

**INSTITUTE OF APPLIED RESEARCH IN SUSTAINABLE ECONOMIC
DEVELOPMENT-IPADES**

THE BIODIVERSITY OF MOLECULES

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The International Union of Pure and Applied Chemistry, in partnership with the United Nations Educational, Scientific and Cultural Organization (UNESCO), celebrate in 2011, the international year of chemistry. In Brazil, one of the activities the respect is the cycle of talks, from April to November, promoted by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) and the Brazilian Society of Chemistry, with the theme: Chemistry: our life, our future. The Brazil, among the many benefits that chemistry can provide for their development, must include the bioprospecting of molecules.

Biodiversity, a great Brazilian wealth, is usually associated with the diversity of plants, animals and microorganisms that inhabit the biomes of the country. However, there is a fourth genus of biodiversity that permeates all that natural heritage, are the molecules, i.e. the chemical diversity of biodiversity. Are these new products from molecules useful to humans, will emerge with the certificate of origin: Brazilian Industry. The diversity of the molecules is presented with high added value, that is, a scientific value that can become economical.

The pharmaceutical industry uses primarily synthetic molecules, approximately 80% of drugs that have this source. Aspirin, one of the best-selling drugs in the world, is completely synthetic. However, atorvastatin, used to control cholesterol, a sales success in the pharmaceutical industry, is a synthetic substance developed from a natural molecule. Is that the medicinal chemists and pharmacists are inspired on biodiversity to produce these complex substances. It is therefore important that this natural laboratory is maintained and studied, for this has to bioprospecting. This, understood as exploration and research resources resulting of the flora, fauna and microorganisms in order to identify active principles to obtain new products and processes with a view to marketing.

The bioprospecting in marine environment detected in snail *Conus magus*, who lives in the Red Sea and Indian Ocean, a substance used medically to a thousand times more potent than morphine, approved for clinical use in the United States in 2004. Brazil seems to expect from the future, when the subject is bioprospecting. There are a large number of species of plant in the *Myrtaceae* family in Brazilian biomes

whose molecules have not yet turned into products, while in other countries already serve as the basis for medicines. As an example of success that stimulates investment in this area has the whaling-herb (*Cordia verbenacea*), common in the Brazilian coast, used by fishermen on the coast of South and Southeast--is the raw material of the product from which originated the Acheflan cream, indicated for muscular pain and tendinitis. Is the first genuinely Brazilian, anti-inflammatory resulting partnerships between Universidade Federal de Santa Catarina, Universidade Federal de São Paulo, Universidade Estadual de Campinas, Pontifícia Universidade de Campinas and the Aché Pharmaceutical Laboratory. The active ingredient of the plant was discovered in 2001 and is called Alpha-humuleno. The survey suffered a major breakthrough with the discovery that the alpha-humuleno was the active ingredient responsible for the anti-inflammatory action and not the artemitina.

This example demonstrates that a lot of research and investment are required to achieve the objective sought, since the molecules do not bring leaflets highlighting the intended use. Rather, they are often toxic in nature, because nature produces these molecules to their own regulation; It produces no "thinking" on our health. Is that researchers need to study them and direct them to our goals.

However, the goal is not only finding new compounds to combat diseases that require treatment, but also improve what already exists: to reduce the use of solvents, energy costs and waste production during the manufacturing process, molecules for cosmetics etc.

To which these products appear in biodiversity, value-added, it is necessary, firstly, investment in knowledge. In this regard, the State of São Paulo has since 1999, with the Program in Characterization, Conservation, Restoration and Sustainable Use of Biodiversity in the State of São Paulo, better known as BIOTA-FAPESP. Is the first Brazilian scientific programme with regular investment in research in the natural sciences and ecology.

The biodiversity of the molecules also has a large field of scientific exploration and market in the areas of flavors and perfumes. The perfume brings emotions, seduces and, some say, arrives to the gods. The sweet indicates power to the palate and generates fuel that move lot of motorized fleet in Brazil.

In perfumes, Brazil has an icon, Phebo soaps made from 1924 by Portuguese who migrated south to the North in search of an aroma similar to that found in some British products. The main raw material was the rosewood (*Aniba rosaeodora* Ducke) Amazon tree. The tree, which has already been found throughout the Amazon rainforest, extension currently exists only in the region of Manaus and in certain areas

of difficult access. It is in the list of endangered species of the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA.

In addition to the reduction in the amount of plants available for cutting, linalool belongs to the family of substances that are present easily. For 50 tons of oil are produced, it is necessary the cut of about two thousand trees per year.

This species provides the industry's most coveted substance of fragrances, linalool, oil that serves as a raw material for the manufacture of the famous French perfume Chanel No. 5. Perfume created by Ernest Beaux, one of the greatest performers of all time, at the request of Coco Chanel. It is prepared with a mixture of sixty fragrances.

At that time, the study of molecules was the beginning of the path for the production of fragrances on an industrial scale. The Croatian chemist Leopold Ruzicka was a pioneer, which earned him the Nobel Prize for your area in 1939. In 1926, he had elucidated the structure of muscone, a substance extracted from deer muskrat 20 years earlier, widely used in perfumery.

What has advanced in the polls from sugars are various products such as food and supplies more synthesis with clean, sustainable, giving rise to the so-called "Green Chemistry". Forecasts indicate that in 2020 this chemistry should generate \$ 307 billion. The raw material is lacking, because 95% of the biomass produced by nature, about 200 billion tons per day, are carbohydrates, and the man uses only 5% of this total.

The chemistry of sucrose is so important that even has a name, *sucroquímica*. And must gain more importance as oil becomes more scarce, provided there is sufficient investment in research. We need to learn to do with this biomass everything we do with the oil. The fine chemicals will depend on the carbohydrates. And in this economy the chemistry Brazil should stand out.

For the biodiversity of the molecules increase their participation in the Brazilian economy two main aspects must be prioritized, encouraged and receive investments. The preservation of ecosystems which must count on more support from society. The study of species taxonomy to the industrial process of their active principles, which in turn depends on research centers, preferably on level excellence. So Brazil can preserve, know and appreciate this natural resource, increasing its contribution in the formation of national wealth.