

GRIGORE ANTIPA (1867-1944) THE FOUNDER OF ECOLOGICAL HYDROBIOLOGY

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Abstract. Through culture, erudition, work capacity, original research, and practical achievements, Grigore Antipa represents one of the most important Romanian personalities. His theoretical and practical scientific work promoted him as a scientist, a genius personality in the field of aquatic ecology, and a dedicated organizer of the natural sciences museums.

Keywords: Grigore Antipa, scientist, ecological hydrobiology.

Rezumat. Grigore Antipa (1867-1944) fondatorul hidrobiologiei ecologice. Prin cultură, erudiție, putere de muncă, prin cercetările sale originale și realizările practice, Grigore Antipa se înscrie în panoplia celor mai de seamă oameni ai României. Opera sa științifică teoretică și practică l-a consacrat ca savant, personalitate de geniu în domeniul ecologiei acvatice și organizării muzeelor de istorie naturală.

Cuvinte cheie: Grigore Antipa, om de știință, hidrobiologie ecologică.



Most specialists consider that Grigore Antipa is the founder of ecology in Romania. This genial researcher and thinker, studying the Danube and its floodplain, the Delta and the Black Sea, understands and explains the fundamental laws that govern the supra-individual systems of organization of living matter (populations, biocoenoses) integrated in its abiotic environment. He discovers the automatic auto-regulation process through reverse, negative connection within ecosystems, the mechanism of biological productivity, the organization and functioning of plant and animal populations of the biocoenoses (BREZEANU & CIOBOIU, 2010).

He underlines that the biocoenosis represents a universal form of organization of the organisms emphasizing that *“no animal or vegetal organism can live an isolated life and has to be part, together with other organisms, of a biological association of many species – the biocoenosis – where each species is represented by a certain number of individuals”*.

Through culture, eruditions, work capacity, original research and practical achievements, Grigore Antipa represents one of the most important Romanian personalities. The academician Mihai Băcescu, one of his well-known disciples and successors said: *“Antipa was a forerunner, a pioneer not only of the Romanian science, but of the universal science”* (BĂCESCU & MARINESCU, 1979). One of Antipa's contemporaries and admirers, the academician professor Ludovic Mrazec, in a detailed analysis of the scientist's work delivered at the Romanian Academy in 1937, on the occasion of his 70 years anniversary mentioned: *“We consider Antipa's work one of the greatest conquests in the field of hydrobiology, a starting point for the biology and economy of the Lower Danube and the Black Sea”*.

It is significant what Constantin Meisner, an honor member of the Academy, said about the scientist on the same occasion: *“..... an almost unique fact, one of our country's sons worked under the auspices of three great sovereigns (Carol the 1st, Ferdinand the 1st, Carol the 2nd) for almost 50 years and he was ceaselessly appreciated with the same kindness and benevolence by each of them”*.

Praised during his life by great cultural and scientific personalities from our country and not only, Grigore Antipa is permanently present in the consciousness of the researchers, teachers, and students, hydrology experts, fish breeders, economists, sociologists etc.

A great hydrobiologist expert, Antipa was also remarked, through his work, as a great economist and sociologist, as well.

Antipa's name is closely related to the greatest Museum of Natural History from our country and Europe; the scientific vision and the way the museum is organized are his work entirely.

An important stage in the scientist's life and further development is the one referring to his studies: we mention here the almost eight years (1885-1892) spent in Germany at Jena, in the laboratories of Professor Ernst Haeckel, a famous scientific personality, an advocate of the evolutionist conception. Under Haeckel's coordination, in 1891, Grigore Antipa sustained his PhD thesis receiving *“summa cum laude”*.

Coming back home, the young Antipa has the opportunity to present to king Carol the 1st a scientific notification regarding the necessity of developing a national pisciculture in Romania. Antipa had fundamental knowledge about a field he would soon become a master of.

In 1893, he was named director of the Museum of Natural History from Bucharest and general manager of the state fisheries. Under such circumstances, he started his great journey in science, studying and discovering the secrets of the Danube, its floodplain, the Delta, and the Black Sea.

Antipa would soon realize that, in Romania at the time, there was no scientific and technical conception regarding the best way of capitalizing these vast territories. Starting from this situation, he would methodically and scientifically approach the relations among the Danube, its floodplain, the Delta, and the Black Sea. He studied and emphasized the mechanisms of biological and piscicultural production explaining the dynamics of the biological processes according to the seasonal hydrological regime of the river. Knowing the flooding mechanism and the mechanism of biological productivity and production, Grigore Antipa scientifically proved that the floodplain may produce and become the most important region of the country (BÂRCA & BĂCESCU, 1969; NEGREA & NEGREA, 1975).

The large permanent lakes, he used to say, are characterized by an increased biological production that ensures favourable conditions for obtaining large fish quantities; shallow areas where water remain for a certain period of time, may be harnessed for pisciculture; the fields that are not flooded for long periods may be used as pasture lands, while the higher ones, which are rarely flooded, may be protected by dykes and used in agriculture.

This was the conception of the great scientist that demonstrated how a territory of over 400,000 ha could be managed to be profitable for the country; however, there were numerous opinions and high pressure for transforming this large and rich floodplain in agricultural fields. Antipa was a clear opponent of such solutions.

In his work, *“The Danube’s floodplain – present state and means for its capitalization”*, published in 1910, he emphasized that: *“The dyking of the Danube would trigger inestimable consequences as the great pools make up an organic entity with the river and their separation would transform them into unproductive marshes”* and, further more, he underlines *“To get the pools dry without replacing them with other humidity sources would bring to a disequilibrium in the economy of nature that may have dangerous effects on the future of agriculture, as well as, on the climate of the region and everything else related to it”*.

Unfortunately, later on, Grigore Antipa’s ideas were not taken into account. The dyking of the river and the disappearance of its floodplain ended up with what the great scientist had forecast – ecological disequilibrium and economic loss (ANTIPA, 1921).

The research regarding the Danube Delta represented one of the scientist’s greatest preoccupations. Based on his huge understanding capacity, he deciphered the natural mechanisms that led to the development of the delta, to the formation and diversification of the types of ecosystems. He underlined the role of the hydrodynamic factors of the sea and the Danube in alluvia transport, formation of levees, islets, and lakes in the Danube Delta. But, most of all, he underlined the importance of the biological-ecological factors in the formation and evolution of the Delta.

In his work *“Scientific and economic issues regarding the Danube Delta”*, Antipa (1912) emphasized *“... the further development of the Delta as we see it today, with all its landforms and component elements, is due to the shape and general direction of the coast line, sea waves and currents, dominant winds, nature of the estuary bottom, fluvial current and the alluvia it carries in suspension, water salinity, vegetation ...”*. To this last factor – vegetation – Antipa pays a great deal of attention as an essential element in the formation of the types of ecosystems characteristic to the Delta, minutely describing the formation of the reed floating islands and their importance for the evolution of the Delta (ANTIPA 1894, 1895).

On the basis of his own research, Antipa established the principles and methodologies for increasing biological and piscicultural production and productivity of the lakes, floodplain, and the Delta. He showed that a high biological and piscicultural production of the lakes located within the Delta and the floodplain could be ensured only if there they were supplied with fresh water from the Danube. Consequently, at his initiative, in 1907, it was built Dunavăț canal that links Razelm lake and Sf. Gheorghe branch and, then, in 1913, Razelm - Babadag canal. Thus, by regulating the hydrological regime of these ecosystems the structure of the planktonic and benthonic biocoenoses modified, the biological production and productivity of Razelm lake increase, and the piscicultural production reached 3,600,000 kg / year from 380,000 kg / year in just 3 or 4 years (ANTIPA, 1907).

As founder of the ecological hydrobiology, one of the scientist’s preoccupations was fish biology and taxonomy. One of his important works is *“Ichthyologic fauna of Romania”* published in 1909. Besides rendering the morphologic characters and classifying fish from taxonomic point of view, the work presents data related to the ecology of species, migration causes, inter-relations between structure of biocoenoses and nutrition, reproduction and development. The presented sketches made *“Ichthyologic fauna of Romania”* one of the most beautiful of Antipa’s works.

Oceanographic activity was also a field successfully approached. His work *“The Black Sea”* is a work that proves a minute knowledge of the specific features of the Black Sea. Finished in 1936, the book was published in 1941. Antipa explained the delay as it follows *“... too many urgent works, the elaboration of numerous law projects did not allow me to check the manuscript”*.

“The Black Sea” was intended to be a two-part monograph. Unfortunately, he did not have time to accomplish the work as he had intended to. The first part comprises the oceanology, bionomy, and general biology, while the second part referred to the ichthyofauna of the Black Sea. Through the contents of this work, Antipa proves a profound knowledge of the features of the Black Sea. He emphasizes that *“the physical environment with its agents”* triggered the structural and functional characteristics of the marine biocoenoses, the way the environment particularities transformed, modelled the structure of the biocoenoses *“in such a way that different species would correspond to general and specific requirements imposed by bionomic laws of the biotopes”*.

In 1932, he organizes the Bio-oceanographic Institute from Constanța, which will become the Piscicultural Research Station and then, "The National Institute for Marine Research and Development Grigore Antipa".

Grigore Antipa's theoretical and practical scientific work made him a great scientist, a genius personality of science (MOTAȘ, 1961; PAUCĂ, 1985; PORA & MARINESCU, 1975).

In his book "*Following Grigore Antipa*", he underlines "*Posteriority, implacable, but impartial judge, took over his work and developed through his worthy successors: He remained – both nationally and internationally, a great scientist, a forerunner*" (NEGREA, 1990).

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