An Inventory of Medicinal Plants at the Finca las Piedras site

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Abstract

The goal of this inventory was to begin making a list of medicinal plants present at the Finca Las Piedras site. As no inventory was present, the project began by reading around the subject, and collating information to create a list of possible species. Furthered by knowledge of onsite researchers and local workers, the Finca Las Piedras rainforest, food forest, plant nursery and aguajal were scouted for plants. The project resulted in a list of onsite plants with images taken on site; and a list of other species which could possibly be found at the site.

Introduction

Medicinal plants form an integral part of the immediate healthcare resources for the majority of the global population (Bennett, 1998). Rainforests, such as the Amazon in the Madre de Dios region of Peru, contain such an array of secondary plant compounds (Bennett, 1998) that the potential for discovering new pharmaceuticals and thereby improving the local economy of rural Peru is immense. Although an obvious shift towards Western pharmaceuticals is occurring in local and indigenous communities (Bussmann & Sharon, 2015), many indigenous communities still depend on medical plants for immediate and cheap relief of symptoms (Paniagua-Zambrana et al., 2015). Connecting local, historical knowledge of plants with current scientific methods could produce valuable pharmaceuticals, or at least increase knowledge of human pathology. Furthermore, if gathered with consideration of the local ecosystem, medicinal plants can form a part of a sustainable income for the local population, therefore the identification and description of local medicinal plants could aid in the development of a sustainable economy which does not irreversibly drain the resources of the rainforest. As the desirability of medicinal plants grows in the Western culture, given the perceived lesser side effects and many years of experience of use, it is important not only to preserve the knowledge of local communities, but also ensure that the communities are given a return on their participation (de Albuquerque et al., 2012). Opening up an economy and ensuring fair access to it from the people who first described the medicinal properties could be the benefit; as well as improving access to medicinal plants globally to emigrants e.g. access to *Erythroxylum coca* plants, which are under strict legal control in the developed world but form a mainstay of Peruvian and Bolivian herbal medicine (de Medeiros et al., 2011).

As the drug pipeline appears to be drying up globally, with the target-based approach seemingly producing fewer drugs

than anticipated, it appears counterintuitive not to look into treatments people have been using for thousands of years. This also allows for testing combinations of drugs which naturally occur together, to assess symbiotic action, reduction of side effects and other interactions, which may have been unknowingly exploited by locals and indigenous communities. Many of the most commonly used drugs in the current Westernised healthcare systems are plant derived – morphine, cardiac glycosides, caffeine and the newly appreciated cannabidiol, all originate in plants and have been used therapeutically throughout human history (Kricher, 2017). Perhaps the most unexploited and taboo use of plants is the hallucinogenic properties of plants such as *Banisteriopsis caapi* and *Psychotria viridis*, both widely used in the popular Ayahuasca drink, used in shamanic rituals of healing (Kilham, 2009). A detailed description of a healing ritual using ayahuasca is given in Desmarchelier et al. (1996), the authors suggesting a high prevalence of psychosomatic diseases in the population accounting for the efficacy of the hallucinogen. If true this could carry to other psychiatric disturbances, and hallucinogens have already proven efficacious in preliminary research in addiction. However, it is possible that these shamanic rituals and associated prejudices against indigenous communities led to the low interest of ethnobotanically described treatments, despite well described methodological experiments performed by traditional healers, who use clues ranging from smell and taste, to extent of herbivory and ecological habitat to estimate the therapeutic powers of plants (Bennett, 1998). An inventory of local plants can open doors to chemical and pharmaceutical testing of compounds, as well as controlled experiments of plant use, as expected by the Western scholar, to change the view of herbal medicines from archaic to efficacious. Promotion of this information can then also benefit local communities, as the knowledge of herbal remedies has been reported to vary between even neighbouring indigenous peoples (Lenaerts, 2006).

Therefore, the usefulness of creating an inventory of the medicinal plants at Finca las Piedra has multiple facets, from potentially benefitting local communities, to enhancing pharmaceutical knowledge more globally. Given the short time period for the study, lack of knowledge and experience of the researcher, as well as lack of immediately accessible resources, the main goal of the study is to increase knowledge and produce material which can be easily accessible to future researchers at the Finca las Piedras site.

Methods

The project will be completed by work both in the field, searching for plants, as well as by gathering the most information possible. The Finca las Piedras site is a secondary terra firme forest, with a local stream (aguajal) and a plant nursery maintained by on-site researchers. Gathering information occurred from ethnobotanical studies, books and locals which work at the site. Where possible a Latin name as well as a local name is given, along with a description of use and which symptoms the plant is used for. It should be noted that where illnesses are named, the treatment targets diseases whose symptoms resemble those named.

Further work was performed on walks through the rainforest on site, where specimens resembling those described were collected, as well as walks with locals where they identified plants they are familiar with, and whose use they can describe. The location of these were marked and pictures of any specimens taken and attached in the final product. Any description by the locals was noted. The

final document is unlikely to be an exhaustive list of medicinal plants in the area, nor would the author recommend self-experimentation using any of the found plants, unless the species is properly identified by a botanist and the user is well acquainted with the traditional mode of preparation.

Species found on site

1. *Mauritia flexuosa* locally Aguaje. Diacious plant, meaning both male and female trees exist. Studied in the phenology project, with a large number around the aguajal, can find them marked on the GPS. Female palms produce small red flowers. Fruits are brown and covered in scales to almost resemble dragon eggs. Oil of the seed is used for skincare. Medicinal use described by on-site researcher.

Figure 1: (a) close standing Aguaje palms; (b) leaf debris at the base of an Aguaje palm.

2. Local name Archo sacha, sp. Unknown. Grown in the nursery, produces little red berries. Used for external fungal infection. Use described by onsite researcher.

Figure 2: Archo sacha plants in the nursery.

3. *Bertholletia excelsa* locally Brazil nut. Monitored in the phenology project, marked on the GPS. Emerging tree, round big, heavy fruit. Sap is red and dries to black. Sap can be applied to burns (as described by onsite researcher); husks of seed pods can be brewed in water and the tea drank for stomach aches; tree bark can be boiled in water and the infusion drank for liver ailments (described at http://www.rain-tree.com/brazilnu.htm (online resource)).

4. *Aniba canelon* locally canalon (big cinnamon). A small tree grows by the other bathing platform, marked on the GPS. Leaves can be crushed, smell and taste distinctly of cinnamon. Bark can be brewed in tea for strengthening, or at times of general malaise. Occasionally brewed with coca leaves to better the taste of coca tea. Uses found at https://www.caminoverde.org/blog/2017/11/5/the-amazons-most-durable-timber (online resource).

Figure 3: Both Canalon leaves and branching pattern. Better images can be found in the seed collection project.

5. Locally Caña Caña, sp. Unknown. Taken for fever/general malaise. Stem is boiled in water, a sip is drank and the rest in bathed in. Use was described by an onsite worker who had grown up in this area and used this remedy. Near the entrance of the forest, leaves grow in a staircase up the stem. Blooms with a big red flower (dry in pictures)

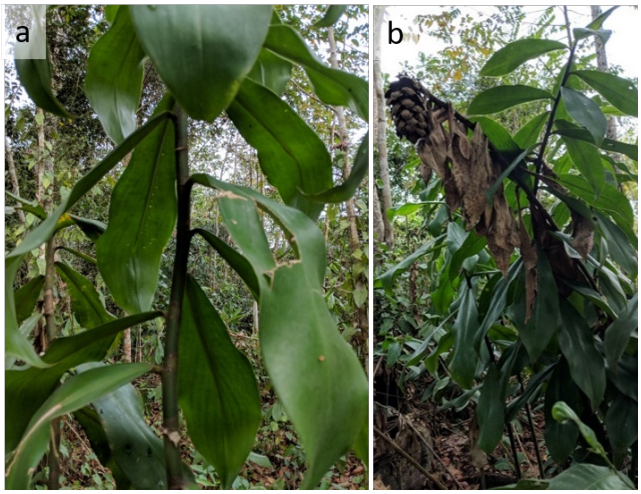

Figure 4: Both Caña Caña spiral staircase leafing pattern and a dead individual with a dried flower. Better images in the seed collection.

6. *Brunfelsia grandiflora* locally Chiricsananogo, in English often referred to as yesterday, today and tomorrow. Root boiled in water and infusion is drank for symptoms resembling a cold; also used in ayahuasca mixtures, all uses described by Desmarchelier et al. (1996). Genus can be found in the wild and food forest, but species is definitely planted in the nursery. Tagged by the butterfly team as a host plant.

Figure 5: Chiricsananogo growing in the nursery, still a sapling.

7. *Copaifera reticulata* locally Copaiba. Oil obtained from bark is taken orally for ulcers and digestive complaints. Oil is very potent so only a few drops should be used as could be lethal in larger quantities. On the lindero, marked, can be found on the plant list. Use described by a local worker who has used this treatment before.

8. *Pothomorphe peltat*e locally Hoja Santamaria. Leaves are ground and cooked in water, used in washes for external ulcers. Medical use described by Desmarchelier et al. (1996). Three specimens at least grow in the nursery as weeds, have big leaves on a small bush.

Figure 6: Hoja Santamartia growing in the nursery, note large round leaves palmeatly veined.

9. *Batocarpus amazonicus* locally Mashonaste. Stem sap is rubbed on external ulcers to provide analgesia (Desmarchelier et al., 1996). Grown in the nursery as well as in the wild – identify by a perfectly cylindrical trunk which has no branches for around 15m, and big, shallow, red roots. Latex is white and sticky.

Figure 7: Mashonaste root growing on main train, note deep burgundy to orange transition.

10. *Piper angustifolium/aduncum* locally as Matico. Leaves are boiled and infusion is taken orally for a number of varied diseases (Desmarchelier et al., 1996, Bussmann & Sharon, 2015). A number of species in this genus grow around the forest edge in the food forest, however identification is difficult. Nodes on stem and not overly fuzzy leaves should determine species.

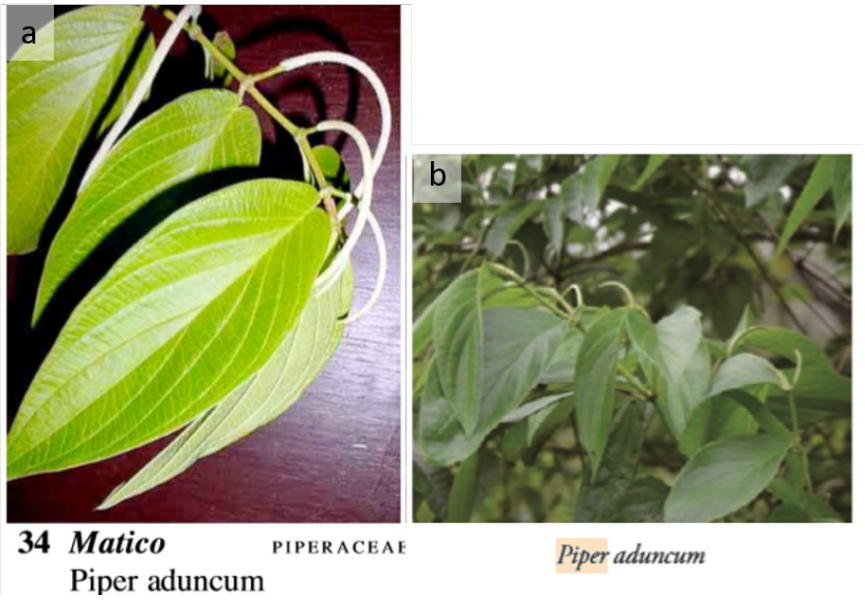

Figure 8: Examples of matico leaves, (a) adopted from Beltran & Benavente, (b) adopted from Bussmann & Sharon (2015).

11. *Euterpe precatoria* locally palma huasai. Roots are ground and mixed with water to treat anaemia, UTIs; followed with lots of water for kidney pain (Desmarchelier et al., 1996), (recollections of an onsite worker). Aerial roots are vibrantly red in wet season, when they are recommended to be used. Found almost everywhere in the forest and by the aguajal, tall palms with thin, spaced out leaflets on leaves.

Figure 9: Palma huasai vibrant red roots, picture from dry season when comparatively fewer are observed to be vibrant, possibly due to loss of moisture.

12. Locally known as Quina quina. Bark boiled in water, drank for diabetes and malaria (recollections of an onsite worker). Tagged on GPS, tall tree with bitter bark. Original source of anti-malarial medicine quinine.

13. *Dipterex micranthra* locally shihuahuaco. For arthritis boil bark with bee honey and drink for arthritis, as described by local worker. English – iron wood tree, canopy tree with large roots, grey/white bark. Marked on the GPS and a number can be found in the forest, one near the forest entrance.

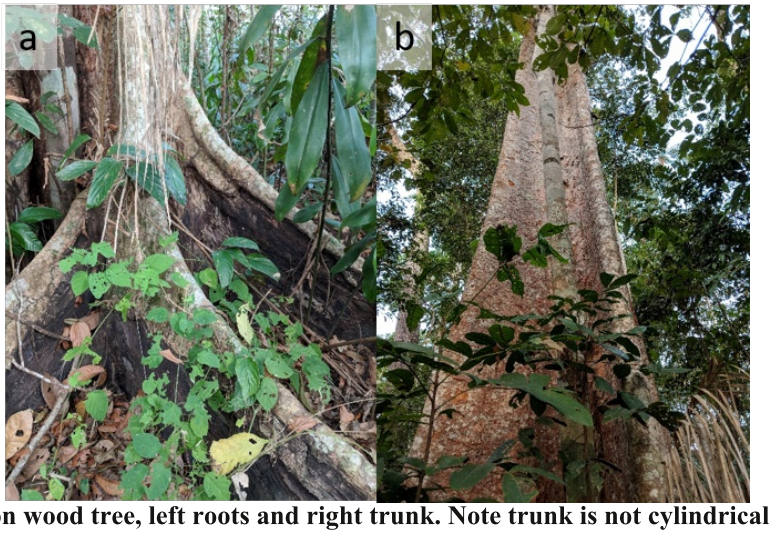

Figure 10: Iron wood tree, left roots and right trunk. Note trunk is not cylindrical and roots are large and begin above the ground. In the right picture the iron wood tree is in the back, behind the other smaller trunk.

14. *Uncaria guinanensis* locally Una de Gato. Used as an immune system stimulant, analgesic, and anti-inflammatory, from a number of online sources and Bussmann & Sharon (2015). Curved thorns on a wooden vine. Found in numerous places on site – at entrance of the forest, in the aguajal. Species identification has to be done before ensuring the medicinal species is present on site.

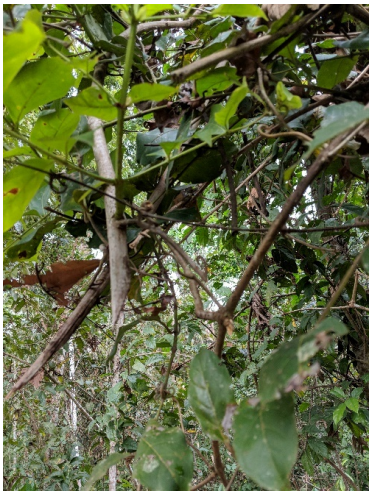

Figure 11: Una de Gato growing at the entrance of forest – upon closer inspection can see curved cat's claws on the stems.

15. *Oenacarpus batahua/mapora* locally ungurahui or sinamillo. Oil is used for haircare and fruit can be made into drinks (on site researcher knowledge). Three specimens are growing between phenology aguajes 2 and 3, big solitary palms, with large leaflets (as compared to other palms), which are spaced close together. Trunk has nodes – is not perfectly cylindrical.

Species found in Literature but not on site

1. *Abuta grandiflora* locally Abuta. Stem is ground and boiled, the infusion is taken orally for symptoms resembling tuberculosis. Also used as a contraceptive, boiling root and stems in water and drank warm (1 cup 3x per day) 3 days before and 3 days after the menstrual period. A liana. Use described by Desmarchelier et al. (1996) and Bussmann & Sharon (2015).

Abuta grandifolia

Figure 12: Abuta example picture adopted from Bussmann & Sharon (2015).

2. *Bixa orellana* locally Achiote. Used as an anti-inflammatory, either by consuming seeds (three at a time, as needed) or leaved boiled in water and a litre of infusion drank per day. A small Amazonian tree. Use described by Desmarchelier et al. (1996) and Bussmann & Sharon (2015).

Bixa orellana

Figure 13: Achiote example picture adopted from Bussmann & Sharon (2015).

3. *Banisteropsis caapi* locally Ayahuasca. Sections of stems boiled and macerate taken orally in healing rituals, active ingredients harmaline, harmine and tetrahydroharmaline act as reversible Monoamine Oxidase-A (MAO-A) inhibitors to produce hallucinations. Can be taken with other hallucinogens e.g. Psychotria Verdi (active ingredient DMT) to enhance the effects. Used in medicinal rituals, whereby shaman and the patients both take the macerate, to find out the cause of illness. Harmaline also acts as an anti-helminthic, possibly aided by the purgative actions of the mixture, which helps get rid of worm infestations. Use described by Lenaerts (2006).

Figure 14: Ayahuasca example pictures (dried and drawn) from online source, no referene provided.

4. *Gynerium sagittatum* locally cana agria/chonta. Leaves are ground, put into water and used in a bath for a variety of skin ailments. Pictured below. Use described by Desmarchelier et al. (1996) and Bussmann & Sharon (2015).

Gynerium sagittatum

Figure 15: Cana agria/chonta example picture adopted from Bussmann & Sharon (2015).

5. *Hura crepitans* locally Catawa. Latex is taken orally as a purgative; otherwise three seeds ground are mixed with a cup of oats as a laxative. Very strong so dosage has to be small. Use described by Desmarchelier et al. (1996) and Bussmann & Sharon (2015).

Hura crepitans

Figure 16: Catawa example picture adopted from Bussmann & Sharon (2015).

6. *Phyllantus niuri* locally Chancapiedra. Whole plant is boiled in water and the infusion is taken orally for kidney diseases, especially kidney stones. Use described by Desmarchelier et al. (1996) and Bussmann & Sharon (2015).

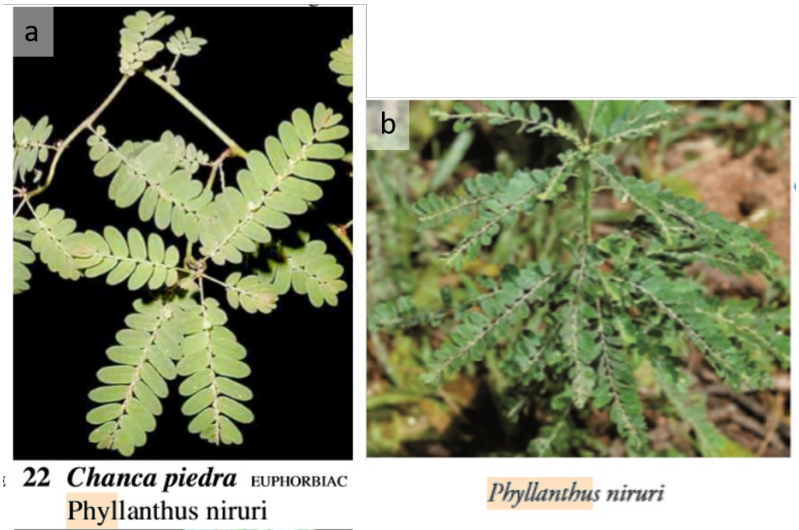

Figure 17: Chancapedra example pictures adopted from (a) Beltran & Benavente and (b) Bussmann & Sharon (2015)´.

7. Locally known as Charcot, sp. Unknown. Roots boiled in oil and cream applied to aching muscles for relief. Use described by tour guide at Tambopata Inn on the Tambopata River – could be a flood plain species.

8. Locally known as Cordoncillo, sp. Unknown. Leaves chewed to numb mouth for toothache; roots can be topically rubbed on skin to pre-empt stitches. Described and demonstrated by tour guide at Tambopata Inn on the Tambopata River.

9. *Psidium guajava* locally Guayaba. Leaves and roots boiled, taken orally for diarrhoea. Medical use described by Desmarchelier et al. (1996). Unlikely to be found growing wild as is usually farmed to produce and sell Guava fruit.

Psidium guajava

Figure 18: Guyaba example picture adopted from Bussmann & Sharon (2015).

10. *Clavariadelphus sp.* Locally as Hongo. Internal water of the mushroom is placed in ear to treat earaches (Desmarchelier et al., 1996).

11. *Jatropha macrantha* locally Huanarpo/Pinon blanco. Root is ground and boiled, taken orally as a depurative (Desmarchelier et al., 1996).

21 *Huanarpo* EUPHORBIACEAE
Jatropha macrantha

Figure 19: Huanarpo example picture adopted from Beltran & Benavente.

12. *Petivera alliacea* locally Mucura. Leaved boiled in water and the infusion drank for colds (Desmarchelier et al., 1996). Leaves have a strong smell.

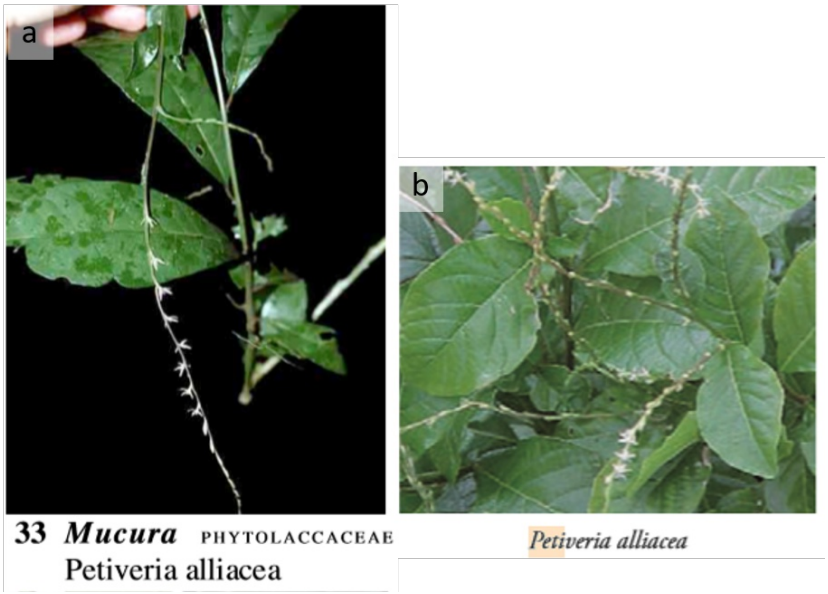

Figure 20: Mucura example picture adopted from (a) Beltran & Benavente and (b) Bussmann & Sharon (2015).

13. *Ficus insipida/maxima* colloquially Oje. Stem latex is taken orally as a purgative for parasitic infections (Desmarchelier et al., 1996).

Figure 21: Oje example picture adopted from Beltran & Benavente.

14. *Aspidosperma exelsa* locally Remo Caspi. Bark from trunk is chewed for toothaches (Desmarchelier et al., 1996).

15. *Chenopodium ambrosioides* locally Paicco. Leaves rubbed on body for external mycosis (Desmarchelier et al., 1996).

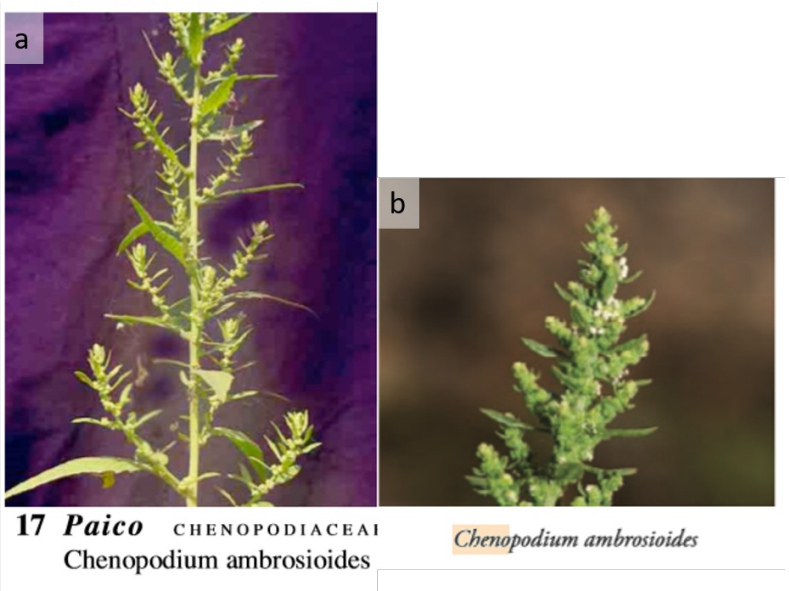

Figure 22: Paicco example pictureadopted from (a) Beltran & Benavente and (b) Bussmann & Sharon (2015).

16. *Plukentia volubilis* locally Sacha Inchi. Seed is eaten/oil from seed extracted and taken orally, used as a supplement/body strengthening.

17. *Draconium sp.* Locally Sacha jargon. Used to treat snake wounds, the whole plant is boiled and the macerate is used externally; also reported used in leishmaniasis (Desmarchelier et al., 1996).

18. *Nicotiana tabacum / rustica* locally tabaco. Leaves smoked in ayahuasca rituals/ other healing rituals by the shaman (Lenaerts, 2006).

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