

SELECTIONS FROM THE WRITINGS OF AND ABOUT THE ROMANIAN SCIENTIST GRIGORE ANTIPA

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Abstract: Grigore Antipa (1867–1944) is one of the most prestigious scientists of Romania. Together with Emil Racoviță and Ioan Borcea, he is a founder of the national biological oceanography. A naturalist, biologist, zoologist, ichthyologist, ecologist, oceanolo-grapher, doctor in biological sciences, university professor, full member of the Romanian Academy. Founder of the Romanian School of hydrobiology and ichthyology. Author of *The Black Sea* monograph (1941). Founder and director of the National Museum of Natural History (Bucharest). Protector of the Bio-oceanographic Institute (Constanța) and of a Marine Biological Station (Caliacra). Organizer, general director and inspector general of the State Fisheries. Chairman of the Steering Committee of PARID Administration. Expert adviser to the European Danube Commission. National Delegate, Vice President and Rapporteur for the entire Eastern Mediterranean: the Black Sea, the Sea of Marmara and the Aegean Sea in the International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM). A member of the Oceanographic Institute of Paris. His name has crossed the borders of his country of origin, being recognized as a scientist of European prominence.

Keywords: Grigore Antipa, Danube, Danube Delta, Black Sea, Romania, Romanian coast, oceanography, marine fisheries, museology.

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It is never exaggerated to reproduce or to resume in the contemporary informational circuit significant biographical aspects and considerations related to the work of the great personalities of Romanian science. They have deeply marked their own field of expertise, as scholars, educators, people of culture and patriots. They are also always reasons of professional inspiration in order to deepen and expand the field concerned and to generate possible new ideas, from the point of view of extending and completing those already achieved by the precursors.

One of these multilateral personalities is the Darwinian, biologist Grigore Antipa, who was born in Botoșani on November 27, 1867 and died in Bucharest on March 9, 1944 (Fig. 1). He was the disciple of the famous professors P. Poni, G. Cobălcescu, A.D. Xenopol, P. Missir and ecology creator E. Haeckel, as a student at Jena in Germany. A specialist in Romania's ichthyofauna (Antipa, 1909). Initiator of indigenous research on the Danube and the Danube Delta (Antipa 2011a). Organizer of the first Romanian research expedition, in the Black Sea, aboard the cruiser MRR *Elisabeta* in 1883, 1884 and 1885 (Fig. 2) (Antipa 2010a,b; Ghiță 1961; Negrea 1990; Bologa 2017a, Bologa and Bavaru 2018; Șelariu 2018). Concerned with the issue of the evolution of the Romanian people (Antipa 2011b).

Founder of the National Museum of Natural History in Bucharest (Fig. 3), resulted from the first collection of natural history exhibited in “*The National Museum of Bucharest*”, in the halls of the Sfântu Sava College, and a director since

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1983, for a number of 53 years, and of the Bio-oceanographic Institute in Constanța in 1932 (Fig. 4), turned into the Fisheries Research Station “Dr. Grigore Antipa” (after 1945) and a component of the National Institute for Marine Research (Fig. 5) between 1970–1989, of the Cape Caliacra Marine Biological Station in the Quadrilateral lost to Bulgaria in 1940 (Fig. 6), of the National Museum of Natural History, named after him (1934), organizer, general director and inspector general of the State Fisheries, chairman of the Steering Committee of the PARID Administration, full member of the Romanian Academy (1910), a member of the Oceanographic Institute of Paris, the second national delegate to the International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM) after the official accession of Romania represented by scientist Emil Racoviță (1925), between 1926–1944, rapporteur of the Commission for the Black Sea (1927) and later for the whole Eastern Mediterranean, the Sea of Marmara and the Aegean Sea (1928), an expert advisor to the European Danube Commission, author of the Black Sea monograph (1941), creator of the “diorama” concept.



Fig. 1 Grigore Antipa (1938)



Fig. 2 The *Elisabeta* Royal Romanian Navy Cruiser



Fig. 3 The National Museum of Natural History, Bucarest (1900)



Fig. 4 The Bio-oceanographic Institute, Constanța (1932)



Fig. 5 The Romanian Marine Research Institute (1970–1979), nowadays the “Grigore Antipa” National Institute for Marine Research and Development Constanța



Fig. 6 The former marine biological station of Caliacra, currently in ruins.

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The monograph *The Black Sea. Vol. I Oceanography, Bionomy and General Biology of the Black Sea*, published in 1941 (Fig. 7), is one of the most lively testimonies, in addition to the entire activity and scientific work, prodigious and original, of scientist Grigore Antipa. The work has maintained its scientific value and presentness, in the context of the pronounced anthropic aggression of this marine environment, during the last decades, with the regrettable corollary of the imbalance of the Pontic ecosystem at present (Antipa 2010a,b).

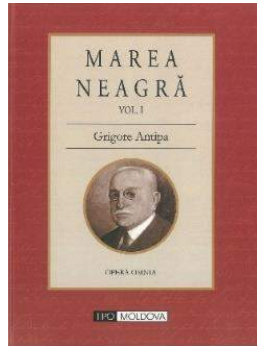


Fig. 7 The cover of the monograph *The Black Sea*, by Grigore Antipa, 1941 (new anastatic edition, 2010)

This monographic work, unfortunately unfollowed by a second volume, comprises the following chapters:

Preface

Introduction

Part I – General issues

Chapter I. THE ORIGIN AND GEOLOGICAL EVOLUTION OF THE BLACK SEA AND THE PROVENANCE OF ITS POPULATION

Chapter II. THE SPECIAL PROBLEMS OF THE BIONOMY AND BIOLOGY OF THE BLACK SEA, WITH ITS RESEARCH PROGRAMME

Part II – Physiology, hydrography and hydrology of the Black Sea and its bionomy

Chapter I. THE PHYSICAL STRUCTURE OF THE BLACK SEA

Subchapter. A) *The Black Sea Basin, its conformation, relief, constitution and composition*

Subchapter. B) *The hydrography and hydrology of the Black Sea*

Chapter II. THE BLACK SEA AS A LIVING ENVIRONMENT. ITS ECOLOGY AND BIONOMY

Subchapter A) *The aphotic zone or the deep layer of the sea*

Subchapter B) *The photic zone or the surface layer of the sea*

Subchapter C) *The general balance of the advantages and disadvantages presented by the Black Sea as a habitat and the bionomic bases of its productivity*

Part III – *Population and general biology of the Black Sea*

Chapter. I. THE POPULATION OF THE BLACK SEA

Subchapter. A) *The origin of the population and its variations in relation to the different phases of the evolution of the sea*

Subchapter. B) *The colonization of the Black Sea. The factors that determined the selection of the species and the composition of its population*

Subchapter. C) *The analysis and classification of the Black Sea population from the point of view of the ecological characteristics of the species*

Chapter II. THE EFFECTS OF THE BIONOMIC CONDITIONS OF THE PHYSICAL ENVIRONMENT ON THE QUALITATIVE AND QUANTITATIVE COMPOSITION OF THE POPULATION AND THE MECHANISM OF ITS SELECTION

- Chapter III. THE DISTRIBUTION OF THE BLACK SEA POPULATION IN RELATION TO THE VARIATIONS OF THE LIVING ENVIRONMENT AND ITS REGULATORS
 Subchapter. A) *The geographic distribution of the population (Black Sea Biogeography)*
 Subchapter. B) *Chorological distribution of the population (Chorology of the Black Sea)*
- Chapter IV. CLASSIFICATION OF THE BIOTOPE TYPES IN THE BLACK SEA, WITH ITS ZONES, FACIES AND FORMATIONS
 A) The anaerobiotic zone
 B) The photic or aerobiotic zone
 Subchapter. I. *Pelagos*
 Subchapter. II. *The benthos or the bottom of the sea*
- Chapter V. THE BLACK SEA VEGETATION, ITS BIOLOGICAL IMPORTANCE, ITS COMPOSITION AND DISTRIBUTION OF BENTHOS
 Subchapter A) *The distribution of vegetation on the continental shelf*
- Chapter VI. AN OVERVIEW OF THE BLACK SEA FAUNA
- Chapter VII. THE DISTRIBUTION OF FAUNA BY FACIES AND BIOTOPES
 Subchapter. A) *The biology of rocky bottoms ("Psephites")*
 Subchapter. B) *The biology of sand bottoms ("Psammite")*
 Subchapter. C) *Clay or mud bottoms ("Pelite")*
- Chapter VIII. THE BIOSOCIAL AND BIOECONOMIC STRUCTURE OF THE POPULATION OF THE BLACK SEA AND THE ORGANIZATION OF ITS COLLECTIVE LIFE
 Subchapter. A) *Facies, Biotope, Biocoenosis*
 Subchapter. B) *Biocoenoses, their role in organizing the mechanism of collective vital activity in the waters of the Black Sea and the structure of its population*
 Subchapter. C) *The general vital activity of the entire Black Sea Holobios. Its goals and methods*

A few conclusions.

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In the book written in his honour, Ștefan Negrea quotes Grigore Antipa among others: "The Danube will keep us in contact with the civilized peoples and will open the way to the ocean, for the exchange of the products of the country and the people's work with the products of the most distant countries. It guarantees the future and progress. It also offers us a series of natural gifts: a rich source of humidity for the agriculture, a source of electricity for the industry, fisheries of unique wealth, pastures and meadows." (Negrea 1990).

Among the first scientific pursuits of Antipa were the knowledge of the biological bases and the mechanism of fish production in the Lower Danube (Antipa, 1928): *Unter allen denjenigen Gewässerarten, welche als die grössten natürlichen Fischproduktionsquellen betrachtet werden, stehen gewiss die Unterläufe der grossen*

Flüsse mit ihren Lagunen und seenreichen Mündungsgebieten in den allersersten Reihen. Die Bedeutung dieser Süß- und Brackwasserfischereien ist nicht nur vom vollkswirtschaftlichen – d. h. als wichtiger Zweig der nationalen Produktion der betreffenden Län-dern – sondern auch vom sozialen Standpunkt aus – als alleinige Erwerbsmöglichkeit einer zahlreichen Bevölkerung – sehr hoch zu schätzen. Die Auffindung der Mittel zur Erhaltung, Hebung und Steigerung der natürlichen Produktion dieser Gewässer bildet also eine der wichtigsten Aufgaben der betreffenden Staaten.

Antipa observes the decrease in fishing wealth and deals with the causes: overfishing, intensification of naval traffic, water pollution, etc. Although adequate legal measures have also been taken: the introduction of prohibition periods, minimum fishing quotas, protected areas for migratory fish, fry (alevin) and so on, these are palliative solutions. He seeks the true cause of this constant decline in the natural fish fund, as only its knowledge can lead to confronting it by taking appropriate measures.

He draws attention to the erroneous and misleading conception on the mechanism of fish production in large rivers.

He explains the hydrographic and biological bases of the fish production process in the Lower Danube waters and the role played by the individual areas within the total production, he draws the biologists' attention to the particular biological conditions of this river basin and to the scientific bases of rational water management, while hoping to stimulate the theoretical and practical solution to one of the most important questions of applied biopotamology and fisheries science.

He starts from considerations dating from the beginning of the research on fishing in the Danube and the means of increasing production, in 1892. The biology of the fish in here is determined not only by the internal life requirements specific to each species, but also in particular by several external factors which constitute, influence and condition the special vital environment. Thus, it is largely a product of the special natural conditions of existence in these waters. He gives one example, the carp, the main species, which has become a migratory fish in here.

The research methodically targeted the following directions:

1. The fish fauna of the entire Lower Danube area,
2. The biology of the main species and especially of the migratory species,
3. The natural physical conditions,
4. The biological relations,
5. The mechanism of fish production.

The results of faunal, hydrographic and biological research, as well as of the fishing methods based on behavioral habits, obtained in almost 35 years, were published in a series of 35 monographs (Antipa, 1928).

The following are treated in turn:

- I. The types of Lower Danube waters and their biological relations,
- II. The fish production
 - a) Production goals,
 - b) The importance of flood for production,

- c) The natural occupancy of the different waters,
 - d) The mechanism of production and the natural fishing industry,
 - e) The natural rational fishing industry of the Lower Danube.
- The results and 9 main conclusions are summarized.

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Another major pursuit of G. Antipa was the study of the biological bases of fisheries production in the northwestern region of the Black Sea. (Antipa 1931): *C'est un fait connu, que les plus riches pêcheries de la mer Noire se trouvent concentrées dans le coin situé entre la Crimée et la Cap Caliacra, ainsi que dans la mer d'Azov, c'est-à-dire dans la région des embouchures des grands fleuves. La richesse de ces pêcheries ne consiste pas dans la variété des espèces, celle-ci étant limité au nombre restreint des quelques espèces qui supportent la vie dans les eaux saumâtres, mais plutôt elle est formé par la quantité du poisson capturé ici.*

Antipa mentioned that in the northeastern region of the Black Sea the total fish production could not be accurately calculated. However, it was known that only the Danube Delta region, for which there were regularly performed statistics, before the First World War, produced an average quantity of 16–20,000 t per year, i.e. about 50 kg per hectare.

He argues that the entire north-western surface of the Black Sea does not have a production equal to that of the Danube Delta region, yet there is no doubt that the quantities of fish in this area are superior to those caught in the rest of this sea. He enumerates and details four causes, in his opinion, for this great difference in productivity: 1. the constitution of the Black Sea basin and the distance from the coast to the lower limit of the continental shelf, 2. the large quantity of fresh water discharged into this sea by its main tributaries, 3. The numerous *limanuri* (banks), lagoons and coastal lakes along the entire coast of this portion of the sea, 4. The ichthyological fauna of this region, composed of species having a high commercial value and very rich in specimens.

The purpose of the paper is to highlight the way in which these determined factors collaborate in this sector of the Black Sea in order to achieve its productivity and, also, to understand the practical consequences arising from these findings:

- I. The constitution of the basin
- II. The influence of the tributaries
- III. The influence of coastal lakes
 - A) Dniester lagoon
 - B) The complex of lakes, lagoons and channels of the Danube Delta
 - 1. The Danube river bed
 - 2. The waters of the Danube Delta
 - a) Delta lagoons (Lake Razelm) [the correct name is currently Razim]
 - b) Delta lakes and swamps
 - C) The coastline salt lakes themselves
- IV. The ichthyological fauna

V. Conclusions.

The paper presents the bathymetric map of the Black Sea (after the surveys carried out by the Spindler and Wrangel Russian expedition) and the Danube Delta Lakes Development Plan.

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The principles of improving the productivity of the Lower Danube (Antipa, 1932) is another important pursuit of G. Antipa: *Le Danube représente pour les peuples habitant le plus magnifique don octroyé par la nature. Car il ne constitue pas seulement une grande voie naturelle, reliant depuis les temps les plus anciens le centre du continent européen aux pays asiatiques, mais il représente en même temps aussi une importante source de production naturelle.*

Antipa specifies that Romania has on its territory the largest part of the surface of the waters of this river, and that it benefits from this natural wealth more than the other riparian countries. But this advantage offered by nature imposes upon it the obligation to organize this natural wealth, in order to obtain, through rational exploitation, the maximum and optimal production.

Thus, he explains what this natural wealth consists of, how it can be enhanced and exploited, the program of the works undertaken and the measures taken to date in order to achieve this goal.

I. The constitution of the basin and the regime of the Lower Danube waters

II. The natural conditions of the production of these waters and of the lands of the Lower Danube.

III. Problems in improving the productivity of the Lower Danube waters and lands, where he quotes from the article of the German geographer and cartographer Emil Sydow (1812–1873) *Ein Blick auf das Russisch-Türkische Grenzgebiet an der unteren Donau*, published in *Petermanns geographische Mitteilungen: ... Seitdem nun der Moldau die Donaumündungen in die Hände gegeben sind, auf welche die Augen ganz Europas schon seit lange gerichtet waren, ist ihr auch von Neuem die Aufgabe ans Herz gelegt worden, ihre nationalen Kräfte zeitgemäß zu entfalten ... Möge nun des Lesers Phantasie die Niederungen der Donau mit Deichen, Gräben und Kanälen durchziehen, aus den versumpften Wildnissen üppige Getreidefluren, aus den Fischerhütten stolze Häfen und Handelsstädte erblicken und durch betriebsame Menschen (underlined by the author) *eine zweite Lombardei, ein zweites Holland an den Gestaden des Schwarzen Meeres erstehen sehen ...* a context in which Antipa specifies that this problem had already been posed for the Romanian State for 40 years, since King Carol I, together with his faithful advisers Petre Carp and Dimitrie Sturdza, charged him with the study of the Romanian fisheries and with the development of practical proposals for their organization and improvement. This important issue has been the subject of his research shown in about 40 publications. On their basis, the state implemented a series of measures and performed significant works in order to capitalize on these natural riches.*

- A) The Danube Delta
 - B) The floodable region
 1. The surrounding lakes and lowlands
 2. The “Levees” and high ground
 3. The medium altitude lands
 - C) The minor river bed of the river
- IV. The general improvement plan and its implementation.

The bibliography of the paper includes 14 articles by G. Antipa, I. Vidrașcu – *Valorificarea regiunii inundabile a Dunării / The valorization of the floodable Danube region*, Bucharest, 1921 and the Ministry of Agriculture and domains, Bucharest – *Îndiguirile regiunii inundabile a Dunării / The embankment of the floodable Danube region* and *Desbaterile comisiei îndiguirilor / Debates of the embankments commission*, Bucharest, January–April 1929.

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The biosociology and bioeconomy of the Black Sea are issues that have deeply preoccupied G. Antipa (Antipa 1933a): *Les recherches, que j'ai entreprises depuis longtemps sur les conditions biologiques des eaux de la Roumanie, m'ont fait voir que, sans une étude minutieuse de la nature physique de leurs bassins et de leur régime hydrographique, nous ne pouvons pas être en état de comprendre et d'expliquer la vie et la distribution des êtres vivants dans ces eaux. Car c'est la structure physique et ses agents qui déterminent les lois bionomiques du milieu ainsi que la composition, densité et distribution de la population. J'ai du me convaincre que même les groupements des espèces et individus en différentes associations sont déterminés par les mêmes facteurs. C'est pour cette cause que j'ai du donner bientôt une nouvelle direction à mes recherches, examinant, spécialement le bassin et les eaux du Danube à ce point de vue aussi.*

The remarkable research of Russian scientists Spindler and Wrangel, Andrusov and Knipovici on the physical structure of the Black Sea are invoked. Antipa found that the density and composition of the population of each biotope are really determined by the conditions that they impose and the resources they provide. For a concrete idea of the perfect adaptation of the population to the needs of the biotope, biologist Antipa gives the example of the phytoplankton and its migration during different seasons. The specialization of populations and its distribution, in order to meet the need for exploitation of environmental resources, are found in the smallest biotopes, which make up the total environment of this sea.

But also any component of the benthos that constitutes a particular biotope, by its petrographic nature, the state of aggregation of its sediments and the vegetation that includes it, has its resources to be exploited.

The notion of biocoenosis, as it was defined by German zoologist Karl August Möbius (1825–1908) known for his contributions to marine biology, is sufficient to characterize a biological association of the nature found in oyster reefs.

Antipa points out that the same associations of individuals and species that are the subject of “Biosociology” are also the subject of “Bioeconomics”. He

speaks of “Individual bioeconomics”, as well as of “Regional bioeconomics” (of biotopes) and of “General bioeco-nomics” (of the sea).

The general vital circuit of this sea also includes fish that use and transform the special production of different biotopes and which in turn serve as food for other superior animals, such as aquatic birds, the three species of dolphins (*Delphinus delphis* L., *Delphinus tursio* Fabr. and *Phocaena communis* Less., Black Sea seal *Monachus albiventer*¹, etc.).

In the field of botany, Antipa mentions Swiss H. Gams and I. Braun-Blanquet, for their work “*Prinzipienfragen der Vegetationsforschung*”, respectively “*Pflanzenphysio-logie. Grundzüge der Vegetationskunde*”. The second is the first attempt to synthesize the results of previous contributions and to examine the vegetation types from this point of view, creating a new independent science, «*phytosociology*».

By giving another example, Antipa attributes the development of the study of biocoenosis to scientists E. Naumann, H. Broch, C. Patterson, F.T. Doflein, D.O. Hessen, J. Hjort², E. Hentschel, A. Thienemann, H. Lohmann, who published a series of remarkable works on the structure of biocoenosis and animal life as a whole in different biotopes.

Towards the end of the article, Antipa recalls that he became aware of Braun-Blanquet’s important work later on, when he had almost finished writing his monograph “*Asupra vieții în Marea Neagră / On Life in the Black Sea*”, under print at the time, in which he had already written a special chapter on the biosociology of the Black Sea (Antipa 2010 a,b).

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The Black Sea sturgeons, their biology and the measures needed to protect them were another favorite topic of his prolific research (Antipa 1933b): *Parmi les espèces peuplant les eaux de la mer Noire, ce sont sans doute celle du groupe des Acipensérines ou Sturions (Cuv.) qui ont la plus grande importance, autant par le nombre considérable des individus et leur grand taille, que par leur valeur alimentaire et commerciale. Du point de vue alimentaire: leur viande, très appréciée pour son goût délicat, est presque tout aussi nutritive que celles des mammifères et des oiseaux et sert de base à une grande industrie de conserves; leur vessie a une grande utilisation industrielle dans la préparation et la clarification des vins. Du point de vue commercial: il suffit de rappeler que la viande et le caviar d’une femelle – de*

¹ Currently, the listed species are *Tursiops truncatus* Montagu (common bottlenose dolphin or Atlantic bottlenose dolphin), *Delphinus delphis* L. (short-beaked common dolphin) and *Phocoena phocoena* L. (harbor porpoise), *Monachus monachus* Hermann (Mediterranean monk seal).

² The Institute of Marine Research in Bergen, Norway, dedicated to him its symposium ICES *Challenging the scientific Legacy of Johan Hjort: Time for a new paradigm in marine research?*, between 12–14 June, 2019, where the author delivered the speech ‘Quasiquicentennial development of marine sciences in Romania and its maritime Dobrogea’, also evoking Grigore Antipa and his fruitful role in the evolution of this process.

taille moyenne, d'un poids de 250 kgr. – du grand Esturgeon Huso huso, représente au moins la valeur commerciale de 5 paires de bœufs.

Antipa presents simple and clear data on the biology of these very precious fish, emphasizing their high commercial value. He considers the catching of these species to be much easier, as fishermen do not have to travel at sea in their pursuit, *vue que le poisson, lui-même, vient régulièrement séjourner devant leur village. C'est précisément l'abondance de ces poissons dans les eaux saumâtres de la zone littoral, devant les embouchures des grandes fleuves qui se jettent dans la partie Nord et Nord-ouest de la Mer Noire et de la Mer d'Azov, qui a provoqué l'agglomération des grandes colonies de pêcheurs sur les côtes de cette région et qui a donnée lieu à une grande activité commerciale et industrielle dans ces parages.*

In the report titled *Die Störe und ihre Wanderungen in den europäischen Gewässern*, held at The International Congress of Fisheries in Vienna, in 1905, Antipa gave a brief description of their systematics and biology. *De même, dans mon livre sur l'Ichtyologie de la Roumanie (Antipa 1909), j'ai décrit largement et figuré, sur plusieurs planches, les différentes espèces et variétés – avec leurs embryons et alevins – Acipensérines, autant que le grand nombre des Bâtards produits par le croisement de ces espèces. Dans ce travail j'ai publié aussi un grand nombre d'observation, concernant leur Biologie dans le Danube et dans les aux maritimes, devant ses embouchures. Dernièrement enfin, j'ai publié encore, dans l'excellent ouvrage Sur la Faune et la Flore de la Méditerranée, rédigé par notre vénéré collègue Mr. L. Joubin, les figures des principales espèces d'Acipensérines, vivant dans la Mer Noire, accompagnées d'une courte description pour chaque espèces.*

In the article, Antipa enumerates within the Black Sea waters and its tributaries the existence of mainly six well defined species of sturgeons: *Acipenser ruthenus* L., *A. glaber* Marsigli, *A. stellatus* Pall., *A. Güldenstaedtii* Brandt, *A. sturio* L. și *Huso huso* L.; with the exception of the last one listed, each species presents one or more varieties, more or less well fixed, some of which may be considered as distinct species.

A) River species

1. *Acipenser ruthenus* L.
2. *Acipenser glaber* Marsigli

B) Marine species

1. *Acipenser sturio* L.
2. *Acipenser stellatus* Pall.
3. *Acipenser güldenstaedtii* Brandt
4. *Huso huso* L.

From his considerations, Antipa draws XII conclusions and ends the article with measures for the protection of the Black Sea sturgeons, respectively 1°. What are the protective measures that are dictated by nature and 2° Which is the way to ensure their implementation, specifying that the biological needs for the protection of these fish require the following measures:

I. *Reproductive protection*, that is:

1. ensuring the free passage of the breeders to reach their natural reproduction areas;
2. Conservation of breeding areas in good condition
3. Prohibition of fishing during spawning and hatching of eggs
4. Prohibition of the sale of fish during the prohibition period

II. Protection of fish fry growth

1. Prohibition of alevin and fry fishing, until the age of sexual maturity
2. Regulation of fish netting sieves
3. Prohibition of the sale of the fry and the prescription of minimum measures for the fry

III. Prohibition of fishing in fry's feeding and hibernation places.

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In addition to scientific publications on the Danube River and Black Sea fish fauna and fishing and fisheries and protection of fishery resources, G. Antipa was equally preoccupied with the principles and means of reorganizing natural history museums (Antipa 1934). In the preface of the article he states: *Il y a déjà 42 ans depuis que je fus nommé Directeur du Musée d'Histoire Naturelle de Bucarest. L'ancien Musée, placé dans 3 salles du local de l'Université, ne consistait que de quelques collections d'oiseaux et mammifères communs, mal empaillés et complètement décolorés et détériorés par les insectes nuisibles, ainsi que de quelques modèles anatomiques en cire ou papier maché. Je dû donc me convaincre qu'il ne me restait rien d'autre à faire que d'abandonner tout ce qu'était inutilisable, d'acquérir des nouvelles collections et d'organiser un nouveau Musée* (Bucarest, le 26 mai 1934).

G. Antipa mentions that among the cultural institutions of different peoples, museums, already from antiquity, occupy one of the main places. Nowadays, all the capitals of the European countries have real treasures accumulated in their museums. For example, in 1909 France owned, besides the outstanding museums of world importance in Paris, 250 museums in the province; Germany, at the same date, had 210 public museums; the United Kingdom – 211, Italy, Spain, Belgium, Holland, Denmark, Sweden, Norway, Austria, Bohemia, etc. – a huge number of museums, spread even in less important provincial cities.

A) Origin, evolution and current status of natural history museums

... *The main innovation introduced by scientist Moebius lies in the idea that the "Main collection" ("Hauptsammlung"), which should serve only as a "Scientific collection" ("Wissenschaftliche Sammlung") and should be as rich as possible in specimens, must be radically separated from the "Public collection" ("Schausammlung" or "Öffentliche Sammlung").*

Modern science museums, as a result of their historical development, currently have to fulfil the following three fundamental functions:

1. As *Scientific research institutes*, to serve the development of pure and applied science,

2. As *Collection deposits*, preserved, classified and arranged in such a way as to serve, at any time, as a documentation and scientific research material,

3. As *Public popularization collections* (“*Öffentliche Schausammlungen*”), composed and explained in a special way, in order to serve the needs of education, as well as to spread the science and education of the masses (“*Schausammlungen*”).

B) Organization of museums

I. Purposes of museums

II. Organization of collections and deposits for scientific research.

The main collection

III. Organizing public collections

1. Composition of collections

2. The way the collections are displayed

3. Labeling and explaining the collections.

The work is accompanied by XII drawing boards with 22 figures.

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A scientific contribution as valuable as the previous ones concerns the general organization of the collective life of organisms and mechanisms of production in the biosphere (Antipa 1935). The preface dates from Bucharest, March 25, 1935. In the Introduction G. Antipa states: *Dans une conférence faite, en Septembre 1927, au X-ème Congrès Internationale de Zoologie, à Budapest, nous avons montré les conditions d'existence, physiques et bio-logiques, caractérisant le milieu dans les eaux du Danube inférieur et la manière dont ses agents conditionnent, comme facteurs déterminants, la sorte et la quantité de la production des pêcheries dans ces eaux. C'était une synthèse des nombreux résultats que nous avons rassem-blés par de miunutieuses recherches spéciales, poursuivies pendant 34 ans, qui nous sont permis d'expliquer le mécanisme naturel de la production du poisson et d'établir certaines lois générales, gouvernant le déploiement de la vie animale et végétale dans ces eaux. Dès lors déjà, nous avons exprimé l'opinion, que ces lois s'appliquent aussi à la production des pêcheries dans les eaux de tous les grands fleuves, où les conditions naturelles – c'est-à-dire la constitution du bassin, le régime des eaux et les conditions biologiques – sont pareilles à celles du Danube.*

I. The mechanism of production in a pond

II. The mechanism of production in the Danube waters

III. The mechanism of production in the Black Sea waters

1. The Black Sea as a field of production and its components

2. The hydrographic and faunal structure of the waters of the main basin and its variations

3. Relationships between the different Black Sea biotopes and their importance for the general production and the mechanism of Black Sea production compared to that of the Danube waters

4. The biosociological and bioeconomic organization of the Black Sea population and the biological basis of the production mechanism

5. Is the new conception of general biology and the mechanism of production in the Black Sea in accordance with the current knowledge on the physical and biological structure of this sea?
- IV. The mechanism of production in other seas and oceans
 1. The waters of the Atlantic Ocean and of its annexed seas

Waters of tropical origin

 - a) Equatorial waters
 - b) Atlantic waters
 - c) Waters of polar origin
 2. The waters of the Indian and Pacific Oceans
- V. The mechanism of production as a general organization of populations of all hydrosphere waters and its biological bases
- VI. The mechanism of production and the organization of collective life in the terrestrial domain and underground
- VII. General considerations on the biological structure of the biosphere and fundamental principles of the organization of organisms' collective life
- VIII. Summary, findings and general conclusions
 - *Organization of the production mechanism (5)*
 - *Distribution and grouping of populations, as a result of the ecological characters of the species to which they belong and the demands of environment's variation (8)*
 - *Principles of social and economic organization of populations, with their biological bases and their crucial natural purposes (4)*
 - *Organizing the collective life in its entirety (3).*

*

Studies followed regarding the goals and pathways of the ichthyological research in the Black Sea, summarized in an *article dedicated respectfully to the tireless researcher of the Black Sea and the Caspian Sea, Prof. N.M. Knipovici – Leningrad, on the 50th anniversary of the activity in the field of bio-oceanography (Antipa, 1936):* *Es sind über 40 Jahre her, dass ich mich mit der Ichthyologie des Schwarzen Meeres beschäftige. Meine erste Absicht war, die vollständige Fischfauna dieses Meeres festzu-stellen und zu beschreiben. Dies um so mehr, als gerade der nord-westliche Teil und die Küstengewässer meiner eigenen Heimat bis dahin noch sehr wenig erforscht wurden, sowie weil ich hier eine Anzahl für diese Meer noch unbekannte und überhaupt manche ganz neue Arten konstatieren und beschreiben konnte. Ich unternahm sogar, schon im Jahre 1893, eine neunmonatliche Forschungsreise, auf dem Kreuzer «Elisa-beta» der Königlich Rumänischen Marine, um die Gewässer dieses Gesamtmeeres ichthyolo-gisch und allgemein biologisch zu untersuchen.*

G. Antipa seeks first and foremost the complete understanding of the species and subspecies of the fish in this sea, then the study of the way of life of the individual species and of the life communities, of the quantities of these organisms, and just as important of their distribution by regions, depths and ages.

He also supports the view that *the ichthyologist and fisheries biologist must be – in the Black Sea’s case even more so than in other seas – also a good oceanographer.*

*

The tireless G. Antipa elaborates and publishes in Bucharest a *Memorandum on the application of a five-year plan for the development of the State’s fisheries* (Antipa 1937a): *The development of the complex of ponds and floodable lands, which make up the production fund of our Fisheries and the enhancement of the products of this fund, fructified by the effort of the population that works in this branch of production, requires an important capital investment.*

In summary, the plan includes the following specifications:

A. I. Investments to improve the production fund (with 12 objectives)

B. II. Equipment investments for the exploitation of fisheries and the industrialization of fish (7 objectives)

C. Working capital.

Antipa answers in 9 points to the objections to this plan, according to the extract from Minutes no. 204 of the Steering Committee, from the meeting of July 24, 1936, in the presence of Minister Mircea Cancicov³.

*

The hydrological bonification of the deltas is addressed in a short article (Antipa, 1937b), concerning:

I. What is meant by “delta bonifications” and

II. The Delta bonification systems

A. Deltas of old age (Nile Delta)

B. (Rhone Delta, Mississippi Delta)

C. Young deltas (Danube Delta)

The genesis, structure and evolution of the Danube Delta

Improvement of the Danube Delta

Conclusions and 10 illustrative figures.

*

Subsequently, G. Antipa voices the hydrobiological research and their practical applications in Romania (Antipa 1937c), an extract of this article being kept, with the following affectionate dedication: *To dear Mrs. Celan*⁴, with

³ A prominent member of the National Liberal Party and a liberal deputy in the Parliament of Romania, honorary member of the Romanian Academy, a brilliant lawyer, several times the Minister of Finance of Romania in several governments between 1936–1939, and a reputed economist, who succeeded in boosting the country’s economy in 1938, a year which is still considered a standard of development (https://ro.wikipedia.org/wiki/Mircea_Canicov).

⁴ Maria S. Celan (1898–1989), a reputed marine algologist (macrophytobenthos, algal associations, eco-logy), a graduate of Mihăileană University of Iași, doctor of the Sorbonne University in Paris, France, in 1940/1941 (Bologa 1989, 1991, 2017c, 2018, 2019, 2020).

gratitude for her beautiful works on the Black Sea algae and for her collaboration with our Institute of Bio-oceanography.

- I. The waters of Romania and the beginnings of the hydrobiological studies
- II. The program and evolution of hydrobiological research
- III. The hydrobiological study of lake Razelm and the improvements it has generated
- IV. Study and hydrobiological improvements in the Danube Delta
- V. The hydrobiological improvement of St. George Island
 - A) Provisional measures and works
 - B) Definitive works
- VI. Hydrobiological research in the floodable region of the Danube and their practical applications
 - a) The physical and biological structure of floodable lands
 - b) Natural mechanism of fish production in the floodable region and the consequences of embankment
- VII. Ichthyological and bio-oceanographic research in the Black Sea (mentioning 15 specialized works)
- VIII. Findings, results and conclusions (6).

The article ends with the depiction of the characteristics of the hydrobiological improvement channels built up to that date in the Danube Delta:

1. King Carol I channel
2. King Carol II channel
3. The connection channel between Puiuleț and Puiu lakes
4. The connecting channel between Puiu, Potcoava and Roșu lakes
5. Prince Ferdinand channel
6. Michael the Brave Voivode channel
7. Pardina channel
8. Cofa channel
9. Queen Elizabeth channel
10. The access channel «Portița-Razelm»
11. The large supply channel «Litcov»
with a recap of their lengths.

The map of the Danube Delta – The hydrobiological improvement and 15 figures with different images: channels of the Danube Delta, the Grigore Antipa National Museum of Natural History, a museum hall with ichthyological collections, the new Bio-oceanographic Institute of the Fisheries Administration in Constanța, one of the institute's laboratories, the Fisheries Administration Palace in Tulcea with the Museum and hydrobiological laboratories of the Danube Delta and an ichthyological collection of the Hydrology Laboratory in Tulcea complete the iconography of the paper.

The economic capitalization of the Danube floodplain has met two opposing views, which have been the subject of extremely controversial debates, that of biologist and ecologist Grigore Antipa and that of engineer Anghel Saligny (Lup, 2019).

*

Romania's participation in the celebrations of the Tricentenary of the National Museum of Natural History of Paris was marked in the speeches delivered by G. Antipa (Antipa 1937d), including:

I. The speech delivered at the grand official banquet offered by the Minister of National Education in the lounges of the Claridge hotel in Paris and

II. The speech delivered at the closing banquet of the celebrations of the tricentenary after the inauguration of the Oceanographic Institute at Dinard.

On June 13, 1926, the illustrious biologist and founder of biospeleology⁵ Emil Racovitza (1868–1947), a praised participant in the Antarctic expedition aboard the *Belgica* ship in 1897, under the command of Commander Adrien de Gerlache, later the founder of the first speleology institute in the world in Cluj in 1920, was received as a full member of the Romanian Academy, the highest national scientific and cultural forum dating from 1866. The presence of His Majesty King Ferdinand, Honorary President and Protector for life, was greeted by the renowned archeologist professor Vasile Pârvan, the general secretary of the Academy. And the answering speech was delivered by the master biologist, ichthyologist, a prominent member of the same Academy, Grigore Antipa (Racovitza 1926).

In his opening remarks, Grigore Antipa, addressing the audience with the words Sire, Ladies and Gentlemen, confessed from the beginning: *With great joy I have received the assignment that my colleagues wanted to give me, to answer on behalf of the Romanian Academy, to the speech upon receiving into this institution of our new colleague, Dr. Emil Racoviță, and to wish him the traditional «you are welcome among us». I am all the more grateful for this honor that has been placed upon me, as I was given the opportunity to express my feelings of deep admiration, not only for a scientist of universal reputation and one of the most brilliant representatives of Romanian culture, but also for a specialty colleague, a very close friend from my earliest childhood* (Antipa 1926).

Subsequently, the speaker addressed him directly: *Dear colleague, In your beautiful speech you have explained to us, in a form understood by everyone – of a simplicity that contrasts with the magnitude of the problems you have exposed and in a beautiful Moldovan language, for which any literate can envy you – the purpose and meaning of Speleology; ... You have explained to us in particular what Biospeleology is and pursues, this new science, to which you have devoted all your activity over the last 20 years.*

Antipa revealed the very modest character of the scientist, who fails to specify that his role in defining, organizing and developing biospeleology was *overwhelming: Because every biologist knows that you are the true parent of this new science; ...* He therefore, considers it his duty to complete the information

⁵ E. Racovitza states in his welcoming speech: *I have adopted this name [speleology, author's note] which comes from σπέος, considering it more euphonic, especially in its compounds, Bio-speleology, Speophysics, etc., than: "Speleology", derived from σπήλαιον* (Racovitza 1926).

presented by the newly promoted among the Romanian academics. He begins with a *brief outline of the history of cave studies and the birth of Biospeleology, as one of the main branches of natural sciences, together with Oceanography, Limnology and all those similar sciences, which have as a purpose the study of all the physical and biological conditions of certain categories of geographical units across the globe and their explanation. He added, I beg your pardon if, in this brief exposition, I shall be forced to offend your modesty, because at a baptism – even in the Academy – every garment is required to be stripped and especially that of modesty.*

He brings completions, with numerous documented connotations, on the importance of *these sub-earthly gaps*. He points out that many *geographers, geologists, paleontologists, anthropologists, osteologists, prehistorians, botanists and zoologists* have dedicated them-selves to their research. He gives an example, among those who have preoccupied them-selves with the study of the caves: Protestant pastor Johan F. Esper, ever since 1774. Or the great philosophers Leibnitz and Kant. He emphasizes the accumulation of numerous data over time, *which requires the need for a coordination and synthesis of the results*. Thus, *the new science of the caverns is born, for which, following the proposal of the tireless explorer of the caves of France E. A. Martel, the name of Speleology – created by E. Rivière – was adopted.*

He explains that this science, more precisely *physical speleology*, was a chapter of Geography until then. *Caves, however, are linked apart from geophysical problems also to a number of special biological problems – at least just as important – ... The caves are, in fact, a living environment completely different from the others. The way that life was able to penetrate, spread and adapt here to these difficult conditions of existence – the eternal darkness, the constant temperature, the air saturated with humidity and so on. – in order to be able to conquer and dominate and form a «Habitat» also in these parts of the earth, make for one of the most interesting phenomena of biology.*

Then, compared to the level that this science reached at the beginning of the twentieth century, he mentions the appearance, *in the old and well-known magazine «Archives de Zoologie expérimentale et générale» of his fundamental work titled «Essais sur les problèmes biospéologiques».* ... *a synthesis work, which will always be an act of birth of this science, ...*

Tailored and thus guided, by E. Racovitza, Biospeleology now takes its place – as an independent science, with precise goals and methods – together with its sister, physical speleology and both compose that synthetic science called Speleology, ... One without the other cannot be conceived, ... As in Oceanography – and in all of those synthetic sciences related to certain categories of geographical units– physical and biological research must, therefore, go hand in hand.

.....

Dear Colleague,

.....

The spark, which your enchanted lighter threw into the easily flammable tinder of human mind curiosity, caught on. Today you can be happy to see that, all

over the globe, an army of researchers, inflamed by that spark, explore the caves according to your methods and guidelines ...

By evoking the proverb “Man sanctifies the place” Antipa does not fail to praise the theoretician merits of E. Racovitza, arguing that *you are not only a man of conception but also of action and, as such, you have put yourself at the head of the entire activity and have organized the studies: ...*

He adds, admiringly and with full objectivity, some significant biographical data of the qualities and merits of the scientist, in the meantime fully accredited: *In this regard, your natural gift of being a good organizer was also of great use here; the same, for which the expedition «Belgica» chose you as the organizer and the leader of its biological research in the Antarctic polar ice sheets; the same one, for which you, a foreigner, were entrusted with the management of the French biological marine station of Banyuls, and also the same for which – after the death of the great zoologist Lacaze Duthiers – you were also entrusted with editing for the oldest and most famous zoological magazine in France.*

... You have created, therefore, under your supervision and on your own account – first of all in Sorbona – the center of the world biospeleological research, which has assumed the task of implementing the entire action plan. ... at the same time, you have also organized a speleological Museum, ... you have set up a special magazine: «Biospeleologica» ... the practical organization you have given to the entire research and study activity is a masterpiece.

.....

But even as a Romanian, I could not allow, especially here at the Romanian Academy, these extraordinary merits of a countryman not to be mentioned with the proper expression of gratitude and admiration.

We are not only grateful for what you have done, but we are proud, because your masterpiece bears the stamp of the creative genius of the Romanian people's mind; it is a proof of what the intelligence of this people can generate when it is placed under favorable work and operation conditions.

Antipa completes his passionate response with a few features, to give to your soul portrait that true expression given by that new light in which you have been placed... *A place of honor among the most important biologists of the time. ... left with a clean Romanian soul ... a professor of zoology at the new Romanian university in Cluj. ... to put yourself in the service of the cultural consolidation of the reborn homeland. ... it seems a wonder that your entire biospeleological activity has made such great progress even after your relocation in the country. ... you created that institute of speleological research in Cluj which today is a reason of pride for the country. ... you have relocated the Biospeleology center in the middle of and near some classic regions of caves and earth gaps. ... you have come to work with all your eagerness also to raise the general cultural level of the country. ... the first step we need to take is to improve the higher education with all of its institutes, ... how much gratitude the country owes you for the services you bring to it ... You have shown us that, ... the sciences you call «synthetics” are, on the contrary, meant “to revive old and famous antic schools, where the student*

received a complete education”; ... As a person, just like you, starting from Zoology, I came, through my research on the Danube, upon a synthetic science, a sister to Speleology, I can fully confirm and realize the great importance of the issue you tackle, ...

.....

Dear Colleague,

...

... I have found you – with all the aversion I know you have for the so-called politics – sitting in parliament, as a representative of the University of Cluj, to watch over the cultural legislation and to oppose the anti-cultural measures; ... I find you wherever there is an issue with the participation in an international, scientific or cultural activity, where the prestige of the country is at stake and where you always have the memoir ready, showing what needs to be done ... I know the disappointments you often have, I know the struggles you put up with the little interest you often find for the important proposals you make. However, I have not seen you yet discouraged; ...

*

A suggestive example regarding the interest and involvement of E. Racoviță in participating in international activities, is his invitation to set up the International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM) in 1919. He declined the honor to act as Romania’s first national delegate to the oldest, most prolific and long-lived European oceanographic forum until the present day (Fig. 8), as a result of its many scientific, didactic and public tasks. And, as well as – once again – of his obvious modesty, as well as the recommendation of appointing his former colleague and well-known scientist Grigore Antipa for the aforementioned dignity (Bologa 1993, 2015, 2017b; Bologa and Marinescu 2002).



Fig. 8 The premises of the International Commission for the Scientific Exploration of the Mediterranean Sea, in Monte Carlo, Monaco

With regard to the altruistic proposal of E. Racovitza, he explained from the beginning that the national delegate must not only have a “diplomatic competence” but must also be a recognized specialist in oceanography. In a second report transmitted to the Minister of Foreign Affairs I.G. Duca, he wrote: *Another essential step is to get Dr. Antipa as a collaborator. As I stated in my report dated January 9, 1924, unfortunately now in our country there are only two experts in oceanography, capable to comply with the conditions to be met by the Romanian*

delegate at CIESM: Dr. Antipa and Racoviță. The first mentioned is the most suitable to accomplish that task in the best conditions. Indeed, Dr. Antipa has performed high administrative jobs and led many economic and diplomatic negotiations, thus adding the negotiation and administrative practice to his scientific competence, which can be very useful in that case. Besides, he has more available time than myself and his living in Bucharest, even in the neighbourhood of Ministry of Foreign Affairs, will be of considerable help in solving problems and department functioning: Conclusions: I have the honor to propose you: A. replacement of Racoviță as government delegate at CIESM by Dr. Antipa; B. Changing, Messr Antipa and Racovitza with drawing up a draft of Ministry decision for the creation of a national commission to act as a CIESM branch.

Prior to his appointment to the CIESM, Grigore Antipa replied to his confrere who proposed him for the nomination: *I took knowledge – and I am very grateful for it – that you quoted first of all my name among the persons which could represent Romania at that international commission, as being well known in the scientific world due to my papers. I am sure it's only your modesty that determines you to put your own name after mine, because the great expeditions you have participated in and 20 years leadership of an important marine biological station [Banyuls sur Mer] entirely recommend you for such a task for the benefit and high reputation of your country. I can't promise you but to help you with all my powers* (Arhivele Statului / State's Archives 1924).

The illustrious G. Antipa has shone bright in the new dignity assumed at international level. As a major investigator of the Black Sea ichthyofauna, confessing that his interest in biological oceanography and its issues was stimulated by Prince Albert I of Monaco, during their meeting at the Marine Zoological Station in Naples, founded by the German scientist Anton Dohrn.

Following his election as Vice President of CIESM, together with Odón de Buen y del Cos in 1928, G. Antipa informed the Commission of the creation of the Marine Zoology Station, by Professor Ioan Borcea, at Agigea in 1926 (Bologa 1993).

In 1933, G. Antipa transmitted to CIESM the significant progress made in Romania regarding the research undertaken on the maritime Danube, the Danube delta, the lakes and coastal lagoons, the Black Sea and the Eastern Mediterranean. On behalf of the Government of Romania, in the same year, he sent the official invitation for organizing the 10th Congress and General Assembly in Bucharest, October 15–20, 1935. In the absence of the CIESM President, Admiral Paolo Ravel di Taon, he presided over the scientific event, underlining the extremely important role played by the Commission in the development of the marine sciences (CIESM, Rapp. Proc.-verb. Reun., 1937). The congress, organized admirably and dedicated to the vice-president Dr. Antipa by the President, enjoyed high praise from all the participants, both Romanian and foreign. Here is the President's assessment: *In quest'atmosfera di ricordi gloriosi per la civiltà mediterranea, l'assemblea di Bucarest, capitale della Nazione che sul Mar Nero rappresenta la romanità, assumerà singolarissima importanza e sono sicuro di interpretare i sentimenti di tutti i Coleghi affermando che esse rivestirà anche carattere di festeggiamento in*

onore del Prof. Antipa ... And the leader of the French delegation mentioned: C'est au nom de l'unanimité des membres de la Commission que nous prions le Gouvernement Roumain de croire a notre gratitude émue pour l'accueil qui nous est fait et pour la liberale hospitalité dont nous beneficions. M. le President Antipa a dit que la Roumanie était fiere d'avoir été choisie comme siege de notre session; nous avons eu le plaisir, en nous reunissant ici, a rendre a la Roumanie un hommage pour le grand role qu'elle joue dans notre Commission.

This remarkable international success was due to the predominant role of the scientist and man of culture, organizer and patriot G. Antipa.

*

The scientific work of Dr. Grigore Antipa was solemnly honored in the speeches of prominent contemporary personalities, published on March 20, 1938. (xxx 1938a). These were initiated by Professor Alexandru Lapedatu – the president of the Romanian Academy. He also read the message of His Majesty King Carol II: *I join with open heart the celebration of Doctor Gr. Antipa and gladly bring with these few words my praise for a life dedicated to science and to the public good. The accomplished work on State Fisheries and especially at the Museum of Natural History will leave beautiful and lasting traces. The museum is one of the works Romania can be proud of. With all my heart, on these holidays, I thank him for his accom-plished work.* To these were added the speeches of Professor Traian Săvulescu – a member of the Romanian Academy, the president of the Romanian Science Society, professor Gheorghe Ionescu Şişeşti – the Minister of Agriculture, Domains and Cooperation, teacher Ştefan Şoimescu – the administrator of the Schools House and People Culture and of a student in the first year of the Faculty of Veterinary Medicine, G. Leluţiu.

Then followed the response of the feted person, addressed to his dear colleagues and friends, to the ministers and to the ladies and gentlemen in the auditorium.

The festive meeting was concluded by President Alexandru Lapedatu.

The publication is illustrated with a photograph depicting the feted person speaking at the stand, in the presidium on the right with A. Lapedatu and G. Ionescu-Şişeşti, and on the left T. Săvulescu, minister Nicolae Petrescu-Comnen and professor Dimitrie Gusti (Fig. 9).



Fig. 9 Dr. Grigore Antipa delivering his speech at the Romanian Academy (1938)

Of the more than 500 letters, addresses and telegrams from many admirers and friends, who could not participate in the festivity, the ones with official character were published. They belonged to: academician Sextil Pușcariu, professors Ștefan Goangă (Rector), I. Răducanu (Rector), Emil Racoviță, Ioan Grințescu, Nicolae Donici, Eugen Botezat, Ilie Bărbulescu, G. Macovei (Director), cons. eng. D. Drâmbă, eng. Stavri C. Cunescu, Metropolitan of Transylvania Nicolae, A. Dupront (French Institute of Higher Studies in Romania), B. Manzone (Institute of Italian Culture in Romania), Wilhelm V. Pochhammer (German diplomatic representation in Bucharest), Umberto d'Ancona (Padua, Italy), Brunelli (Central Hydrobiology Laboratory, Rome, Italy), D. Richard (Oceanographic Institute and Museum of Monaco), Biering (Minister of Denmark and Iceland), archbishop Raymund Netzhammer (Eschenz, Thurgau, Switzerland).

*

The anniversary volume *Grigore Antipa Hommage à son œuvre* (Fig. 10), published in the Official Journal, the National Printing Office, in Bucharest, in 1938, totals 727 pages (xxx, 1938b). It includes 6 deferential articles, 46 original scientific contributions and 12 official addresses, letters and congratulatory telegrams (Bologa 2017a). They are the work of a number of 56 authors, including three members of the Romanian Academy, among them four prominent Romanian biologists persecuted by the authorities of the oppressive communist regime: Constantin S. Antonescu, Teodor Bușniță, Constantin Motaș, and Zaharia Popovici (Bologa 2010). The authors represent 12 Romanian academic and public institutions and 18 from abroad (Austria, France, Germany, Italy, Monaco, United Kingdom, USA).



Fig. 10 The cover of the volume *GRIGORE ANTIPA Hommage à son œuvre*, 10 décembre 1867 – 10 décembre 1937, with a dedication to Miss Maria Celan

The introductory article *Rara avis* by Professor Constantin Meissner, teacher, Romanian politician and honorary member of the Romanian Academy, abounds in laudatory references to G. Antipa, such as: *Antipa's small stature, but great through his brilliant intelligence, culture, erudition, work power, his original research and practical achievements with which he endowed his homeland, has always been increasing, during his long life, the number of his fans and admirers,*

both inside and outside our borders. ... our feted person is also loved, sincerely loved. ... Der kleine dicke Antipa ist ein äußerst begabter und herziger Junge [Ernst Haeckel]. ... a son of the country, activating under the watchful eyes of three great Sovereigns, for a long time of almost fifty years, was uninterruptedly appreciated with the same High goodwill and solicitude by Each of them. ... And in such august manifestations, how could we not, in addition to recognizing the merits of Antipa, find a certain dose of ... sympathy for him? ... it is natural to ask the question: where does the magic originate in the case of Antipa? ... Is it motivated by his vast culture, by the quickness of his sharp mind, by what he has done and does, by the bonhomie and the joy of which he is not separated, by his distinguished kindness, by his chosen manners, by his always attractive conversation, by ... This erudite septuagenarian preoccupied with solving even the deepest problems of the nature has kept to this day ... a child's heart. ... Antipa remains a rara avis.

The content covers the following scientific fields, with which the celebrated person had professional or related interests: geology, sedimentology, oceanography, topography, chemistry, mycology, phytopathology, zoology, planktonology, ichthyology, ichthyopathology, limnology, marine fishing, mammology, genetics, internal medicine, legal medicine, therapeutics, national economy, sociology, museology, statistics and Christian martyrs.

The volume also contains a number of 111 bibliographic references, books and articles, authored by Grigore Antipa.

*

As a tribute to the illustrious master Grigore Antipa, who remarked her early and recommended her cordially to Professor Ioan Borcea, for employment, as an algologist, at the Maritime Zoological Station “King Ferdinand I” (later on, “Professor Ioan Borcea”), founded by him, in Agigea, in 1929) (Bologa *et al.* 2013), Maria Celan would dedicate to him the red algae *Gelidiella antipae* Celan, discovered as a new species in the Black Sea (Celan 1938).

The National Museum of Natural History in Bucharest, as well as the National Institute for Marine Research and Development “Grigore Antipa” in Constanța bear the name of the scientist, starting from 1933 and 1990, respectively.

Intermediate education institutions bearing Grigore Antipa’s name are Gymnasium School No. 6 in the hometown and Botoșani county residence, General School no. 15 in Constanța and I–VII Gymnasium School in Tulcea, the College of Sciences in Brașov county residence, and streets named in his honor and memory are found at least in the localities of Agigea and Eforie Nord (Constanța county) and in Botoșani, Cluj-Napoca, Suceava and Tulcea municipalities, was named after him.

Moreover, the “Grigore Antipa” marine research vessel, which belongs to the Diving Center in Constanța, bears his name.

One of the annual prizes awarded by the Romanian Academy is named after Grigore Antipa.

In 1992, the National Bank of Romania issued a banknote for circulation, with the nominal value of 200 lei, which has on the front the portrait of Grigore Antipa (Fig. 11).



Fig. 11 A banknote from 1992 showing Grigore Antipa 1867–1944

Also, on December 4, 2017, the National Bank of Romania issued a commemorative gold coin, with a nominal value of 100 lei, on the occasion of the 150th anniversary of the birth of scientist Grigore Antipa. The coin has the title of 900 ‰, the weight is 6.452 grams, the diameter of 21 mm, has a minted edge and was issued in 250 copies, all of high quality (the National Bank of Romania, *150 years since the birth of Grigore Antipa*).

*

Following a solid professional training, thanks to his native skills highlighted early on and to some elite professors from Romania and Germany, Grigore Antipa manifested notably in the scientific and public life. His many qualities and original results, diversified and multilateral, obtained throughout a brilliant career, have been appreciated both at home and abroad. His successes continue to this day, although not all his knowledge and recommendations, of practical nature, have been taken into account and applied precisely. Thus, the scientific, organizational and cultural work of Romanian scientist Grigore Antipa remains unchallenged. In addition to its intrinsic value, it continues to be, several decades after its elaboration and confirmation, an important source of documentation, especially on some aspects of zoology, ichthyology, Danube and Black Sea fishing, museology, international cooperation, as well as inspiration sources for new research in these fields which are important to science and the national economy.

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