

History of Biology in the Moldovan SSR (1947-1991): Chronological Dimension

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Abstract: *Institutionalization of academic and university biological sciences in the Moldovan SSR had started 75 years ago. They have been evolving within the Botany Section and the Zoology Section of the Moldovan Base of the USSR Academy of Sciences (1947), as well as the Faculty of Biology of Chişinău State University (1947). Following the Base was transformation into the Moldovan Branch of the USSR Academy of Sciences, biological sciences were developing in the Institute of Biology, the Microbiology Section and the Botanical Gardens Institute. With the establishing of the Academy of Sciences of Moldovan SSR (1961), new academic institutions have been created: Institute of Zoology, Institute of Plants Physiology and Biochemistry, Section of Plant Genetics. Scientific schools were founded in the field of genetics and melioration (academician A. Kovarski), parasitology (academician A. Spassky), hydrobiology (academician M. Iaroshenko), ornithology (academician I. Ganea), mycology and phytopathology (academician I. Popushoi), fodder plants biology (academician M. Lupashcu), cytoembryology (academician A. Ciubotaru), stress physiology (academician T. Furdui), cellular and vegetal tissue biology (academic. B. Matienco), etc.*

Keywords: *history of science; biological sciences; Academy of Sciences of Moldova; Moldova State University; Tiraspol State University.*

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Introduction

Evolution of academic biological sciences in the Moldovan SSR consists in the development and simultaneous consolidation of its main components within the branch sector of the agrarian and medical profile, as well as the university sector, forming as a whole an unique republican scientific research system (Manolache, 2022).

Analysis of the research idea and discussions

Botanical Gardens Institute

In 1947, within the Moldovan Scientific Research Base of the USSR Academy of Sciences (AS), the Section of Zoology and the Section of Botany have been established. At the end of 1949, the Moldovan Base has changed its status and was transformed into the Moldovan Branch of the USSR Academy of Sciences with the preservation of the Zoology Section. The Botanical Section has been reorganized into the Botanical Gardens. The first document, in which the foundation of the Botanical Gardens has been decreed, was the Decision of the Soviet of Ministers of the Moldovan SSR dated July 31, 1950 Nr. 1110. For the construction of the Botanical Gardens, in the fall of 1950, a 76 ha land plot was allocated, in the Durleshti river valley (today the Dendrarium city park). The first botanists who worked in the Botanical Gardens were acad. Tatiana Gheideman (director, 1950-1964), doctors of science (PhDs) Bella Holodenco, Nina Sharov, Bronislava Ivanova, Zoia Ianusevici, Ion Comanich, Petru Leontiev, academicians Alexei Rybin, Alexandru Ciubotaru, Mihail Lupashcu, Boris Matienco and others.

The main research directions developed in the Botanical Gardens were:

- introduction of different groups of plants, trees and shrubs species, loric-decorative, food, fodder, technical, hetero-oleaginous plants, etc.;
- studies of vegetation, flora and plant resources of Moldova;
- elaboration of the scientific foundations of cities' and villages' landscaping/greening in the republic;
- creation of the Republican Botanical Gardens on high scientific and architectural-landscape level.

These research directions are still relevant today (Teleuta et al., 2018).

Microbiology section

According to the Decision of the Presidium of the USSR Academy of Sciences regarding the new structure of the Moldovan Branch of the USSR AS (February 15, 1952), the Plant Physiology and Biochemistry Section and the Soil Microbiology Section have been established as the Branch subdivisions. In 1957, the Institute of Biology was organized with the following laboratories: Plant Physiology, Plant Biochemistry, Hydrobiology, Zoology, Phytopathology, Animal Physiology and Biochemistry, Genetics. The Microbiology Section within the Moldovan Branch of the USSR Academy of Sciences was organized according to the Decision of the Bureau of the Biological Sciences Section of the USSR Academy of Sciences (November 24, 1959).

In the late 1950s, the works of the following scientists were known in the scientific world: univ.prof. L. Dorohov – in physiology and biochemistry; univ.prof. M. Iaroshenko – in ichthyology, fish culture and hydrobiology; univ.prof. A. Kovarski – in plant selection and genetics; univ.prof. Vl. Rybin – in karyology, genetics and fruit growing; univ. prof. C. Moraru – in physiology and plant breeding; univ.prof. I. Prince - in entomology and plant protection; univ.prof. D. Verderevski – in phytopathology, plant protection, immunology and virology (Jarcuțchi et al., 2013).

Establishing of the Institute of Zoology, Institute of Physiology and Plants Biochemistry and Plant Genetics Section

An important stage in the development of indigenous science was the creation, on the base of the Moldovan Branch of the USSR Academy of Sciences, of the Academy of Sciences of Moldovan SSR (1961), which triggered the division of the Institute of Biology into the Institute of Zoology, Institute of Physiology and Plants Biochemistry and Plant Genetics Section. The Section of Biological and Chemical Sciences has been established. In the next years, the title of the section has been changed several times depending on the scientific institutions it coordinated. The function of coordinating academician was executed consecutively by academicians P. Dvornikov, A. Spassky, Gh. Lazurievsky, I. Popushoi, A. Juchenko, M. Lupashcu, S. Toma et al. (Furdui & Chirilov, 2016).

The years 1960s-1980s were marked with the expanded research in various fields of biological sciences. From the moment of the AS of Moldovan SSR establishing, its institutional structure have not been a static model, it was in the permanent evolutionary modernization. By the Decision

of the Soviet of Ministers of the MSSR (Moldovan Soviet Socialist Republic) Nr. 916-r of September 27, 1965, in the South-East part of the Chişinău city, a new 104 ha plot of land was allocated for the design and construction of current Botanical Gardens. The design and construction works of this institution were carried out under the supervision of acad. A. Ciubotaru, who worked as this institution director for over 32 years. The State Committee for Science and Technology, by the Decision of the USSR Soviet of Ministers Nr. 38 of July 1, 1975, had assigned the Botanical Gardens the status of a scientific research institution (Teleuta et al., 2010).

Research schools in the Botanical Gardens

Prestigious scientific schools were founded in the Botanical Gardens. Corresponding member Tatiana Gheideman (11.11.1903, Tbilisi, Georgia-05.07.1995, Chişinău) was the first director of the Botanical Gardens (1950-1964), and she also coordinated the work of the Flora and Geobotany Laboratory within the Botanical Gardens since 1964 until 1980. She had focused the research in this laboratory towards the three scientific fields: floristics, geobotany, forestry. Here, the problems of plants spreading were studied, a substantial contribution was made to organization, improvement and maintenance of Moldovan Herbarium within the Botanical Gardens. The laboratory staff argued the need to organize the "Codrii" natural reserve and other areas with valuable vegetation as the state-protected zones, they developed the classification of forest phytocenoses in Moldova, drew up the Vegetation Map of Moldova (1972) (Membrii Academiei, 2006).

Academician Vladimir Rybin (26.11.1893, Saratov, Russia-27.06.1979, Chişinău) was employed as a senior scientific researcher at the Botanical Gardens (1956), where he founded the Laboratory of Distant Hybridization of Fruit Plants, which he headed until 1968. He carried out the karyological analysis of apple species, elaborated a scientifically based method for the selection of frost resistant plums (Membrii Academiei, 2006). Academician Alexandru Ciubotaru (20.02.1932, Şipca village, Orhei county, today Soldăneşti district-26.04.2017, Chişinău), scientific researcher (1959-1964) and director of the Botanical Gardens (1964-1987) founded the scientific school of cytoembryology: he performed the extensive karyological and cytoembryological studies of cultured and spontaneous species, launched (1969-1972) and substantiated the homeostatic theory of double fertilization (1989-1990). He is the author of the following concepts: Organelogenesis (1972); Neoplasmogenesis of zygote (1972); Morphofunctional status of gametogenesis (1984), etc (Manolache, 2017a).

Academician Boris Matienco (3.08.1929, Cușmirca com., Soroca county, today Soldănești district-26.11.2004, Chișinău), senior researcher, head of the Plant Anatomy Laboratory at the Botanical Gardens (1959-1978), is considered the founder of scientific school in the field of cellular biology and plant tissue, whereas the studies carried out within the morphofunctional paradigm of fruit development, functionality and evolution, represent a new direction in plant biology and reproductive biology (Membrii Academiei, 2006). Academician Andrei Negru (28.07.1937, Stoicani village, today Soroca district-21.12. 2011, Chișinău), scientific researcher, head of the Flora and Geobotany Laboratory of the Botanical Gardens (1969-1981), deputy director for scientific issues (1981–1987), director of the Institute of Botany of ASM (1988-1996), is the founder of paleobotanists' school in the Republic of Moldova: he discovered more than 120 fossil taxa new to science, developed the "Cronoflora-Cleome" concept and scientifically argued a new floristic geotype in the plant world evolution in Eurasia, documented the florogenesis process of the actual European flora and vegetation (Manolache, (2017b).

Evolution of the Institute of Zoology and Physiology and its research schools

The Institute of Zoology of ASM had evolved from the Sector within the Moldovan Scientific Research Base (1947) and the Institute of Biology of the Moldovan Branch of the USSR AS (1957), being formalized in 1961. Academician Mihail Yaroshenko was organizer and head of the institute since its foundation until 1972. In 1976, on the basis of the Institute of Zoology, the Institute of Zoology and Physiology of ASM was established, led by the academician Teodor Furdui (1972-1991). Later on, the Section of Paleontology and Stratigraphy was included in its composition (1979), and in 1991 the institute was divided into two independent research structures, one of them bearing the previous name. Institute of Zoology has been and remains one of the most prestigious research and scientific-methodical centers in the country, which coordinates and carries out fundamental and applied scientific research, trains highly qualified personnel in the field of zoology, entomology, parasitology, helminthology, hydrobiology, ichthyology and ecology (Toderas et al., 2016).

The Animal Physiology and Biochemistry Laboratory within the Biology Institute of the Moldovan Branch of USSR AS was created in 1957. The founder of the Physiology Laboratory was recognized scientist, Dr. Habilitate in medicine A. A. Zubkov, who distinguished himself through the fundamental studies on heart functions' mechanisms regulation, central

inhibition, membrane excitation, interrelationships between the sympathetic and parasympathetic nervous systems. Additional research was initiated in this laboratory in the field of stress, endocrine, nervous and digestive systems. Dr. T. Furdui's studies in the field of endocrinology (1959-1962) led to the highlighting of the development mechanisms under the influence of stressogenic emotional factors of a fairly widespread disease - diffuse toxic goiter, a fact, which allowed creation of an experimental model of this disease on laboratory animals. The role of different endocrine glands in the adaptation process and functional disturbances towards the action of environmental factors was determined. In 1963, on the base of the Animal Physiology and Biochemistry Laboratory, Dr. Habilitate S. Cuznetsov has created the Biophysics Laboratory. The research performed in this laboratory have contributed to elucidation of the neural systemic processes and the neurons' activity mechanisms of various nervous structures and to the developing, on their basis, of biophysical models and bionic systems. High appreciation of the research results in physiology achieved in the Institute of Zoology and Physiology served as a premise to separate its physiological profile laboratories, estbishing a stand-alone, independent structure - the Institute of Physiology (1991), which later on, with the foundation of sanocreatology, in 1998, was reorganized into the Institute of Physiology and Sanocreatology of ASM (Furdui & Ciochină, 2016).

Academician Mihail Iaroshenko (13.02.1900, Demianovka village, Poltava reg., Ukraine-11.04.1985, Chisinau), scientific secretary and senior researcher of the Moldovan Scientific Research Base (1947-1949), head of the Zoology Section of the Moldovan Branch (1949-1957), director of the Institute of Biology of the Moldovan Branch (1957-1961), director (1961-1972) and scientific consultant (1972-1985) of the Institute of Zoology of ASM, is the founder and head of the hydrobiological school. He made a substantial contribion to the revealing of regulations regarding the hydrofauna's state and successions, hydrobiological regime of various types of aquatic ecosystems in the republic, first of all, of Dniester (Nistru) river, pursuing the goal of developing the scientific bases for the effective exploitation of their biological potential (Membrii Academiei, 2006).

Academician Iakov Prinț (28.09.1891, Ciucea village, Crimea reg., Ukraine-23.05.1966, Chișinău), since 1946 has been working: in the Agricultural Institute of Chișinău (1946-1950), as head of the Plant Protection Section of the Institute of Pomiculture, Viticulture and Vinification of the Moldovan Branch (1950-1956), and from 1957 to 1966 he headed the Laboratory of Invertebrate Zoology of the Institute of Biology and Institute of Zoology of the ASM. He dedicated his activity to

fundamental studies in anatomy, physiology, biochemistry and cytology of phylloxera, developed the theoretical bases of plant immunity towards the pests. On his initiative, the nematodological, acarological, etc. research has been started at the Institute of Zoology (Membrii Academiei, 2006).

Academician Aleksei Spassky (3.07.1917, Lukoianov, Nizhny Novgorod reg., Russia-26.06.2006, Chişinău), is one of the founders of the Academy of Sciences, being vice-president of ASM (1961-1969) and coordinating academician of the Section of Biological and Chemical Sciences (1964-1965). During the years 1965-1984 he headed the Laboratory of Parasitology and Helminthology of the Institute of Zoology. Due to his research in morphology, ecology, systematics and taxonomy of flatworms, he described about 300 genera, subfamilies and new families, which were included in the world specialty determinants, he also carried out the studies in the fields of biophysics, biochemistry, zoogeography, typology of the parasitocenoses succession in the process of evolution (Manolache, 2017c).

Academician Ion Ganea (22.07.1926, Soroca-4.04.1993, Chişinău), senior lecturer at the Pedagogical Institute in Bălţi (1948-1954) and at the Pedagogical Institute in Tiraspol (1954-1956), junior researcher (1956) of the Zoology Section of the Moldovan Branch, senior researcher (1963), head of the Ornithology Laboratory of the Institute of Zoology of the ASM (1976-1993), deputy director for scientific issues at the same institute (1972-1983). Being the founder of ornithological school, he performed the research on evolution, systematics, ecology, zoogeography, paleozoology, protection and rational use of animals. He put forward and argued the hypothesis about the adaptation and synanthropization in jumps of ornitofauna and revealed the main stages of its evolution under the conditions of anthropic impact on nature. He pioneered the studies of bird migration regularities using the radiolocation methods (Membrii Academiei, 2006).

Academician Teodor Furdui (9.05.1935, Dumitreteni village, today Floreşti district), devoted his entire scientific and organizational activity to the academic science being a researcher (1961-1966; 1968-1971), scientific secretary (1966- 1968) and deputy director for scientific issues at the Institute of Zoology (1971-1972), director of the Institute of Zoology and Physiology (1972-1991). He is the founder of the scientific school in stress physiology, adaptation and sanocratology. He also conducts research in the field of functional disorders and physiology of endocrine system. He was the first to initiate and supervise the scientific research in this field in former Soviet Union. He had developed an experimental pathogenetic model of neurogenic thyrotoxicosis; deciphered the physiological mechanisms of acute stress and adaptation; developed methods to prevent and mitigate the

excessive stress and its consequences. He reexamined the Selye's theory, developed a new theory regarding the stress development, driving force and vulnerable periods of intrauterine and postnatal development of human organism (Ciochină, 2001).

Microbiology section

The first scientific institution in the field of general and industrial microbiology in our country was the Microbiology Section of the Moldovan Branch of the USSR AS, established on December 30, 1959, on the base of the Soil Microbiology Section organized earlier in 1952-1953. The first collaborators of this section in the years 1953–1959 were: V. Cotelev (head of the laboratory), Dr. I. Zaharov, T. Vasilieva, V. Sabelnicova, N. Sergheeva. Professor Vadim Cotelev, well known for his fundamental and applied works in microbial protein synthesis, was later the founder and head of the Microbiology Section for over 13 years (1959-1970, 1974-1978).

In 1962-1963, the first structural research units of the Microbiology Section have been established: Laboratory of Technical Microbiology (head V. Cotelev), Laboratory of Biologically Active Substances in Microorganisms (head P. Razumovski) and Laboratory of Gnotobiology (head V. Sorokin), and in 1968 – Laboratory of Microbial Origin Metabolites in Phytotechnology (head V. Sabelinikova) (Rudic, 2016). In the years 1970-1974, the Microbiology Section was headed by the academician Ion Popushoi (6.01.1924, Chişinău-24.05.2012, Chişinău), the founder of the scientific school of mycology and phytopathology, identifying about 5,000 species of fungi (Membrii Academiei, 2006). During this period, Laboratory of Mycology and Phytopathology was also working within this Section, renowned for its research on pathogenesis of mycotic, bacterial and viral diseases and measures to combat them (L. Onofraş, C. Dasheeva, J. Prostacova, L. Marjina, M. Culic, M. Steinberg, E. Cogan and others) (Rudic et al., 2014).

A short but brilliant page in the history of the Microbiology Section was written by Mihail Moldovan (22.06.1935, Râbniţa-9.08.1979, Chişinău), corresponding member, head of the Microbiology Section (1978-1979) and founder of the Laboratory of Virology. From the very beginning, this laboratory became an important scientific school in the field of virology, phytopathology and plant immunity (M. Moldovan, V. Bujoreanu, V. Chiriac, D. Tertiac, A. Grosu, L. Voloshciuc, F. Caisîn, V. Todirash) (Rudic, 2016). The Agrophytocenosis Laboratory of fodder crops was created and headed for 15 years (1979-2004) by the academician Mihail Lupashcu (27.08.1928, Cuizăuca village, today Rezina district-21.06.2016, Chisinau), coordinator of the Biological and Chemical Sciences Section of ASM (1978-

1980), vice-president of ASM (1978-1986, 1990-1995). He is the founder of the scientific school in fodder plant biology and crop scheduling, he developed the theoretical and practical bases for the production of fodder and vegetable protein, the bases for phytocenoses of fodder crops modeling and scheduling their crops (Membrii Academiei, 2006).

A new research direction appeared with the integration within the Section of the Laboratory of Pesticides Action and Transformation, led by the Dr. Habilitate in agricultural sciences, professor Iosif Libershtein (head of the Microbiology Section in the years 1981-1984). The research carried out in this laboratory remains actual to this day, being focused on the study of regulations of pesticides migration, transformation and destruction in soil and development of complex procedures to mitigate their harmful action (I. Libershtein, T. Dvornikova, T. Granatski, L. Sirețanu, S. Tolocikina et al). In 1980, the Soil Microbiology Laboratory was created, led by professor, doctor in medical sciences Gheorghe Mereniuc (head of the Microbiology Section in 1987-1990). This team (Gh. Mereniuc, A. Usatîi, A. Creciu, E. Emnova et al.) made a significant contribution to knowledge development regarding the soil biogenesis in Moldova, composition and action of soil microflora, functioning regularities of microbial coenoses (Rudic et al., 2014).

Evolution of the plant physiology and biochemistry section and its main research schools

Academic research in the field of plants' physiology and biochemistry, genetics and plant improvement in the MSSR was organized along with the creation of Plant Physiology and Biochemistry Section (1952-1953), Laboratories of Plant Physiology, of Plant Biochemistry, and of Genetics within the Biology Institute of the Moldovan Branch of the USSR AS (1957).

Research work within the Plant Physiology Laboratory was channeled in the following directions: winter resistance of the vine (D. Shutov), growth and fruiting processes of horticultural plants (S. Ivanov, B. Biblin), physiological diseases of agricultural crops, physiological bases of low-temperature processing of thermophilic plants' seeds, to increase their productivity (D. Shutov). Biochemical studies within the Plant Biochemistry Laboratory aimed to reveal the agricultural production quality in dependence on biological specifics, pedoclimatic conditions in Moldova and cultivation technologies (V. Arasimovich, N. Ponomariov, A. Melnic), research on the fruits' chemical composition during their storage, regularities of substances' biosynthesis and metabolism that determine an increased indices of storage capacity (V. Arasimovich, Ș. Baltaga, L. Vasiliev) (Toma & Tudorache, 2011).

The Institute of Plants Physiology and Biochemistry and the Plant Genetics Section were established within the MSSR Academy of Sciences in 1961. Main directions in the first years of their activity included the studies of photosynthesis as a factor of plant productivity improving; elucidation of physiological and biochemical peculiarities of vine, fruit, technical and cereal plants productivity in dependence on mineral nutrition and water regime. The bases of the Institute's scientific benchmarks were laid by the well-known scientists, founders of consolidated studies, bringing a substantial contribution to the development of biological sciences: acad. S. Toma, cor.mem. C. Moraru, acad. B. Matienco, acad. Gh. Shishcanu, cor.mem. N. Balaur (Andronic et al., 2021).

A special merits in the creation of the institute, organization of the research process and identification of research directions belong to: the corresponding member Lazar Dorohov (13.04.1900, Aleksandriiskaia village, Stavropol region, Russia-11.03.1964, Chisinau), director of Plants Physiology and Biochemistry Institute of ASM (1961-1964), in which the studies were carried out on plant physiology and biochemistry (respiration, transpiration, plant photosynthesis and metabolism, root nutrition, effect of CO₂ on physiological processes, influence of nitrogen, phosphorus and potassium on photosynthetic productivity of agricultural crops (Membrii Academiei, 2006); corresponding member Serghei Ivanov (14.10.1904, s. Mihalevo, Smolensk region, Russia-6.12.1980, Chişinău), vice-president of Branch Presidium (1949-1952), head of the Laboratory of Plant Nutrition Physiology, Growth and Development (1961-1980), who studied the physiological processes related to the resistance of crop plants to low temperatures, frosts, their behavior with regard to the low temperatures (Membrii Academiei, 2006). Imposing results in studying the physiology of plant resistance to adverse environmental factors were obtained by the Institute's researchers under the leadership of Dr. Habilitate in biology Margarita Kushnirenko (Toma & Tudorache, 2011).

Under the supervision of corresponding member Constantin Moraru (19.06.1926, Chiurt village, today Edineţ district-03.08.2015, Chişinău), director of the Plant Physiology and Biochemistry Institute of ASM (1970-1978) and head of the Laboratory of Formogenesis Physiology and Biochemistry (1967) of the same institute, the phenomena of specific periodicity and massiveness of rye flowering have been investigated, and the new methods of artificial excitation of flowers opening and pollination were developed, the action of mutagenic activity of high-altitude solar radiation in alternation with darkness was established with regard to the wheat and corn plants meiosis and formogenesis (Duca & Furdui, 2011).

Significant results were obtained in revealing the role of mineral nutrition elements, especially microelements, in plants (S. Ivanov, S. Lisnic, S. Veliksar, G. Semeniuc, B. Biblin, etc.). The leading role in this direction belongs to academician Simion Toma (30.08.1936, Mârzaci village, today Orhei district-11.11.2015, Chişinău), director of the Plant Physiology Institute (1978-2005) and founder of the scientific school in the field of microelements as vectors of biological processes, highlighting the laws of the microelements distribution (Mn, B, Zn, Cu, etc.) in soil and plants, which allowed to develop the cartograms on the contents of different fractions (total, mobile, water-soluble) in the soils of republic. In common with the Institute's research staff, he specified the role of microelements in the formation of resistance, plant productivity and quality of agricultural crops, developed strategies, procedures and technologies to apply the microelements separately and simultaneously with macrofertilizers and biologically active substances (Furdui et al., 2016).

Biochemical studies have allowed to make the quantitative and qualitative biochemical assessment of fruits depending on ripening period and cultivation technologies, in order to improve their storage capacity and terms, reducing the waste after storage (V. Arasimovici, S. Baltaga, B. Cahana, N. Bujoreanu, V. Toderash, T. Bogdanovschi) (Toma & Tudorache, 2011).

Corresponding member Valentina Arasimovich (1.03.1906, Brest, Belarus-10.02.1993, Chişinău), head of the Biochemistry Laboratory (1961-1981), scientific consultant at this institute (1981-1990), was involved in the research on carbohydrates composition and metabolism in fruits and vegetables, performed a number of theoretical and methodical studies and a series of practical works related to fruit and vine grapes preserving, evaluating the biochemical indices of fruits and vegetables quality and keeping capacity (Membrii Academiei, 2006).

Academician Gheorghe Siscanu (5.07.1932, Măcăreşti village, today Ungheni district), scientific researcher (1961-1965), head of Photosynthesis Laboratory (1975), deputy director (1988-1990), is the founder of a new direction in photosynthesis: the study of photosynthetic activity in fruit plants (Furdui & Duca, 2017). As a result of his scientific research, new principles and notions were developed and introduced into the theory of photosynthetic productivity, making an important contribution to studying the peculiarities of photosynthetic apparatus functioning in crop plants (Andronic et al., 2021, 7-8).

Under the leadership of corresponding member Nicolae Balaur (17.10.1939, Buţeni commune, Lăpuşna county, today Hânceşti district) the

Bioenergy Laboratory was organized (1982). N. Balaur founded and developed Agrobioenergetics - a new direction in plants physiology and biochemistry, contributing essentially to elucidation of energy regulation mechanisms in metabolic processes in plants and formulation of a new hypothesis on plant productivity based on the study of transformation, accumulation and use of the natural and artificial energy sources (Furdui & Duca, 2009). An essential contribution to the development of cellular and tissue biology was made by the Plant Structure and Ultrastructure Laboratory under the leadership of academician B. Matienco within the Institute (1984-2004). Here, the pre- and proliferative potential of certain carpoexplants of grapevine, tomato and chokeberry was discovered, along with the selection of some pigmented cell lines, the verisimilitude intracellular traffic of biosynthesis, translocation and localization of phenolic compounds and proteins was studied by B. Matienco, E. Zagorceanu, E. Maximov, L. Artiomov et al. (Toma & Tudorache, 2011).

Research in plant genetics and breeding

Systematic and multilateral academic research in plant genetics and breeding was organized, starting in 1957, with the creation of the Genetics Laboratory of the Biology Institute of the Moldovan Branch of USSR AS, and the Plant Genetics Section within the MSSR Academy of Sciences (1961). At that time, the studies were focused on the collection of local genetic resources and creation of the initial improvement material (inbreeding, pollination biology, directed transformation through the "education", etc.) (Botnari et al., 2016). The founder of this direction was academician Anatoli Kovarski (24.01.1904, Popovka village, Chernigov reg., Ukraine-30.01.1974, Chişinău). From 1944 until the end of his life, he headed the Department of Breeding and Seed Production of Agricultural Institute in Chisinau, being at the same time the head of the Plant Genetics Section of ASM (1957-1974). Through his research and experiments, he laid the scientific foundations for the hybrid corn seeds improvement and production. A new source of cytoplasmic androsterility from the local maize variety (Moldovan orange) was discovered, which later became known as the Moldovan type of androsterility (M) (Palii, 2014). In common with his team, he had created a genetic collection of species traditional for Moldova (wheat, corn, beans, peas, millet, sorghum, chickpea) and of new species (peanuts, mas, vigna). It should be noted that some varieties have not been implemented at that time, and were studied by the following generations of geneticists. He initiated the studies in cytoembryology and induced mutagenesis (Malcoci & Xenofontov, 2019).

During the years 1974-1991, the corresponding member of ASM, Natalia Balashova, has founded the scientific school in immunogenetics and gametic improvement of vegetable plants: interrelationships and interactions of horizontal and vertical resistance of plants towards the pathogens with general and specific adaptation capacity were studied, regularities were revealed on phytopathogens microevolution - fusariosis inducers on the infectious backgrounds in soybean and triticale populations. Under her guidance, a new scientific direction in breeding was developed, based on the principles of resistance to phytopathogens phenomenon as a component of general non-specific resistance, a part of the adaptive potential of plants, determined by evolution (Botnari et al., 2016).

Since 1976, academician Aleksandr Juchenko has started his scientific and organizational activity in the Plant Genetics Section, as the head of Cytogenetics Laboratory, then Ecological Genetics Laboratory (1981). In the second half of the 1970s acad. A. Juchenko argued the fundamental concepts of cultivated plants' ecological genetics, which represented a vast theoretical bases for justification of research in genetics and plant breeding, confirmed by the establishment of the Institute of Ecological Genetics in 1985, which later, as a result of several modification procedures, was reorganized into the Institute of Genetics, Physiology and Plant Protection (Andronic et al., 2021).

Academician Aleksandr Juchenko (25.09.1935, Esentuki, Russia-01.06.2013, Moscow) for two years was vice-president of the MSSR Academy of Sciences and, at the same time, academician-secretary of the Biology and Chemistry Section (1976-1977); president of the MSSR AS (1977-1989) and, simultaneously (from 1985), director of the Institute of Ecological Genetics. He was the founder of the scientific school of ecological genetics of cultivated plants (Membrii Academiei, 2006). The main works of acad. A. Juchenko are dedicated to the development of ecological and genetic bases of the intensive cultivation of crop plants. He comprehensively studied the adaptation, recombination and agrobiocenosis of cultivated plants (Malcoci & Xenofontov, 2018).

Academician Anatolie Jacotă (21.06.1941, Badragii Noi village, Edineț district-11.01.2010, Chișinău), scientific researcher (1970-1976), head of research team and laboratory (1976-1984) at the Institute of Plants Physiology and Biochemistry of the MSSR AS, deputy director for scientific issues at the Institute of Ecological Genetics (1985-1990), then director (since 1990) of the Institute of Genetics, was the founder of the scientific school in genetics and molecular genetics of plant resistance to abiotic factors (Membrii Academiei, 2006). A. Jacotă laid the foundations for

solving the problems of evaluating the genetic factors involved in the differentiation of parental forms according to quantitative characters; using the morphological and biochemical markers to identify the plant resistance towards the stressful abiotic factors. Applying these approaches, he formulated and argued the concept of organization and functioning of integrated genetic system of plant resistance with regard to the unfavorable abiotic factors (Andronic et al., 2021).

Principal research directions explored by the staff of the Institute of Ecological Genetics during the years 1985-1990ade it possible to achieve the outstanding results, specifically: elaboration of theoretical bases and methods of expanding the genetic variability spectrum to improve the adaptive potential of agricultural plants, creation of new adaptive selection methods on this basis; studying the genetic nature of the adaptive reactions mechanisms at the molecular, cellular, organism, population, species and biocenosis level. A special attention was paid to the recombinogenesis problem, to which studies four laboratories directly contributed: induced recombinogenesis (later F-R systems laboratory, acad. A. Juchenko), population genetics (dr. hab. A. Koroli), biological methods of variability inducing (dr. V. Bujoreanu) and the ontogenetic control of recombinogenesis (Dr. V. Klimenko). To carry out the pioneering tasks, the new subdivisions have been established - Laboratories of Physiological Genetics (Acad. A. Jacotă), New Breeding Methods (Dr. T. Balashov), Remote Research Methods of agrocenosis (Dr. O. Voinov); also, the Laboratories of Immunogenetics (cor.mem. N. Balaşova), Climatology (dr. hab. Z. Miscenko), Mutagenesis (dr. hab. V. Lâsikov) and Ecology of Protozoa (dr. N. Danşin) were reorganized (Botnari et al., 2016).

Faculty of Biology of Chişinău State University

The Faculty of Biology of Chişinău State University was formed (1947-1948) out of two Departments: Botany and Zoology. On March 2, 1949, the Faculty was transformed into the Faculty of Biology and Pedology. For a quarter of a century (1946-1962) at the helm of the Department of Botany was its founder, renowned botanist, doctor in biological sciences Vladimir N. Andreev (1889, Astrakhan, Russia-1962, Chişinău) (Obuh et al., 1989), who also held the positions of head of the Botany Sector of the Moldovan Scientific Research Base (1947-1950). He was a founder in 1951, in common with with T. Gheideman, of the Botanical Gardens' Herbarium and was heading this collection (1951-1961) (Tofan-Dorofeev & Ioniţa, 2019). In the 1950s, the following research and education staff were active at the Botanical Department: Associate Profs., Doctors T. Popova, N.

Davydova, N. Smirnova-Garaeva, assistants E. Nica and I. Jalicova. In the 1960s, the Department was headed by Assoc. Prof. V. N. Kononov, and from 1972 to 2000, the head of the Department was the distinguished scholar in the field of algology, corresponding member Vasile Shalaru (September 26, 1934, Vărativ village, Bălți county, today Râșcani district-May 16, 2016, Chisinau), the founder of the "Algology" research Laboratory (1978), which today also bears the name of the scientific school of algology in the Republic of Moldova. The research activity is focused on the study of algae flora in water basins in Moldova, with a special focus to phytoplankton (Membrii Academiei, 2006).

The Department of Zoology of Chișinău State University was founded and led by the Assoc. Prof., Doctor, entomologist Zinaida Sergheeva. In 1951, at the invitation of A. Lazarev, Minister of Education, Associate Professor, biologist Viktor S. Chepurnov, transferred to Moldova, and became the Rector of the Chișinău State University (1951-1962) and concurrently head of the Department of Zoology (Chepurnova, 2021). From 1963 to 1973, the Department of Zoology was headed by Doctor in biological sciences, specialist in hydrobiology and ichthyology, graduate of Heidelberg University Valentin L. Grimalski. He founded a scientific research station in the field of fish farming, he also worked as a professor at the Agricultural Institute, being an author of numerous works in hydrobiology and fish farming, he created his own scientific school, whose representatives include: S. Tiutiunic, O Krivtsova, I. Toderash, I. Melian, I. Dediu (Chepurnova, 2021). The third period in the history of the Department of Zoology (1973-1987) is associated with the name of Dr. Mina N. Lozanu. Under the leadership of M. Lozanu, the new research fields appeared - teriology (Prof. M. Lozanu), ecotoxicology (Prof. I. Dedu) (Rusnac & Cozma, 2000). The Zoology Department's research includes the following fields: ichthyofauna and zooplankton in water basins between Danube and Dniester; amphibians, reptiles, birds and entomofauna of Moldova.

Corresponding member Ion Dediu (24.06.1934, Rediu Mare village, Soroca county, today Dondușeni district - 04.11.2019, Chișinău) in the period 1971-1990 was a lecturer, professor, dean of the Faculty of Biology and Pedology, he founded the Interuniversity Department of Ecology and Environmental Protection within the MSU (1988), the National Institute of Ecology (1990) and a national ecological school, within which he opened the new directions in science: ecological biogeography of continental basins, aquatic ecotoxicology, political ecology. He discovered and formulated the law (principle) of mutual exclusion of biotic complexes having the different zoogeographic origin (Membrii Academiei, 2006).

In the 1940s and 1950s, the following Departments were established at the Chisinau State University: Animal Physiology, later Human and Animal Physiology (head Dr. Habilitate in medicine I. Vul), Plants' Physiology and Biochemistry (head Assoc. Prof. V. Klimenko), Entomology and Applied Phytopathology (Senior Lecturer I. Kataev). In 1955, the University possessed a Biological Station and a "Leo Berg" Zoological Museum.

The research in plant physiology at the Chişinău State University was initiated by Professor D. A. Shutov (1889–1957), the founder of the Plant Physiology and Biochemistry Department. The basic scientific direction of the Department became the study of vegetable albumins' chemistry. The research performed under the leadership of corresponding member Vasili Klimenko (04.04.1906, Golubavki village, reg. Dnepropetrovsk, Ukraine-23.03.1978, Chişinău), head of the Department (1950-1978) and dean of the Faculty of Biology and Pedology (1950-1957), was focused on physiological and biochemical characteristics of reserve proteins in cultivated plant seeds, their mobilization mechanisms in seed germination process (Membrii Academiei, 2006). V. Klimenko promoted the creation of research laboratories: "Protein Chemistry" (1956) and "Biochemistry of Heteroleuiose Plants" (1960) (Eremia, 2016). A substantial contribution to the development of biological sciences was made by the researchers of the Department: Iosif A. Vaintraub (1929-2005), founder of the school in the field of seed reserve protein metabolism (Duca et al., 2009), Valeriu Movileanu-Ilvitsky, geneticist, founder of two new research directions in induced mutagenesis – antimutagenesis and directed mutagenesis (Ilviţchi, 2021), etc.

The following scientists contributed to the research in higher nervous activity, neuro-endocrinology and homology within the Department of Human and Animal Physiology of the Chişinău State University: I. Vul, M. Cahana, G. Nica, V. Lupashcu, N. Muzlaeva, A. Robu, A. Crivoi, E. Palade.

Academician Boris Melnic (11.02.1928, s. Briceni-27.04.2012, Chisinau), rector of the Chişinău State University (1974-1992), was appointed the head of Department in 1968 and led it for 30 years. He founded a scientific school in neuroendocrinology and homology with the following research fields: formation of protective adaptive reactions and targeted increase of the body's resistance; studying the problems of hypothalamo-endocrine relations in different states of the body. In the 1970s and 1980s, the Department of Human and Animal Physiology became an important center for complex research on the pituitary hormone melanotropin (Manolache & Hadîrca, 2015).

Corresponding member Dmitri Verderevsky (8.07.1904, Tashkent, Uzbekistan-30.10.1974, Chişinău), head of the Department of Plant Protection of the Agricultural Institute in Chişinău (1944-1946, 1952-1974), also held the positions of professor, head of the Phytopathology Department of Chişinău State University (1949-1951), is the founder of the scientific school in phytopathology, phytoimmunology and phytovirology. He is well known for his fundamental and experimental research in the field of varieties selection resistant to diseases and pests, protection of cultivated plants; he developed the theory of parasitism evolution in microorganisms and the bases of the general theory of plants' antimicrobial immunity (Membrii Academiei, 2006).

Biology research evolution at the "T. G. Shevchenko" State Pedagogical Institute from Tiraspol

"T. G. Shevchenko" State Pedagogical Institute from Tiraspol is a recognized institution in university education and research activities, especially in the field of natural sciences. The Department of Zoology was one of the first departments of the Faculty of Biology and Chemistry, established in 1931. During its activity, the Department was supervised by: A. Marits, A. Perevalov, Ia. Kolomeichenko, E. Panas, D. Veliksar, L. Popa, V. Bolocan, P. Pulbure. In the period of 1953-1960, zoological research was focused on studying the biodiversity of entomofauna (F. Hazanjieva), birdlife (I. Ganea) and mammals (A. Perevalov). In the 1960s, two main directions were determinant in the study of animal world: collection and processing of entomological material (L. Borodina) and research in hydrobiology (S. Antonovich, L. Popa, T. Gontea, M. Syrghii, V. Burla, I. Lavric, N. Karimova). Since 1964, a new research direction appeared at the Department - the study of herpetofaunal diversity (V. Tofan, A. Perevalov). At the same time with the research activities, the staff of the Department was involved in the development of zoology teaching methods in general and higher education (L. Popa, L. Borodina, T. Gontea, S. Antonovich). The Department of Zoology contributed to the organization in 1970 of the first republican conference "Fauna of Moldova and its Protection" (Popa & Burnashev, 1970).

The Department of Botany was founded in 1954 with the transfer of the Faculty of Natural Sciences and Geography of Pedagogical Institute from Chişinău to Tiraspol. Doctor in biology Boris Matienco (1955-1959) was appointed the head of this Department, and in 1963 Dr. Petru Tarhon took this position. At the Biological Station of the Institute he has founded a nursery and an arboretum, which listed about 400 species of arborescent

plants of different geographical origins. Later on, with his transfer to the Moldova State University, he created another nursery and arboretum on the territory of the MSU Biological Station, which counted over 300 species from all continents. P. Tarhon is rightly considered to be a founder and promotor of a new direction in plants introduction – Vegetal introductive ecophysiology (Grati, 2020). In the years '50–'60 the staff of the department was involved in the studies in the anatomy and morphology of *Cucurbitaceae* fruits (B. Matienco), morphology and embryology of castor ben plant and hemp (V. Shubernetsky), cytology of corn and vegetative hybridization of different plant species from the *Solanaceae* (S. Ivannikov), geobotany, dendrology and intorduction of new plant species (Gh. Simonov, Ia. Bumbu, A. Vainshtein, P. Tarhon), plant biology and ecology (P. Crăciun) (Nirka, 1960).

Conclusions

After proclaiming the independence and sovereignty of the Republic of Moldova, at a modern stage, the researchers working in the fields of academic and university biological sciences respond adequately to the challenges of time and societal demands, on a national scale, according to the traditions, also taking the confident steps towards the integration into the unified European research space and the regional one, asserting and promoting the scientific achievements on the international arena.

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References

- Andronic, L., Smerea, S., & Cotenco, E. (2021). Cercetări în genetica și fiziologia vegetală: retrospectivă și realizări actuale ale IGFPP. In *Genetica, fiziologia și ameliorarea plantelor* (pp. 5-10).
https://ibn.idsi.md/ro/vizualizare_articol/139453/gscholar
- Botnari, V., Andronic, L., Cotenco, E., Balaur, N., Todiraș V. (2016). Pagini din istoricul Institutului de Genetică, Fiziologie și Protecție a Plantelor al Academiei de Științe a Moldovei. *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 328(1),15-49.
https://ibn.idsi.md/sites/default/files/imag_file/15_49_Pagini%20din%20istoricul%20Institutului%20de%20Genetica,%20Fiziologie%20si%20Protectie%20a%20Plantelor_0.pdf
- Chepurnova, L.V. (2021). A history of appearance, flourishing and transformations of the Zoology Department of Moldova State University. In *Academician Leo Berg – 145: Collection of Scientific Articles*. (pp.60-61). Eco-TIRAS.
https://ibn.idsi.md/sites/default/files/imag_file/60-64_27.pdf
- Ciochină, V. (2001). Școala academicianului Teodor Furdui în fiziologia stresului, adaptării și sanocreatologie. *Buletinul Academiei de Științe a Republicii Moldova. Științe biologice și chimice*, 286(1),83-85.
- Duca, Gh., & Furdui, T. (2011). Un performer al științei. Membru corespondent Constantin Moraru la 85 de ani. *Revista de Știință, Inovare, Cultură și Artă „Akademos”*, 21(2), 155-155. https://ibn.idsi.md/vizualizare_articol/1534
- Duca, M.V., Gudumac, V.S., Shutov, A.D. (2009). Professor Iosif Alexandrovich Vaintraub (1929-2005). *Studia Universitatis. Seria Științe ale Naturii*, 1, 218.
https://ibn.idsi.md/sites/default/files/imag_file/218.Iosif%20Alexandrovici%20Vaintraub.pdf
- Eremia, I. (Ed.). (2016). *Istoria Universității de Stat din Moldova*. CEP USM
- Furdui, T., Gaina, B., Botnari, V., Andronic, L., Tudorache, Gh. & Chirilov A. (2016). In memoriam academicianului Simion Toma (30.08.1936 – 11.11.2015). *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 329(2), 181-182.
https://ibn.idsi.md/sites/default/files/imag_file/181_Personalitati%20notorii_Simion%20Toma.pdf
- Furdui, T., & Chirilov, A. (2016). Să nu dăm uitării numele celor care au stat la baza dezvoltării științei autohtone. *Revista de Știință, Inovare, Cultură și Artă „Akademos”*, 42(3), 35-39. https://ibn.idsi.md/en/vizualizare_articol/48143
- Furdui, T., Ciochină, V. (2016). De la fiziologia generală la știința nouă în biomedicină – sanocreatologia – calea de dezvoltare a științei în Institutul de Fiziologie și Sanocreatologie al Academiei de Științe a Moldovei. *Buletinul Academiei de Științe a Moldovei. Științele vieții*. 328(1) 75-77.

- https://ibn.idsi.md/sites/default/files/imag_file/75_100_De%20la%20Fi ziologia%20general%20la%20stiinta%20noua%20Sanocreatologia.pdf
- Furdui, T., Duca, Gh. (2009). Distins savant în domeniul fiziologiei și biochimiei plantelor. *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 308(2), 160-162. https://ibn.idsi.md/ro/vizualizare_articol/146/dublincore
- Furdui, T., Duca, Gh. (2017). Distins savant în fiziologia plantelor. Academicianul Gheorghe Siscanu la 85 de ani. *Akados*, 2, 180-181. http://www.akados.asm.md/files/180_181_Distins%20savant%20in%20fiziologia%20plantelor.%20Academicianul%20Gheorghe%20Siscanu%20la%2085%20de%20ani.pdf
- Grati, V. (2020). Unele aspecte ale activității catedrei de Botanică a Institutului Pedagogic de Stat „Taras G. Șevcenco” din Tiraspol în perioada anilor 1954-1991. In *Instruire prin cercetare pentru o societate prosperă: Conferință științifico-practică, Chișinău*, 1(18), 20-21. https://ibn.idsi.md/sites/default/files/imag_file/UST_Volum1_Conferinta_a_Biologie_Chimie.pdf
- Ilvițchi, S. (2021). Omagiu la 90 de ani profesorului universitar și savantului genetician Valeriu Movileanu-Ilvițchi de la Facultatea de Biologie a Universității de Stat din Chișinău. In *Patrimoniul cultural de ieri – implicații în dezvoltarea societății durabile de mâine: Conferință științifică internațională, ed. a 4-a, Iași-Chișinău*.
- Jarcuțchi, I., Manolache, C., Xenofontov, I. (2013). Știința în Republica Moldova: file de istorie (I). *Enciclopedia*, 1(4), 5-16. https://ibn.idsi.md/ro/vizualizare_articol/34417
- Malcoci, I., & Xenofontov, I. (2019). Academicianul Anatoli Kovarski, unul dintre fondatorii Academiei de Științe a RSS Moldovenești. *Revista de Știință, Inovare, Cultură și Artă „Akados”*, 52(1), 98-103. <https://doi.org/10.5281/zenodo.2907692>
- Malcoci, Iu., Xenofontov, I. (2018). Academicianul Aleksandr Jucenko (1935–2013). Parcurs ideologic și profesional. *Acta Terrae Fogarasiensis*, 7, 415. https://biblioteca-digitala.ro/reviste/ACTA_TERRAE_FOGARASIENSIS/07_ACTA_TERRAE_FOGARASIENSIS_VII_2018_412.pdf
- Manolache, C. (2022). Evoluția științelor biologice în RSS Moldovenească (1947-1991): sinteză cronologică. In *Conferința științifică internațională (ediția a VI-a) Latinitate, Romanitate, Românită* (pp. 439-455). https://ibn.idsi.md/sites/default/files/imag_file/439-455.pdf
- Manolache, C. (ed.). (2017a). *Academician Alexandru Ciubotaru. Biobibliografie*. Biblioteca Științifică Centrală (Institut) „Andrei Lupan”. https://enciclopedia.asm.md/wp-content/uploads/Acad_A_Ciubotaru.pdf

- Manolache, C. (ed.). (2017b). *Academician Andrei Negru: Biobibliografie*. Biblioteca Științifică (Institut) „Andrei Lupan”. https://enciclopedia.asm.md/wp-content/uploads/Academician-A_Negru_internet.pdf
- Manolache, C. (ed.). (2017c). *Academician Alexei Spassky: Biobibliografie*. Biblioteca Științifică (Institut) „Andrei Lupan”. https://enciclopedia.asm.md/wp-content/uploads/Acad.-Alexei_Spassky_Biobibliografie.pdf
- Manolache, C., & Hadîrca, D. (2015). Academicianul Boris Melnic, părintele fiziologiei naționale. *Enciclopedica. Revista de istorie a științei și studii enciclopedice*, 8(1), 29-34. https://ibn.idsi.md/sites/default/files/imag_file/29-34_20.pdf
- Membrii Academiei de Științe a Moldovei (1961-2006): *Dicționar*. (2006). Editura Știința.
- Nirka, E.A. (1960). Evolution of Natural Sciences-Geographic Faculty during 30 years. In *Book of Abstracts of 2nd Scientific Conference of Young Scientists of T.G. Shevchenko Tiraspol Pedagogical Institute*. Chisinau, 5.
- Obuh, P.A., Salar, V.M., Sabanova, A.V. & Lupusor, A.V. (1989). Vladimir Nikolaevich Andreev (1889-1962): Dedicated to the 100th Anniversary. In *Theoretical and Applied Aspects of Studying the Flora of Moldova: Proceedings of the Republican Scientific Conference, May 11-13, 1989*. Chisinau
- Palii, A. (2014). Academicianul Anatol Kovarski, ctitor al școlii naționale de geneticieni și amelioratori. *Akademos*, 32(1), 153-154. https://ibn.idsi.md/ro/vizualizare_articol/30355
- Popa, L.L., Burnashev, M.S. (1970). Some totals and development perspectives of faunistic knowledge in the T.G. Shevchenko Tiraspol Pedagogical Institute and V.I Lenin Chisinau State University. In *Fauna of Moldova and its protection: Proceedings of the 1st Republican Interuniversity Scientific and Practical Conference*, Chisinau, (pp.3-4).
- Rudic V., Codreanu S., Cepoi L., Miscu V. (2014). 55 de ani ai științei microbiologice din Republica Moldova. *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 324(3), 185-192. https://ibn.idsi.md/ro/vizualizare_articol/34160
- Rudic, V. (2016). File din istoria Institutului de Microbiologie și Biotehnologie al Academiei de Științe a Moldovei. *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 328(1), 101-123. https://ibn.idsi.md/sites/default/files/imag_file/101_123_File%20din%20istoria%20Institutului%20de%20Microbiologie%20si%20Biotehnologie.pdf
- Rusnac, Gh., Cozma, V. (2000). Mina Lozanu – savant, pedagog și filosof al științei. *Anale științifice. Seria Științe chimico-biologice*. CEP USM

- Teleuta, A., Bucatel, V. & Sirbu T. (2018). Grădina Botanică (Institut) a Academiei de Științe a Moldovei. In A. Teleuță (ed.). *Grădina Botanică (Institut) a Academiei de Științe a Moldovei: monografie*. Chișinău, (pp.5-6).
- Teleuta, A., Ciubotaru, A., Alexandrov, E., & Coltun, M. (2010). Grădina Botanică (Institut) a Academiei de Științe a Moldovei la 60 de ani—realizări și perspective. In *Conservation of plant diversity* (pp. 15-22).
https://ibn.idsi.md/sites/default/files/imag_file/pp15-22.pdf
- Toderas, I., Ungureanu, L., Calestru, L. (2016). Institutul de Zoologie al Academiei de Științe a Moldovei. Istorie și contemporanietate. *Buletinul Academiei de Științe a Moldovei. Științele vieții*, 328(1), 124-156.
https://ibn.idsi.md/sites/default/files/j_nr_file/1_2016_Stiințele%20Vieții.pdf
- Tofan-Dorofeev, E., Ionita, O. (2019). Herbarul Grădinii Botanice Naționale (Institut) „Alexandru Ciubotaru”. *Journal of Botany*, 11(2,19), 97-99.
https://ibn.idsi.md/sites/default/files/j_nr_file/Revista%20GB_final_bun%20de%20tipar_2_2019.pdf
- Toma, S., & Tudorache, G. (2011). Fiziologia și biochimia vegetală-istorie, prezent și perspectivă. In *Agronomie* (Vol. 29, pp. 10-19).
https://ibn.idsi.md/vizualizare_articol/78430