

FRAGMENTS FROM THE LIFE OF A GREAT ROMANIAN BIOLOGIST - UNIVERSITY PROFESSOR PHD, EMERITUS, CONSTANTIN CRĂCIUN - A LIFE DEDICATED TO THE STUDY OF THE CELL ULTRASTRUCTURE (1937-2016)

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Constantin Crăciun, PhD (1937-2016).

Abstract. Biological sciences in general and cellular biology in particular have recently undergone an irrecoverable loss, the passing away of the renowned specialist, Professor Emeritus dr. hc. Constantin Crăciun, PhD (Babes-Bolyai University, Cluj-Napoca). Born in Pîrșcoveni settlement, former Romanati County (1937), he graduated Corabia Theoretical High School. Based on his further education, he is the product of the reputable scientific school of Transylvania, Babes-Bolyai University of Cluj-Napoca, Faculty of Natural Sciences (1961-1966). He had the chance to participate and be educated in the laboratories of some personalities of the Romanian science that were active at that time in Cluj-Napoca (Acad. Eugen A. Pora, animal physiology; Acad. Oreste Marcu (entomology); Acad. Vasile G. Radu (invertebrate zoology), Professor Victor Pop, PhD (vertebrate zoology), Professor Dumitru Rosca, PhD (cyto-histo-physiology), Prof. Ghișa Eugen, Prof. PhD Csuros Ștefan, PhD (Botany), Prof. Kiss Ștefan, PhD (microbiology) etc. After graduation, he worked as a researcher at the Centre of Biological Research in Cluj-Napoca (1966-1970) and was admitted to the PhD studies by Prof. Vasile Gh. Radu, C.M. of the Romanian Academy, with a subject the finalization of which required extensive investigations and a solid experience in the field of electron microscopy. During this period, Professor Vasile Gh. Radu, founded and organized the Laboratory of Electron Microscopy of the Faculty of Biology, Babes-Bolyai University of Cluj-Napoca. In these conditions, the future Prof. Constantin Crăciun, PhD, was transferred from the CBR-Cluj-Napoca to the Faculty of Biology, Babes-Bolyai University, as a scientific researcher. He was appointed Director of the newly created Centre of Electron Microscopy.

His main task was the organization and coordination of its activities (1971-2000). One of the co-authors of this material (currently Prof. Gabriel C. Corneanu, PhD, at that time a teaching assistant PhD at the University of Craiova) had the chance to do a specialization internship in the field of electron microscopy in the laboratory from Cluj-Napoca. This was the beginning of our friendship and collaboration that lasted 40 years. Afterwards, the other co-author (Prof. Mihaela Corneanu, PhD, currently at UASVMB Timișoara) benefitted from the same warm and honest friendship, as well as from the access to the investigation equipment, specialized literature and specialists' experience. Within the framework of interdisciplinary, inter-university research, there were also associated other specialists from other national and international education and research institutions and there were achieved research activities within the framework of numerous contracts and research grants. Professor Constantin Crăciun (figure 1) conducted experiments in 17 research grants financed by CNCISIS, BCUM or CNMP. This resulted in hundreds of scientific papers published in reputable publications, scientific monographs, etc. The research conducted by Prof. Constantin Crăciun is huge and is represented by more than 531 scientific papers (106 in ISI publications), 25 books and monographs, patents, etc. A representative study is the monograph elaborated in collaboration with Prof. Dorina Cachita-Cosma, PhD (University of Oradea) and printed in the Handbook of Plant Cell Culture (vol. V, DA Evans ed., McGraw-Hill Publishing Publ. Co. New York, 1990). Prof. Constantin Crăciun was a member of numerous international scientific societies (ECBO, EMS, IAPTC, JSPP, Malpighi Academy, etc.) or Romanian scientific societies (SRME, SNBC, AOS, ARCTV, SOR, FORS, etc.), his activity being highly appreciated by great contemporary experts. The meeting in 1971 with the reputed specialist of Romanian origin, Prof. George Emil Palade, PhD (Nobel Prize in Medicine and Physiology, 1974) was beneficial for his activity assessment. As a result of positive appreciation, Professor Constantin Crăciun was invited to attend the ceremony held at Wayne State University, Detroit, USA at his 90 years celebration. We mention that there were invited only seven officials and only two were Eastern Europeans (Professors Gheorghe Benga and Constantin Crăciun, both born in Oltenia and working in Cluj-Napoca). On this occasion, it was held the manifestation "George Emil Palade Lecture" and the award International Prize and Gold Medal "George Emil Palade" and Wayne State University, Detroit was named "George Emil Palade" University. He was a PhD supervisor (Biology) and taught courses at the Master programme and the Doctoral School in Cluj-Napoca. As he was a good organizer, he organized and founded the Laboratory of Electron Microscopy at the University of Oradea, Vasile Goldis Western University of Arad and MFU Timișoara. He also established SNBC branches in the main cultural centres in western Romania (Oradea, Arad, Baia Mare, Satu Mare, Brașov, Sibiu, Zalău, etc.). He was involved in the editorial process of specialized publications (SRBC Annals; Oltenia. Studies and Research. Natural science, the Oltenia Museum Craiova, etc.). In this continuous activity that marked his whole life, the only moments of relaxation were when he was together with his family or when practicing his two hobbies: hunting and gardening. Along with his scientific and professional activity, they brought and were sources of great satisfaction. His wife, Veronica Crăciun, worked with him in all the activities of cell biology, being practically inseparable, at home and at work. Their two children are professionally accomplished. The daughter, Adina Crăciun, an appreciated dentist, has a dental clinic in Timișoara. The boy, Radu Crăciun, established in Belgium, has a PhD in cell biology at the Free University of Brussels, and is highly appreciated by others (actor Jean-Claude Van Damme, for example).

Keywords: scientific activity, professional activity (didactic and research), main results.

Rezumat. Fragmente din viața unui mare biolog român - profesor universitar doctor emerit Constantin Crăciun - o viață închinată studiului ultrastructurii celulei (1937-2016). Științele biologice în general și biologia celulară în special au suferit recent o pierdere irecuperabilă, prin trecerea în neființă a recunoscutului specialist Profesor Emerit Dr. Constantin Crăciun (Universitatea Babes-Bolyai, Cluj-Napoca). Născut în satul Pîrșcoveni, fostul județ Romanati (1937) a absolvit studiile liceale la Liceul

Teoretic Corabia. El a fost un produs al reputei școli științifice transilvane, Universitatea Babeș-Bolyai, Cluj-Napoca, Facultatea de Științele Naturii (1961-1966). A avut șansa de a fi educat în laboratoarele unor personalități a științei românești, care la vremea respectivă erau în activitate la Cluj-Napoca (Acad. Eugen A. Pora, fiziologie animală; Acad. Oreste Marcu (entomologie); Acad. Vasile G. Radu (zoologia nevertebratelor), Profesor dr. Victor Pop (zoologia vertebratelor), Profesor dr. Dumitru Rosca (cito-histo fiziologie), Prof. dr. Ghișa Eugen, Prof. dr. Csuros Ștefan (Botanică), Prof.dr. Kiss Ștefan (microbiologie), etc. După terminarea facultății a lucrat ca cercetător la Centrul de Cercetări Biologice Cluj -Napoca și a fost admis la doctorat de Prof. Vasile Gh. Radu, membru corespondent al Academiei Române, cu un subiect a cărui finalizare necesita investigații și experiență solidă în microscopie electronică. În timpul acestei perioade Prof. Vasile Gh. Radu a fondat și organizat Laboratorul de Microscopie Electronică a Facultății de Biologie a Universității Babeș-Bolyai, Cluj-Napoca. În aceste condiții tânărul doctorand Constantin Crăciun a fost transferat la noul laborator tot pe post de cercetător științific. În 1971 a fost numit Director al Centrului de Microscopie Electronica, poziție pe care a ocupat-o până în anul 2000, ocupându-se de organizarea și coordonarea activităților desfășurate aici. Unul dintre co-autorii acestui material (Prof.dr. Gabriel C. Corneanu, doctorand la vremea respectivă și asistent universitar la Universitatea din Craiova) a avut șansa unei specializări în domeniul Microscopiei Electronice în laboratorul din Cluj-Napoca. Acesta a fost începutul unei prietenii, care a durat 40 de ani. În cadrul unei rețele de cercetare inter-disciplinară și inter-universitară s-au realizat numeroase contracte și granturi de cercetare. Profesorul Constantin Crăciun a coordonat experimente în 17 granturi finanțate de CNCIS sau CNMP București. Din aceste granturi au rezultat sute de lucrări științifice publicate în reviste științifice de prestigiu, monografii, etc. Munca de cercetare coordonată de profesorul Constantin Crăciun a fost uriașă și s-a concretizat în 531 lucrări științifice (106 publicații ISI), 25 de cărți și monografii, brevete, etc. O publicație reprezentativă este monografia realizată în colaborare cu Prof. dr. Dorina Cachiță-Cosma (Universitatea din Oradea) tipărită în Handbook of Plant Cell Culture (vol. V, DA Evans ed., McGraw-Hill Publishing Publ. Co. New York, 1990). Prof. Constantin Crăciun a fost membru în numeroase societăți științifice internaționale (ECBO, EMS, IAPTC, JSPP, Malpighi Academy, etc.) sau din România (SRME, SNBC, AOS, ARCTV, SOR, FORS, etc.), activitatea lui fiind apreciată de comunitatea științifică. Întâlnirea cu Prof.dr. George Emil Palade (Premiul Nobel pentru Medicină și Fiziologie, 1974) din anul 1971 a fost benefică pentru dezvoltarea carierei sale. În semn de apreciere Prof.dr. Constantin Crăciun a fost invitat să participe la ceremonia de celebrare a 90 de ani a Prof. George Emil Palade, la Wayne State University, Detroit, USA. La această ceremonie au fost doar șapte invitați din Europa, doar doi din Europa de Est (Profesorii Gheorghe Benga și Constantin Crăciun, ambii născuți în Oltenia și profesând la Cluj-Napoca). Cu această ocazie a avut loc manifestarea științifică "George Emil Palade Lecture", s-a fondat Premiul Internațional și Medalia de Aur "George Emil Palade", iar Wayne State University, Detroit a fost redenumită "George Emil Palade" University. Profesorul Constantin Crăciun a fost conducător de doctorat (Biologie) și a predat cursuri la programul master și școala doctorală din Cluj-Napoca. Fiind un bun organizator a fondat și coordonat Laboratoare de Microscopie Electronica la Universitatea din Oradea, Universitatea de Vest Vasile Goldiș, Arad. De asemenea el a înființat filiale ale Societății Române de Biologie Celulară în principalele centre culturale din vestul țării (Oradea, Arad, Baia Mare, Satu Mare, Brașov, Sibiu, Zalău, etc.). A fost implicat în procesul editorial al mai multor publicații de specialitate (Analele SRBC, Oltenia. Studii și cercetări Științele Naturii, etc.). Cu o activitatea de cercetare continuă, care i-a marcat existența, momentele de relaxare le petrecea împreună cu familia sau dedicându-se celor două pasiuni: vânătoarea și grădinăritul. Soția lui Veronica Crăciun a lucrat împreună cu el în laborator, fiind practic inseparabili, la serviciu și acasă. Cei doi copii s-au realizat profesional. Fiica lui Alina Crăciun este un apreciat medic stomatolog în Timișoara, iar fiul Radu Crăciun a obținut titlul de doctor în biologie celulară la Free University of Brussels și este stabilit în Belgia.

Cuvinte cheie: activitate științifică, activitate profesională (didactică și cercetare), rezultate principale.

General data, pre-university studies.

Professor Emeritus dr. hc. Constantin Crăciun, PhD (Babeș-Bolyai University, Cluj-Napoca) (Fig.1) was born on the 14th of March, 1937, in Pîrșcoveni commune, the former Romanati County. He studied at Corabia Theoretical High School. Due to the conceptions of that time related to the so-called 'unhealthy origin', he could not continue his university studies immediately after high school. He graduated the Technical School of Topography in Bucharest (1957), after which he was appointed as topographer at the Cadastre Office of Crișana Region. Due to the same label ('unhealthy origin'), he performed his military service within the **Work Battalion (DGSM)**, with the **rank of 'uninstructed soldier'**. As the Romanian society slightly 'changed' in the 7th decade of the last century, he was allowed to attend university courses at the Faculty of Natural Sciences (Biology), 'Babeș-Bolyai' University of Cluj (1961-1966).

Research and university activity.

After graduating the university, he was appointed as a scientific researcher at the Center for Biological Research in Cluj-Napoca (1966-1978). Passionate about scientific research and studies of new information, he enrolled in the PhD studies at Prof. Vasile Gh. Radu PhD, who founded the **Electron Microscopy Laboratory** at the Faculty of Biology in Cluj-Napoca. Being a PhD student on the subject of optical and electron microscopy, he organized and led the **Electron Microscopy Center** (1971-2000), being the director of this modern research base. There were achieved many scientific research papers, research contracts and specialists from both Romania and abroad were trained in this field. Among those who were trained and approached research on cell ultrastructure in this fascinating field of cell biology were also the authors of this commemorative text (Corneanu Gabriel, starting with 1976 and Corneanu Mihaela, starting with 1986); the research studies were carried out within MURF (Multiple Users Research Foundation), founded in 2000 at the Faculty of Biology, Babeș-Bolyai University of Cluj-Napoca.

As a result of his activity, he became a consultant professor at the Faculty of Biology and Geology, having the responsibility of coordinating and teaching two courses at the master and doctoral programmes on two subjects: **Advanced Aspects of Cell Structure and Ultrastructure** and **Electron Microscopy**. His exceptional scientific knowledge and organizational qualities made him be designated to teach of new subjects at newly established faculties in Romania. In this way, he became associate professor at the University of Oradea, the faculties of Medicine and Biology and at "Vasile Goldiș" Western University of Arad. Here, he set up, organized and led the following subjects:

Histology, Cell Biology, Cellular Cytology and Electron Microscopy. Supported by the Romanian authorities in the field, Professor Constantin Crăciun became PhD supervisor in Biology, Specialization Cell Biology at Babeș-Bolyai University of Cluj-Napoca; 17 PhD students supervised by him graduated (a doctoral student from abroad).

A positive event in his life and professional activity was the meeting with the eminent Romanian scientist, the winner of the Nobel Prize in Medicine and Physiology (1974), Professor George Emil Palade, in 1971, when visiting Romania. Professor George Emil Palade positively appreciated Professor Constantin Crăciun's professional activity at UBB Cluj-Napoca. The confirmation of this appreciation was the invitation and the participation of Professor Constantin Crăciun in 2003, together with seven scientific personalities (only two personalities from the countries of Eastern Europe, namely Prof. Gheorghe Benga, **Iuliu Hațieganu UMF Cluj-Napoca** and Prof. Constantin Crăciun, **BBU Cluj-Napoca**) at the festivity organized by Wayne State University, Detroit, USA, on his 90 years celebration. On this occasion, there took place the event '**George Emil Palade Lecture**' and the awarding of "**George Emil Palade International Award** and **Gold Medal**". The first winner was Gunther Blobel, a disciple of Professor G.E. Palade and winner of the Nobel Prize in Medicine and Physiology in 1999. On this occasion, Wayne State University, Detroit received the name "George Emil Palade" University (Cristian Colceriu, Cluj University Elites, 2004).

Scientific and publishing activity.

Professor Constantin Crăciun achieved a fruitful scientific activity, highlighted by the number and quality of the elaborated scientific works and the number of scientific manifestations he participated in, the number of books and monographs written or co-authored, the number of scientific grants obtained through competition, the number of patents, and so on. Thus, Professor Constantin Crăciun elaborated over 531 scientific papers published in extenso (out of which 106 in ISI publications), 25 books and edited scientific monographs (4 abroad and 2 ISI), 9 patents (4 ISI), 22 collective volumes, 17 CNCISIS and CNMP grants as a Director and 13 as a partner, 140 research contracts to which he was Director or Main Partner, etc.

At a SNBC session held in Craiova, we invited 12 friends to a party organized at home. The piece of resistance was a large goose, besides classical appetizers (cheese, sausage, etc.) and sweets from local confectioneries or prepared by our colleagues from SNBC Craiova. The table being too loaded and to be a surprise, after sorting the goose, I asked a colleague to offer my colleague, Prof. Constantin Crăciun PhD, one of the 'cotoaie' of the goose. Being Transylvanian and not knowing the meaning of the term 'cotoi', she asked her husband, original from Bihor, to tell her the meaning of this term. But neither colleague Bită knew it. He asked Costică (his brother-in-law) for clarifications. Costică asked immediately from which bird the 'cotoi' came. When hearing of the word goose, he answered: 'Sir, it is one of the legs of the bird, taken entirely from the spinal cord. At this symposium, we also established together with the illustrious leaders of SNBC (the spouses Nicolae and Maya Simionescu) that the third day would be dedicated to cultural activities specific to the region where the Symposium was taking place, in this case, the Art Museum of Craiova.

The place and theme of the meeting being previously established, in the third day of the Symposium, on a heavy rain, 'armed' with two umbrellas under which I protected the cakes made by my colleagues, Dr. Irina Păunescu and Dr. Marcela Popilian, we went to the Art Museum. Fortunately, I lived in the central area of the city, because there were not available taxi drivers. The presentation in the halls of the Art Museum of Craiova was made by the colleague Prof. Paul Rezeanu PhD, the director of the museum, for several hours, with significant details, in the smell of coffee and cakes. The action was a success, being 'tasted' by SNBC leadership (Acad. Prof. Nicolae Simionescu PhD, President of SNBC, Acad. Prof. Maya Simionescu PhD, Vice-president, etc.).

It seems that SNBC sessions were the most attractive also due to the scientific programs, which made us glad. Thus, at another session of SNBC that also took place in Craiova, the opening of the annual SNBC session coincided with the inaugural phase of the World Football Championship. My friend Crăciun arrived by car on the route Cluj - Slatina, together with our colleague Prof. Octavian Popescu PhD, and from here, each of them travelled to Craiova with their own relatives. We decided to watch the first football match of the W.C. at my place. One of my neighbours suggested watching the match at his apartment as he had a better TV set sent by his son settled in the USA. The two apartments were in two neighbouring blocks: I was living on the ground floor and my neighbour at the mezzanine in the adjacent block. We parked the car in front of the block, got the luggage, entered the elevator, pressed the button for the 2nd floor (the block had a mezzanine, information not marked on the elevator) and we went directly to my colleague's residence.

We were in a little delay, so we agreed that the polite words to be addressed during the first pause. We were greeted by an unknown person. I ask him directly: Are you here for the match, isn't it? He answered affirmatively. A little while later, when tasting the wine offered by the hosts, I asked him: but Mr. Nicu and Mrs. Nelica, where are they? He answered that the Constantin family lives under them, at the mezzanine! After the confusion passed (due to the fact that we went one floor up), I realized that, at the back of the block, there was no sign of a mezzanine, but of one more floor. The behaviour of the two spouses was slightly bizarre because they were in divorce and each of them thought that we had been invited by the other partner to watch the match. However, the follow-up was positive because the two spouses reconciled. At the SNBC symposiums there were numerous funny situations, as there were numerous other participants besides us who were the heroes of numerous scenes, including the county party secretary, from Mureș County, and, of course, Professor Constantin Crăciun and the undersigned!

The scientific and publishing activity is accomplished through the activities carried out within numerous Romanian or international scientific societies where he was a member and which awarded him prizes and scientific titles.

Scientific societies to which he was affiliated.

He was affiliated to 13 scientific societies, namely: **International societies:** ECBO (European Cell Biology Organization since 1995), EMS (European Microscopy Society since 1998), IAPTC (International Association for Plant Tissue Culture since 1997), INTECOL (International Association for Ecology, 1998), JSPP (Japanese Society of Plant Pathology, 1998), **Malpighi Academy** for the Study of Microscopic Anatomy (Rome, 1999), etc. **Romanian Scientific Societies:** **Romanian Electron Microscopy Society** (since 1972), **Romanian Society for Cell Biology** (1982), AOS Romania (Association of Romanian Scientists, 1986), **RACCPT** (Romanian Association of Cell Culture and Plant Tissue, 1994), **ROS** (Romanian Ornithological Society, 1997), **FORS** (Governmental Science Foundation, 1999), etc.

Awarded scientific prizes and titles: *Traian Savulescu Prize* of the Romanian Academy (2001), *Maya and Nicolae Simionescu Prize* of SNBC (2003), *Doctor Honoris Causa* of Vasile Goldiș Western University of Arad (2003); *Doctor Honoris Causa* of Iuliu Hațieganu UMF of Cluj-Napoca (2008) (Fig. 2), *Professor Emeritus* at Babeș-Bolyai University of Cluj-Napoca (2012) (Fig. 3). Since 2007, he has been president of Cluj-Napoca branch of RSCB (Romanian Society for Cell Biology, as it is recently named) (Fig. 4).



Figure 2. The ceremony *Doctor Honoris Causa* of Iuliu Hațieganu UMF of Cluj-Napoca (2008).



Figure 3. At his desk in the laboratory of Electron Microscopy (2006).



Figure 4. In the Organizing Committee of the 28th Annual Session RSCB (Constanța, 2010).

In the last two decades, due to his organizational qualities, he organized and set up branches of RSCB in the western part of Romania, where annual scientific sessions of RSCB took place: Oradea (1996), Arad (1997), Baia Mare (2001), Satu Mare (2002), Zalău (2003), Brașov (2004), Sibiu (2005). He was also editor of prestigious scientific

publications: Bulletin of SNBC, Annals of SNBC, presently called *Annals of the Romanian Society for Cell Biology* (Associate Editor), *Oltenia Museum Craiova*, *Oltenia Journal for Studies in Natural Sciences* (Craiova, member of the Editorial Board). In the last two decades, he has set up Electron Microscopy Laboratories at higher education institutions in Oradea, Arad and Timișoara.

Science news introduced in the specialized literature. As a result of laborious scientific investigations, Professor Constantin Crăciun, alone or within different research collectives, introduced a series of science news in the specialized literature. Among these, there can be mentioned.

(a) *Eracosome* - a super complex of mucoprotein synthesis in the glandular cell of a terrestrial crustacean (*Porcellio scaber*). It is involved in the synthesis and preservation of reserve substances for sperm nutrition during hibernation.

(b) He highlighted the existence of **insulin-producing cells** in the hepatopancreas of some Black Sea molluscs and fish.

(c) Studies on **vacuolar compartmentalization** that elucidated the development of various metabolic processes (the involvement of vacuolar subdivision in the clearing of cellular debris, etc.).

Scientific mentors involved in his training.

Professor Constantin Crăciun benefited from the guidance of some of the greatest specialists in Biology field. Besides scientific knowledge and practical skills, they also represented wonderful models of life: Acad. Eugen A. Pora (Animal Physiology); Acad. Oreste Marcu (Entomology); Acad. Vasile G. Radu (Invertebrate Zoology), Victor Pop (Vertebrate Zoology), Dumitru Rosca (Animal Physiology), Eugen Ghișa, Ștefan Csűrös (Botany), Prof. Ștefan Kiss (Microbiology).

His faculty colleagues, in the scientific climate of Cluj-Napoca, maintain their ascendancy in the scientific world and represent current scientific personalities of Romania in Biology field.

In the last 40 years, I have worked together with Professor Constantin Crăciun, along with other colleagues, in inter-disciplinary, inter-university collectives that have brought real contributions to scientific knowledge. Among these, we can mention:

- the study of some metabolic structures of the nucleus and their role in the cell (*bodyguard* and *NAB's*), aspect remarked by great specialists (James D. Watson, winner of the Nobel Prize);

- the reaction of eukaryotic and prokaryotic cell, when maintaining the body in conditions similar to the extra-terrestrial environment (the value of the geomagnetic and geoelectric field; the acceleration force, etc., research grant with the Romanian Space Agency);

- analysis of various factors that can modify the cell response under different experimental conditions, and so on.

A few days before the Final, before the presentation of a paper on the ultrastructural changes at the spleen level under various environmental factors at an International Conference, we talked on the phone about the implication of different experimental parameters. Professor Constantin Crăciun, attentive as he always was, insisted on some involved structural aspects. I remark that, during our collaboration of over five decades, between the two mentioned works that marked the beginning and still not the final point of our collaboration (the first paper described the ultrastructural modifications of the genetic material in mitosis, and the last paper, sent for publication, the ultrasound modifications induced in the spleen), several hundred works rendering different ultrastructural aspects were published. Moreover, there is a rich analysed material based on experimental data, which has not been published yet, waiting to be written and disseminated.

He had a family life as we all want, but few enjoy it. After an intense day of work at the electron microscope, we went together in 'Zorilor 42', where Mrs. Veronica, his wife, was waiting for us, as usually, with game delicacies. On his way home, he used to remove the snow from the branches of coniferous trees as they were bent under its weight, thus protecting nature.

The scientific and research activity was interwoven with two hobbies, which relaxed him: hunting and gardening. These are two practical aspects of biology, respectively two characteristics that played an important role in the evolution of human populations. Other recreational activities were those carried out in the family (together with his wife and two children, professionally accomplished), as well as the participation in scientific events in different countries and continents. This activity (writing and presenting the results of scientific research) was supposed to be the specific activity of the third age. Unfortunately, we only succeeded to do it together just partially. However, we are pleased with what we have achieved so far. We believe our friend COSTICĂ is of the same opinion.

Good bye, DEAR FRIEND!

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