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# Phytochemical Screening of Costa Rican Plants: Alkaloid Analysis II.*

by

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The first part of this work (2) has stimulated a more detailed study of some of the plants whose qualitative alkaloid analysis showed the presence of that kind of principles (3), while the initial screening has continued, as here reported.

Besides plants used in folk medicine (1, 4) this time we have also paid attention to plants that because of their habitat or distribution pattern or their morphological characteristics are not precisely attractive as to be used in folk medicine.

## MATERIALS AND METHODS

We used roots, leaves, stems, and fruits of Costa Rican plants, processed and analyzed following procedures already described (2). The only modification of the original procedure consisted in the use of aqueous-ethanol 50 % as solvent instead of 95% ethanol. Herbarium vouchers of each species studied were prepared and placed in the collections of the National Museum, San José, and of the University of Costa Rica.

## RESULTS

A summary of the results obtained is detailed in Table 1.

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TABLE 1

*Qualitative alkaloid analysis*

| Species | Plant Part | H+ layer | OH— layer |
|---|---|---|---|
| Acanthaceae | | | |
| *Jacobinia tinctoria* (Herst.) Hemsl. | Leaves | — | — |
| ——— | Stem | — | — |
| *Jacobinia umbrosa* (Benth.) Blake | Leaves | — | + (Weak) |
| ——— | Stem | — | + (Weak) |
| Apocynaceae | | | |
| *Stemmadenia obovata* Schum. | Leaves | ++ | + |
| ——— | Stem | + | + (Weak) |
| Araceae | | | |
| *Dieffenbachia seguina* (L). Schott. | Leaves | — | — |
| ——— | Stem | — | — |
| Betulaceae | | | |
| *Alnus acuminata* HBK | Leaves | + | + |
| ——— | Stem | — | — |
| Bignoniaceae | | | |
| *Spathodea campanulata* Beauv. | Leaves | — | — |
| ——— | Stem | — | — |
| Caesalpiniaceae | | | |
| *Cassia bacillaris* L. | Leaves | — | + (Weak) |
| ——— | Stem | — | — |
| *Tamarindus indica* L. | Leaves | — | — |
| ——— | Stem | — | — |
| Capparidaceae | | | |
| *Capparis indica* L. | Leaves | — | — |
| ——— | Stem | — | — |
| Caprifoliaceae | | | |
| *Sambucus oreopola* Donn. Smith | Leaves | — | — |
| ——— | Stem | — | — |
| Caricaceae | | | |
| *Carica papaya* L. | Leaves | + | — |
| Combretaceae | | | |
| *Conocarpus erecta* L. | Leaves | — | — |
| ——— | Stem | — | — |
| Compositae | | | |
| *Baltimora recta* L. | Leaves | — | — |
| ——— | Stem | — | — |

| Species | Plant Part | H+ layer | OH— layer |
|---|---|---|---|
| *Eupatorium hebebotryum* (DC.) Hemsl. | Leaves | — | — |
| ——— | Stem | — | — |
| *Eupatorium pittieri* Klatt | Leaves | — | — |
| ——— | Stem | — | — |
| *Polymnia maculata* Cav. | Leaves | — | — |
| ——— | Stem | — | — |
| *Senecio multivenius* Benth. | Leaves | — | — |
| ——— | Stem | — | — |
| *Senecio oerstedianus* Benth. | Leaves | — | — |
| ——— | Stem | — | — |
| Convolvulaceae | | | |
| *Ipomoea pes-caprae* (L.) Roth. | Seed | — | — |
| Cucurbitaceae | | | |
| *Polakowskia tacaco* Pittier | Leaves | — | — |
| ——— | Stem | — | — |
| ——— | Fruit | — | — |
| Elaeagnaceae | | | |
| *Elaeagnus parvifolia* Royle | Leaves | — | — |
| ——— | Stem | — | — |
| Ericaceae | | | |
| *Gaultheria costaricensis* (Donn. Smith) Small | Leaves | — | — |
| ——— | Stem | — | — |
| *Pernettia coriacea* Klotzsch. | Leaves | — | — |
| ——— | Stem | — | — |
| *Vaccinium consanguineum* Klotzsch. | Leaves | — | — |
| ——— | Stem | — | — |
| Gesneriaceae | | | |
| *Besleria standleyi* Morton | Leaves | + | + |
| ——— | Stem | — | — |
| Gramineae | | | |
| *Chusquea subtessellata* Hitchc. | Leaves | — | — |
| ——— | Stem | — | — |
| Guttiferae | | | |
| *Clusia alata* Pl. & Tr. | Leaves | — | — |
| ——— | Stem | — | — |
| *Hypericum silenoides* Juss. | Leaves | — | — |
| ——— | Stem | — | — |
| *Vismia guianensis* (Aubl.) Pers. | Leaves | — | — |
| ——— | Root | — | — |
| ——— | Stem | — | — |
| Loranthaceae | | | |
| *Gaiadendron poasense* Donn. Smith | Leaves | — | — |
| ——— | Stem | — | — |

| Species | Plant Part | H+ layer | OH— layer |
|---|---|---|---|
| Malvaceae | | | |
| *Wercklea insignis* Pitt. & Standl. | Leaves | — | — |
| ——— | Stem | — | — |
| Melastomaceae | | | |
| *Monochaetium vulcanicum* Cogn. | Leaves | — | — |
| ——— | Stem | — | — |
| *Conostegia xalapensis* (Bonpl.) D. Donn. | Leaves | — | — |
| ——— | Stem | — | — |
| Mimosaceae | | | |
| *Calliandra confusa* Sprague & Riley | Leaves | — | — |
| ——— | Stem | — | — |
| Moraceae | | | |
| *Cecropia mexicana* Hemsl | Leaves | — | — |
| ——— | Stem | — | — |
| Myrsinaceae | | | |
| *Ardisia pleurobotrya* Donn. Smith | Leaves | — | — |
| ——— | Stem | — | — |
| Myrtaceae | | | |
| *Myrtus oerstedii* (Berg.) Hemsl. | Leaves | — | — |
| ——— | Stem | — | — |
| Papaveraceae | | | |
| *Bocconia frutescens* L. | Fruit | +++ | + |
| ——— | Leaves | +++ | — |
| ——— | Stem | +++ | — |
| Papilionaceae | | | |
| *Gliricidia sepium* (Jacq.) Steud. | Leaves | — | — |
| ——— | Stem | — | — |
| ——— | Root | — | — |
| *Ulex europaeus* L. | Leaves | + (Weak) | — |
| ——— | Stem | — | — |
| Piperaceae | | | |
| *Piper neurostachyum* C.DC. | Leaves | — | — |
| ——— | Stem | — | — |
| *Piper pseudo-lanceaefolium* Trelease | Leaves | — | — |
| ——— | Stem | — | — |
| Polygalaceae | | | |
| *Monnina costaricensis* Chodat | Leaves | — | — |
| ——— | Stem | — | — |
| Polygonaceae | | | |
| *Polygonum punctatum* Ell. | Leaves | — | — |
| ——— | Stem | — | — |

| Species | Pant Part | H+ layer | OH— layer |
|---|---|---|---|
| Proteaceae | | | |
| *Grevillea robusta* Cunningham | Leaves | — | — |
| ——— | Stem | — | — |
| Rubiaceae | | | |
| *Calycophyllum candidissimum* (Vahl.) DC. | Leaves | — | + (Weak) |
| ——— | Stem | — | + (Weak) |
| Salicaceae | | | |
| *Salix chilensis* Molina | Leaves | — | — |
| ——— | Stem | — | — |
| Sapindaceae | | | |
| *Melicocca bijuga* L. | Leaves | — | — |
| ——— | Stem | — | — |
| Solanaceae | | | |
| *Solanum dotanum* Standl. | Leaves | ++ | — |
| ——— | Stem | ++ | — |
| *Solanum ochraceo-ferrugineum* (Dunal) Fernald | Leaves | — | — |
| ——— | Root | — | — |
| ——— | Stem | — | — |
| *Solanum parcebarbatum* Bitter | Leaves | + | + |
| ——— | Stem | — | — |
| Sterculiaceae | | | |
| *Melochia pyramidata* L. | Pericarp | — | — |
| Symplocaceae | | | |
| *Symplocos brenesii* Standl. | Leaves | — | — |
| ——— | Stem | — | — |
| Tiliaceae | | | |
| *Corchorus orinocensis* H.B.K. | Leaves | — | — |
| ——— | Stem | — | — |
| Umbelliferae | | | |
| *Myrrhidendron Donnell-Smithii* C. & R. | Leaves | — | — |
| ——— | Stem | — | — |
| Verbenaceae | | | |
| *Citharexylum Donnell-Smithii* Greenm. | Leaves | | — |
| ——— | Stem | — | — |
| Winteraceae | | | |
| *Drimys granadensis* | Leaves | — | — |
| ——— | Stem | — | — |

## DISCUSSION

From the comparison of the above results with those published by the U.S.D.A. (5) and with later reports it appears that the qualitative alkaloid analysis of the following plants is reported for the first time: *Alnus acuminata* HBK, leaves; *Besleria standleyi* Morton, leaves; *Stemmadenia obovata* Schum, leaves and stem; *Solanum dotanum* Standl., leaves and stem; *Jacobinia umbrosa* (Benth.) Blake, leaves and stem; *Calycophyllum candidissimum* (Vahl.) DC., leaves and stem; and also, that the leaves of *Bocconia frutescens* L. are reported for the first time as containing alkaloids.

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## SUMMARY

A total of 57 species of Costa Rican plants were tested for their alkaloid content in both acid and alkaline layers; 8 of the plants mentioned in the list are here reported for the first time as containing alkaloids.

## RESUMEN

Se analizaron por alcaloides tanto en la capa ácida (bases terciarias) como en la alcalina (bases cuaternarias) un total de 57 plantas de Costa Rica. Se reporta por primera vez el análisis cualitativo positivo de alcaloides de 8 de las especies mencionadas en este trabajo.

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