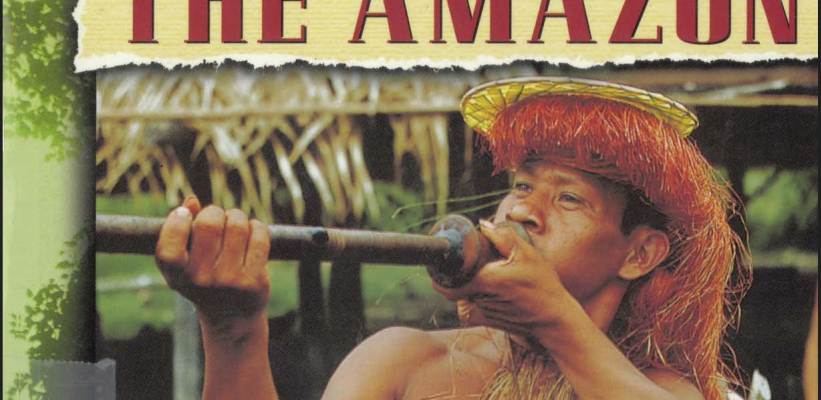
Fielding WORLDWIDE

The adventurer's guide to the mysteries of

THE AMAZON



A Scientist Speaks Out

By Professor M.C. Meyer

A passionate spokesman for the potential of Amazonian pharmacology, Professor Mario Christian Meyer provides a privileged look into the future potential of Amazonian plant life. Trained as a neuropsychiatrist at Université Paris VII, he is presently a guest professor at the University of Paris as well as Deputy Governor and senior adviser to the Governor of Amazonas for international business development. He is also a senior expert of scientific, technological and industrial cooperation in biotechnology and environmental sciences to leading industrial groups around the world. As a liaison between medicine, science and business, the Brazilian-born Meyer represents a new kind of Amazonian advocate—dedicated to utilizing the resources of the planet in a life-supporting, Earth-supporting capacity for all involved.

Capaiba/Balsam Copal

Copaifera langsdorfii Desf.
LEGUMINOSAE

The long-living balsam copal tree, a native of the *cerrado* and of tropical and subtropical forests, is easily recognized by its red bark. Its branches spread out in different directions, forming a wide and attractive crown. The leaves are characteristically compound, generally formed by six small folioles. In the summer its delicate pink flowers emanate an aroma very attractive to bees, which extract the nectar. In the fall its fruit becomes mature and releases dark seeds. Oil from this tree is popularly used in small doses as an antiblennorrhagic, a stimulant, and as medicine to treat bronchitis. The wood has a pale red duramen (heart) with dark grooves and is widely used in the naval industry and in luxury-cabinet making.

Chichá

Sterculia chica St. Hil.
STERCULIACAE

Parrots and apes can often be seen eating the fruits of the chichá tree. It grows along the ciliar forests and the rainforest, in the Northeast and in the states of Minas Gerais, Mato Grosso, São Paulo and Espirito Santo. In the forest it reaches about 30 meters in height (100 feet), with a trunk covered by smooth gray bark, featuring irregular grooves. It's supported by tabular roots, which provide a stable base. The large, duck-shaped leaves fall in the winter, leaving scars in the thick branches. The small flowers have no petals, but usually bloom from February-April, and sometimes continuously until June. Its capsule-like fruit is red and emerges between July and August, with a velvety texture and containing seven or eight black, oily, and edible seeds, similar to peanuts. Quite tasty, these seeds can be roasted or cooked for consumption.

Castaneira-do-Pará/Brazilian Nut

Bertholletia excelsa Humb. & Bonpl.
LECYTHIDACEAE

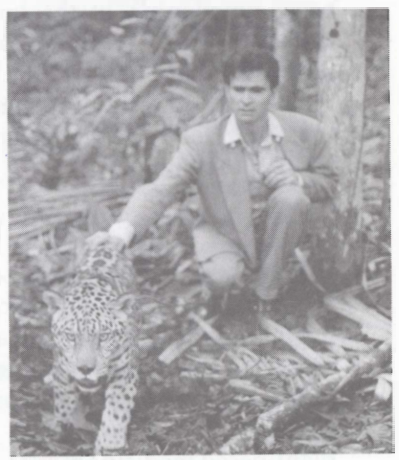
This exuberant tree reaches up to 50 meters (165 feet), way above the canopy of the forest. Its rich nut is considered one of the main food resources of the forest. Generally, the nuts are ripe from December-March. Its trunk is smooth and very long, with a wide spread-out crown, covered with simple, alternate leaves. Its white or white-ocra flowers have a rare and exotic beauty and emanate a pleasant aroma. This attracts bees, which extract nectar, helping the pollination process. The wood is used in housing and naval industries.

FUTURE OF THE FOREST

A Healing Pharmacy

by Professor M.C. Meyer

A passionate spokesman for the potential of Amazonian pharmacology, Professor Mario Christian Meyer provides a privileged look into the future potential of Amazonian plant life. Trained as a neuropsychiatrist at Université Paris VII, he is presently a guest professor at the University of Paris, as well as Deputy Governor and senior adviser to the Governor of Amazonas for international development of business. He is a senior expert of scientific, technological and industrial cooperation in biotechnology, as well as environmental sciences, to leading industrial groups around the world. As a liaison between medicine, science and business, the Brazilian-born Meyer represents a new kind of Amazonian advocate – dedicated to utilizing the resources of the planet in an Earth-supporting capacity for all involved.



Professor M.C. Meyer with Katrimara, his jaguar.

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The Amazon posses nearly two-thirds of the world's living plant and animal species and, by consequence, two-thirds of our planet's genetic heritage. For thousands of years Amazonian Indians have been well aware of the active therapeutic properties found in the colossal arsenal of jungle plants. Even prehistoric man used medicinal

plants. Researchers have detected pollen in medicinal levels of usage in bones dating as far back as 60,000 B.C. What we have come to discover is that prehistoric usage of medicinal plants have been related mainly to stimulants, diuretics and astringents. Aspirin, today one of the widest known and most consumed medicines in the world, was initially an extract of willow bark, from which the active principal 'salicine' was isolated, along with vitamins, glycosides, etc.

Since the beginning of the century, teams of the "Institut Pasteur" have traveled to Amazônia in order to extract natural substances from plants; these studies are becoming increasingly important today in the face of AIDS and other immunological catastrophes that are affecting our modern-day population. It was nearly 90 years ago that **Professor Charles Richet**, a French scientist, discovered in Amazônia a new vegetal toxin, the **crepitine**, an extract from the plant assaku, that allowed him to understand the basic functioning of the immunological mechanism of humans. Today, crepitine appears to be an important antivirus compound. In 1908 Richet brought back from Rio Purus (a tributary of the Amazon) the latex of this plant that the Indians used to 'poison' the river water to facilitate the capture of fish.

Biotech & Bio-industry

Plant-based medicines, once reserved mainly for shamans, folk medicinemen and herbalists, and at the beginning of the century, for artisanal biological-chemistry scientists (discovers of aspirin, for example), were later harnessed by pure chemists, who often replaced the plant-based molecules with synthetic molecules. Today, plant-based medicine moves away from pure chemists and synthetic transformation and onward to an original universe of high-tech production, based again upon biological models. From this movement has arisen the present-day advent of the BIO-industry, that is to say, any technology-oriented industry that uses biological systems, living organisms or derivatives to make or modify products or processes for specific use.

Given the rapid evolution in biotech research, one could conjecture that by the end of the century pharmaceutical labs will have even more useful techniques. This advanced

technology would permit the selection of new natural molecules of Amazonian origin, and verification of the active principals in a considerable number of plants. These plants are prescribed in the treatment of 75% of the illnesses of the planet – diseases treated even today, in many cases, by an artisanal plant-based therapy (traditional natural folk medicine, over-the-counter herbistry, etc.).

Technological, Economic & Environmental Challenges

Due to high research and development costs, pharmaceutical giants find themselves today confronted with a slowdown in the number of chemical innovations in pharmacology, reducing the discovery, on average, to only one new and profitable molecule per year among 10,000 synthetic molecules tested. In contrast, 20 years ago, 20 new molecules were being discovered per year.

Pharmaceutical companies are now particularly interested in research alternatives that traditional medicine and its "living" molecules can offer. For example, a leading US pharmaceutical company, interested in identification and selection of plants having new therapeutic properties, recently passed special agreements with **INBIO**, a Costa Rican institute and the government of Costa Rica. In return for a $1 million investment of technical assistance on the part of the American company, the Costa Rican side agreed to furnish 100 plant extracts and microorganisms, together with an exclusivity on the pharmacological analysis for a period of two years.

As a result of our anthropological and biotechnological work, major French pharmaceutical laboratories have committed themselves along the same lines for plant research in the Amazon, precipitating a landmark Franco-Amazonian government commitment without precedent. This cooperation has great potential for the establishment of joint ventures, as well as significant positive social economic repercussions for the Amazon region. This kind of rational exploitation of the Amazonian biodiversity, through bio-tech, is, in my opinion, the only pragmatic and realistic way to deal with delicate and crucial environmental problems. Indeed, it could be said that natural molecules from Amazonian flora and fauna have, in themselves, a direct and indirect economic value.

They serve as indirect models for new synthetic molecules and are even more active, more specific, and provoking fewer side effects than classical chemical medicines.

High-tech vs. Savage Mind

The contribution of natural molecules raises a crucial question as the century comes to an end. It concerns access to genetic resources and the "royalties for nature's know-how." This was a key point in the **Convention of Biodversity at the Summit** of Rio 1992, attended by 160 heads of state and numerous scientists, ecologists and activists.

In my opinion, the use of Amazonian Indian knowledge by First-World pharmaceutical companies requires some fundamental reflection. I have come to believe that there is an inherent cultural conflict between the American and Western scientists in their perceptions of their psychocultural identities.

In my own project, called the **Franco-Amazonian Project for Scientific Technological and Industrial Cooperation**, the cooperation between the Amerindians and high-tech scientists has demonstrated that we must give important consideration to the means and limits of their interaction to avoid a 'power struggle' between Indians and Western-thinking scientists. Indians who today come into contact with urban Amazonian centers, often enticed by money or too embarrassed to return to the tribe because of a failure at urbanization, are exploited as prostitutes, or fall under the influence of drug dealers or *garimpeiros* (gold miners), as well as being adversely affected by mercury pollution. Moreover, isolated native tribes that come into unsupervised conflict with outside influences are also at great psychological risks and have been known to suffer deeply from loss of roots, emotional orientation, intellectual dynamism, and even brain functions, resulting in a psycho-social form of schizophrenia. If those in the so-called 'civilized sector' continue to invade and exploit the forest without forethought to social, psychological and environmental consequences, tribal peoples, the true kings of the richest forest in the world, may easily become the "rubbish" of this cross-cultural conflict.

In the final analysis, the only way to safeguard tribal peoples from acculturation or even extermination is to respect their knowledge in a practical way by integrating their traditional technology and their "science of nature" into the development of modern society. The Indians, as scientists of nature, could be integrated into the labor force at a level where their skills and thousand-year-old traditions would be respected in a fairly balanced cooperation. Otherwise, the Amazonian Indian will become what they themselves fear most: an insignificant piece of a fossilized "wax museum" zoo.

Sacred & Secret 'New' Molecules

The ancient botanical knowledge of Indians, oftentimes characterized as sacred and secret, has from its initiation been associated with myths of longevity and youth through invoking the "gods of nature" or by cultivating the "magical" virtues of plants.

It is therefore not surprising that our analytical and structural chemical studies of these plants have shown the presence of powerful antioxidant and anti-free radicals in high concentration (such as various flavonoids of the rutaceaes family). Responsible for equalizing cellular metabolism, these plants contain important protective and regenerating properties for tissue; external tissue in the field of dermatology, by improving the quality of collagen and elastin, thereby acting against skin aging, as well as internal tissue; in the field of cardiology, where they have proven effective against rigidity of the arteries, as well as being highly beneficial to the vascular system. In the same Amazonian plant family, we have identified numerous plants, particularly rich in saponines, glycosides and terpenes – often associated with rare metals such as germanium, which according to unpublished Brazilian and Japanese studies, has strong reactions against cancerous tumors. Such is the case with a recently discovered molecule, hexacyclique nortriterpene, unknown until the present, which is reported to inhibit the growth of cancerous cells in vitro, according to 1986 research at Tokushima Bunri University in Japan.

Through the efforts of my collaboration with many Brazilian and French scientists, a large arsenal of vegetal hormones has recently been identified, which has proven

effective in regulating the human metabolism, notably diminishing the cholesterol level in the blood and increasing the coronary circulation. Stigmasterol and sitosterol are principally responsible; the latter has the power, among others, to increase the level of estrogen in the organism in a balanced manner, as well as playing an essential role in the regulation of the cellular aging process.

As scientists delve deeper into the hidden aspects of forest potential, they are finding that native legends often provide "sacred" clues into the vast potential of a species. For instance, according to legend, the well-known Amazonian plant **guaraná** was given to the Indians as a gift by the thunder god Tupan to help them fight against the evils of the bad spirit Juruparo. The plant was rediscovered by Europeans in 1669 as a result of the mission work of Superior Betendorf, a Jesuit priest, among two Amazonian tribespeople, the Andiras and the Saterés-Mawés. Throughout the centuries guaraná has been used by jungle inhabitants as a psychostimulant tonic, appetite suppressant, and anti-cramping compound, as well as an aphrodisiac when associated with an energetic neuromuscular tonic (family *olacaceae*). Today, all strata of the population consume guaraná in many forms (bark, powder, and as an additive to a popular Brazilian soft drink, among other forms). In the future, untapped usage of guaraná may include weight control as well as anti-cellulite combat, but at the present the research results remain industrial secrets.

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The entities involved in this research include the Universidade do Amazonas, Fundaçãi Oswaldo Cruz, INPA (Instituto Nacional de Pesquisa da Amazônia), EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria), and UTAM (Universidade Technologica do Amazonas, among others.

(Also see M.C. Meyer's other article starting on page 85, detailing his adventures with the Sateré-Mawé tribe.)

An Exotic Medicine Chest

by Professor M.C. Meyer

The richness of Amazonian biodiversity constitutes a double treasure for specialists of "natural medicine": first, the large variety of plants with therapeutic properties and

second, the great diversity of mammals natural extracting healing substances from these plants.

In response to the pressing need to discover new superior medicines in plant life in the face of growing epidemics like AIDS and other social and environmental illnesses, a new, exotic specialist has thus been inspired to arise within the scientific arena – the **zoopharmacologist**. These specialists study plants used by animals to treat their own illnesses (such as antibiotics) or to regulate certain vital biological functions, such as contraception.

For instance, among the uncountable varieties of monkeys in the southern region of the Amazonian forest, we find the **muriqui**, the biggest monkey of the Americas. Apparent masters at controlling their own population, the females manage to reduce their fertility, thanks to the ingestion of certain leaves rich in isoflavoids , which have a physiological effect similar to that of estrogen. Inversely, the same females have been found to ingest *'orelha de macaco'* (monkey's ear) , a vegetable rich in a steroid that facilitates fertility. Scientists have discovered that these females often tend to chew on this plant during times of ovulation, suggesting that they may have the firm intention to be fertilized.

Medicinal Plants

COPAIBA. The copaiba can be found in large amounts in the Amazon's *terra firme* regions. Rich in beta-caryophylene and copaene, its therapeutic property is antivirus and antipsoriasis. Its oil is anti-inflammatory, antirheumatic, and has other numerous healing properties. It's also used in cases of chronic varicose ulcerations and pharyngitis.

CRAJIRU. This is a type of creeping plant used as an anti-inflammatory. The dry leaves contain tannins, quinonas and alkaloids. The plant, often served as a tea, is used to counteract intestinal colic and uterine inflammation. Other therapeutic properties are used as an astringent and as a powerful anticheloid (to heal rough scar tissue). In Amazonas, silkworms fed crajiru leaves (rich in flavonoid pigment) produce red thread.

URUCU. The seeds of this plant, which contain carotenoid-like beta carotene (pro-vitamin A), have properties capable of increasing the pigmentation of fatty

tissue and thus making the skin resistant with natural coloration (it contains an excellent UVR filter, which acts as sunscreen). It is also a bio-insecticide, a cure and protection against insect bites. It can either be ingested as capsules or by cooking with it in powder form. For thousands of years Amerindians have used urucu for their body-painting rituals because of its bright color. They also mix the pulp, which surrounds the seeds, with the oil of Amazonian fish to make a cream that protects against the sun and insect bites.

The famous red dye "bixina" obtained from the fleshy red pulp inside the seed pods of "Urucu" (*Bix Orellana*), called annatto in English, is the principal sinew coloring used in most initiatory body paintings and is associated with such extraordinary uses as:

- Protective filter against the ultraviolet rays, which incisively strike the Indian skin exposed to the equatorial sun during the many hours spent fishing. Used internationally today in creams for tanning, solar products, and by the bigger multinationals for cosmetics.
- Powerful repellent and insecticide, utilized today by the majority of *selvicolas*, indigenous workers in the forest, who put the fresh red pulp directly on their face, hands, and arms and also apply it on various skin infections.
- Capillary treatment for the elasticity and brilliance of the hair.
- Food coloring for margarine, butter, cheese and other dairy products.
- Soft drink, when mixed with carbonated water.