

ŞTEFAN NEGREA PhD (November 09, 1930 – February 20, 2019)

A life dedicated to the study on the creatures of the dark and damp underground caves A life dedicated to speleology – Light from the dark

The scientific community of Romanian biologists, as well as many lovers of nature or hiking, have been deeply saddened by the news of the famous biospeleologist Dr. Ştefan Negrea's disappearance, witness to the renaissance of the Emil Racoviță Institute of Speleology in Bucharest, later becoming one of its most renowned scholars, known everywhere at home and abroad for his papers of speleology, ecology and zoology, especially for those on cladoceran crustaceans and chilopods.

Dr. Ştefan Negrea left us discreetly, lonely after the loss of his dear wife and collaborator on the road of science – Dr. Alexandrina Negrea – Didina, as he usually called her.

Dr. Ștefan Negrea left behind a radiant light of his speleological and hydrobiological research in Romania and abroad.

Dr. Ştefan Negrea highlighted the life and work of some great personalities of Romanian biology.

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Dr. Ştefan Negrea spoke to scientists, and to the media, about the caves in our country and elsewhere, showing their treasures, the creatures of the world without sun, with their amazing adaptations.

Dr. Ştefan Negrea worked at the Institute of Speleology of the Romanian Academy, an institution reborn after 1956, under the direction of Emeritus Professor Constantin Motaş (1891–1980). We can say that Ştefan Negrea was linked by speleology, for life, mostly due to Professor Constantin Motaş, who later, prefacing a book, characterized him as follows: "Ştefan Negrea is a naturalist by vocation, and in his veins is flowing a restless blood of an explorer...".

In these lines, we want to honor our colleague Ştefan Negrea's memory, but we think it is absolutely necessary to interpose in our note a few words about Prof. C. Motaş, who was his model in life, mentor and colleague, true friend, without whom, with all his talent and hereditary heritage, they could not had been activated for the completion of the young biospeleologist.

Certainly, the passion for knowing life in the dark and humid caves of the earth was transmitted to Ştefan Negrea and other speleologists as a relay started from Emil Racoviță through Constantin Motaș and from here through the generation living in a troubled world, with many shortcomings, but strengthened and forced to survival, Stephen's generation, to the young generation of the new Millennium. But let the facts speak.

Constantin Motaş was an eminent young man recommended by Emil Racoviţă for a scholarship in France, which he concluded with a doctorate for which he obtains the mark "très honourable avec felicitations du jury".

Returned to the country, the young biologist with a brilliant training, as we were told, occupied a number of important academic dignities and, after 11 April 1949, Acad. C. Motaș became responsible for the series of volumes "Fauna Republicii Populare Române" ["Fauna of the Romanian People's Republic"], he is arrested (after a political trial and convicted at 25 years); after seven years in communist prisons, under the pressure of colleagues from abroad, he was released and asked to choose one of the institutions in which he worked. He chose the Institute of Speleology, which was being reorganized at national level, almost 10 years after Emil Racoviță's death, its founder in Cluj. He was director of the institute from 1956 till 1969, but continued to work at the institute until 1980, sharing the same room with Stefan Negrea for a long time. Emeritus Professor Constantin Motas was followed by Prof. Dr. Traian Orghidan, Prof. Costin Rădulescu and Dr. Ioan Povară. Together with them, Ștefan Negrea contributed fundamentally to the "invention" and the development of stigobiology – the study of the creatures of all kinds of underground waters. Without the contribution of stigobiology, speleology would remain a field of geology – carstology, without the knowledge of biodiversity and the evolution of life in underground environments.

Ștefan Negrea was born on the 9th of November 1930 in a family with intellectual roots, that of Priest Vasile and Maria Negrea, in Gura Văii village, Neamţ county. He was proud of his family, whom he described in warm,

melancholic tones, when he was at conferences in his native lands, in Piatra Neamţ or in Bacău, for example. Important ancestors, as they were mentioned in Ştefan Negrea's CV, were: Ion Negrea (great-grandfather's brother, born in Gura Văii), a professor of science, who founded, along with the writer "literature professor" Calistrat Hogaş, Petru Rareş Theoretical High School from Piatra Neamţ (now National College) in 1869; Vasile Conta (his grandfather's primary cousin, Ioan Trifan, born in Dachia) – philosopher, propagator of darwinism and author of "Teoria ondulaţiunii universale" ["Universal Wave Theory"]; Constantin Virgil Gheorghiu (his mother's primary cousin, born in Petricani in 1916, m. 1992) – priest from 1968 at the Orthodox Church in Paris, prolific writer (he wrote over 50 books, among which "Ard malurile Nistrului" ["Banks of Dniester River are burning"] as reporter of war and the novel "Ora 25" ["Hour 25"], in 1962, which brought him a world fame, and after which the French–Italian–Yugoslav film "The 25th Hour" was made.

STEFAN NEGREA'S SCHOOLS

He spent his childhood and primary school (1936–1940) in his native village, then he attended the gymnasium at Petru Rareş High School in Piatra Neamţ (1941–1949).

As a high school student was enchanted by the lessons of zoology which guided him to observe and to discover nature; sometimes he told us how he was waiting for the butterflies to fly, the hairy caterpillars rattling the leaves, bush-crickets singing in the grass, the "black as pitch" crickets taken out with the straw from holes, the ants carrying their colossal burdens.

In high school he was also noted for his literary skills and participated in the student competitions, obtaining for his papers on Soviet literature, compulsory at that time, the First Prize in 1947 and 1948, and in 1949 he became a member of the Literary Cenacle "The New Word" and founding member of the Romanian Writers' Union Branch in Piatra-Neamţ. His skills in writing and literature would reach high levels all Ştefan's life. In 1949 Ştefan Negrea took the baccalaureate exams receiving the highest mark, "very well".

A year later, he married (on August 16, 1950) with his former high school colleague – Alexandrina Budăi, the One, Didina as he used to tell her, remaining together all their life. Young Ștefan Negrea felt strongly attracted both to literature and to biology-zoology. Finally, discussing with Didina, he decided and had chosen the second option, the study of nature. Thus, together with his wife, he decides to study biology together and in 1951–1954 the young couple Ștefan and Alexandrina attended the courses of the Faculty of Biology of the University of Bucharest.

As a student he is remarked for his scientific interest and becomes president of a student scientific circle of hydrobiology, being awarded in Bucharest and country competitions. In 1953 he wrote the paper "Hydrobiological and Fishery Research in Snagov Lake", being supported by Prof. Traian Orghidan (1917–1985) – a remarkable naturalist and scientific personality who, after 1956, was to become one of the dynamic organizers of the Institute of Speleology, and which helped Ştefan Negrea to develop interest in the study of hydrobiology. The paper was awarded with an honorary diploma.

Also in 1953, as a student, Ştefan Negrea and Didina had the great chance to visit the Cave of Vadul Crișului, a cave with resurgent reliefs, with abundant water, very suited to speleological and bio-speological research, the very first cave visited by them. Being fascinated by its beauties, Negrea spouses were glimpsed by an idea, which became a dream of their future activity; was the desire to explore the cave creatures as zoologists and hydrobiologists at the Speleology Institute of Emil Racoviță and as researchers, together with their masters, Professor Margareta Dumitrescu and associate professor Traian Orghidan, biologists "definitively converted to speleology".

Next year, in 1954, Ștefan Negrea wrote the paper "Fauna de cladoceri a Lacului Snagov" ["Cladoceran Fauna of Snagov Lake"], which was awarded at the second Student Scientific Conference. For the Bachelor's degree exam, he continued the study of the tiny aquatic crustaceans and prepares the thesis "Contribuţii la studiul faunei de cladoceri din lacurile glaciare ale R. P. Române" ["Contributions to the Study of Cladocerans of the Glacial Waters of the Romanian People's Republic"] and passes the exam with the grade "Very well".

Under the guidance of Prof. Nicolae Botnariuc – the promoter of systemic conception in ecology, Ştefan Negrea prepares the PhD at Bucharest University, studying the small freshwater crustaceans from his group studied during studentship, Cladocera Order, included in Branchiopoda Class, a group he studied minutely his whole life. In 1971 he obtained a PhD in Biology with a doctoral thesis titled "Ecologia cladocerilor din lacurile Jijila, zona inundabilă a Dunării" [Cladoceran Ecology of Jijila lakes, flooded area of the Danube".

In 1975 he attended a training and scientific study period in France (Paris, Moulis) in the Underground Laboratory of the National Center for Scientific Research, considered the most important biospeleological center in the world at that time.

SCIENTIFIC ACTIVITY

The period of the 1950s, when Ştefan Negrea made his university studies and began to work, was a difficult time, with many shortcomings and destructions, as after the war, but also as the setting up of a new political order in the country, the Soviet order brought with the tanks. Then, as a result of a political pressure to organize the Romanian Academy according to the Soviet model, the Committee of Hydrology, Hydrobiology and Ichthyology of Romanian Academy is founded. This

committee gathers around it some distinguished biologists with the initiative and desire to develop biology in Romania, such as Teodor Buşniţă (1900–1997), Mihai Băcescu (1908–1999), Ludovic Iosif Urban Rudescu (Rodewald) (1908–1992), Nicolae Botnariuc (1915–2011), A.C. Banu (geographer), Radu Codreanu (1904–1987) and others, who organized a series of researches on the Danube and the Black Sea, employing university graduates.

After graduating his studies, Ștefan Negrea's career takes the lead of scientific research. In brief, after a brief period in Constanța and Brăila, Dr. Ștefan Negrea was a scientific researcher at the "Emil Racoviță" Institute of Speleology of the Romanian Academy, Bucharest, since 1956. In 1966, he was promoted to the position of scientific researcher gr. III, in 1990 he became scientific researcher gr. II, and in 1995 – scientific researcher gr. I. In 2005 he retired, and since 2008 he was associate researcher at "Emil Racoviță" Institute of Speleology.

However, we must mention that at the end of 1954, he was appointed as a research assistant at the Committee of Hydrology, Hydrobiology and Ichthyology of the Romanian Academy, with a job at the Constanţa Marine Research Station, the former Bio-Oceanographic Institute, founded by Grigore Antipa. Here he stayed for a short time, but he gave us the "Observations sur la répartition du zooplancton sur le profil Est – Constanţa", published together with Alexandrina Negrea and Lucretia Elian in 1959.

In the period 1955–1956, Ștefan Negrea was transferred to the Brăila Hydrobiological Station of the University of Bucharest, thanks to Prof. Nicolae Botnariuc, who coordinated an important project on the "Study of the Crapina-Jijila Pool in the Danube Flooding Area". He was among the young researchers; the results of this collaboration are included in the paper "Observații asupra biologiei speciei *Fagotia esperi* (Fér.) din complexul de bălți Crapina-Jijila". ["Observations on the biology of the species *Fagotia esperi* (Fér.) in the Crapina-Jijila Pond Complex"], published in 1963 together with Nicolae Botnariuc and Alexandrina Negrea.

At the beginning of his career, Ştefan Negrea collaborated with Prof. Constantin Motaş and Lazăr Botăşăneanu, making important researches on the biology of the springs and phreatic waters in the central part of the Romanian Plain; the results of the extensive studies were published in a volume of over 330 pages in the Romanian Academy Publishing House (1956).

Among the reference works of Dr. Stefan Negrea, we mention:

- Cercetări asupra biologiei izvoarelor şi apelor freatice din partea centrală a Câmpiei Române (C. Motaş, L. Botoşăneanu, Şt. Negrea, 1962, 366 pp.); [Researches on the biology of springs and phreatic waters in the central part of the Romanian Plain];
- Bibliographia Biospeologica Romanica (1937–1963) (V. Decu, Şt. Negrea, 1965);

- Recherches sur les grottes du Banat et d'Oltenie (L. Botoşăneanu, A. Negrea, Şt. Negrea, A. Decou, V. Decou, M. Bleahu, 1967, 397 pp.) [Studies on the caves of Banat and Oltenia];
- The three papers dedicated to parietal, guano and flooring biocenoses of the caves of the Banat Mountains (Şt. Negrea, A. Negrea, 1971–1977);
- Ecologia populațiilor de cladoceri și gasteropode din zona inundabilă a Dunării (Șt. Negrea, A. Negrea, 1975, 232 pp.) [Ecology of the cladoceran and gastropod populations of the Danube flooding area];
- The volume "Speleology" in the monograph series "The Iron Gates" (editors T. Orghidan, Şt. Negrea, 1979);
- Expediționari români la tropice (Şt. Negrea, 1980, 208 pp.) [Romanian Explorers in Tropics];
- "Cladocera" in the academic series "Romanian Fauna" (Şt. Negrea, 1983, 399 pp.);
- Pe urmele lui Grigore Antipa (Șt. Negrea, 1990) [On Grigore Antipa's Footsteps];
- Biodiversitatea în mediile subterane din România (Şt. Negrea, A. Negrea, A. Ardelean, 2004, 248 pp.) [Biodiversity in the underground environments in Romania].

Dr. Ștefan Negrea was a member of a number of scientific organizations and associations:

- The International Myriapodology Center in Paris;
- The Senate of "Alexandru Ioan Cuza" University of Iași;
- Limnology Society of Romania, affiliated to the International Society of Limnology (SIL);
- Division of the History of Science of the Romanian Committee for the History and Philosophy of Science and Technology (CRIFST) of the Romanian Academy;
- The Leading Board of the Association of Journalists and Writers of Tourism in Romania.

Also, Ștefan Negrea was part of the Editorial Staff of scientific journals of Romania and abroad:

- Academic series "Fauna României" (deputy editor-in-chief since 1983);
- Annales de Limnologie International Journal of Limnology in Toulouse;
- *Noema*; *Studii și Cercetări* Divizia de Istoria Științei a CRIFST;
- Travaux de l'Institut de Speologie "Emile Racovitza";
- Oltenia Studii şi Comunicări, Ştiințele Naturii (the journal of "Oltenia" Museum in Craiova).

IMPORTANT ACHIEVEMENTS

Over the years, the results of the research undertaken by Dr. Ştefan Negrea materialized in the elaboration of an impressive number of works, with particular reference to the cladocerans (Cruciacea: Branchiopoda), the chilopods (Myriapoda) and the underground environments.

He has also carried out numerous expeditions for the scientific exploration of caves in Romania.

- The researches from 1956–1959 were carried out during scientific expeditions aimed at exploring the caves of the Southern Carpathians, Banat and Dobrogea.
- Between 1960–1986, Dr. Ştefan Negrea explored, together with his wife and Dr. Lazăr Botoşăneanu, hundreds of caves and fauna of the Banat Mountains, the Cerna Valley and the Poiana Ruscă, which became very well known in Romania, from biospeleological point of view.
- As a result of these studies, information on more than 240 caves and ravines from Romania were published, and about 30 km of cave galleries were mapped, mostly in the southwestern part of the country.

Since 1961, Dr. Ștefan Negrea has carried out a series of field trips together with members of the "Exploratorii" Speleological Club of Reșita, and since 1987 he did field applications at the National School of Biospeology. Negrea spouses, in collaboration with amateur biospeleologists from this center, studied dozens of caves from the hydrographic basins of Caraş and Bârzava (1980–1984).

Between 1969 and 1973, Dr. Ştefan Negrea participated in 40-day Romanian—Cuban Biospeleological Campaigns in the Cuban Tropical Karst Area, the results contributing to the formation of an overview of the cave fauna within the area. Obtained data were published in four volumes at the Romanian Academy Publishing House (1973, 1977, 1981 and 1983).

In 1990, at Prof. Univ. Dr. Francis Dov Por's request (University of Jerusalem), in 1990, Ștefan Negrea was included in a team for a 40-day expedition in Israel for the collection of zoological material from the cave and terrestrial environment. The results of the researches were used in a series of papers published under the aegis of the Romanian Academy (1995).

During his long scientific career, Dr. Ștefan Negrea collaborated with numerous colleagues, both from the country (Motaș C., Orghidan T., Botnariuc N., Botoșăneanu L., Decu V., Sencu V.L., Karban G., Elian Lucretia, etc.), especially from "Emil Racoviță" Institute of Speleology and from abroad: Pospisil P. from Austria, Dumont H.J. from Belgium, Por F.D., Dimentman Ch. from Israel and other famous specialists from France, Spain, Germany, Hungary, Bulgaria, Macedonia, Poland, Czech Republic, Italy, Russia, Cuba, Mexico, USA, etc.

In his 55 years of scientific activity (1954–2009), Dr. Ştefan Negrea has published, single or as collaborator, 406 articles and books with subjects that dealt

with the various fields of biological sciences: classical taxonomy (Cladocera, Chilopoda) aquatic, terrestrial and underground ecology, zoogeography, phylogeny, nature conservation, history of biological sciences and some of its representatives.

- Among these, a valuable scientific contribution is the original, complex study of the crustaceans of the Branchiopoda Class, with reference to ecology, ethology, phylogeny and their classification. Dumont and Negrea made a cladistic analysis of all branchiopod groups, using a total of 42 morphological characters and establish that this class is composed of five superordinates and 11 orders (nine recent, two fossils); the results of these researches materialized in the publication of the monograph "Introduction to the Class Branchiopoda" (H.J. Dumont, Şt. Negrea, 2002, 398 pp.), published in the series "Guides to the identification of the invertebrates of the continental waters of the world". The paper was awarded the "Emil Racoviță" Prize of the Romanian Academy and now it is considered one of the most valuable carcinology works of the world;
- Dumont and Negrea (1996), reviewing of the cladocerans of the cave waters of the world, present, also, a synthesis of the current knowledge on cladocerans by providing a historical study on concept development, category identification among groundwater species and discussing the existing adaptations and lines of evolution; in addition, they consider that out of the total of 450 non-marine Cladocera, estimated in the world, only ≈20% can occur in underground aquatic habitats, their number (stigobionites or stigobites) being relatively low (Dumont H. J., Negrea Şt., 1996 − "A conspectus of the Cladocera of the underground waters of the world", Hydrobiologia 325 (1): 1–30 DOI: 10.1007 / BF00023664);
- In Israel, Negrea and his collaboratories studied the morphology, zoogeography and ecology of scutigeromorph centipeds and presented an identification key for species.

Dr. Ştefan Negrea spoke about the caves in our country and abroad, showing us their treasures, the creatures of the world without the sun, with their amazing adaptations. The description of over 40 new species for science, of myriapods (chilopods and diplopodes) and cladoceran crustaceans represents a significant contribution to the knowledge of the cave environment biodiversity.

This way, the specialist Ştefan Negrea evolved, the one who studied taxonomically, ontogenetically, plylogenetically, and biogeographically mostly the Branchiopod crustaceans from the freshwater, brackish, marine, hypersaline and underground regions of the palearctic, neotropical and ethiopian regions, for more than 50 years from embryonic development point of view, but also other invertebrate groups, in terms of ethology, ecology, and biogeography (including palaeobiogeography). Dr. Ştefan Negrea's books guided young people towards science adventure and decided the orientation to the biological knowledge and training of many people.

He left behind, the result of an agitated life, the search for science, numerous and valuable biological contributions, which, at this early hour after his departure into eternity, we mention by chance and partly as follows:

- Studiul zoologic al peșterilor din România: [Heleobia (Semisalsa) dobrogica (Grossu & Negrea, 1989). (Gastropoda: Rissoidea: Cochliopidae), Biodiversitatea în mediile subterane din România (Șt. Negrea, A. Negrea, A. Ardelean, 2004, 248 pp.). [Zoological study of the caves in Romania: [Heleobia (Semisalsa) dobrogica (Grossu & Negrea, 1989). (Gastropoda: Rissoidea: Cochliopidae), Biodiversity in the underground environments in Romania];
- Studierea biocenozelor parietală, de guano și de planșeu a peșterilor din Munții Banatului (Șt. Negrea, A. Negrea, 1971–1977) [Study of the parietal, guano and flooring biocenoses of the caves in the Banat Mountains];
- Ecologia populațiilor de cladoceri și gasteropode din zona inundabilă a Dunării (Șt. Negrea, A. Negrea, 1975, 232 pp.) [Ecology of the cladoceran and gastropod population in the floodplain area of the Danube];
- Cladocera, in the serie "Fauna României" [Romanian Fauna] (Şt. Negrea, 1983, 399 pp.);
- Cunoașterea biologiei izvoarelor și apelor freatice din partea centrală a Câmpiei Române (C. Motaș, L. Botoșăneanu, Șt. Negrea, 1962, 366 pp.) [Knowledge of the biology of the springs and phreatic waters in the central part of the Romanian Plain];
- Cercetări asupra peșterilor din Banat și Oltenia (L. Botoșăneanu, A. Negrea, Șt. Negrea, A. Decou, V. Decou, M. Bleahu, 1967, 397 pp.) [Research on the caves in Banat and Oltenia];
- Contribuții speologice la realizarea Seriei monografice Porțile de Fier (editori T. Orghidan, Șt. Negrea, 1979) [Speleological contributions to the Iron Gates monographic series];
- Filogenia, evoluția și clasificarea Clasei Branchiopoda (Crustacea) (Ștefan Negrea, Nicolae Botnariuc, Henri J. Dumont) [Phylogeny, Evolution and Classification of Class Branchiopoda (Crustacea);
- Conspectul Cladocerelor din fauna apelor subterane ale lumii (Ștefan Negrea, Henri J. Dumont) [Cladocerans Groundwater Fauna of the World];
- Evaluarea critică a speciilor de Chilopode din România și Israel istoricul studiilor, sinonimele, actualizarea nomenclaturii a două înregistrări vechi: *Eupolyothrus* [Critical evaluation of Chilopod species in Romania and Israel history of the studies, synonyms, updating the nomenclature of two old records: *Eupolyothrus*];
- Istoria biologiei românești și biografiile marilor săi slujitori: Pe urmele lui Grigore Antipa (Șt. Negrea, 1990); Nicolae Botnariuc la 95 de ani [The history of Romanian biology and of its great servants' biographies: In Grigore Antipa's footsteps of Grigore Antipa; Nicolae Botnariuc at his 95th anniversary];

• Expediționari români la tropice (Şt. Negrea, 1980, 208 pp.) [Romanian explorers in the Tropics].

Being contemporary with Dr. Ştefan Negrea, we can appreciate him as one of the most important specialists from Romania in the second half of the 20th century in the knowledge of organisms of the underground waters. The recognition of Dr. Ştefan Negrea's scientific contributions can be exemplified by the many new species and genera to science, which were dedicated to him by a number of Romanian and foreign specialists.

But as many aspects of life and work as Dr. Ştefan Negrea could add, nothing is more relevant than the impressive list of 343 scientific papers, plus 28 books (author and/or editor), 42 chapters of books or independent scientific volumes, approachably edited for the distribution of science all levels of education.

Looking at the list of the distinguished colleague's papers, we will have a better image of the passionate, pedantic naturalist, biospeleologist-zoologist Ştefan Negrea, the slightly proud-spirited one, but with literary talent and profound analyst of the researched subjects, that he presented clearly, by explicit texts, and where it was necessary, by beautiful scientific drawings. We will understand its ability to explain the evolution of organisms from the complex environments, revealing the apomorphic characters, as compared to the plesiomorphic ones, in order to establish cladograms, verified and confirmed later and by methods of molecular biology techniques.

During his career, Dr. Ştefan Negrea wrote valuable pages of the history of Romanian biology, about "people and facts", witnessing events that marked the development of biological sciences in our country.

In more than 50 years of scientific activity, Dr. Ştefan Negrea worked with passion and tenacity at the service of Biology in Romania, to whom he was devoted to his colleagues, collaborators, by all those who had the privilege to be in around.

Today, when he is in a better world, he left us a light behind, gathered along a life time the darkness of caves. Also, he left us a model of marriage rarely occurred, when spouses share the same concern, and together they go in field trips, share the lab together, consult together on scientific issues, write and publish together, participate in conferences and symposiums. This explains why, after Didina's eternal departure, Stephen did not find his peace of mind until February 20, 2019, when he also left for eternity.

Farwell beloved friend and colleague in your last underground trip! Rest in peace, anxious soul in search of light in the darkness of the caves!

Prof. Dr. Marian-Traian Gomoiu, Member of the Romanian Academy Dr. Dumitru Murariu, Corresponding Member of the Romanian Academy

Dr. Sanda Maican, Institute of Biology Bucharest of the Romanian Academy

DR. ŞTEFAN NEGREA - SELECTED PAPERS

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