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Research

Comparison of plants used for skin and stomach problems in Trinidad and Tobago with Asian ethnomedicine

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Abstract

This paper provides a preliminary evaluation of fifty-eight ethnomedicinal plants used in Trinidad and Tobago for skin problems, stomach problems, pain and internal parasites for safety and possible efficacy. Thirty respondents, ten of whom were male were interviewed from September 1996 to September 2000 on medicinal plant use for health problems. The respondents were obtained by snowball sampling, and were found in thirteen different sites, 12 in Trinidad and one in Tobago. The uses are compared to those current in Asia. Bambusa vulgaris, Bidens alba, Jatropha curcas, Neurolaena lobata, Peperomia rotundifolia and Phyllanthus urinaria are possibly efficacious for stomach problems, pain and internal parasites. Further scientific study of these plants is warranted.

Background

Trinidad and Tobago is one country consisting of two adjacent islands located just northeast of the Venezuelan coast with a combined area of 5070 km² [1]. The human population of 1.25 million is multi-ethnic, multi-religious and multicultural and increases at 1% annually. In Trinidad, the major population centres are concentrated along the west coast and along an east-west transportation corridor in the north of the island [1].

The multi-ethnic population of Trinidad and Tobago is reflected in its folk medicinal use. Previous research has indicated that the folk medicines used by hunters are derived from ancient Amerindian practices [2]. This paper will continue to explore the cultural origins of Caribbean folk medicine by investigating the contribution of the Chinese to Caribbean folk medicine. Chinese medicine has been described as a complex and holistic system of medical practice with its own philosophy, diagnosis, treatment systems and pharmacology which also includes acupuncture, moxibustion and Qi Gong. However in this paper I will focus on ‘Ben Cao’ (Herbalism) [3].

The Chinese were the first Asian immigrants, arriving before the original East Indians who arrived in 1845. Chinese Tartars (192 men and one woman) were brought to Trinidad in the fall of 1806. These men from Macao, Penang and Canton were brought to cultivate tea but most were dissatisfied with local conditions and returned on the same ship [4,5]. The twenty-three who stayed made a living as entrepreneurs (butchers, shopkeepers, carpenters and market gardeners) and creolised (integrated into the local population).

Prominent sugarcane planters believed that the emancipation of Caribbean slaves in 1838 would create a labour shortage. In the 1840s, the British “opened” a labor market of displaced or impoverished peasantry in southern China to fill this shortage and 2,500 mainly-male Chinese were brought legitimately to Trinidad as indentured work-
ers, or were 'shanghaied' (abducted by European traders) [6]. After the first Opium War (1840–42), and second Opium War, the British (as well as French and Americans) occupied twelve major ports (and colonized Hong Kong) [6]. China's defeats in the Opium Wars led to the deregulation of Chinese immigration. This combined with the unrest, rebellion, and war in China, facilitated the organized labour traffic of one million southern Chinese to the West from 1840 to 1875 [6].

Three vessels brought 1,100 Chinese indentured labourers to Trinidad in 1853 and 600 more came in 1865 and 1866. In 1862, 467 immigrants came from Hong Kong. Most of the immigrants arriving between 1853 and 1866 came from the southern Guangdong province (Macao, Hong Kong and Canton). In the last 5 trips, a total of 2837 emigrants came from Macao, Amoy, Canton and Hong Kong. Chinese migration after 1911 was driven by the Chinese revolution. Punti traders described Hakka prisoners as pigs on the bills of lading and shipped them to the Caribbean and South America [4,5]. Between 1920s and 1940s new immigrants consisted of the families and friends of earlier migrants. They came as merchants, peddlers, traders and shopkeepers, not indentured labour [4]. Almost 9,000 more Chinese immigrants came voluntarily from British Guyana to Trinidad over the next century, after having served their indentureship [5]. Chinese people now constitute approximately 1% of the Trinidad and Tobago population as an ethnic group but are also present in the large mixed-raced population of 18 – 25%.

There is one publication that describes the use of medicinal plants by the Chinese community in Trinidad [7]; it contained no plants in common with those in this research [1]. Nevertheless in the discussion section of this paper, comparisons will be made of the uses of the plants in Trinidad and Tobago and those current in Asia and South-east Asia. The ethnomedicinal literature available from Asia will be used in the non-experimental validation.

Fifty-eight plants used in ethnomedicine in Trinidad and Tobago for skin problems, stomach problems, pain and internal parasites are described in this paper and a non-experimental validation of them is presented. The recent publication of high-quality studies and clinical trials on the ethnomedicinal plants in this paper has enhanced the non-experimental validation of the plants presented in the discussion section.

Methods
Study design
This study adhered to the research guidelines and ethical protocols of Wageningen University in the Netherlands. Thirty respondents, ten of whom were male were interviewed from September 1996 to September 2000. The respondents were obtained by snowball sampling, and were found in thirteen different sites, 12 in Trinidad and one in Tobago. Snowball sampling was used because there was no other means of identifying respondents. The chief objective of the sampling method was to identify knowledgeable respondents.

Twenty respondents were interviewed once, the other ten (who were healers) were interviewed three or four times. Healers were also asked to reconstruct the circumstances and contexts of the plant uses so that the means of administration of the plants could be identified. No interview schedule of questions was used but a more qualitative, conversational technique. Plants were collected when available to verify that the common names used by each respondent were the same in each ethnic group as those recorded in the literature. The majority of the plants were identified at the Herbarium of the University of the West Indies but voucher samples were not deposited. This ethnomedicinal study was part of a larger research project on ethnoveterinary medicine; other data collecting techniques were used in the larger study [1].

Non-experimental validation
The ethnomedicinal plants used in Trinidad and Tobago for skin problems, stomach problems, pain and internal parasites are presented in Tables 1 and 2.

The plant-based remedies were evaluated for safety and efficacy with a non-experimental method. Published sources such as journal articles and books and databases on pharmacology and ethnomedicine available on the Internet were searched to identify the plants' chemical compounds and clinically tested physiological effects. This data was incorporated with data on the reported folk uses, and their preparation and administration in Latin America, the Caribbean, Asia and Africa. For each species or genus the ethnomedicinal uses in other countries are given if available; then follows a summary of chemical constituents, in addition to active compounds if relevant (Tables 3 and 4). This type of ethnopharmacological review and evaluation has been previously published [2]. The plant uses in China are then given (Table 5) and a comparison of the uses in Trinidad and China is made in the discussion.

Results
The ethnomedicinal plants used in Trinidad and Tobago for skin problems, stomach problems, pain and internal parasites are presented in Tables 1 and 2.

Plants used for skin problems
Twelve plants are used for skin problems including one for the rash caused by measles plus one for shingles. The
The majority of the plants were being used for children including babies. The thirteen plants belong to nine plant families. Eight plants are used to bathe babies. **Acnistus arborescens** Croton gossypifolius and **Manihot esculenta** are used to bathe babies for eczema. **Bidens alba/Bidens pilosa** and **Origanum vulgare** are used to bathe babies and older children. **Eclipta prostrata** is combined with a non-plant material and used to bathe children for malnutrition. **Solanum americanum** is also used to bathe children for malnutrition. **Azadirachta indica** and **Chamaesyce hirta/hypericifolia** are used for measles. **Sida carpinifolia** (syn. **Sida acuta**) and **Spondias mombin** are used for eczema. **Achyrantas indica**, **Cassia alata** and **Chamaesyce hirta/hypericifolia** are used for skin rashes and other skin problems.

### Plants used for stomach problems, pain, internal parasites

The medicinal plants used for stomach problems, injuries, endoparasites, arthritis and bites are combined in Table 2. This grouping partially reflects the analgesic activity of many of the plants used. Eighteen plants are used for stomach problems including diarrhoea. Another fifteen plants are used for various kinds of pain including cuts, bites, sprains and arthritis. Four plants are used as anthelmintics. Other plants in the table are used for dropsy. Twenty-seven plant families are represented in Table 2.

The following plants are used as carminatives: **Cecropia peltata**, **Aframomum melegueta**, **Ferula asafoetida** and **Tournefortia hirsutissima**.

The following plants are used for stomach problems: **Ambrosia cumanensis**, **Aristolochia rugosa/trilobata**, **Capraria biflora**, **Dorstenia contrajerva**, **Cajanus cajan**, **Momordica charantia**, **Punica granatum**, **Brownea latifolia** and **Cocos nucifera**.

Diarrhoea is treated with the following plants: **Chamaesyce hirta**, **Eleusine indica**, **Peperomia rotundifolia**, **Phyllanthus urinaria** and **Scoparia dulcis**.

The plants used as anthelmintics are **Citharexylum spinosum**, **Cucurbita maxima**, **Portulaca oleracea**, **Tagetes patula** and **Eupatorium triplinerve**.

Plants used specifically for pain are: **Brownea latifolia**, **Abelmoschus moschatus**, **Eupatorium macrophyllum**, **Morinda citrifolia** and **Cola nitida**.

Arthritis is treated with the following plants: **Nicotiana tabacum**, **Petiveria alliacea**, **Rosmarinus officinalis** and **Neurolaxana lobata**.

Plants used for cuts, injuries and swellings are: **Solanum melongena**, **Jatropha curcas/gossypifolia**, **Bidens alba/Bidens pilosa**, **Cucurbita pepo**, **Tournefortia hirsutissima**, **Bambusa vulgaris**, **Bixa orellana** and **Cocos nucifera**.

Scorpion and snake bites are treated with **Tamarindus indica**, **Nopalea cochinellifer**, **Centropogon cornutus** and **Rosmarinus officinalis**.

### Table 1: Ethnomedicinal plants used for skin problems in Trinidad and Tobago

| Scientific name     | Family               | Common name         | Plant part used | Use                                      |
|---------------------|----------------------|---------------------|-----------------|------------------------------------------|
| 1 Achyranthes indica | Amaranthaceae        | Man better man      |                 | Skin problems                            |
| 2 Acnistus arborescens | Solanaceae          | Wild tobacco        | Leaves          | Bathe babies for eczema                  |
| 3 Azadirachta indica | Meliaceae            | Neem                | Leaves          | Measles                                  |
| 4 Bidens alba/Bidens pilosa | Asteraceae | Needle grass/Railway daisy | Leafy branch | Bathe children                           |
| 5 Cassia alata       | Fabaceae- Caesalpiniaceae | Senna            | Leaves          | Skin problems                            |
| 6 Chamaesyce hirta/hypericifolia | Euphorbiaceae | Malomay            | Flower          | Skin rashes, measles                     |
| 7 Croton gossypifolius | Euphorbiaceae       | Blood bush/Bois sang | Leaves         | Bathe babies for eczema                  |
| 8 Eclipta prostrata  | Asteraceae           | Congolala           |                 | Bathe for children's malnutrition        |
| 9 Manihot esculenta  | Euphorbiaceae        | Cassava             | Leaves          | Bathe babies for eczema                  |
| 10 Origanum vulgare  | Lamiaceae            | Majoram             |                 | Bathe babies                            |
| 11 Sida carpinifolia (syn. Sida acuta) | Malvaceae | Garaba broom       | Leaf            | Eczema                                   |
| 12 Solanum americanum | Solanaceae          | Agouma, gouma       | Plant           | Bathe for children's malnutrition        |
| 13 Spondias mombin   | Anacardiaceae        | Hogplum             | Leaves          | Eczema                                   |

The following plants are used as anthelmintics: **Citharexylum spinosum**, **Cucurbita maxima**, **Portulaca oleracea**, **Tagetes patula** and **Eupatorium triplinerve**.
Table 2: Plants used for stomach problems, pain and internal parasites in Trinidad and Tobago

| Scientific name          | Family               | Common name     | Part used               | Use                                                      |
|--------------------------|----------------------|-----------------|-------------------------|----------------------------------------------------------|
| 1. Abelmoschus moschatus | Malvaceae            | Gumbo musque    | Seeds                   | Grind in rum for foot cramp                             |
| 2. Aframomum melegueta   | Zingiberaceae        | Guinea pepper   | Seeds                   | Carminative                                             |
| 3. Ambrosia cumanenesis  | Asteraceae           | Altamis         | Bark                    | Stomach pain, 2*3 inch piece bark in urine for 3 days use to wash foot for 3 days for arthritis |
| 4. Aristolochia rugosa,trilobata | Aristolochiaceae | Mat root, anico | Root                    | Stomach pain, colic, poisoning                          |
| 5. Bambusa vulgaris      | Poaceae              | Bamboo          | Leaves                  | Poultice                                                |
| 6. Bidens alba/Bidens pilosa | Asteraceae           | Needle grass    | Leafy branch            | Cuts                                                    |
| 7. Bixa orellana        | Bixaceae             | Roucou          | Root                    | Dropsy                                                  |
| 8. Brownia latifolia    | Fabaceae             | Cooper hoop     | Flower, leaves          | Gripe, pain                                             |
| 9. Cajanus cajan         | Fabaceae             | Pigeon pea      | Leaves                  | Food poisoning, colic, constipation                     |
| 10. Capraria biflora    | Scrophulariaeae      | Du thé pays     | Leaves                  | Flavour for purgative                                   |
| 11. Cecropia peltata    | Cecropiaceae         | Bois canôt      | Stem                    | 3 'Ridges' from inside stem boiled as a carminative     |
| 12. Centropogon cornutus | Campanulaceae        | Deer meat, crepe coq | Leaves                 | Snake, scorpion bite                                    |
| 13. Chamaesyce hirta     | Euphorbiaceae        | Malomay         | Leaf                    | Diarrhoea                                               |
| 14. Catharexylum spinosum | Verbenaceae         | Bois côtelette  | Leaf                    | Anthelmintic                                            |
| 15. Cocos nucifera      | Areaceae             | Coconut         | Root- 7 inches, Shell   | Dropsy, Hernia                                          |
| 16. Cola nitida         | Sterculiaceae        | Obie seed       | Seed                    | Any kind of pain                                        |
| 17. Cucurbita maxima     | Cucurbitaceae        | Pumpkin         | Seeds                   | Anthelmintic                                            |
| 18. Cucurbita pepo       | Cucurbitaceae        | Pumpkin         | Seed                    | Anthelmintic                                            |
| 19. Dorstenia contrajerva | Moraceae             | Refriyau        | Leaf                    | Food poisoning                                          |
| 20. Eleusine indica     | Poaceae              | Pied poule      | Leaf                    | Diarrhoea                                               |
| 21. Eupatorium macrophylum | Asteraceae         | Z'herbe chatte  | Leaf                    | Pain                                                    |
| 22. Eupatorium triplinerve | Asteraceae         | Ayapana, japonne | Leaves                  | Stomach problems (worms)                               |
| 23. Ferula asafoetida   | Apiaceae             | Asafoetida      | Leaf                    | Carminative                                             |
| 24. Jatropha curcas/gossypifolia | Euphorbiaceae   | White/Red Physic Nut | Leaf                   | Clean sores                                             |
| 25. Momordica charantia | Cucurbitaceae        | Caraaill        | Vine                    | Stomach problems                                        |
| 26. Morinda citrifolia  | Rubiaceae            | Noni            | Leaves                  | Pains                                                   |
| 27. Neurolema labata    | Asteraceae           | Z'herbe á pique | Leaves                  | Tincture for arthritic                                  |
| 28. Nicotiana tabacum   | Solanaceae           | Tobacco         | Leaves                  | Arthritis                                               |
| 29. Nopalea cochinellifera | Cactaceae          | Rachette        | Joint                   | Snake bites                                             |
| 30. Peperomia rotundifolia | Piperaceae          | Mowon           | Plant                   | Diarrhoea                                               |
| 31. Petiveria alliacea  | Phytolaccaceae       | Mapourite       | Plant                   | Arthritis and rheumatism                               |
| 32. Phyllanthus urinaria | Euphorbiaceae        | Red seed under leaf | Plant                  | Diarrhoea                                               |
| 33. Portulaca oleracea  | Portulaceae          | Pussley         | Plant                   | Anthelmintic                                            |
| 34. Punica granatum     | Punicaceae           | Pome-granate    | Seeds                   | Stomach problems                                        |
| 35. Rosmarinus officinalis | Lamiaceae        | Rosemary        | Leaf                    | Arthritis, Snake bites                                  |
| 36. Scoparia dulcis     | Scrophulariaeae      | Sweet broom     | Root                    | Diarrhoea                                               |
| 37. Solanum melongena   | Solanaceae           | Melongene       | Fruit                   | Breaks                                                  |
| 38. Togetes patula      | Asteraceae           | Marigold        | Plant                   | Anthelmintic                                            |
| 39. Tamarindus indica   | Fabaceae             | Tamarind        | Plant                   | Scorpion bite                                           |
| 40. Tournefortia hirsutissima | Boraginaceae    | Chigger bush    | Leaves                  | Tea, carminative, chiggers                             |
Table 3: Non-experimental validation of plants used for skin problems in Trinidad and Tobago

| Scientific name | Validation | Reference |
|-----------------|------------|-----------|
| Achyranthes aspera | Achyranthes bidentata is a commonly used Chinese medicinal plant and is used in Nepal and in Mauritius and Rodrigues for skin diseases. Achyranthes bidentata polysaccharide can inhibit non-enzyme glycation in D-galactose induced mouse aging model in vivo. Achyranthes aspera leaf extract and the non-alkaloid fraction containing mainly non-polar compounds have chemo-preventive activity. | 8–10 |
| Azadirachta indica | A paste made of Azadirachta indica and Curcuma longa used to treat 814 people with scabies cured 97% of them within three to five days of treatment. Azadirachta indica (leaves, bark, fruit, flowers, oil, and gum) have the following properties: antimicrobial effects, in vitro antiviral activity, and antibacterial activity. Some active principles of Azadirachta indica are azadirachtin, salannin nimbin, and 6-desacyclinimb. Clinical symptoms associated with toxocariasis in 1009 Trinidadian schoolchildren (aged 5–12 years) included eczema. | 11–14 |
| Bidens pilosa | Bidens pilosa is a commonly used traditional Chinese medicine. Bidens pilosa contains ethyl caffeate, a natural phenolic compound. Extracts of dried aerial parts of Bidens pilosa showed some antimicrobial activity as do components of the extract such as phenylheptatriyne, linolic acid and linolenic acid. The triterpenes as well as several flavonoids (aurones, chlorones) are antiinflammatory agents. The chloroform fractions from the roots of Bidens aurea are anti-parasitidal in vivo. The constituents of Bidens pilosa explain the use of this plant in traditional medicine in the treatment of wounds, against inflammations and against bacterial infections of the gastrointestinal tract. | 15–17 |
| Cassia alata | "Jue ming zi" (Cassia tora L. and Cassia occidentalis L.) has traditionally been used to improve visual acuity and to remove "heat" from the liver in Chinese medicine. Modern physicians use "Jue ming zi" to treat hypercholesterolemia and hypertension. "Jue ming zi" contains chrysophanol, emodin, and rhein. Roasted "Jue ming zi" is given as a health drink tea. The antioxidant activity of the methanolic extracts of "Jue ming zi" (Cassia tora L. and Cassia occidentalis L.) was established. Cassia alata is used for skin problems in the Caribbean, India, in traditional East Asian medicine and in the Ivory Coast (West Africa) to treat bacterial infections caused by Escherichia coli, and fungal infections caused by Candida albicans and dermatophytes. Cassia alata L. possesses anti-inflammatory, analgesic, laxative and antiplatelet aggregating activity and it contains kaempferol-3-O-gentisobioside. Cassia alata has antifungal activity that may be attributed to chrysophanol. When Cassia alata extracts were evaluated relative to a standard antibacterial agent chloramphenicol and antifungal agent amphotericin B the extracts had therapeutic potential for the treatment of opportunistic infections of AIDS patients. A 10-year human study indicated that a Cassia alata leaf extract can be reliably used as a folk medicine to treat Pityriasis versicolor. The leaf extract contains anthraquinones, flavonoids, quinones and sterols and had no side-effects. | 18–21 |
| Chamaesyce hirta | Chamaesyce hirta is used in West Bengal for ringworm. Antibacterial effects of Chamaesyce hirta leaves were found by several investigators. An aqueous extract of Chamaesyce hirta strongly reduced the release of prostaglandins I2, E2, and D2. Additionally Chamaesyce hirta extracts exerted an inhibitory effect on platelet aggregation and depressed the formation of carrageenin-induced rat paw oedema. | 22 |
| Croton gossypifolius | Croton species are used in Thailand to treat dysmenorrhoea, gastric ulcers, gastric cancers, and dysentery. Croton kongensis Gagnep., is known in Thailand as "Plao Ngeon" or "Plao Noi". A crude CH2Cl2 extract of Croton kongensis showed antimalarial and antimiycobacterial activities. Croton sylvaticus showed 5-lipoxygenase inhibitory activity with IC(50) values <61 ppm. A review of papers published in 2003, found that in vitro and in vivo studies supported the use of Croton lechleri Mull. Arg. for wounds, tumors, herpes infection, the itching, pain and swelling of insect bites and other conditions. | 23–26 |
| Eclipta prostrata | Eclipta prostrata is commonly used as self medication by AIDS patients in southern Thailand and showed potential as a therapeutic agent against Giardia intestinalis infections. The hydroalcoholic extract of Eclipta prostrata plant showed antinociceptive, immunomodulatory and antiinflammatory effects. | 27 |
| Origanum vulgare | Origanum volatile oil has potential efficacy against the infection of dysentery bacteria (Shigella sonne (Sh. sonnei) and Shigella flexneri). The carvacrol constituent has the most effective antimicrobial activity in Origanum vulgare. Diarrheic children in Trinidad were positive for Shigella (33 or 14.0%), 4 for Salmonella, and 1 for Enteropathogenic E. coli. Two fecal samples were positive for Campylobacter jejuni, and I was positive for hookworm ova. | 28–30 |
| Sida acuta | Sida acuta contains ecldosterone, ephedrine, hentriacontane, hypolaetin-8-glucoside, beta sitosterol, stigmasterol and campesterol. These chemicals can be responsible for the plant's reported narcotic analgesic, anti-inflammatory and analgesic activity. | 31 |
| Solanum americanum | Solanum americanum extracts were active against Microsporum gypseum and Cryptococcus neoformans and showed intra-peritoneal subacute toxicity in mice. Alpha-solamargine isolated from the fresh fruits of Solanum americanum is a glycoalkaloid with biological activity against Herpes simplex I, Herpes zoster and genital Herpes and Trypanosoma cruzi. Solanum melongena contains an anthocyanin, delphinidin, which inhibits the collagenolytic ability of matrix metalloproteinases. | 32, 33 |
Table 4: Non-experimental validation of plants used for stomach problems, pain and internal parasites in Trinidad and Tobago

| Scientific name                  | Validation                                                                 | #   |
|----------------------------------|---------------------------------------------------------------------------|-----|
| Aframomum melegueta              | A decoction of the leaves of Aframomum melegueta is used for rheumatism    | 34–36|
|                                  | and as an anti-emetic and a decoction of the fruits for dysenteric         |     |
|                                  | conditions. The methanol extracts of the seeds were significantly active   |     |
|                                  | against Gram (+) and Gram (-) bacteria (S. aureus, B. subtilis, E. coli, |     |
|                                  | P. aeruginosa) and fungi (C. albicans, A. Niger). Aframomum melegueta       |     |
|                                  | has antimicrobial properties against E. coli and Bacillus cereus. The     |     |
|                                  | antioxidant extracts of Aframomum melegueta was attributed to its phenolic |     |
|                                  | components. Scabies and acute poststreptococcal glomerulonephritis (the   |     |
|                                  | latter can be caused by several bacterial and viral infections) are        |     |
|                                  | frequently associated with S. aureus in Trinidad.                         |     |
| Ambrosia cumanensis              | The ambrosanolide-type sesquiterpene lactone cumanin (from Ambrosia       | 37  |
|                                  | polistochya) showed a potent inhibitory effect in NO production (IC₅₀ = |     |
|                                  | 9.38 ± 0.38 μM) with low cytotoxicity.                                    |     |
| Aristolochia species             | The Chinese herb "Mu Tong" has included Aristolochia manshurienis only    | 38, 39|
|                                  | since the 1950s. The classical Chinese herbal literature until the mid    |     |
|                                  | 17th century identifies "Mu Tong" as several Akebia species. From the     |     |
|                                  | 17th until the early 20th century "Mu Tong" was based on Clematis species. |     |
|                                  | Renal failure due to ingestion of large doses of Aristolochia            |     |
|                                  | manshurienis has been reported in China and other countries while no     |     |
|                                  | activity was recorded in traditional Chinese herbal texts. Aristolochial  |     |
|                                  | topical anti-inflammatory activity has been recently described.          |     |
|                                  | Aristolochic acids, isolated from Aristolochia longa inhibited Coccidioides |     |
|                                  | col, Pseudomonas aeruginosa, Streptococcus faecalis, Staphylococcus       |     |
|                                  | aureus and Staphylococcus epidermis. The chloroform and hexane extracts   |     |
|                                  | of Aristolochia trilobata leaves and bark were active against              |     |
|                                  | Coccidioides col and Pseudomonas aeruginosa and Staphylococcus aureus.    |     |
| Bambusa vulgaris                 | The antiinflammatory effect of the methanol extract of Bambusa arundinacea| 40  |
|                                  | was significant when compared to standard drugs validating its use in      |     |
|                                  | Ayurvedic medicine. The methanol extract of Bambusa arundinacea also     |     |
|                                  | showed antihypersensitivity activity, immunosuppressive activity,        |     |
|                                  | experimentally.                                                          |     |
| Bidens pilosa                    | The "Shida Chan" which was originally recorded in "Ben Cao Gang Mu Shi Yi" | 41–43|
|                                  | (A Supplement to the Compendium of Materia Medica) is "Longyao" (Agrimonia |     |
|                                  | pilosa). Bioactive polyacetylenes were found in the methanolic extract of  |     |
|                                  | Bidens pilosa (whole plant). The antiinflammatory effect of               |     |
|                                  | aqueous extracts of the three plants Bidens pilosa var. minor (Blume)    |     |
|                                  | Sherriff, Bidens pilosa and Bidens chilensis DC was significant. The     |     |
|                                  | immuno-suppressive activity of Bidens pilosa is attributed to the        |     |
|                                  | polyacetylene isolated from leaves. The water extract of Bidens pilosa    |     |
|                                  | showed a higher activity against Bacillus cereus and Coccidioides col     |     |
|                                  | than gentamycin sulphate. In one study diarrheic children in Trinidad    |     |
|                                  | were found to be positive for enteropathogenic E. coli.                   |     |
| Bixa orellana                    | Bixa orellana exhibited antimicrobial activity with a low MIC against    | 43  |
|                                  | Escherichia coli (0.8 microg/ml) compared to gentamycin sulfate (0.9     |     |
|                                  | 8 g/ml). Bixa orellana exhibited a better MIC against Bacillus cereus     |     |
|                                  | (0.2 microg/ml) than gentamycin sulphate (0.5 microg/ml).                 |     |
| Cajanus cajan                    | Extracts of roots and leaves of Cajanus cajan yielded 8 compounds:       | 44–46|
|                                  | betulonic acid, biochanin A, cajanol, genistein and 2'-hydroxygenistein,  |     |
|                                  | longistyl A and C, and pinostrinol. The stilbenes, longistyl A and C,    |     |
|                                  | and pinostrinol have anti-inflammatory activity against chloroform-induced|     |
|                                  | hepatotoxicity and may act by an anti-oxidative defence mechanism.        |     |
| Capraria biflora                 | The dried leaves of Copararia biflora (aqueous extract (50–200 mg kgl-1) | 47  |
|                                  | produced a moderate analgesic effect.                                     |     |
| Cecropia peltata                 | Cecropia pachystigma has antioxidant properties. The two flavonoids     | 48, 49|
|                                  | orientin and iso-orientin, isolated from the active butanolic fraction    |     |
|                                  | could be responsible for the observed antiinflammatory-like effect of C. |     |
|                                  | glazioui. Antiinflammatory activity against E. col.                      |     |
| Centropogon cornutus             | Centropogon cornutus has a synonym Lobelia cornuta. Three new piperidine  | 50  |
|                                  | alkaloids were isolated from stems, leaves and flowers of Lobelia        |     |
|                                  | laxiflora. The residues obtained from the ethanol extracts from stems,    |     |
|                                  | leaves, and flowers showed anti-inflammatory protential.                  |     |
| Chamaesyce hirta syn.            | Euphorbia hirta aqueous extract is used for dysentery, colic, bronchial   | 51–53|
|                                  | infections and to treat ulcers. The plant contains eucocyanidol,       |     |
|                                  | querctol, camphol, quercterin,                                          |     |
|                                  | ethanolic extracts of the aerial parts of the plant showed             |     |
|                                  | antimicrobial activity against Escherichia coli                         |     |
| Citharexylum spinosum            | Six new iridoid glucosides and one known iridoid glucoside were isolated | 54–56|
|                                  | from the fruits and other parts of Citharexylum caudatum. The aerial     |     |
|                                  | parts of Citharexylum spinosum L. contain five iridoid glucosides,       |     |
|                                  | and one known ligan glucoside. When formulated in jojoba oil and applied  |     |
|                                  | to mice tails followed by infection with Schistosoma mansoni cercariae,  |     |
|                                  | the iridoid mixture from leaves of Citharexylum quadrangular blocked    |     |
|                                  | cercarial penetration and caused significant reduction (94%; P < 0.05) in |     |
|                                  | worm burden in treated mice in comparison to controls.                   |     |
| Cucurbita species                | The minimum inhibitory concentration (MIC) of 23 gr. of pumpkin seed    | 57, 58|
|                                  | (+/- 73 seeds) (Cucurbita maxima) in 100 ml distilled water as an         |     |
|                                  | antiparasitic agent using canine tapeworms with an intestinal isolation   |     |
|                                  | of 5 to 6 hours was determined. Alterations in helminthic motility were  |     |
|                                  | found at a dose of > 23 gr. There is a protheolithic effect with an      |     |
|                                  | average survival time of 38.4 minutes. The anthelmintic effect is        |     |
|                                  | increased at 30 and 32 gr.                                              |     |
| Cola nitida                      | In Nigeria, Cola acuminata, Cola nitida and Cola milleni are used in     | 59  |
|                                  | ethnomedical treatment for the treatment of diarrhea and dysentery.     |     |
|                                  | Cola species contain caffeine, koeleint and kolatin alkaloids,           |     |
|                                  | proanthocyanin, magnesium, potassium, potasium, bromide, cobalt,         |     |
|                                  | caesium, zinc and selenium. The Mucobacterium buvis was susceptible at   |     |
|                                  | 1000 μg/ml of methanol extract root bark of both Cola nitida and Cola    |     |
|                                  | milleni but insensitive to methanol extracts of both the leaves and     |     |
|                                  | stem-bark of the three Cola sp. tested. The MIC of the methanol root     |     |
|                                  | extract of Cola nitida against Mucobacterium buvis is 125 μg/ml. The    |     |
|                                  | MIC of methanol root extract of Cola nitida against the six ATCC strain |     |
|                                  | of Mucobacterium vaccae ranged from 500 μg/ml to above 1000 μg/ml. The   |     |
|                                  | control Rfimipin is active against M. buvis at 5 μg and 10 μg/ml.       |     |
| Cucurbita species                | The minimum inhibitory concentration (MIC) of 23 gr. of pumpkin seed    | 60  |
|                                  | (+/- 73 seeds) (Cucurbita maxima) in 100 ml distilled water as an         |     |
|                                  | antiparasitic agent using canine tapeworms with an intestinal isolation   |     |
|                                  | of 5 to 6 hours was determined. Alterations in helminthic motility were  |     |
|                                  | found at a dose of > 23 gr. There is a protheolithic effect with an      |     |
|                                  | average survival time of 38.4 minutes. The anthelmintic effect is        |     |
|                                  | increased at 30 and 32 gr.                                              |     |
| Dorstenia contraervga            | Dorstenia species contain fumarocoumarins with analgesic, anti-          | 61–63|
|                                  | inflammatory, antibacterial, antiviral, anticoagulant, and              |     |
|                                  | photosensitizing activities. Preynlated chalcones are also found and may  |     |
|                                  | have anti-carcinogenic and antiproliferative properties. Dorstenia      |     |
|                                  | contraervga was active toward Gardia lamblia with IC(50)=38 μg/ml. This   |     |
|                                  | antiprotozoal activity supports the popular use to treat diarrhoea and    |     |
| Eleusine indica                  | Eleusine indica ethanol extract showed activity against vesicular        | 64  |
|                                  | stomatitis virus. The plant contains hydrocyanic acid.                   |     |
Table 4: Non-experimental validation of plants used for stomach problems, pain and internal parasites in Trinidad and Tobago (Continued)

| Plant Name                  | Description                                                                 |
|-----------------------------|-----------------------------------------------------------------------------|
| Eupatorium macrophyllum     | The ethanol extract of the leaves of Eupatorium adonophorum (100, 200 and 300 mg/kg, po) showed significant analgesic activity, compared to standard drugs diclofenac sodium and pentazocine. Petroleum ether and methanolic extracts of leaves of Eupatorium adonophorum showed broad spectrum antibacterial activity at the tested concentration (250–1000 μg/ml) except against Shigella dysenteriae. The petroleum ether extract also showed antifungal activity. Two extracts (dichloromethane and methanol), of the dried stems and leaves of Eupatorium inulofolium, the 52 fraction of the hexane extract and neureolin B from the dichloro-methane extract, showed statistically significant antiplasmodial activity. |
| Ferula a safotida           | A Ferula asafoilata gum extract (3 mg/ml) reduced the average amplitude of spontaneous contractions of the isolated guinea-pig ileum to 54+/- 7% of control. Ferula asafoilata gum extract [0.3–2.1 mg/100 g body weight] reduced the mean arterial blood pressure in anesthetized rats. |
| Jatropha curcas             | Two deoxypreussomerins were isolated from stems of Jatropha curcas. Two compounds had antibacterial constituents. Jatropha curcas crude bark extract accelerates the healing process of wounds on Wistar albino rats by reducing the skin breaking strength, granulation tissue breaking strength, wound contraction, dry granulation tissue weight and hydroproline levels. A significant decrease in epithelization period was also observed. |
| Morinda charantia           | Morinda charantia may induce both intestinal and also systemic anti-inflammatory responses and may have antiviral activity. |
| Morinda citrifolia          | The lyophilised aqueous extract of roots of Morinda citrifolia produced a dose-related, central analgesic activity in mice. The analgesic efficacy of the Noni extract was less strong than morphine but non-addictive and had no side effects. Morinda citrifolia fruit powder demonstrated over 70% COX-1 inhibition. The extracts from Morinda citrifolia leaf (45%) showed moderate inhibition on COX-1. The extracts from Morinda officinalis root was inactive (9.87%) at a concentration of 3.4 mg/ml. |
| Neuraena lobata             | Neuraena lobata has antinociceptive and antibacterial activities. When tested against Brugia pahangi, a lymphatic dwelling filarial worm, the ethanol extract of Neuraena lobata showed potential macro- and micro-filaricidal activity. |
| Nicotiana tabacum           | The lack of nicotine-induced analgesia assessed by the tail flick reflex test in female rats is consistent with human studies showing that nicotine reduces pain elicited by brief noxious cutaneous stimulation in male but not female subjects. |
| Peperomia rotundifolia      | In south-east Asia, Peperomia pellucida is used for wounds, skin problems, abdominal pain and other pains and for headache. Peperomia pellucida is reported to have antiplasmodial activity in mice, antibacterial activity against Bacillus subtilis, Pseudomonas aeruginosa and Staphylococcus aureus, and antifungal activity. Peperomia pellucida ethyl-acetate soluble extracts and crude methanolic extracts were active against Gram-positive and Gram-negative bacteria. |
| Petiveria alliacea          | Petiveria alliacea extract showed an antinociceptive effect which account for its popular use as an analgesic. The oral administration of Peperiera alliacea root crude lyophilized extract at the highest dose of extract tested (43.9 mg/kg body wt.) significantly reduced the number of migrating neutrophils, mononuclear cells and eosinophils. The Petiveria alliacea root extract also showed a significant antinociceptive effect. Thiosulfonates, trisulfides and benzy1sulfonic acid are antimicrobial compounds, with the benzyl-containing thiosulfonates having the broadest spectrum of antimicrobial activity. |
| Punica granatum             | Punica granatum was used by Egyptians in ancient times as a treatment for tapeworm and other parasites. A pomegranate extract at a low extract concentration (0.01% v/v) Delayed bacterial growth of Staphylococcus aureus FRI 722, while a higher concentration (1% v/v) eliminated bacterial growth. |
| Rosmarinus officinalis      | Rosmarinus officinalis has historically been used as an anagalgesic and antirheumatic herb. The aqueous and ethanol extracts of Rosmarinus officinalis L. aerial parts induced a significant antiplasmodial activity. In an observational study, a combination of reduced iso-alpha-acids from hops, rosemary extract and oleanolic acid decreased pain in patients suffering from rheumatic conditions and osteoarthritis. |
| Solanum melongena           | Solanum melongena contains significant quantities of histamine and serotonin. |
| Scoparia dulcis             | Scoparia dulcis has traditionally been used to treat stomach troubles, inflammation, hemorrhoids, and hepatitis and as an analgesic. Biologically active substances from Scoparia dulcis include scoparic acid A, scoparic acid B, scoparic acid A and B, scopadulcic acid and scopadulcic acid. The chloroform/methanol fractions Scoparia dulcis showed antimicrobial activity against the human pathogenic bacteria Salmonella typhi, Staphylococcus aureus, Escherichia coli, Bacillus subtilis, Pseudomonas aeruginosa, and Proteus vulgaris and the plant pathogenic fungi Alternaria macrospora, Candida albicans, Aspergillus niger, and Fusarium oxysporum. |
| Tagetes patula              | Tagetes erecta callus cultures produce ascorbic acid as well as insecticidal pyrethrin. Tagetes patula oil contains several compounds with the major ones being limonene, (E) and (E)-l-ocimene, dihydrotagetone, terpinolene, piperitone, peperitenone, E-caryophyllene and trans-sesquiphellene hydrate. The fourth instar larvae of Aedes aegypti (LC₅₀ 37.91) was most susceptible to Tagetes patula essential oil followed by Anopheles stephensi (LC₅₀ 12.08, LC₉₀ 57.62) and Culex quinquefaciatus (LC₅₀ 22.33, LC₉₀ 71.89). |
| Tamarindus indica           | In Thai traditional medicine, the fruit of Tamarindus indica is considered to be as a digestive, carminative, laxative, expectorant and a blood tonic. A crude Tamarindus indica seed extract inhibited the PL22, protease, hyaluronidase, L-amino acid oxidase and 5-nucleotidase enzyme activities of Viplera russellii venom in a dose-dependent manner. Mice that received the extract 10 min after the injection of venom were protected from venom-induced toxicity. The seed coat extract of Tamarindus indica has antioxidant activity. The extract is composed of flavonoids including tannins, polyphenols, anthocyanidin, and oligomeric proanthocyanidins. These flavonoids may produce vasorelaxant activity, increase capillary permeability and protection from oxidative stress. Excess nitric oxide production is associated with diseases such as autoimmunity, rheumatoid arthritis, inflammatory bowel disease and septic shock. In vitro studies demonstrated that the crude seed coat extract of Tamarindus indica suppressed nitric oxide production while producing no adverse effects. |
| Tournefortia hirsutissima    | In Taiwan, Tournefortia sarmentosa Lam. is used as a detoxicant, an anti-inflammatory agent, and a circulation promoter to remove blood stasis. Alkaloids, flavones, triterpenoids, and cinnamates are found in the genus Tournefortia. The stems of Tournefortia sarmentosa contain five phenolic compounds as well as salicylic acid and allantoin. Tournefortia nofo-serecae leaves contain pyrroolidine alkaloids (5% of dry weight). |
Abelmoschus moschatus

Chinese ethnomedicinal plant and practice: Geographical origin S.E. Asia. Myrcetin a flavonol, is found in tea, berries, fruits, and the herb of Abelmoschus moschatus. This flavonol has both antioxidative and cytoprotective properties and has been used successfully to treat depression and anxiety in traditional Chinese medicine [94].

Achyranthes aspera, Achyranthes indica

Chinese ethnomedicinal plant and practice: Achyranthes bidentata is grown in the tropical parts of China, Korea and Vietnam. Its roots ("Niu Xi", Radix Achyranthes Bidentatae) are used in traditional Chinese medicine as a tonic, emmenagogue, antiarthritic, diuretic, and anti-fertility agent to nourish the liver and kidneys, strengthen bones and muscles and invigorate circulation [95].

Aristolochia rugosa/A. trilobata

Chinese ethnomedicinal plant and practice: The stem of Aristolochia manshuriensis (AMA, Guanmuton) is a traditional Chinese medicinal herb largely harvested from the Northeast of China. It is used as a diuretic, anti-inflammatory, to alleviate swelling and to treat rheumatism [96].

Bidens alba/Bidens pilosa

Chinese ethnomedicinal plant and practice: Bidens pilosa (Xiaohua-Guizhencao) is used as a traditional antipyretic, anti-inflammatory and anti-rheumatic medicine in China [97]. Bidens pilosa was introduced into Asia and is common in Taiwan.

Cajanus cajan

Chinese ethnomedicinal plant and practice: In Chinese folk medicine pigeon pea leaves are used to staunch blood, as an analgesic and to kill parasites [98].

Cassia alata

Chinese ethnomedicinal plant and practice: Cassia obtusifolia seed, called "Jue-mingzi", is used to treat eye infections, headache, and dizziness [99]. Cassia alata can be purchased in herb shops in Thailand.

Croton gossypifolius

Chinese ethnomedicinal plant and practice: There are 21 species of Croton distributed throughout the southern part of China. Several species including C. kongensis are used in traditional Chinese medicine to alleviate dysmenorrhea (fruits), as a purgative (seeds), and to treat dyspepsia (bark) and malaria (leaves) [100].

Eclipta prostrata

Chinese ethnomedicinal plant and practice: In Chinese medicine this plant is called "Eclipta Prostrata Herba" (Yetbadetajo Hert) [101]. It is also used in Taiwanese folk medicine.

Eupatorium macrophyllum

Chinese ethnomedicinal plant and practice: Eupatorium chinense grows in the south of China and is used for colds, snakebite and inflammation [102].

Momordica charantia

Chinese ethnomedicinal plant and practice: Momordica charantia seeds are known in Chinese medicine as "Ku guazi". They are used for infections and immune disorders [103].

Morinda citrifolia

Chinese ethnomedicinal plant and practice: Chinese traditional tonic herbal medicine "BaJiTian" (Morinda officinalis) has been prescribed in China for about two thousand years, for tonifying kidney, strengthening Yang-qi and relieving rheumatism [104].

Phyllanthus urinaria

Chinese ethnomedicinal plant and practice: Phyllanthus urinaria grows widely in China. It is used to treat jaundice, hepatitis B, nephrolithiasis, and painful disorders [105].

Portulaca oleracea

Chinese ethnomedicinal plant and practice: Portulaca oleracea (Ma-Chi-Xian), grows widely in China, and is used traditionally for alleviating pain and swelling. It has anti-bacterial, anti-viral, anti-diabetic, and immuno-modulating activity [106].

Sida acuta

Chinese ethnomedicinal plant and practice: This medicinal plant is named "Huanghuaren" [107].

Tamarindus indica

Chinese ethnomedicinal plant and practice: In Thai traditional medicine, the fruit of T. indica is used as a digestive, laxative, expectorant and blood tonic. The seeds of T. indica are used as an anthelmintic, antidiarrheal, and an emetic, and the seed coat is used to treat burns and aid in wound healing as well as against dysentery. [90], [91]

Non-experimental validation of plants used for skin problems in Trinidad and Tobago

For each species or genus the ethnomedicinal uses in other countries, particularly Asian countries, are given if available; then follows a summary of chemical constituents, in addition to active compounds if relevant to the condition being treated (Tables 3 and 4).

Comparative evaluation of plants used for skin problems, stomach problems, pain and internal parasites

Table 5 contains a preliminary listing of the ethnomedicinal plants discussed in this paper that are used similarly in Chinese ethnomedicine. If the specific plant was not found in the literature search the closely related species that are used similarly in Chinese traditional medicine are listed.

The commonalities between Chinese traditional medicine and Trinidad and Tobago “bush medicine” are provided below.

Abelmoschus moschatus is used to treat depression and anxiety in traditional Chinese medicine [94]. In Trinidad and Tobago it is used for pain.

Achyranthes bidentata ("Niu Xi" in Chinese medicine, Radix Achyranthes Bidentatae) is used as a tonic, to nourish the liver and kidneys, and invigorate circulation [95]. Achyranthes indica is used in Trinidad and Tobago for skin rashes and other skin problems.

Aristolochia manshuriensis (AMA, “Guanmuton”) is used in China as a diuretic and anti-inflammatory [96]. Aristolochia rugosa/trilobata are used in Trinidad and Tobago for stomach problems. Zhu claims that the Chinese herb “Mu Tong” has been based on Aristolochia manshuriensis only since the 1950s. The classical Chinese herbal literature until the mid 17th century identifies “Mu Tong” as several Akebia species and no toxicity related to “Mu Tong” was recorded in these traditional Chinese herbal texts.

Bidens parviflora ("Xiaohua-Guizhencao") is used as a traditional antipyretic, anti-inflammatory and anti-rheu-
matic medicine in China [97]. Plants used for cuts, injures and swellings in Trinidad and Tobago include *Bidens alba/Bidens pilosa*.

During the ethnomedical research one of the respondents claimed that the use of *Cajanus cajan* for internal parasites was a recent addition to Trinidad folk medicine. This ethnomedical practice in Trinidad is the same as that reported for the folk medicine of China (to kill parasites) [98] but no definitive statements about its origins can be made at this time. *Momordica charantia* seeds or "Ku guazi" are used for infections and immune disorders [103]; in Trinidad and Tobago the plant is used for stomach problems.

"Bal Ji Tian" (*Morinda officinalis*) has been prescribed in China for about two thousand years, for tonifying the kidney, strengthening "Yang-qi" and relieving rheumatism [104]. Plants used for pain in Trinidad and Tobago include *Morinda citrifolia*.

*Phyllanthus urinaria* is extensively grown in China. It is used to treat jaundice, hepatitis B, nephrolithiasis, and painful disorders [106]. Diarrhoea is treated with *Phyllanthus urinaria* in Trinidad and Tobago.

*Portulaca oleracea* ("Ma-Chi-Xian") is grown widely in China, and is used traditionally for alleviating pain and swelling [106]. It is used as an anthelmintic in Trinidad and Tobago. *Tamarindus indica* fruit is used as a blood tonic and the seed coat of *Tamarindus indica* is used to treat burns and aid in wound healing in China. In Trinidad and Tobago, scorpion and snake bites are treated with *Tamarindus indica*.

**Discussion and conclusion**

Vincent Yañes, the captain of the caravel Niña reportedly dug up *Morinda citrifolia* in Hispaniola on December 30, 1492 [1]; yet this plant was not considered special in Trinidad until the forces of globalisation made "Noni" ubiquitous as an "Australasian cure-all" and it was then sold on the streets of Trinidad by herbalists and other traders [1]. This story illustrates that since Caribbean folk medicine is a product of globalisation and colonisation, research into its origins and plant uses is complex. Attributing specific uses to Chinese folk medicine would necessitate access to the earliest Chinese herbarials.

The ship that brought 467 Chinese men, women, and children (from an original 549) in 1862 was the first ship to bring Chinese women to Trinidad. In the last 5 voyages (1862–1866), of 367 females embarked, 309 landed. The immigrant gender imbalance may have affected the dissemination of Chinese folk medicine into the Caribbean culture. Two wars taking place in eastern China in 1862 facilitated the immigration or abduction of Hakka peoples to the Americas and presumably the Punti peoples came in the later stages of immigration [108,109]. If any of these original immigrants had expertise in Chinese plants, besides knowledge of opium, they did not widely advertise this under the British colonial administration.

It may be the case that the Chinese contribution to Caribbean folk medicine has formed part of its earliest foundation and its provenance is not remembered. Research on the Chinese contribution to Trinidad is complicated by the fact that many of the Hakka research population have lived up to their migratory reputation – moving on to North America. Language is also a barrier.

Cuba and other Caribbean countries have not adopted the model of China's barefoot doctors. Cuba's medical diplomacy and investment in biotechnology generates symbolic capital: intangible qualities (like honour, prestige, and reputation) which appear opposed to strictly economic interests, are in fact convertible back into material capital [110]. The Cuban policy is to demonstrate that its socialist state can provide a modern health care system and need not settle for small-scale technologies like traditional medicine [110]. In contrast it has been estimated that 80% of medications used in Chinese rural areas are derived from Chinese materia medica and related products. These products are economical and therefore provide important cost savings [2,111,112].

Similarly to the process taking place in the Caribbean, younger people in Taiwan have been moving away from Chinese medicines because work pressures force them to seek faster cures from allopathic doctors [2]. However tonic herbs such as "Dangguí" (*Radix Angelica sinensis*), "Huangqi" (*Radix Astragali/Astragalus membranaceus*), "Gōu Qí Zí" (*Fructus barbarum*) and "Renshen" (*Radix Panax ginseng/Panax notoginseng*), are used by Taiwanese families in slow-cooking winter meals. These herbs are also popular for postnatal care, for the elderly and for postsurgical therapy [2].

Non-experimental validation is a new approach that is designed to introduce cost effectiveness into medicinal plant research. The findings of the non-experimental validation suggest that the majority of the therapeutic applications of the plants used in Caribbean folk medicine listed in this paper are justified, and more studies are warranted to explore their efficacy. All of the plants used in Trinidad and Tobago for skin problems merit clinical trials. The plants used for stomach problems, pain and internal parasites that should take priority in clinical trials are *Bambusa vulgaris, Bidens alba, Jatropha curcas, Neurolaena lobata, Peperomia rotundifolia* and *Phyllanthus urinaria*.
Competing interests

The author(s) declare that they have no competing interests.

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References

1. Lans C: Creole remedies of Trinidad and Tobago, book self-published on Lulu.com 2006.
2. Lans C, Harper T, Georges K, Bridgewater E: Medicinal and ethnobotanical remedies of hunters in Trinidad. BMC Complement Altern Med 2001, 1:101.
3. Chan K: Chinese medicinal materials and their interface with Western medical concepts. J Ethnopharmacol 2005, 96:1-18.
4. Anon: The Chinese in Trinidad and Tobago. 2006 [http://library2.nalib.gov.nf/build/asp?tid=2494].
5. Goodenough B: The 'Land of Beginnings'. A historical digest. Newsday Newspaper Sunday August 27 2000.
6. Yun L, Laremont R: Chinese Cookies and African Slaves in Cuba, 1847–74. Journal of Asian American Studies 2001, 4:99-122.
7. Harris R: Local Herbs Used in the Chinese Way (Tonics). Book I. The Traditional Chinese Medical Centre, Trinidad and Tobago, W1 1991.
8. Deng HB, Cui DP, Jiang JM, Feng YC, Cai NS, Li DD: Antitumor activity of Achyranthes bidentata polysaccharide and Lycium barbarum polysaccharide on nonenzyme glycation in D-galactose induced mouse aging model. Biomed Environ Sci 2003, 16(3):267-75.
9. Zeng Y, Zhong JM, Ye SQ, Ni ZY, Miao XQ, Mo YK, Li ZL: Screening of Epstein-Barr virus early antigen expression inducers from Chinese medicinal herbs and plants. Biomed Environ Sci 1994, 7:50-5.
10. Chakraborty A, Arntzen A, Mukainaka T, Nobukuni Y, Kuchide M, Zeng Y, Zhong JM, Ye SQ, Ni ZY, Miao XQ, Mo YK, Li ZL: New antimycobacterial and antimalarial 8,9-secoakaurane diterpenes from Croton kongensis. J Nat Prod 2003, 66:868-70.
11. Jones K: Review of sangre de drago (Croton lechleri) - a South American tree sap in the treatment of diarrhea, inflammation, insect bites, viral infections, and wounds: traditional uses to clinical research. J Altern Complement Med 2003, 9:877-96.
12. Sawangjaroen K, Suphadhiraksakul S, Phongpachit S, Siripanich C, Jamjaroen K, Sawangaroen K: The in vivo anti-angioid activity of extracts from plants that are used for self-medication by AIDS patients in southern Thailand. Parasitol Res 2005, 95:17-21.
13. Liao F, Huang Q, Yang Z, Xu H, Gao Q: Experimental study on the antibacterial effect of origanum volatile oil on dysentery bacilli in vivo and in vitro. J Huazhong Univ Sci Technol Med Sci 2004, 24:400-3.
14. Santoyo S, Caveno S, Jaime L, Ibenez E, Senerons FJ, Reglero G: Supercritical carbon dioxide extraction of compounds with antimicrobial activity from Origanum vulgare L.: determination of optimal extraction parameters. J Food Prot 2006, 69:369-75.
15. Khan-Mohammed Z, Adesiyun AA, Swanston WH, Chadee DD: Frequency and characteristics of selected enteropathogens in fecal and rectal specimens from childhood diarrhea in Trinidad, 1990–1995. Rev Panam Salud Publica 2003, 17:170-7.
16. Malairajan P, Geetha Gopalakrishnan, Narasimhan S, Jessi Kala Veni K: Antiulcer activities of an ethanolic extract of Acalypha indica L. var. radiata Schult. Bp. J Ethnopharmacol 1999, 67:333-40.
17. Geisserberger P, Sequin U: Constituents of Bidens pilosa L.: do the components found so far explain the use of this plant in traditional medicine? Acta Trop 1991, 48:251-61.
18. Crockett CO, Guede-Guina F, Pugh D, Yang-Manda M, Robinson TJ, Olubadewo JO, Ochillo RF: Cassia alata and the preclinical search for therapeutic agents for the treatment of opportunistic infections in AIDS patients. Cell Mol Biol 1992, 38:505-11. Erratum in: Cell Mol Biol 1992, 38:615.
19. Fenech S, A. Venkataraman A. A study on the therapeutic efficacy of Cassia alata, Linn. leaf extract against Pityriasis versicolor. J Ethnopharmacol 1994, 42:19-23.
20. Yan GC, Chen HW, Duh PD: Extraction and identification of antioxidative component from Jue Ming Zi (Cassia tora L.). J Agric Food Chem 1998, 46:820-824.
21. Cuella MJ, Giner RM, Recio MC, Manez S, Rios JL: Topical anti-inflammatory activity of some Asian medicinal plants used in dermatological disorders. Fitoterapia 2001, 72:221-9. cassia antinfl
22. Mukhopadhyay SK, Buddhadeb D, Duany B, Dasgupta MK, (Ed), Ghosh DC, (Ed), Gupta DD, (Ed), Majumdar DK, (Ed), Chattopadhyay GN, (Ed), Ganguli PK, (Ed), Munsli PS, (Ed), Bhattacharya D:. In Ethnonotary of some common crop field weeds in a sub-humid agricultural tract of West Bengal Proceedings of the national symposium on sustainable agriculture in sub-humid zone, Sriniketan, West Bengal, India:272-277. 3 – 5 March 1995.
23. Tayanin GL, Brathall D: Black teeth or caries prevention? Practice and beliefs of the Kammu people. Community Dent Oral Epidemiol 2006, 34:81-6. croton
24. From Y, Viljoen AM: In vitro S-ß-glucuronidase and anti-oxidant activities of South African medicinal plants commonly used topically for skin diseases. Skin Pharmacol Physiol 2006, 19:329-335.
25. Thongtan J, Kittazoop P, Ruangrungsi N, Saenboonrueng J, Thebraranont Y: New antimycobacterial and antimalarial 8,9-secoakaurane diterpenes from Croton kongensis. J Nat Prod 2003, 66:868-70.
26. Jin X, Yang W, Zheng J, Zhang G, Xu Z, Gao L, Zhang Y, Sun X, Shi X, Wang B: Antimicrobial activity of some Asian medicinal plants used in traditional Chinese medicine as topical ointments. J Ethnopharmacol 2003, 85:159-64.
27. Geisserberger P, Sequin U: Constituents of Bidens pilosa L.: do the components found so far explain the use of this plant in traditional medicine? Acta Trop 1991, 48:251-61.
28. Crockett CO, Guede-Guina F, Pugh D, Yang-Manda M, Robinson TJ, Olubadewo JO, Ochillo RF: Cassia alata and the preclinical search for therapeutic agents for the treatment of opportunistic infections in AIDS patients. Cell Mol Biol 1992, 38:505-11. Erratum in: Cell Mol Biol 1992, 38:615.
29. Fenech S, A. Venkataraman A. A study on the therapeutic efficacy of Cassia alata, Linn. leaf extract against Pityriasis versicolor. J Ethnopharmacol 1994, 42:19-23.
30. Yan GC, Chen HW, Duh PD: Extraction and identification of antioxidative component from Jue Ming Zi (Cassia tora L.). J Agric Food Chem 1998, 46:820-824.
31. Cuella MJ, Giner RM, Recio MC, Manez S, Rios JL: Topical anti-inflammatory activity of some Asian medicinal plants used in dermatological disorders. Fitoterapia 2001, 72:221-9. cassia antinfl
32. Mukhopadhyay SK, Buddhadeb D, Duany B, Dasgupta MK, (Ed), Ghosh DC, (Ed), Gupta DD, (Ed), Majumdar DK, (Ed), Chattopadhyay GN, (Ed), Ganguli PK, (Ed), Munsli PS, (Ed), Bhattacharya D:. In Ethnonotary of some common crop field weeds in a sub-humid agricultural tract of West Bengal Proceedings of the national symposium on sustainable agriculture in sub-humid zone, Sriniketan, West Bengal, India:272-277. 3 – 5 March 1995.
33. Tayanin GL, Brathall D: Black teeth or caries prevention? Practice and beliefs of the Kammu people. Community Dent Oral Epidemiol 2006, 34:81-6. croton
34. From Y, Viljoen AM: In vitro S-ß-glucuronidase and anti-oxidant activities of South African medicinal plants commonly used topically for skin diseases. Skin Pharmacol Physiol 2006, 19:329-335.
35. Thongtan J, Kittazoop P, Ruangrungsi N, Saenboonrueng J, Thebraranont Y: New antimycobacterial and antimalarial 8,9-secoakaurane diterpenes from Croton kongensis. J Nat Prod 2003, 66:868-70.
36. Jin X, Yang W, Zheng J, Zhang G, Xu Z, Gao L, Zhang Y, Sun X, Shi X, Wang B: Antimicrobial activity of some Asian medicinal plants used in traditional Chinese medicine as topical ointments. J Ethnopharmacol 2003, 85:159-64.
37. Geisserberger P, Sequin U: Constituents of Bidens pilosa L.: do the components found so far explain the use of this plant in traditional medicine? Acta Trop 1991, 48:251-61.
40. Muniappan M, Sundararaj T: Anti-inflammatory and antieulcer activities of Bambusa arundinacea. J Ethnopharmacol 2003, 88:161-7.
41. Chih HW, Lin CC, Tang KS: Anti-inflammatory activity of Tai
wan folk medicine "ham-hong-chho" in rats. American Journal of Chinese Medicine 1995, 23:273-8.
42. Xie ZW: Textural research on "Shidachuan" and "Shijian-
chuan" in "Ben Cao Gang Mu Shi Yi" (a supplement to the compendium of materia medica). Zhongguo Zhi Yau Zhao Zh Zhi 2000, 25:49-51.
43. Rojas JJ, Ochoa JV, Ocamo SA, Munoz JF: Screening for antiimi-
crobial activity of ten medicinal plants used in Colombian folk
inka: a possible alternative in the treatment of non-tuberculous infections. BMC Complement Altern Med 2006, 6:2, bidens, bixa.
44. Duker-Eshu G, Jaroszewski JW, Asomaning WA, Oppong-Bosachie F, Brogger Christiansen S: Antiplasmodial constituents of Cajanus
cojan. Phytother Res 2004, 18:138-30.
45. Dato S, Sarmas S, Bhattacharya B: Effect of a herbal protein, CI-1, isolated from Cajanus indicus on immune response of control
and stressed mice. J Ethnopharmacol 1999, 67:259-267.
46. Ghosh A, Sarkar K, Sil PC: Protective effect of a 43 kD protein
from the leaves of the herb, Cajanus indicus L on chloroform
induced hepatic dysfunction. J Biochem Mol Biol 2003, 39:197-207.
47. Acosta SL, Muro LV, Sacerio AL, Pena RA, Okwei SN: Antimicrobial properties of Proparrhia bifolda leaves aqueous extract. Fitoterapia 2003, 74:868-8.
48. Consolimi AE, Ragona ML, Migliori GN, Conforti P, Volonte MG: Card-
diotoxic and sedative effects of Cecropia pachystachya Mart.
(ambay) on isolated rat hearts and conscious mice. J Ethno-
pharmacol 2006, 106:90-9.
49. Rocha FF, Lapa AJ, De Lima TC: Evaluation of the anxiolytic-like
effects of Cecropia glazioui in mice. Pharmacol Biochem Behav 2002, 71:183-90.
50. Philippov S, Istankova R, Ivanovska A, Denkova P, Tosheva K, Navas H, Winer B: Cytotoxic and antimalarial activities induced in mice by purified iridoid polyphenon 60 (ambay) on isolated rat hearts and conscious mice. J Ethnopharmacol 1999, 67:259-267.
51. Ghosh A, Sarkar K, Sil PC: Protective effect of a 43 kD protein
from the leaves of the herb, Cajanus indicus L on chloroform
induced hepatic dysfunction. J Biochem Mol Biol 2003, 39:197-207.
52. Acosta SL, Muro LV, Sacerio AL, Pena RA, Okwei SN: Antimicrobial properties of Proparrhia bifolda leaves aqueous extract. Fitoterapia 2003, 74:868-8.
53. Rocha FF, Lapa AJ, De Lima TC: Evaluation of the anxiolytic-like
effects of Cecropia glazioui in mice. Pharmacol Biochem Behav 2002, 71:183-90.
54. Philippov S, Istankova R, Ivanovska A, Denkova P, Tosheva K, Navas H, Winer B: Cytotoxic and antimalarial activities induced in mice by purified iridoid polyphenon 60 (ambay) on isolated rat hearts and conscious mice. J Ethnopharmacol 1999, 67:259-267.
55. Ghosh A, Sarkar K, Sil PC: Protective effect of a 43 kD protein
from the leaves of the herb, Cajanus indicus L on chloroform
induced hepatic dysfunction. J Biochem Mol Biol 2003, 39:197-207.
56. Acosta SL, Muro LV, Sacerio AL, Pena RA, Okwei SN: Antimicrobial properties of Proparrhia bifolda leaves aqueous extract. Fitoterapia 2003, 74:868-8.
57. Rocha FF, Lapa AJ, De Lima TC: Evaluation of the anxiolytic-like
effects of Cecropia glazioui in mice. Pharmacol Biochem Behav 2002, 71:183-90.
58. Philippov S, Istankova R, Ivanovska A, Denkova P, Tosheva K, Navas H, Winer B: Cytotoxic and antimalarial activities induced in mice by purified iridoid polyphenon 60 (ambay) on isolated rat hearts and conscious mice. J Ethnopharmacol 1999, 67:259-267.
59. Ghosh A, Sarkar K, Sil PC: Protective effect of a 43 kD protein
from the leaves of the herb, Cajanus indicus L on chloroform
induced hepatic dysfunction. J Biochem Mol Biol 2003, 39:197-207.
60. Acosta SL, Muro LV, Sacerio AL, Pena RA, Okwei SN: Antimicrobial properties of Proparrhia bifolda leaves aqueous extract. Fitoterapia 2003, 74:868-8.
61. Rocha FF, Lapa AJ, De Lima TC: Evaluation of the anxiolytic-like
effects of Cecropia glazioui in mice. Pharmacol Biochem Behav 2002, 71:183-90.
62. Philippov S, Istankova R, Ivanovska A, Denkova P, Tosheva K, Navas H, Winer B: Cytotoxic and antimalarial activities induced in mice by purified iridoid polyphenon 60 (ambay) on isolated rat hearts and conscious mice. J Ethnopharmacol 1999, 67:259-267.
63. Ghosh A, Sarkar K, Sil PC: Protective effect of a 43 kD protein
from the leaves of the herb, Cajanus indicus L on chloroform
induced hepatic dysfunction. J Biochem Mol Biol 2003, 39:197-207.
64. Acosta SL, Muro LV, Sacerio AL, Pena RA, Okwei SN: Antimicrobial properties of Proparrhia bifolda leaves aqueous extract. Fitoterapia 2003, 74:868-8.
