Chapter 1

Introductory Chapter: General Features of Reptiles and Amphibians

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1. Introduction

Reptiles and amphibians are ectothermic vertebrate animals with a wide distribution on the planet [1]. Although there are similarities between these biological groups, they also have many differences; however, both are studied under the same science, herpetology.

The reasons why herpetology studies these two groups (reptiles and amphibians) are not only exclusively based on taxonomy or phylogenetics (reptiles certainly originated from amphibians), but also in ecology, as the methods to study both reptiles and amphibians are in many cases similar [2].

Reptiles (Class Reptilia or Sauropsida) are organisms that have scales on the skin, are amniotes, which have colonized almost all terrestrial and marine environments, originated in the Carboniferous from the amphibians, they have a tricameral or tetracameral (crocodiles) heart, are phylogenetically related to birds (these arose from reptiles), ectotherms, and are characterized by being very efficient in the use of energy. Currently, there are four orders of reptiles with living representatives: Testudines (turtles), Squamata (snakes and lizards), Crocodilia (crocodiles, alligators, and gharials), and Sphenodontia or Rhynchocephalia (tuataras), of which there are only two species in New Zealand [3].

Amphibians (Class Amphibia), are characterized by having a naked skin, without scales, hair, or feathers, are ectotherms, anamniotas, have a tricameral heart, with three possible types of breathing (pulmonary, branchial, and cutaneous), and which are the only group of vertebrates that undergo metamorphosis, besides presenting some neotenic organisms. They originated in the Devonian from fish with lobed fins (Sarcopterygii). They have colonized almost all terrestrial (except Antarctic) and freshwater environments. Currently, there are three orders of amphibians with living representatives: Anura or Salientia (frogs and toads), Urodela or

Caudata (tritons and salamanders), and Gymnophiona or Apoda (caecilians). It is the group of vertebrates that proportionally has the highest number of endangered species [3–7].

Currently, both amphibians and reptiles face serious threats that place them at risk of disappearing. These threats include habitat loss, climate change, pollution, invasive species, illegal trade of species, emerging diseases, myths, and cultural factors [3, 8–10].

Conservation strategies for amphibians and reptiles, as for other biological groups, are very diverse and will depend on the particular threats that each site or species has. Among the most important strategies for the conservation of herpetofauna, we can mention the conservation of habitat, decree-protected natural areas and biological corridors, an increase of knowledge about herpetofaunal diversity through listings or inventories, deepening of research on their ecology of populations and communities, participation in trophic networks, and interactions with other organisms. Other strategies are to carry out reintroduction, introduction and increase programs, avoid or minimize pollution, monitor diseases, control the illegal trafficking of species, avoid the introduction of exotic species, and environmental education where respect and care of these living beings are promoted [3, 11].

Reptiles and amphibians, like other organisms, are bioindicators of environmental health, because when there are diseases of an epidemic nature, anomalies in more than 5% of the population, population declines or extinction of species, both locally and globally, we must consider that probably some anthropogenic factor is causing these effects, affecting not only amphibians and reptiles but the environment in general [12, 13].

Another important aspect is the use of reptiles and amphibians as models of research in experimental biology and biomedicine, since areas such as embryology (developmental biology), biology and regenerative medicine, ecotoxicology, endocrinology, and physiology have been greatly favored by the use of these animals in the laboratory [14, 15].

Also, reptiles and amphibians have been used as a source of food (frog legs, crocodile, turtle, snake, and iguana meat), as a source for making accessories or clothing (crocodile and snake skin, tortoiseshell), and as a source of medicines (bufotoxin, bufotenin, and antivenom).

As we can see, reptiles and amphibians have always been of great importance to society, so it is our responsibility to conserve them today and to ensure that these biological groups continue to exist in the future.

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