

HERPETOLOGY

by I. S. Darevskii

From Chapter Nine, Vertebrate Zoology, in Fifty
Years of Soviet Science and Technology, Moscow,
1967; pp. 245-249

Translation submitted by George Jacobs

Edited by
George Zug and James A. Peters

SMITHSONIAN HERPETOLOGICAL INFORMATION SERVICES

1970

Additional copies available from:

Division of Reptiles and Amphibians
United States National Museum of Natural History
Washington, D. C. 20560

Interest has increased in the past ten years in the study of our native amphibian and reptilian fauna. Current works in this area represent a continuation of the traditional herpetological research of Russian zoologists of the pre-revolutionary period, characterized by the three-volume monograph of A. M. Nikol'skiy, "Reptiles and Amphibians" (1915-1918), from the series "Fauna of Russia". This basic summation, however, demonstrated an obvious lack of data on our native herpetofauna, especially with regard to its ecology.

By the end of the 20's the basic direction of our herpetological research was more or less clearly determined, i.e., faunistic research and, closely related to it, work on classification and zoogeography, the study of the mode of life of the separate species and morphological-ecological research, all undergoing further development in subsequent decades. In addition, at the present time the question of the study of amphibians and reptiles as intermediate and reservoir hosts for some parasites of man and useful animals has become more urgent, and the study of poisonous snakes as producers of poisons has found growing applicability in our pharmaceutical industry.

Beginning in the 20's and 30's there was a broad flowering of faunistic research embracing the whole of the territory of the Union, which assisted in pinning down the geographic distribution of many species of amphibian and reptile (see the collected articles of S. A. Chernov, 1945, and of P. V. Terent'yev, 1957).

For a long time and most thoroughly the territory of the European part of the USSR had been covered in the herpetological sense. More than one hundred special works had been dedicated to the distribution and in part to the ecology of the species found there.

The rich amphibian and reptilian fauna of the Caucasus has repeatedly attracted the attention of our herpetologists. Reports and private studies have been published on the herpetofauna of Armenia, Azerbaidjan, Georgia, Dagestan and other regions of the Caucasus and Trans-caucasus. A great contribution has been made by Soviet experts toward the study of the extremely interesting herpetofauna of Kazakhstan and Central Asia. The latter was made possible as a result of the increase of native cadres of zoologists and the activity of the zoological institutes of the republican academies. Much research has also been conducted on the herpetofauna of Siberia and the Far East.

A series of varieties, including several new ones in the study of lizard species and sub-species, were first recorded in our country. While A. M. Nikol'skiy reported only 23 species of amphibian and 127 species of reptile, at the present time in the USSR 33 of the former and 132 of the latter are known.

The distribution of several rare species of lizard and snake was examined, only 1-2 specimens of which had earlier been identified, and many of which were discovered far beyond the limits of the boundaries of their previously known habitats. It was not excluded that some of these findings, especially in the southern regions of the USSR, resulted as a consequence of the generally observed warming of the climate and subsequent expansion of the habitat of the heat-loving varieties toward the north.

The basic results of the aforementioned increased faunistic research and questions of the formation of herpetofauna of the many natural zones of the USSR are reflected in relevant sections of the five-volume work - "The animal world of the USSR", compiled by the Zoological Institute of the Academy of Sciences of the USSR (1936-1958).

It should be noted that along with their study of native fauna Soviet experts also devoted part of their attention to the herpetofauna of some foreign countries (see, for example, A. G. Bannikov, 1958).

With the usual effect of the accumulation of knowledge concerning the distribution of amphibians and reptiles, a broadening of the research in the field of taxonomy has taken place, which we are even now, however, not developing sufficiently. Primarily, such research has had the task of defining the status of unclear areas in the systematic relationship of groups, i.e., the green frog (*Rana*), the round-headed lizard (*Phrynocephalus*), or the Colubridae (adder) snake (*Eirenis*). In recent times the attention of the taxonomist-herpetologist has been drawn more and more to questions of geographic and population variations of the distinct varieties. Thus P. V. Terent'yev (1957) came to the conclusion that many taxonomic indicators concerning amphibians, considered constant, consist in actuality of a stage in a series of gradual changes now known as clinal variation. Terent'yev even theorized that, in many cases when studying geographic variations, one must renounce the concept of sub-species. S. A. Chernov has published a series of articles on the classification of the various genera of snake of our fauna.

A small number of research projects on zoogeography are being conducted principally on the clarification of the genesis of the herpetological fauna of various regions of the USSR, particularly Central Asia, the Caucasus and Crimea. In the course of these projects attempts are being made to explain in the light of paleogeographic data the abrupt breaking-out from the habitat by some widely distributed species of reptiles. Thus, S. A. Chernov (1954) explained the distribution break-out of some species of lizard and snake in the northern Caspian Sea area by the fluctuation of the latter body during the Quaternary period. I. S. Darevskiy (1959) demonstrated the possibility of the penetration into the Caucasus of the series of Turan (Central Asian)

elements of herpetofauna by means of a dry-land bridge, which at one time united the Apsheronkiy and Krasnovodskiy Peninsulas. The problem of the influence of the glacial period on geographic variability was examined by Terent'yev (1948). The 1949 book by Terent'yev and Chernov presents a zoogeographic outline of all of our native herpetofauna.

A significant place among the works of the Soviet herpetologists is occupied by the study of the biology of amphibians and reptiles, during which much work was done relating to their nutrition. Following the well-known research of N. V. Krasavets (1945-51), dozens of articles have been written on the subject, analyzing the qualitative and quantitative side of the eating habits of many species. In particular, it was shown that there was no really significant selective capability in the feeding habits of the majority of the lizards studied, i.e., the qualitative composition of their food depended in the first place on the makeup of the entomofauna in the biocoenosis, changing relative to the season of the year. Secondly, the nature of the food intake of many species of lizard show a gradual adjustment of eating habits to the consumption of particular types of output during the periods when the latter are most plentiful. In addition, the positive role of the lizard as a destroyer of harmful insects was also clarified. It should be stated here, however, that the broad conclusions drawn by some authors as to the "helpful" or "harmful" roles of one or another reptile in the majority of cases are very artificial, inasmuch as their evaluations are based only on an analysis of the contents of the stomach, completely ignoring either the biomass and the number of living things abroad serving as food for the reptile, or the strength and level of the energy metabolism of the predator itself. Some conclusions are expected from a parallel study of the availability of a specific food supply for the predator and his hunting area.

Data were received from a fishing industry study of frogs and water snakes, and what was of special interest was the fact that there is a lack of food competition between the young of amphibians and young fish.

In recent years for many species of amphibian and reptile the time of gonadal development, the duration of the incubation period, the number of eggs in the clutch or the number of young in the litter, the time of the onset of sexual maturity, etc., have been determined. A portionality (sic) of the clutch of a series of arid and semi-arid lizards was discovered, and the existence in some of these of a second, autumnal peak in gonadal development, accompanied by a renewal of sexual activity in the Fall. During a parallel study of the seasonal dynamics of the fatty body and the gonad of the lizard, a connection between the nature of nutrition and reproduction was established.

New in principle for reptiles and higher vertebrates in general was the discovery of normal parthenogenic reproduction, and related to it polyploids in some Caucasian rock lizards of the polymorphic species - *Lacerta saxicola*. Many problems, such as the dynamics of numbers, seasonal and daily migrations, "homing instinct", individual dwelling areas, alarm procedure, growth, age and some other aspects of amphibians and reptiles are still not being studied sufficiently. A continuation is necessary of the work begun by A. A. Sergejev on body temperature and thermoregulation in reptiles.

The study of the dynamics of the development and morphology of amphibians was introduced in our country primarily in the work of I. I. Schmalgauzen and his school, in significant part collected in his monograph "The Genesis of Terrestrial Vertebrates" (1964). The study of the phylogeny of present-day lizards on the basis of an analysis of the musculature of the extremities is being successfully carried forward by V. B. Sukhanov at the Paleontological Institute of the Academy of Sciences of the USSR, which has made some interesting additions to the classical scheme of Kemp. He has done original research on the locomotion of lizards and has clarified the role of the latter in the formation of the system of movement of terrestrial vertebrates in general. To the functional morphology of reptiles is dedicated several works of I. S. Darevskiy, who first reported, in particular, on the skin glands of lizards and explained some of the principles of the evolution of the concrescence of the eyelid in the *Lacertae* and *Scincidae*.

The biomechanics of reptilian armor has been studied by L. I. Khozatskiy (1948-1964).

Numerous works on the fossil types of amphibians and reptiles discovered on the territory of the USSR are collected in a volume devoted to them, i.e., "The Fundamentals of Paleontology (1964)".

The bases for the study of poisonous animals and their poisons were already established in our country in the first years of the Soviet era by Ye. N. Pavloskiy. This lead has been carried forward with success (Bogdanov, 1965). Work on the study of poisonous snakes, the biochemistry and toxicology of their poisons has been effectively conducted primarily in the Institute of Zoology and Parasitology of the Academy of Sciences of the Uzbek SSR. Here were developed the optimal conditions for the maintenance of poisonous snakes in nursery conditions, which noticeably increased the production of snake poisons. Several studies of this institute were published in the collection "Questions of Herpetology and the Toxicology of Snake Poisons (1966)". Our national pharmacological industry has done well in the production of the requisite anti-snakebite serums and other medicinal preparations, for the production of which the poisons of many types of snake of our native fauna were used.

Amphibians and reptiles are apt subjects for the numerous research projects in the fields of physiology, biochemistry and cytology, particularly in the fine work of B. P. Ushakov and his colleagues on the thermostability of the cells and proteins of amphibians and lizards.

In prospect for Soviet herpetology is a broad field of activity in the area of each of the aforementioned categories. In the Far East and the southern regions of Central Asia we can still anticipate the discovery of new species of native fauna. On the agenda in the field of taxonomy have been placed the study of intra-specific and population variability of a growing number of varieties and the formation of objective phylogenetic systems. A complete review and many "hard jobs" are ahead involving the taxonomic relationships of groups, i.e., the round-head and *Eremias* among the lizards. A broadening of ecological research is needed, especially work in the field of population ecology with the application of morphological, physiological, biochemical and other modern methods. Also necessary is the study of the biocoenotic role of amphibians and reptiles, and an examination of the ecological and physiological differences of closely related species living in the same biotype. Much interesting and primarily new material is expected as well from morpho-ecological research. The use of amphibians and reptiles as biological models during research in the field of bionics is also anticipated. For many reasons both classes of animal are also especially well suited for the study of variety-generation and questions of species.

Our national herpetology has published a series of monographs, recognized even at home for their broad scope. The "Guide to Reptiles and Amphibians" of P. V. Terent'yev and S. A. Chernov, the third edition of which (1949) was translated into English, is a comprehensive summary of the data on classification, distribution and the mode of life in the amphibians and reptiles of the USSR. The monograph of P. V. Terent'yev, "The Frog (1956)" has become a reference book for Soviet herpetology. His "Herpetology (1961)" was the first textbook of world herpetology.

In the last two decades alone in our country four doctoral and fifteen master's dissertations on herpetological themes have been successfully defended. Corresponding subjects are ever more in evidence in the scientific zoological institutes and the departments of the Institutes of Higher Learning (VUZ).

In 1964 in Leningrad the First, and in 1966 the Second All-Union Herpetological Conferences were convened, gathering together many participants from the various ends of the Earth. The conferences determined and then discussed the course of further development of herpetological research in our country.