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A phytopharmaceutical survey of Abaco Island, Bahamas

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Abstract
A total of 43 species of higher plants have been collected from Abaco Island, Bahamas. The plants have been extracted and the extracts screened for cytotoxic activity and for antimicrobial activity. Of the 31 extracts tested for cytotoxic activity, 12 were active (≥ 90% kill at 100 μg/mL, while 17 of 50 extracts showed antibacterial (MIC ≤ 39 μg/mL) activity. None of the extracts tested showed antifungal activity. Thus, of the 43 species collected, 18 were active in one or more of the assays, representing a "hit rate" of 42%.

Keywords: Plant extracts, traditional medicine, cytotoxicity, antibacterial, antifungal

1. Introduction
Higher plants have been used as medicinal agents by humans since prehistoric times, and phytochemicals continue to serve as medicinal agents themselves, as templates for synthetic modification, and as structural models for design of new medicines [1-3]. Cancers and infectious diseases continue to be a menace and the specter of drug resistance makes it more imperative that we find new alternative chemotherapeutics for treatment of diseases. In this work, we present a collection and screening of higher plants found on Abaco Island, Bahamas.

2. Materials and Methods
2.1 Collection and extraction of plant materials
Two plant-collecting expeditions were carried out on Abaco Island, Bahamas, in December, 2000, and again in June, 2002. Plants were identified in the field by W. N. Setzer using appropriate field guides [4, 5], and confirmed by comparison with herbarium samples from the Missouri Botanical Garden Herbarium (MBG), New York Botanical Garden Herbarium (NYBG), Fairchild Tropical Garden Herbarium (FTG), Herbarium of the National Trust for the Cayman Islands (CAYM), or the Willard Sherman Turrell Herbarium (MU). Voucher specimens have been deposited in the University of Alabama in Huntsville Herbarium. Fresh plant materials were cleaned of debris, finely chopped, and allowed to air dry for several days in the shade. The dried plant materials were extracted with solvent at room temperature for 48 h, filtered, and the solvent evaporated to give crude extracts (Table 1). In general, small samples were extracted with acetone for general screening; large samples were extracted with dichloromethane and then with acetone for future preparative work.

2.2 Cytotoxicity screening
In-vitro cytotoxicity screening against SK-Mel-28 (human melanoma), Hep-G2 (human hepatocellular carcinoma), MDA-MB-231 (human mammary adenocarcinoma), Hs 578T (human mammary carcinoma), or 5637 (human bladder carcinoma) cells was carried out as described previously [6-9].

2.3 Antimicrobial screening
In-vitro antibacterial screening against *Bacillus cereus*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli*, and for antifungal activity against *Candida albicans* was carried out as previously described [6-9].

3. Results and Discussion

A total of 43 species of higher plants have been collected from Abaco Island, Bahamas. The plants were extracted and the extracts screened for cytotoxic activity and for antimicrobial activity (Table 2). Of the 31 extracts tested for cytotoxic activity, 12 were active (≥ 90% kill at 100 µg/mL, while 17 of 50 extracts showed antibacterial (MIC ≤ 78 µg/mL). None of the extracts tested showed antifungal activity. Thus, of the 43 species collected, 18 were active in one or more of the assays, representing a "hit rate" of 42%. This hit rate is somewhat lower than those observed for collections from tropical rainforest plants from north Queensland, Australia [6], or Monteverde, Costa Rica [7]. It is likely that the depauperate island ecology [10] leads to lower ecological pressures (herbivory, interspecific competition, infections) with concomitant reduction in the necessity to concentrate toxic protective phytochemicals. Nevertheless, the flora of islands is generally different from continental flora and there is often a high degree of endemism, and so examination of these plants is important.

Amyris elemifera is known locally as "white torch". In Abaco bush medicine, leaves or leafy branch tips are boiled alone or together with other species. The decoction is used internally or externally as a febrifuge, wound wash, to treat influenza and diarrhea. In this work, *A. elemifera* acetone bark extract showed *in-vitro* cytotoxic activity against both 5637 and Hs 578T cells as well as antibacterial activity against *B. cereus*. Furanocoumarins have been isolated from *A. elemifera* [11, 12], and this class of compounds has shown cytotoxic activity [13, 14]. The leaf essential oil of *A. elemifera*, rich in limonene and linalool, was not notably cytotoxic [8].

Borrichia arborescens ("bay marigold") decoctions are used in the Bahamas to relieve colds coughs, and back pains [15]. The acetone leaf extract showed cytotoxic activity against 5637 and Hs 578T cells. As far as we know, there have been no phytochemical investigations of *B. arborescens*.

Bursera simaruba is known as "gum elemi" in the Bahamas. This tree is an important traditional medicine in the Bahamas [16]. The natural resin secreted from this tree can be used to stop blood flow from wounds, the sap can also be used as an antidote for poisonwood (*Metopium toxiferum*). A tea is used for rheumatism, and a bath for back pain. A poultice of crushed leaves is used to soothe bee and wasp stings. The dichloromethane bark extract of *B. simaruba* showed excellent cytotoxic activity against all cell lines tested, but was devoid of antimicrobial activity. *B. simaruba* bark extracts have also shown anti-inflammatory [17] and antifungal [18] activities. The phytochemistry of *B. simaruba* has been investigated and the bark extracts have yielded lignans [19, 20], pentacyclic triterpenoids [21, 22], and proanthocyanidins [23], as well as an essential oil rich in α-thujene, α-phellandrene, *o*-cymene, and β-caryophyllene [24]. The pentacyclic triterpenoids are likely contributors to the cytotoxicity observed in *B. simaruba* bark extract [25].

In Cuba, the dry powdered bark of *Caesalpinia bahamensis* is used to treat chronic ulcers [15]. A decoction of the wood is taken to treat liver and kidney problems. In Cuba, *C. bahamensis* is used as a diuretic, and diuretic effects in a rat model have been verified [26]. The dichloromethane bark extract showed cytotoxic activity against SK-Mel-28, MDA-MB-231, and 5637 cells. To our knowledge, there have been no phytochemical studies on the plant.

In the Bahamas, a bark decoction of *Canella winterana* ("white-wood bark") is used as a tonic for "female tiredness" [16]. In Cuba and in Jamaica, the bark is macerated in alcohol and used as a liniment to treat pains [15]. *C. winterana* bark extract did show antibacterial activity against *B. cereus*. The bark of *C. winterana* has been phytochemically examined and is a good source of drimane sesquiterpenoids [27, 29] and these compounds are likely responsible for the antibacterial activity of *C. winterana* bark extract [30].

As far as we know, there have been no ethnobotanical and no phytochemical reports on *Cassia lineata*. In this work, the acetone root extract showed promising antibacterial activity against *B. cereus*.

Apparently, *Cocos nucifera* is not used in Bahamian bush medicine. However, in Mexico the husk is boiled and the decoction used to treat diarrhea and thrush, whereas in Curaçao the husk decoction is taken as an emmenagogue [15]. In this work, the dichloromethane husk extract of *C. nucifera* exhibited cytotoxic activity against MDA-MB-231 breast tumor cells. Both aqueous and hexane extracts of *C. nucifera* have shown antiparasitic activity against *Plasmodium falciparum* [31], as well as weak antibacterial activity [32]. Aqueous husk extracts have shown diuretic [33], antibacterial (*S. aureus*), antiviral (HSV-1) [34], cytotoxic (K562 leukemia) [35, 36], antileishmanial (*Leishmania amazonensis*) [37], antinociceptive, and free-radical-scavenging [38] activities. The aqueous extracts are rich in flavonoids, but it is not known what constituents are present in the non-polar hexane or dichloromethane extracts.

To our knowledge, there have been no ethnobotanical reports on either *Eugenia confusa* or *E. foetida*. The leaf essential oil of *E. confusa* has been shown to be rich in 1,3,5-trimethoxybenzene and 2,4,6-trimethoxystyrene [39]. In this present work, the dichloromethane bark extract of *E. confusa* showed excellent cytotoxic activity against 5637 bladder tumor cells, while the acetone leaf extract of *E. foetida* showed promising antibacterial activity against Gram-positive *B. cereus* and *S. aureus*.

Exothea paniculata acetone bark extract showed selective cytotoxic activity against 5637 bladder tumor cells as well as antibacterial activity against *B. cereus*. Interestingly, *E. paniculata* bark extract from Costa Rica showed promising antileishmanial (*L. amazonensis*) activity, but the extract from Abaco Island was inactive [40]. Apparently, there are no ethnobotanical uses of *E. paniculata* in the Bahamas. This tree is used in Guatemala for tanning animal hides [41].

Leucaena leucocephala, locally known as "jumbey", is used in the Bahamas to treat flatulence, quiet the nerves, and in treating heart trouble [16]. The acetone bark extract showed selective cytotoxic activity against 5637 bladder tumor cells. Leaf extracts have yielded steroids, triterpenoids, phytol, flavonoids, and cinnamic acids [42], but apparently, the bark of *L. leucocephala* has not been investigated for phytochemical constituents.

The acetone leaf extract of *Myrcianthes fragrans* showed promising antibacterial activity against both *B. cereus* and *S. aureus*. Decoctions of the leafy branch tips are used traditionally to treat aches and pains [15]. There have been several investigations of the leaf essential oils from *M. fragrans*, including Cuba (rich in α-pinene and limonene) [43], Jamaica (dominated by limonene and α-terpineol) [44], and Costa Rica (dominated by 1,3,5-trimethoxybenzene and α-cadinol) [45]. The leaf oil from Costa Rica did show marginal cytotoxic activity, but no antibacterial activity [46].

Nectandra coriacea is apparently not used in Bahamian traditional medicine, but it is used as a diuretic in Cuba [47].

The acetone bark extract of *N. coriacea* did show antibacterial activity against *B. cereus*.

Piscidia piscipula, known locally as "dogwood" is a poisonous plant used externally as a wash for skin diseases [16]. The leaves, bark, and wood of *P. piscipula* have also been used as fish poisons and contain the toxic isoflavonoids ichthynone and rotenone [15]. The leaf extract has shown antiparasitic (*Giardia duodenalis*) and antibacterial (*Helicobacter pylori*) activities [48], and in this work *P. piscipula* acetone bark extract exhibited antibacterial activity against *B. cereus*.

To our knowledge, there are no ethnobotanical reports on the uses of *Psidium longipes* ("long-stalked stopper"). The acetone leaf extract of *P. longipes* was selectively cytotoxic to 5637 bladder tumor cells. The leaf essential oils of three individuals of *P. longipes* have been reported [49]. One sample was rich in sesquiterpenes (α-humulene and β-caryophyllene), another was dominated by monoterpenoids (1,8-cineole and α-terpineol), and another had a composition intermediate between the two. Although α-humulene and β-caryophyllene have shown cytotoxic activity to several different human tumor cell lines [8, 50-55], these compounds have not been screened on 5637 bladder tumor cells. It is likely that α-humulene and β-caryophyllene contribute to the cytotoxic activity of *P. longipes*.

Solanum erianthum, known in the Bahamas as "wild tobacco" or "salve bush", is used traditionally as a tea to treat coughs and as a wash for skin sores [16]. The acetone leaf extract showed cytotoxic activity to all cell lines tested and antibacterial activity to *E. coli*. Consistent with these results, leaf extracts of *S. erianthum* from India have also shown cytotoxic [56] and antibacterial [57, 60] activity. *S. erianthum* leaf essential oil from Nigeria, rich in α-terpinolene, α-phellandrene, *p*-cymene, and β-pinene, was found to be cytotoxic to Hs 578T and PC-3 cells [61].

In the Bahamas, the infusion of the bark of *Swietenia mahogoni* ("mahogany") is used as a general tonic, while rum extracts of the bark are used as an aphrodisiac [15]. In this current work, the dichloromethane bark extract showed selective cytotoxic activity to MDA-MB-231 breast tumor cells.

Tabebuia bahamensis ("five fingers") leaves are used in the Bahamas to prepare a tea to relieve "bodily strain" and backache [16]. In this work, the dichloromethane bark extract showed selective cytotoxic activity to 5637 bladder tumor cells.

4. Conclusions

Of the 43 species of Abaco plants examined in this study, eleven show promise for further biological and phytochemical investigations. These include the cytotoxic plant extracts of *Borrichia arborescens*, *Caesalpinia bahamensis*, *Eugenia confusa*, *Exothea paniculata*, *Leucaena leucocephala*, *Swietenia mahogoni*, and *Tabebuia bahamensis*, and the antibacterial extracts of *Cassia lineata*, *Eugenia foetida*, *Myrcianthes fragrans*, and *Nectandra coriacea*. This phytopharmaceutical survey serves to underscore the potential of higher plants to provide new medicinal agents for human use and to emphasize the need to preserve precious habitats.

Table 1: Collection and extraction of plants from Abaco Island, Bahamas.

Plant species (Family)	Collection site (date), voucher number	Extract (mass plant material, solvent, yield)
Acacia choriophylla Benth. (Fabaceae, Mimosideae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-7-2002), WNS2002ACCH	290.5 g bark, acetone, 8.2 g extract
Amyris elemifera L. (Rutaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002AMEL	32.4 g bark, acetone, 1.6 g extract
Ateramnus lucidus (Sw.) Rothm. (Euphorbiaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-15-2002), WNS 2002 ATLU	595 g bark, acetone, 5.0 g extract
Borrichia arborescens (L.) DC. (Asteraceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-7-2002), WNS 2002 BOAR	17.1 g leaves, acetone, 0.9 g extract
Bourreria ovata Miers (Boraginaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002BOOV	43.1 g bark, acetone, 0.9 g extract
Bourreria ovata Miers (Boraginaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002BOOV	23.5 g leaves, acetone, 0.8 g extract
Bumelia salicifolia (L.) Sw. (Sapotaceae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (6-18-2002), WNS2002BUSA	121.4 g bark, acetone, 1.3 g extract
Bumelia salicifolia (L.) Sw. (Sapotaceae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (6-18-2002), WNS2002BUSA	80.6 g leaves, acetone, 9.1 g extract
Bursera simaruba (L.) Sarg. (Burseraceae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (12-26-2000), WNS2000BUSI	285 g bark, CH_2Cl_2, 15.3 g extract
Buxus bahemensis Baker (Buxaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (6-14-2002), WNS2002BUBA	116.1 g leaves, acetone, 11.8 g extract
Caesalpinia bahamensis Lam. (Fabaceae, Mimosideae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (12-26-2000), WNS2000CABA	346 g bark, CH_2Cl_2, 11.0 g extract
Calyptranthes pallens Griseb. (Myrtaceae)	26º 27.18′ N, 77º 3.12′ W, 3.3 m asl (12-20-2000), WNS2000CAPA	100 g bark, acetone, 3.1 g extract
Canella winterana (L.) Gaertn. (Canellaceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-7-2002), WNS2002CAWI	260 g bark, acetone, 4.5 g extract
Cassia lineata Sw. (Fabaceae, Caesalpinoideae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002CALI	20.9 g roots, acetone, 5.2 g extract
Chiococca parvifolia Wullschl. ex Griseb. (Rubiaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-19-2000), WNS2000CHPA	86.0 g leaves, acetone, 7.0 g extract
Chiococca parvifolia Wullschl. ex Griseb. (Rubiaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-19-2000), WNS2000CHPA	54.0 g roots, acetone, 1.5 g extract
Cocos nucifera L. (Arecaceae)	26º 32.78′ N, 77º 3.14′ W, 4.6 m asl (12-26-2000), no voucher	34.0 g husk, CH_2Cl_2, 54.4 mg extract
Croton linearis Jacq.	26º 27.18′ N, 77º 3.12′ W, 3.3 m asl	33.5 g aerial parts, acetone, 0.5 g extract

(Euphorbiaceae)	(12-20-2000), WNS2000CRLI	
Cuscuta americana L. (Convolvulaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-18-2000), WNS2000CUAM	243 g aerial parts, CH_2Cl_2, 3.0 g extract
Desmodium incanum (Sw.) DC. (Fabaceae, Papilionoideae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002DEIN	74.2 g aerial parts, acetone, 2.2 g extract
Echites sect. *Umbellatae* Woodson (Apocynaceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-9-2002), WNS2002ECUM	33.4 g leaves, acetone, 2.4 g extract
Erithalis fruticosa L. (Rubiaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-18-2002), WNS2002ERFR	142.2 g leaves, CH_2Cl_2, 6.2 g extract
Ernodea littoralis Sw. (Rubiaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-18-2000), WNS2000ERLI	143 g leaves, acetone, 13.2 g extract
Eugenia confusa DC. (Myrtaceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-7-2002), WNS2002EUCO	1343 g bark, CH_2Cl_2, 26.2 g extract
Eugenia foetida Pers. (Myrtaceae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002EUFO	20.4 g bark, acetone, 0.5 g extract
Eugenia foetida Pers. (Myrtaceae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002EUFO	53.3 g leaves, acetone, 3.9 g extract
Exothea paniculata (Juss.) Radlk. (Sapindaceae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (12-26-2000), WNS2000EXPA	135.5 g bark, acetone, 4.1 g extract
Ficus citrifolia Mill. (Moraceae)	26º 32.21′ N, 77º 3.21′ W, 7.9 m asl (12-26-2000), WNS2000FICI	78.0 g bark. acetone, 1.5 g extract
Guapira discolor (Spreng.) Little (Nyctaginaceae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002GUDI	24.8 g bark, acetone, 1.1 g extract
Jacquina keyensis Mez (Primulaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002JAKE	599 g leaves, acetone, 0.8 g extract
Leucaena leucocephala (Lam.) de Wit (Fabaceae, Mimosoideae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-19-2000), WNS2000LELE	267 g bark, acetone, 7.6 g extract
Metopium toxiferum (L.) Krug & Urb. (Anacardiaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (6-14-2002), WNS2002METO	59.0 g leaves, CH_2Cl_2, 2.4 g extract
Myrcianthes fragrans (Sw.) McVaugh (Myrtaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002MYFR	27.3 g leaves, acetone, 3.2 g extract
Nectandra coriacea (Sw.) Griseb. (Lauraceae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002NECO	30.9 g bark, acetone, 1.8 g extract
Nectandra coriacea (Sw.) Griseb. (Lauraceae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002NECO	56.3 g leaves, acetone, 4.8 g extract
Piscidia piscipula (L.) Sarg. (Fabaceae, Papilionoideae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002PIPI	133.2 g bark, acetone, 1.1 g extract
Piscidia piscipula (L.) Sarg. (Fabaceae, Papilionoideae)	26º 19.40′ N, 77º 0.24′ W, 38.7 m asl (6-20-2002), WNS2002PIPI	65.2 g leaves, acetone, 8.1 g extract
Pithecellobium mucronatum Britton ex Coker (Fabaceae, Mimosoideae)	26º 27.18′ N, 77º 3.12′ W, 3.3 m asl (12-20-2000), WNS2002PIMU	258 g bark, acetone, 21.7 g extract
Pithecellobium mucronatum Britton ex Coker (Fabaceae, Mimosoideae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-15-2002), WNS2002PIMU	35.2 g leaves, CH_2Cl_2, 1.8 g extract
Pluchea symphytifolia (Mill.) Gillis (Asteraceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-9-2002), WNS2002PLSY	29.0 g leaves, acetone, 1.2 g extract
Psidium longipes (O. Berg) McVaugh (Myrtaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-19-2000), WNS2000PSLO	130 g leaves, acetone, 20.9 g extract
Salmea petrobioides Griseb. (Asteraceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-18-2000), WNS2000SAPE	152 g leaves, acetone, 12.5 g extract
Solanum erianthum D. Don (Solanaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-19-2000), WNS2000SOER	111 g leaves, acetone, 3.5 g extract
Stachytarpheta jamaicensis (L.) Vahl (Verbenaceae)	26º 27.18′ N, 77º 3.12′ W, 3.3 m asl (12-20-2000), WNS2000VAJA	137 g leaves, acetone, 6.2 g extract
Suriana maritima L. (Surianaceae)	26º 34,52′ N, 77º 7.41′ W, 1.0 m asl (6-10-2002), WNS2002SUMA	39.9 g leaves, acetone, 0.7 g extract
Swietenia mahogoni (L.) Jacq. (Meliaceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-7-2002), WNS2000SWMA	1211 g bark, CH_2Cl_2, 20.7 g extract
Tabebuia bahamensis (Northr.) Britton (Bignoniaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-16-2000), WNS2000TABA	581 g bark, acetone, 25.0 g extract
Tabebuia bahamensis (Northr.) Britton (Bignoniaceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-16-2000), WNS2000TABA	594 g leaves, CH_2Cl_2, 50.1 g extract
Tetrazygia bicolor (Mill.) Cogn. (Melastomataceae)	26º 31.09′ N, 77º 4.26′ W, 13.4 m asl (12-18-2000), WNS2000TEBI	191 g leaves, acetone, 10.6 g extract
Trema lamarkiana (Roem. & Schult.) Blume (Cannabaceae)	26º 34.55′ N, 77º 8.35′ W, 1.5 m asl (6-9-2002), WNS2002TRLA	126.3 g leaves, acetone, 2.6 g extract

Table 2: Cytotoxicity and antimicrobial screening of Abaco plant extracts.

Plant Extract	Cytotoxicity assays (% kill at 100 µg/mL)	Antimicrobial assays (MIC, µg/mL)				
		B. cereus	***S. aureus***	***P. aeruginosa***	***E. coli***	***C. albicans***
Acacia choriophylla acetone bark extract	5637 (0%), Hs 578T (0%)	156	1250	625	312	nt[a]
Amyris elemifera acetone bark extract	5637 (90.3±9.7%), Hs 578T (97.2±2.4%)	39	625	625	1250	nt
Ateramnus lucidus acetone bark extract	5637 (0%), Hs 578T (0%)	78	1250	312	1250	nt
Borrichia arborescens acetone leaf extract	5637 (100%), Hs 578T (100%)	78	1250	625	312	nt
Bourreria ovata acetone bark extract	5637 (21.4±8.9%), Hs 578T (0%)	312	1250	625	625	nt
Bourreria ovata acetone leaf extract	5637 (0%), Hs 578T (0%)	625	1250	625	156	nt
Bumelia salicifolia acetone bark extract	5637 (0%), Hs 578T (36.8±8.8%)	78	1250	625	156	nt
Bumelia salicifolia acetone leaf extract	5637 (34.6±25.9%), Hs 578T (2.3±1.6%)	156	2500	625	312	nt
Bursera simaruba CH_2Cl_2 bark extract	SK-Mel-38 (88.4±4.9%), Hep-G2 (100%), MDA-MB-231 (100%), 5637 (100%)	1250	2500	1250	1250	1250
Buxus bahemensis acetone leaf extract	5637 (44.3±8.2%), Hs 578T (18.5±13.9%)	156	1250	1250	156	nt
Caesalpinia bahamensis CH_2Cl_2 bark extract	SK-Mel-38 (89.9±1.1%), Hep-G2 (23.3±13.7%), MDA-MB-231 (100%), 5637 (93.5±6.1%)	156	1250	625	625	1250
Calyptranthes pallens acetone bark extract	SK-Mel-38 (87.3±2.4%), Hep-G2 (43.9±6.1%), MDA-MB-231 (49.4±25.6%), 5637 (65.9±7.8%)	312	2500	1250	1250	1250
Canella winterana acetone bark extract	not tested	39	1250	312	312	nt
Cassia lineata acetone root extract	not tested	19.5	1250	625	156	nt
Chiococca parvifolia acetone leaf extract	SK-Mel-38 (0%), Hep-G2 (27.9±4.4%), MDA-MB-231 (0%), 5637 (0%)	312	2500	1250	1250	1250
Chiococca parvifolia acetone root extract	SK-Mel-38 (0%), Hep-G2 (10.6±8.3%), MDA-MB-231 (0%), 5637 (39.7±9.1%)	312	2500	1250	1250	1250
Cocos nucifera CH_2Cl_2 husk extract	SK-Mel-38 (80.1±7.6%), Hep-G2 (0%), MDA-MB-231 (100%), 5637 (72.0±3.8%)	1250	2500	1250	1250	1250
Croton linearis acetone plant extract	SK-Mel-38 (0%), Hep-G2 (0%), MDA-MB-231 (0%), 5637 (74.3±0.9%)	1250	2500	1250	1250	1250
Cuscuta americana CH_2Cl_2 plant extract	SK-Mel-38 (15.9±9.2%), Hep-G2 (30.0±19.7%), MDA-MB-231 (31.1±11.8%), 5637 (74.4±1.9%)	1250	2500	1250	1250	1250
Desmodium incanum acetone plant extract	not tested	78	1250	625	625	nt
Echites sect. *Umbellatae* acetone leaf extract	not tested	312	1250	625	312	nt
Erithalis fruticosa CH_2Cl_2 leaf extract	not tested	156	1250	625	156	nt
Ernodea littoralis acetone leaf extract	SK-Mel-38 (11.2±6.3%), Hep-G2 (7.5±3.2%), MDA-MB-231 (0%), 5637 (81.4±9.8%)	625	1250	312	625	1250
Eugenia confusa CH_2Cl_2 bark extract	5637 (100%), Hs 578T (42.9±6.1%)	312	1250	625	625	nt
Eugenia foetida acetone bark extract	not tested	78	1250	625	625	nt
Eugenia foetida acetone leaf extract	not tested	39	39	312	1250	nt
Exothea paniculata acetone bark extract	SK-Mel-38 (12.4±3.7%), Hep-G2 (56.1±8.8%), MDA-MB-231 (0%), 5637 (100%)	39	1250	625	156	1250
Ficus citrifolia acetone bark extract	SK-Mel-38 (4.3±2.0%), Hep-G2 (7.5±7.2%), MDA-MB-231 0%), 5637 (14.8±7.7%)	625	2500	1250	1250	1250
Guapira discolor acetone bark extract	not tested	312	1250	625	625	nt
Jacquina keyensis acetone leaf extract	not tested	312	1250	625	1250	nt
Leucaena leucocephala acetone bark extract	SK-Mel-38 (0%), Hep-G2 (0%), MDA-MB-231 (0%), 5637 (95.1±3.1%)	625	2500	1250	1250	1250
Metopium toxiferum CH_2Cl_2 leaf extract	not tested	156	1250	1250	625	nt
Myrcianthes fragrans	not tested	<19.5	<19.5	625	625	nt

acetone leaf extract						
Nectandra coriacea acetone bark extract	not tested	19.5	1250	1250	625	nt
Nectandra coriacea acetone leaf extract	not tested	156	1250	1250	625	nt
Piscidia piscipula acetone bark extract	not tested	19.5	1250	1250	625	nt
Piscidia piscipula acetone leaf extract	not tested	78	1250	625	625	nt
Pithecellobium mucronatum acetone bark extract	SK-Mel-38 (0%), Hep-G2 (0%), MDA-MB-231 (0%), 5637 (0%), Hs 578T (0%)	625	2500	1250	1250	1250
Pithecellobium mucronatum CH_2Cl_2 leaf extract	not tested	156	1250	1250	625	nt
Pluchea symphytifolia acetone leaf extract	not tested	156	1250	625	625	nt
Psidium longipes acetone leaf extract	SK-Mel-38 (0%), Hep-G2 (13.2±6.2%), MDA-MB-231 (0%), 5637 (95.1±3.1%)	312	2500	1250	1250	1250
Salmea petrobioides acetone leaf extract	SK-Mel-38 (5.1±1.5%), Hep-G2 (0%), MDA-MB-231 (0%), 5637 (0%)	312	2500	1250	1250	1250
Solanum erianthum acetone leaf extract	SK-Mel-38 (81.9±2.7%), Hep-G2 (80.0±1.2%), MDA-MB-231 (8.2±7.6%), 5637 (95.0±1.9%)	156	1250	625	78	1250
Stachytarpheta jamaicensis acetone leaf extract	SK-Mel-38 (0%), Hep-G2 (12.9±9.3%), MDA-MB-231 (13.0±6.0%), 5637 (15.2±8.4%)	625	1250	1250	1250	1250
Suriana maritima acetone leaf extract	not tested	156	1250	625	625	nt
Swietenia mahogoni CH_2Cl_2 bark extract	SK-Mel-38 (9.4±3.1%), Hep-G2 (33.3±17.7%), MDA-MB-231 (94.5±2.6%), 5637 (0%), Hs 578T (0%)	78	1250	625	625	1250
Tabebuia bahamensis acetone bark extract	SK-Mel-38 (0%), Hep-G2 (45.8±5.4%), MDA-MB-231 (0%), 5637 (0%)	625	2500	1250	1250	1250
Tabebuia bahamensis CH_2Cl_2 bark extract	SK-Mel-38 (9.4±4.7%), Hep-G2 (38.4±22.1%), MDA-MB-231 (58.8±7.3%), 5637 (93.0±6.9%)	1250	2500	1250	1250	1250
Tetrazygia bicolor acetone leaf extract	SK-Mel-38 (29.6±11.7%), Hep-G2 (0%), MDA-MB-231 (0%), 5637 (0%)	625	2500	1250	1250	1250
Trema lamarckianum acetone leaf extract	not tested	312	1250	625	78	nt

[a] nt = not tested.

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