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Amphibians: Why Preserve?

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Biodiversity conservation is guided by the transmission of the scientific knowledge, acquired over time on biological communities, to society and especially in our interest and personal involvement to carry out such action [1]. Lack of information about a particular taxonomic group, along with prejudices empirically transmitted across generations [2], contributes negatively to the biodiversity conservation. This occurs especially among the animals with "monstrous" appearance, as in the case of amphibians. These animals, generically repudiated in our society, are surrounded by myths and legends [2]. Furthermore, it are often considered as dangerous animals and closely related to witchcraft and black magic rituals. Thus, the human perception about the amphibians, partly determined by the beliefs related to these animals, is of fundamental importance from the viewpoint of conservation, since they are dead simply because they are considered dangerous and disgusting beings by the majority population [3]. This leads to an immediate elimination of any individual who approaches of the residences, whether in big cities or even in rural areas, contributing timidly, to the decline of local amphibian populations.

Recently, amphibian conservation has received considerable attention, especially after the information about the drastic reduction of many populations around the world [4]. Several reasons are cited for this decrease, among which highlights are the habitats destruction [5] climate change [6,7], introduction of exotic species [8], trafficking [9] and urban development [10]. Among herpetologists, the loss of amphibian diversity is a fact and the concern for conservation is well founded. However, among the lay population the importance of amphibians to nature and even to humans is not so widespread.

Despite its ugly appearance, amphibians are essential components in the ecological balance of natural ecosystems (terrestrial and aquatic), acting as key parts in the energy transfer between different levels of food chains [11]. They act both as predators, consuming and controlling the populations of insects and other invertebrates (including insects pests and disease vectors), or as prey, feeding different groups of animals, from invertebrates (spiders, crab, etc.,) to vertebrates (fish , reptiles, birds, mammals and certain species of amphibians) [12,13]. Numerous studies have reported the occurrence of amphibians in agroecological production systems [14-17], and the insect pests are important component from its diets [18]. Thus, the decline in amphibian populations may be directly linked to increase in the number of insects in large cities and of pests in rural areas.

Considering that, the amphibians have thin skin and highly permeable to gas exchange and other substances of the environment, and the occupation of aquatic and terrestrial habitats at different stages of life, amphibians are considered as sensitive bioindicators to various environmental factors [19]. A bioindicator is an organism or set of organisms whose vital functions are correlated so closely with certain environmental factors that permits characterize the state of the ecosystems and reveal as early as possible the natural or induced modifications [20]. Bioindicators are important tools for assessing the ecological integrity of the ecosystems.

Amphibians have strong sensitivity to changes in water quality [12,21]. Tadpoles have been used as indicators of water quality, due to its sensitivity to a wide variety of environmental disturbances in the water, such as lethal concentrations of organochlorine pesticides, heavy metals and other contaminants [22]. Once the amphibians are quite sensitive to small changes in microhabitats, such as moisture, temperature increase, solar radiation incidence and water availability for reproduction, this may affect its distribution and habitat use [12]. Most of the species also relates strongly with the vegetation next the water bodies, being extremely sensitive to any changes in the vegetation structure, which may represent the destruction of specific substrates [23,24]. For these reasons are considered as true thermometers of disturbance level and of environmental quality. Therefore, the increase or decline in amphibian populations in certain regions can provides information about the environmental health of biological communities in the region, and help predict the level of degradation that these communities are subjected.

In addition, amphibians are considered true biochemical laboratories, due to the amount of substances they manufacture. The amphibian skin secretions constitutes a set very broad and diverse of substances (biogenic amines, sterols, alkaloids, peptides, and proteins) with different biological activities (myo-, cardio, or neurotoxic, cholinomimetic, sympathomimetic, anesthetic, hemolytic, hallucinogenic, cytotoxic, and antibiotic activities) [25], which can be used for human and veterinary medicine in the treatment of opportunistic infections. The skin secretion produced by amphibians is part of the immune system against pathogens and includes the production and secretion of numerous peptides with antimicrobial activity [26,27].

The first peptides with antimicrobial activity were recorded in 1987, in the study of Zasloff [28], since then, more than 700 new antimicrobial peptides have been isolated and characterized from the skin secretion of several amphibian species. In 2005, for example, six antimicrobial peptides have been isolated from the skin secretions of *Phyllomedusa hypochondrialis* and *P. oreades*, tree frogs typical of the Brazilian Cerrado. These peptides were effective against various bacterial and protozoan pathogens, including *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Trypanosoma cruzi* [29]. Recently, eight new peptides were isolated from the skin secretion of *Leptodactylus pustulatus*, a leptodactylid popularly known as "Caçote" [30]. The results show antibacterial activity against bacteria (*E. coli*, *S. aureus*, *Klebsiella pneumoniae* and *Salmonella choleraesuis*) and low activity against human cells, important features for future pharmacological applications [30]. In this context, the research and

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characterization of new antimicrobial substances from the amphibian skin are quite valuable, especially by the possibility of developing more efficient drugs than those currently found on the market [31].

Besides these, several other utilities can be pointed out and credited to amphibians. Numerous researches in anatomy, muscle physiology, neurology and embryology were only made possible by the use of amphibians as model. However, such information, accumulated over decades, are restricted only to the scientific universe, where a small number of people can access them and use them consciously. In this case, it is fundamental the socialization of scientific knowledge, since the society can only understand the need for biodiversity conservation, especially of the amphibians, when knowing and understanding its real importance for everyone.

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