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Antiparasitic activity of some New Caledonian medicinal plants

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Abstract

Twenty-nine extracts of 18 medicinal plants used in New Caledonia by traditional healers to treat inflammation, fever and in cicatrizing remedies were evaluated *in vitro* against several parasites (*Leishmania donovani*, *Trypanosoma brucei brucei*, *Trichomonas vaginalis* and *Caenorhabditis elegans*). Among the selected plants, *Scaevola balansae* and *Premna serratifolia* L. were the most active against *Leishmania donovani* with IC_{50} values between 5 and 10 μg/ml. The almond and aril extracts from *Myristica fatua* had an IC_{50} value of 0.5–5 μg/ml against *Trypanosoma brucei brucei*. Only *Scaevola balansae* extract presented a weak activity against *Trichomonas vaginalis*. The almond extract from *Myristica fatua* presented significant activity against *Caenorhabditis elegans* (IC_{50} value of 6.6 ± 1.2 μg/ml).

Keywords: New Caledonia; Leishmanicidal activity; Trypanocidal activity; *Trichomonas vaginalis*; *Caenorhabditis elegans*

1. Introduction

The chemotherapy of many parasitic infections remains an unresolved problem. Widespread resistance to drugs is emerging, not only among helminthic diseases (Kaminsky, 2003) but also in protozoan infections, such as *Trichomonas vaginalis*, the most common parasite causing sexually transmitted diseases (Swygard et al., 2004). The resulting failures of treatment, combined with side effects, make it necessary to search for new drugs by pharmacological screening. Therefore, attempts are being made to identify new candidate antiparasitic agents among naturally occurring compounds with biological properties.

New Caledonia possesses a relatively rich flora. The quotient of the number of species of native phanerogams by surface area (density per square kilometer) is 0.157, which is high compared with those obtained for other Pacific islands. Its high specific endemicity ratio is remarkable (almost 75%) (Jaffré et al., 2001). Although parasitic diseases such as leishmaniasis and trypanosomiasis are absent from New Caledonia and Vanuatu, the IRD (Institut de Recherche pour le Développement) has carried out investigations (Billo et al., 2005a,b) to find new naturally occurring active compounds based on the traditional medicine of these countries. The selection of plants was guided by ethnopharmacological data derived from information collected among traditional healers. These plants are used in traditional medicines of New Caledonia for the treatment of inflammation and fevers. Some were selected for the present study because of their presumed biological activity, particularly that of their essential oils. Crude extracts of 18 plants, including various samples of essential oils, were screened *in vitro* for activity against leishmaniasis (*Leishmania donovani*), African trypanosomiasis (*Trypanosoma brucei brucei*), urogenital trichomoniasis (*Trichomonas vaginalis*) and nematodes (*Caenorhabditis elegans*). Among these plants, some: *Hernandia cordigera* (Richomme et al., 1985), *Myoporum crassifolium* (Menut et al., 2005), *Myoporum tenuifolium* (Tomas et al., 1985), *Eugenia uniflora* (Kanazawa et al., 2000), *Citrus macroptera* (Gaillard et al., 1995) and *Curcuma longa* (Singh and Khar,

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Table 1
Ethnobotanical data of studied plants

Family name	Scientific name	Voucher	Local name	Part used	Uses
Asteraceae	*Wollastonia biflora* (L.) DC. (Syn.: *Melanthera biflora* (L.) Willdenow, *Wedelia biflora* (L.) DC)	JWHL 83	herbe à cochons, kheejak (nelemwa, nixumwak), khâgee (Yuanga) thagac (nyelayu de balade), kaket (haveke), ujo (haveke); holaless ne hunëtë (Lenormand), meaning the 'holaless', earlier translated as 'faux topinambour de rocaille'; segue (nengone); hiök, hiëk, pace (Iaai)	Leaves	Juice of leaves with water in a complex remedy against children dysentery and diarrhea, also diarrhea caused by exposition to cold when fishing
Cupressaceae	*Callitris neocaledonica* Dummer	Maudet Caroline	One of the "bois de fer de montagne"	Wood	No traditional uses because of lack of accessibility, as it grows only up in the mountain, near Mt Humboldt, behind the xârâgurè region
Cupressaceae	*Callitris sulcata* (Parlatore) Schlechter	Maudet Caroline	sapin de la comboui, gniè	Wood	Inner wood resistant to decay and termites, traditionally used in the confection of wooden house poles
Flacourtiaceae	*Homalium deplanchei* (Vieillard) Warburg	LIT 0781	chêne bleu du littoral; dridrem (Drehu)	Leaves	Leaves in a complex remedy against fatigue an/or as a fortifying portion (drehu)
Goodneniaceae	*Scaevola balansae* Guillaumin	JWHL 93	emuet (nemi), mualandio (nyelayu des Belep), jara de veo (ajië); darandaveo (one langage near Bourail, orowe or tîrî)	Bark, leaves	A fortifying potion
Hernandiaceae	*Hernandia cordigera* Vieillard	JWHL101	bois bleu, phoap (nyelayu de Balade; same name in nelemwa, nixumwak and nyelayu), epeth (drehu); drök (Iaaï)	Bark, leaves	Juvenile forms used in remedies against skin diseases (orowe or tîrî region, near Bourail)
Lamiaceae	*Premna serratifolia* L.	Lit1071	hat (nelemwa, nixumwak), khama, khamio (yuanga), alchadscha, al (drehu), ari (Nengone), veek (Iaai)	Leaves	Young leaves heated and used in massages to help blood circulation on new cicatrices, juice expressed from leaves against TB (nelemwa); juice from expressed leaves drunk against migraine and general pains (drehu)
Moraceae	*Ficus prolixa* J.G. Forster	SJ2	banian, thuk (nixumwak), hmana (drehu), saa (Drehu), denge, ye-denge (Nengone), bëk (Iaai)	Leaves, fruits	Dible fruits (nyelay from Belep); crushed leaves are spitted on the chest of a nurse to avoid or treat breast lymphangitis (drehu)
Myoporaceae	*Myoporum crassifolium* J.G. Forster	SereiOuvea MC1	hanyium ne gejë (drehu), hagnyum (Iaii), faux-santal, grande citronelle, kanum(u)	Leaves, wood	Smoke of aerial parts against mosquitoes (nengone)
Myoporaceae	*Myoporum tenuifolium* J.G. Forster	C. Bontemps	faux santal, bois de citronelle, amwat (nelemwa, nixumwak), xabwet (nelemwa, nikumwak), hanyium ne helep (Drehu), hanyöm (iaai)	Leaves, wood	Masticated leaves are projected on skin ulcerations or mycosis, or pressed against mycosis (nelemwa); against odontalgias, eat raw leaves or ingest a remedy containing a decoction of leaves (Drehu); maceration of leaves against epilepsy (drehu); foliar buds masticated against odontalgiae (nengone), masticated with coconut and applicated on head in case of tinea (nengone)