.5-5.2) for further processing. The hemoglobin inside the food vacuole is oxidized to methemoglobin at acidic pH and subsequently hydrolyzed by proteases into denaturated globin and free heme. The toxic by-product is heme or ferri-III-protoporphyrin-IX, which is detoxified by forming an insoluble polymer, hemozoin or malaria pigment. Nonpolymerised heme exits the food vacuole into the parasites cytosol where it is degraded by glutathione.

The influence on this glutathione dependent degradation was investigated methodically by using the assay of Steele and co-workers (2002). Raw extracts and pure substances of *M. foetida* and chalcone derivates, isolated from *Humulus lupulus*, L., Cannabaceae, by Hänsel et al. (1988), were examined. The flavanon glycoside eriodictyol-7-*O*- β -D-glucopyranoside (**17**) showed an activity similar to the well-known antimalarial drug chloroquine. Furthermore, xanthohumol (**I**), 2'',3''-dihydroxanthohumol (**II**) and the pyrano-derivative (**IV**) displayed more than 60 % inhibition, compared with 82 % for chloroquine. Nevertheless, these results are not totally in agreement with the antiplasmodial activity of these compounds.

Another test model was used, in which the process of hemoglobin hydrolysis by cysteine proteases inside the food vacuole was simulated. Instead of falcipains, which are originally found in *Plasmodium* parasites and whose recombinant production is difficult, elaborate and expensive, the herbal cysteine protease papain was chosen. On the basis of this test model, the chalcone derivatives from *Humulus lupulus* as well as the purchased phloretin were tested regarding their inhibiting effect on papain. In addition, five of the chalcone derivatives were tested regarding their inhibiting effects on the parasitic cysteine proteases rhodesain (from *Trypanosoma brucei rhodesiense*) and cruzain (from *Trypanosoma cruzi*) at the Sandler Center, UCSF, USA. *Trypanosoma cruzi* causes Chagas' disease, a chronic illness which is endemic in Central and South America and is associated with heart failure and damages to the intestine. *Trypanosoma brucei rhodesiense* causes sleeping sickness, rather common mainly in Sub-Saharan Africa. When affecting the central nervous system, sleeping sickness leads inevitably to death if untreated.

In the papain assay, 6'-desmethylxanthohumol (**VI**) and xanthohumol (**I**) showed the highest inhibition with 70.8 % and 69.6 %, respectively, at a concentration of 100 $\mu\text{g/mL}$. On the other hand the antiplasmodial activity of 6'-desmethylxanthohumol (**VI**) was 5 times lower than that of xanthohumol (**I**). In this context, the results of our co-operation partners from San Francisco describing the effects of the hop compounds (**I**, **II**, **V**, **VI**, **VII**) on cruzain and rhodesain are of some interest. Only 6'-desmethylxanthohumol (**VI**) was able to inhibit cruzain (89 %) as well as rhodesain (84 %) at a concentration of 1 μM , whereas the remaining derivatives showed no activity.