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Academician Pranciškus Baltrus Šivickis: research trends and students

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The article is dedicated to the commemoration of 130th birth anniversary of Academician Pranciškus Baltrus Šivickis (1882–1968), one of the most outstanding Lithuanian biologists of the XX century, with the focus on the development of biological research and achievements. Professor's scientific activities are elucidated together with basic research trends. Professor P. B. Šivickis is considered an initiator of experimental zoology and of such scientific branches as morphogenesis, tissue regeneration, hydrobiology, parasitology, malacology, pedobiology in Lithuania. In the article, the main focus is on the research carried out by Professor's students and their theses is relevant scientific branches. In general, three main biological research trends have been developed: parasitology, hydrobiology and pedobiology.

Key words: malacology, hydrobiology, parasitology, pedobiology

INTRODUCTION

Academician Pranciškus Baltrus Šivickis (1882–1968) was one of the most outstanding Lithuanian biologists of the XX century. His extensive research made him well known in the context of world-wide science of the time. He is considered an initiator of experimental zoology and of such scientific branches as hydrobiology, parasitology, malacology, pedobiology and morphogenesis in Lithuania. His contribution to the formation of Lithuanian biological terminology is also worthwhile mentioning.

BRIEF BIOGRAPHY

Pranciškus Baltrus Šivickis was born on 30 September 1882 in the village of Žalakiškės, Šiluva parish, Raseiniai district in the family of Kazimieras and Ona (maiden name Grigaitė) Šivickiai. The family raised three sons: Pranciškus, Stasys and Tamošius. In 1890, mother Ona Šivickienė and son Stasys died leaving behind 2 small children – Pranciškus ir Tamošius who were brought up by their father's sister Uršulė. In 1900 Pranciškus completed a three-year Russian school in Šiluva. He associated with book-smugglers (*knygnešiai*), distributed Lithuanian publications and collected folklore songs and tales. He participated in the national liberation movement of 1905 and therefore in 1906 from the persecution of the tzarist regime he was forced to emigrate to the USA. When in Chicago, he did various jobs in factories and attended courses of the English language. In 1908–1922 he studied at American universities: Valparaiso (state of Indiana), Illinois (state of Illinois), Purdue (state of Indiana), Missouri (Columbia), Iowa (state of Iowa), Columbia (New York) and Chicago. Initially he was interested in agronomic and agricultural sciences, later in medicine and biology. In 1911 at Valparaiso University he received Bachelor of Science, in 1917 at Missouri University – his Bachelor of Arts. On

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13 June 1922, at the Faculty of Natural Sciences, Chicago University he defended his thesis and was conferred a degree of Doctor of Philosophy. His citizenship prevented P. B. Šivickis from becoming a professor at University of Chicago and he was offered a job at University of Manila, Philippines. Since 1901 following the Spanish colonization Philippines was a colony of the USA and it was only in 1946 that the country's sovereignty had been recognized. P. B. Šivickis worked in Manila in 1922–1928 (Eitminavičiūtė, 1980).

In 1928 he returns to Lithuania and becomes professor at the Faculty of Mathematics-Natural Sciences of the University of Lithuania (since 1930 – Vytautas Magnus University) in Kaunas. Upon his arrival to Lithuania, Professor immediately got acquainted with the work of many European universities (English, German, Hungarian, etc.) and respective biological stations. His aim was to raise the level of Lithuanian science so it could reach that of other European countries. In Kaunas he worked until the middle of 1940 when some part of the University was transferred to Vilnius. In 1941–1948 he was professor of the Faculty of Medicine of Vilnius University. After the notorious session of the Academy of Agricultural Sciences of the USSR which condemned postulates of genetics and promoted "Michurin-type biology" he officially dissociated from it and had been dismissed from the University. Later he worked as researcher and head of laboratory at Institute of Agriculture (1948), Institute of Animal Husbandry and Veterinary (1952), Institute of Biology (1956), Institute of Zoology and Parasitology (1959). In 1959–1960 he was director of Institute of Zoology and Parasitology. In 1960–1968 – head of sector of Invertebrate zoology. He has been twice elected a Full Member of Lithuanian Academy of Sciences: in 1941 and 1956.

In 1937, at the age of 55 Professor Pranciškus Baltrus Šivickis married a graduate of the Faculty of Mathematics–Natural Sciences of Vytautas Magnus University. His wife Petronėlė Rimkutė, 29, was a teacher and geographer from Raseiniai district. Together they raised five children: two sons and three daughters. Julius (head of laboratory, presently deceased) and Teklė – chemists, Marytė and Albertas – professional musicians, Ramona – a mathematician. All their children had musical inclination.

RESEARCH TRENDS

Professor, contrary to many others, can boast a large number of students. Under his supervision, 30 theses were defended (Table 1) and until 1940 – 18 master theses. The exact number of master theses defended during the later period remains unknown.

P. B. Šivickis' first steps in research were related to experimental zoology and commenced at the University of Chicago in the USA under the leadership of outstanding physiologist embryologist C. M. Childe (Šivickis, 2005). On the basis of the research, a thesis "Studies on the physiology of reconstitution in *Planaria lata*, with description of the species" was defended for Doctor of Philosophy degree and published in journal Biological Bulletin (Concaster Pa) in 1923 (Šivickis, 1923). His research was associated with the problem of morphogenesis with the aim of revealing the factors which regulate the processes of morphogenesis. According to Laima Slavėnienė, one of the methods of morphogenesis investigation is the study of organism regeneration (Slavėnienė, 1980). Key experimental live organisms used in the research were *planaria* (flat worms). Throughout his life with some short intervals P. B. Šivickis has been engaged in this field of experimental zoology. Research had been performed not only in Lithuania but also at Institute of Biology in Hungary (1930), Plymouth biological station in England (1936) which had appropriate equipment and qualified specialists. The majority of articles in this field had been published until 1940 (Slavėnienė, 1980), usually in the English language in foreign journals. Alongside the research of tissue regeneration Professor focused on the study of biochemical processes in protoplasma using jellyfish (*Actromitoides purpureus* Stiasny). The study led him to a theoretical and practical conclusion that young protoplasma with the then minimal concentration of mineral substances is characterized by permanent differentiation processes and the highest level of activity. With age, activity slows down in connection with increase of organic substances. All these theoretical works were a life-long interest of Professor albeit with no followers. A single thesis was defended – „*Planaria lugubris* regeneracijos histologinis tyrinėjimas" ("Histological study of *Planaria lugubris* regeneration"). In 1939 the

Table 1. **Students of Academician Professor Pranciškus Baltrus Šivickis**

Research trend	Name / Surname	Year
Tissue regeneration	Antanina Prielgauskienė-Glebavičiūtė	1939
Anthropology	Salezijus Pavilonis	1948
Hydrobiology	Juozas Maniukas	1950
	Teklė Kiselytė	1958
	Ona Pečiulienė	1959
	Antanas Grigelis	1964
	Dalia Zapkuvienė-Malėlaitė	1972
Parasitology	Jonas Butkus	1953
	Gediminas Volskis	1954
	Julius Pagirys	1954
	Julius Kazlauskas	1955
	Balys Balčiūnas	1956
	Mykolas Rauckis	1956
	Vytautas Povilaitis	1958
	Valerija Kiselienė	1960
	Benedikta Kadytė	1961
	Viktoras Šarkūnas	1962
	Aldona Stanionytė	1963
	Stasys Molis	1964
	Tamara Arnastauskienė	1964
	Juozas Bartninkas	1964
	Edvardas Rauckis	1964
	Mira Goldbergienė	1965
	Kazimieras Varkalis	1967
	Povilas Šleikus	1969
Pedobiology	Irena Eitminavičiūtė	1958
	Ona Atlavinytė	1959
	Algirdas Liepinis	1967
	Irena Sukackienė	1969
	Valentina Strazdienė	1969

thesis was defended by Antanina Prielgauskienė-Glebavičiūtė, a university graduate and teacher of gymnasium. She was the first woman to be awarded a degree of Doctor of Philosophy at Vytautas Magnus University (Table 1) (Arnastauskienė, Jakimavičius, 1997).

Malacology was the second sphere of research Professor P. B. Šivickis had been engaged in during his long career. His interest in mollusks dates back to Philippines. When in Lithuania he commenced collection of mollusks in 1928 by arranging expeditions of students and colleagues to Lithuanian lakes, Curonian Lagoon and Baltic seacoast (Šivickis, 1938; Kiselienė, 1980). An expert in the fauna of aquatic mollusks of Philippines, he started by collecting Lithuanian aquatic mollusks and adding terrestrial mollusks some time later. P. B. Šivickis was acquainted with malacologists working in Europe at that time, for instance Dr. H. Schlesch from Denmark, a famous specialist of fauna in Northern Europe, Dr. C. Krausp from Estonia, an expert in mollusks who had been invited to participate in expeditions in Lithuania. Under supervision of Professor, Mečius Valius defended his master thesis „Obelijos ežero ir apylinkių moliuskų fauna“ (“Mollusk fauna of Obelija Lake and its surroundings”) in 1938 and thesis of doctor of biological sciences „Metelių ežerų krašto Pupillidae šeimos sraigės“ (“Snails of Pupillidae family of Meteliai Lake region”) in 1948. Professor’s persuasion to continue studies of mollusks failed and the topic had been dropped (Valius, 1980). Valerija Kiselienė-Ališauskaitė also investigated fauna of mollusks as intermediate hosts of nematodes, however, her thesis for doctor degree was more associated with parasitology. In 1955, at

the Faculty of Natural Sciences, Vilnius University a master thesis on mollusks was defended by Teresė Rudytė. In 1965, Elena Andreikevičienė was engaged in preparation of a thesis on the biology, ecology and rearing of snail (*Helix pomacia*). The thesis, however, had not been defended.

Although Professor used to stress that mollusks were particularly functional in solving miscellaneous scientific problems, there were no scientists in Lithuania to take over all the field of malacology so highly developed by him (Šivickis, 1938). During Professor's active career mollusks as research objects have been used by helminthologists, hydrobiologists, physiologists (Gediminas Volskis, Valerija Kiselienė, Bronė Usinienė, Ipolitas Gasiūnas, Algis Bubinas, Antanas Grigelis and others). Studies in malacology had a continuaton: at Institute of Zoology and Parasitology a separate subunit, named ecological and physiological features of *Unionacea* superfamily, headed by Danutė Sinevičienė, was established. As research objects mollusks proceeded to be popular as is demonstrated by an array of articles by Leonas Račiūnas, Janina Šyvokienė, Lilija Lazauskienė, Algirdas Stankevičius, Janina Baršienė, Grita Skujienė, Dalė Zapkuvienė and others. In this context, the publication of Albertas Gurskas „Lietuvos sausumos sraigės" ("Lithuanian terrestrial snails") is particularly worthwhile mentioning (Gurskas, 1997). The above-named works not only contributed to the knowledge of ecological, physiological and genetic features of mollusks together with their economic value but also supplemented Professor's mollusk collection with new species. Until this day, P. B. Šivickis' book „Lietuvos moliuskai ir jų apibūdinimas" ("Lithuanian mollusks and their description") remains the most prominent publication in this field in Lithuania (Šivickis, 1960). Professor's last publication on the mollusks collected on the shore of Žuvintas Lake in 1954–1965 was printed in the book „Žuvinto rezervatas" ("Žuvintas Nature Reserve") in 1968 (Šivickis, 1968).

Mollusk collection of P. B. Šivickis could boast European significance. Some species became a part of the collection in the British Museum in London. For instance, the above mentioned scientist H. Schlesch sent 50 mollusk specimens, collected in the Nemunas River near Druskininkai in 1937, to Prof. V. Franz in Germany where a thorough paper was published (Franz, 1938). With consent of P. B. Šivickis, other mollusks remained with Dr. H. Schlesch or were sent to some museums and thus Stockholm, London, Berlin, Riga museums have specimens of Lithuanian mollusks with labels of Dr. H. Schlesch and collector P. B. Šivickis (Gurskas, 2002).

Following the death of Prof. P. B. Šivickis, his collection at the Institute of Ecology was neglected. Therefore, in 1999 at the suggestion of A. Jakimavičius and approval of the Institute's Scientific Council P. B. Šivickis' mollusks collection was given over to Tadas Ivanauskas Zoology Museum in Kaunas in 2000. Presently the collection at the museum is kept as a separate unity. A. Gurskas, chief curator of the funds, made the inventory and catalogue indicating shells of mollusks of 172 species. Among them, not only those of all Lithuanian fauna but also those collected in other countries or received in exchange from Western Europe (Gurskas, 2002).

Many mollusks and *planaria* are hydrofauna, thus, without doubt, for their research all aquatic invertebrates fauna have been collected. Professor used to emphasize the significance of Lithuanian water bodies, their insufficient investigation and usage (Maniukas, 1980). Therefore, first expeditions in Lithuania, involving not only staff from the Chair but also students, were associated with studies of water bodies. The first master theses (J. Krikštopaitė, T. Teizeraitė) were prepared investigating the plankton of ponds. In 1933–1934 the research of fauna and ecology of Lithuanian lakes and Baltic Sea started and some expeditions were financed personally by P. B. Šivickis. Professor had a dream of establishing a biological station with a perspective of uninterrupted investigation. For first expeditions, his homestead in the island of Grabuostas Lake near Molėtai bought both for personal and professional purposes was used. A large bulk of Lithuanian aquatic fauna was collected, although we lack information on how many master theses in this field had been defended. In the field of hydrobiology, the first dissertation „Gyvagimdžių kaulingųjų žuvų *Xiphophorus heleri* ir *Lebistes reticulatus* ekskrecinės sistemos histogenezė ir morfogenezė" ("Histogenesis and morphogenesis of excretion system in *Xiphophorus heleri* and *Lebistes reticulatus*") in 1950 was defended by Juozas Maniukas, Professor's long-time laboratory assistant and colleague. In 1958 Teklė

Kiselytė, another Professor's long-time colleague, defended the dissertation „Kuršių marių zooplanktonas" ("Zooplankton of the Curonian Lagoon"). Zooplankton investigations have been also continued by Ona Pečiulienė who defended her dissertation „Trakų ežerų zooplanktonas ir jo dinamika" ("Zooplankton of Trakai lakes and its dynamics") in 1959. Based on the study of aquatic oligochets in 1964 A. Grigelis defended dissertation „Lietuvos TSR vandenų oligochetai, jų ekologija ir ūkinė reikšmė" ("Aquatic oligochets of Lithuanian SSR, their ecology and economic significance"). In 1986, after years of pursuing hydrobiological studies he prepared and defended the second, a doctoral thesis (presently Dr. habil.) under the title „Baltijos aukštumos ledynmečio kilmės ežerų zoobentoso formavimosi dėsningumai ir bioproduktyvumas" ("Regularities and bioproductivity of zoobenthos formation of Baltic Highland glacial-origin lakes"). The research of D. Zapkuvienė-Malėlaitė, who worked in the subunit headed by Professor, could also be attributed to the sphere of hydrobiological investigation, although her dissertation was supervised by another person. In 1972 she defended dissertation „Medicininė dėlė (*Hirudo medicinalis* f. *serpentina* Moquin-Tandon, 1846) Lietuvos TSR vandenyse ir jos dirbtinio veisimo būdai" ("*Hirudo medicinalis* f. *serpentina* Moquin-Tandon, 1846 in water bodies of Lithuanian SSR and ways of artificial rearing").

The collected aquatic fauna was very abundant not only by species but also by groups whereas at the time qualified specialists to make descriptions were rare. Professor engaged in communication with relevant specialists all over the world and asked for their assistance. Two species of hydrobionts, *Charybdea sivickisi* and *Pleonogaster sivickisi*, carry the name of P. B. Šivickis. These species were described and names given by Dr. G. Stiasny from the Leiden Museum and Dr. J. Stephenson from the British Museum. The fauna was collected in Philippines. These works together with abundant faunistic and ecological material laid the foundations and granted opportunity for the development of hydrobiology in Lithuania. Presently in Lithuania hydrobiological investigations are carried out not only at the universities (Vilnius, Klaipėda) but also at research institutes. The investigations became multi-factor and multi-branched starting from invertebrates and ending with fish. Professor's dream came true: currently hydrobiological science can boast deep-rooted theoretical foundations and a wide-scope practical application in Lithuania.

The largest group of Professor's students who had defended theses were engaged in the field of parasitology. Following the World War II upon collectivization in Lithuania the agriculture, animal husbandry in particular, experienced a lot of hardships. The period was characterized by a shortage of feed, spread of various animal diseases, helminthosis as the key one. Helminths are invertebrates living in other organisms. Specialists of animal husbandry were the first to show interest in investigations in this field and address the Laboratory of Parasitology, Institute of Animal Husbandry and Veterinary of Lithuanian Academy of Sciences headed by Professor. Jonas Butkus at zoological farm of fur animals investigated infestation of foxes with helminths and wrote dissertation „Svarbiausios juodsidabrių lapių endoparazitinės ligos ir kovos priemonės su jomis" ("Key endoparasitic diseases of foxes and control measures"). Under supervision of P. B. Šivickis the thesis was defended in 1953. From 1954 several doctoral students of Professor such as Gediminas Volskis, Julius Pagirys, Mykolas Rauckis started to defend their theses. They were veterinary doctors with a specialization in helminthology. In 1954 Gediminas Volskis defended dissertation „Fascioliozės židinių tyrinėjimas buvusiose Klaipėdos ir Šiaulių srityse" ("Investigation of centres of fascioliasis in former regions of Klaipėda and Šiauliai"), a year later in 1955 doctor-epizootologist Julius Kazlauskas – about the helminth fauna of horses in Lithuania.

Under Professor P. B. Šivickis' supervision the research into trematodes has been further pursued with the focus on trematode biology, development, impact on animal organism with affected liver. Several theses were defended in this field: „Lietuvos TSR kai kurių echinostomatidų biologija" ("Biology of some echinostomatids in the Lithuanian SSR") by V. Kiselienė in 1960, „Biocheminiai pokyčiai gyvūnų organizme sutrikus kepenų funkcijai dėl fascioliozės" ("Biochemical changes in animal organism with affected liver function due to fascioliasis") by Mira Goldbergienė in 1965. The research had been pursued by Ona Kublickienė who defended her doctor thesis (Dr. habil.)

„Eksperimentinė fascioliozė: parazito poveikis šeimininko organizmui ir pažeistų gyvulių kepenų atstatomųjų procesų stimuliavimas“ (“Experimental fascioliasis: parasite’s impact on host organism and stimulation of reconstruction processes in the affected animal liver”) in 1970.

Another group of researchers worked with nematodes. In 1954 J. Pagirys defended thesis „Galvijų diktiokauliozės epizootologija Lietuvoje“ (“Epizootology of cattle dictiocaulus in Lithuania”). Proceeding with this topic, in 1966 he defended doctor dissertation (presently Dr. habil.) „Galvijų diktiokauliozės tyrimai ir kovos priemonės su šia helmintoze Lietuvoje“ (“Investigation of cattle dictiocaulus and control measures of helminthosis in Lithuania”). M. Rauckis investigated pig nematodes and defended thesis „Kiaulių strongiloidozės epizootologija ir pagrindinės profilaktinės kovos priemonės Lietuvos TSR“ (“Epizootology of pig strongyloidosis and key prevention measures in the Lithuanian SSR”) in 1956. As a result of continued research in 1968 doctor thesis (presently Dr. habil.) „*Strongyloides ransomi* Schwartz et Alicata, 1930 biologinės ypatybės ir kiaulių strongiloidozės profilaktika Lietuvoje“ (“Biological features of *Strongyloides ransomi* Schwartz et Alicata, 1930 and prophylaxis of pig strongyloidosis in Lithuania”). Viktoras Šarkūnas’ dissertation „Kiaulių strongiloidozės gydymo palyginamasis įvertinimas“ (“Comparative assessment of treatment of pig strongyloidosis”) (1962) also dealt with these helminths. Povilas Šleikus was the last among helminthologists to defend the dissertation (1969). The object of his research was moniezia, a then common parasite of cattle and sheep. Under supervision of Prof. P. B. Šivickis he defended thesis „Gyvulių moniezijozės Lietuvoje sukėlėjų kai kurių biologinių savybių ir profilaktikos priemonių prieš šią helmintozę tyrimas“ (“Investigation of some biological properties of animal monieziosis-inducing agents in Lithuania and search of prevention measures against this helminthosis”).

Another sphere of Professor’s interest was parasitic insects and mites. Three dissertations were defended in this field: „Erkės *Ixodes ricinus* L. biologija ir ekologija Lietuvoje“ (“Biology and ecology of *Ixodes ricinus* L. in Lithuania”) by Benedikta Kadytė (1961), „Gastrofiliozės sukėlėjai (*Gastrophilus* Leach), jų biologija ir kovos priemonės su jais“ (“Agents of gastrophiliosis (*Gastrophilus* Leach), their biology and control measures”) by Edvardas Rauckis (1964), „Tvartinės musės, jų biologija, ekologija, paplitimas Lietuvos TSR ir kovos priemonės“ (“Flies, their biology, ecology and distribution in the Lithuanian SSR and control measures”) by Kazimieras Varkalis (1967). Theses in entomology by Aldona Stanionytė and Stasys Molis: „Lietuvos TSR žirgelių (Odonata) biologija ir jų parazitai“ (“Biology of Odonata and their parasites in the Lithuanian SSR”) (1963) and „Lietuvos TSR blakės (*Hemiptera-Heteroptera-Pentatomoidea*) ir jų ūkinė reikšmė“ (“*Hemiptera-Heteroptera-Pentatomoidea* and its economic significance in the Lithuanian SSR”) (1964) have some association with the above mentioned research area.

Three dissertations were defended in the field of parasitic protozoa: „Viščiukų kokcidijozė ir kovos priemonės Lietuvos TSR“ (“Chicken coccidiosis and control measures in the Lithuanian SSR”) by Balys Balčiūnas (1956), „Galvijų babezieliozės epizootologija Lietuvos TSR“ (“Epizootology of cattle babesiosis in the Lithuanian SSR”) by Vytautas Povilaitis (1958) and „Galvijų, avių bei kiaulių kokcidijos ir jų biologija“ (“Coccidians of cattle, sheep and pigs and their biology”) by Tamara Arnastauskienė (1964). In 1959, his monograph „Parazitų apibūdinimas“ (“Key to parasites”) (1956) earned P. B. Šivickis the Lithuanian National Prize.

An array of Professor’s students laid foundations for the research which had been pursued until this day at the Laboratory after his name at the Institute of Ecology, Nature Research Centre as well as in the Academy of Veterinary, Institutes of Animal Husbandry and Veterinary. The above mentioned P. B. Šivickis Laboratory of Parasitology, the Institute of Ecology can boast fundamental results in taxonomic and experimental studies of haemosporidian parasites. Particularly good results were obtained in investigation of eukaryotic parasitic organisms, especially protists, helminths, with the focus on their biodiversity, molecular diagnosis, phylogeography. The laboratory became the leader in this field not only in Lithuania but also had been highly appreciated and recognized on an international scale.

In a sense, soil zoology research developed from parasitological investigations. Under supervision of P. B. Šivickis in 1955 Irena Eitminavičiūtė defended master thesis „*Moniezia expansa* ir *Moniezia*

benedeni anatomija ir morfologija“ (“Anatomy and morphology of *Moniezia expansa* and *Moniezia benedeni*”). These are helminths, parasites of sheep and cattle. Animals get infected in pastures through intermediate hosts – saprophagic oribatid soil-inhabiting mites. Fauna of these soil mites in Lithuania and their infestation with *Moniezia* eggs have not yet been known, therefore, doctoral student I. Eitminavičiūtė had a task to investigate these issues. In 1958 she defended dissertation „Lietuvos TSR oribatidai“ (“Oribatids of the Lithuanian SSR”). A similar case was with research topic selection for Ona Atlavinytė. Earthworms became an object of investigation in attempt to elucidate their role associated with pig helminthosis. Thus in 1959 O. Atlavinytė defended dissertation „Oligochetų ekologija Lietuvos TSR dirvožemiuose“ (“Ecology of oligochets in soils of the Lithuanian SSR”). This was the beginning of a new research trend in Lithuania, soil zoology, later pedobiology, which had been developed at Sector of Invertebrate zoology (headed by Prof. P. B. Šivickis since 1960 until his death). In 1962, one more doctor thesis also related with parasitology was defended, namely „Kai kurių daržovių nematodų fauna ir jos dinamika Lietuvos TSR“ (“Fauna of some vegetable nematodes and its dynamics in the Lithuanian SSR”) by Jūra Šlepetienė. Research had been successfully pursued and the following doctor theses (presently Dr. habil.) were defended: „Sliekų ekologija ir jų reikšmė dirvožemių derlingumui Lietuvos TSR“ (“Ecology of earthworms and their significance for soil fertility in the Lithuanian SSR”) (O. Atlavinytė, 1979), „Dirvožemio bestuburių gyvūnų kompleksų formavimosi dėsningumai velėninių-jaurinių dirvožemių zonoje veikiant antropogeniniams faktoriams“ (“Formation regularities of soil invertebrate complexes in the zone of haplic luvisol soils under the effect of anthropogenic factors”) (I. Eitminavičiūtė, 1982), „Dirvožemio nematodų kompleksai susidarant agrobiocenozėms“ (“Soil nematode complexes in formation of agrobiocenoses”) (J. Šlepetienė, 1988).

Pedobiological studies developed in Lithuania in a vast scale with the focus on fauna and ecology of the most abundant Lithuanian soil invertebrates. Another focus was on elucidation of the role of fauna both in disintegration of chemical compounds, various pollutants (insecticides, pesticides, etc.) and varied organic substances in soil. Thus research of soil fauna extended starting from protozoa and proceeding to insects.

The following dissertations to investigate into protozoa fauna, its abundance and spread in soils were prepared and defended: „Lietuvos TSR pirmuonys“ (“Protozoa of the Lithuanian SSR”) (Algirdas Liepinis, 1968), „Insekticidų poveikis dirvožemio pirmuonims“ (“Impact of insecticides on soil protozoa”) (Dalia Laskauskaitė, dissertation was not defended). Research developed with the aim at elucidation of the role of insect larvae in soil formation processes. In 1970 Valentina Strazdienė defended thesis „Dirvožemio erozijos ir melioracijos įtaka vabzdžių lervų faunai“ (“Impact of soil erosion and melioration on insect larvae fauna”) . Also, soil microarthropods and their biological role became top issues with the following dissertations prepared: „Pelkinių ir dirbamų Lietuvos TSR dirvožemių *Collembola*“ (“*Collembola* of marshy and arable soils of the Lithuanian SSR”) (Irena Sukackienė, 1970), „Kolembolų kompleksai antropogeninių substratų destrukcijoje“ (“*Collembola* complexes in the destruction of anthropogenic substrates”) (Rita Zaksaitė, dissertation was not defended). Ecological studies of soil fauna were expanded by B. Kadytė, her theme being soil-inhabiting gamasidae mites. In this field dissertations were defended by Lilija Lazauskienė „Ekologo-faunistiniai erkių (*Tarsonemina*, *Trombidiformes*) kompleksai Lietuvos TSR dirvožemiuose“ (“Ecological-faunistic complexes of mite (*Tarsonemina*, *Trombidiformes*) in soils of the Lithuanian SSR”) in 1975, Artūras Daubaras „Oribatidinių erkių kompleksų struktūriniai pakitimai kaip antropogeninio poveikio laipsnio velėninių-jaurinių dirvožemių zonoje rodiklis“ (“Structural changes of Oribatidae mite complexes as an indicator of anthropogenic impact degree in the zone of haplic luvisol soils”) in 1990. The last doctor thesis in this field was defended in 2008 by Audronė Matusevičiūtė „Mikroartropodų kompleksai ir jų bioindikacinės savybės natūraliai atsistančiuose ir rekultivuojamuose dirvožemiuose“ (“Microarthropod complexes and their bioindicative features in naturally restoring and recultivated soils”).

In study of tarsonemic mites new to science species were found, one was named after P. B. Šivickis – *Scutacarus shivicki* Lazauskienė, Sevastjanov, sp. nov. (Lazauskienė, Sevastjanov, 1974). One more species named after P. B. Šivickis

was a representative of parasitic protozoa (or unicellular parasites) *Eimeria shivicki* Arnastauskienė, 1977, sp. n. According to Arnastauskienė, voles (*Chethrionomys rutilus* Pal.) captured in the Taymyr tundra were infested with this mite (Арнастаускене, 1977). Hence, in total, the name of Prof. P. B. Šivickis was given to four species of invertebrates.

With time research from soil zoology proceeded to pedobiology. Soil microorganisms were investigated by Zinaida Bagdanavičienė (1975) – „Kai kurių sukultūrintų Lietuvos TSR dirvožemių mikrofloros ekologiniai ryšiai ir vystymosi dėsningumai, fermentai, B grupės vitaminai“ (“Ecological relations and development regularities of microflora of some cultured soils of the Lithuanian SSR, ferments, B group vitamins”) by Irena Budavičienė (1975) – „B grupės vitaminai Lietuvos TSR dirvožemiuose“ (“B group vitamins in soils of the Lithuanian SSR”), agrochemical properties of soils by Jonas Vanagas (1984) – „Dirvožemio agrocheminių savybių ir organizmų kitimai, patręšus organinėmis medžiagomis ir įterpus pesticidų“ (“Alterations in soil agrochemical properties and organisms upon fertilization with organic matter and pesticides”), the role of pedobionts in the composted waste by Petras Kazickas (1988) „Dirvožemio mezofaunos vaidmuo ardant kietąsias buitines atliekas“ (“The role of soil mesofauna in disintegration of solid domestic waste”).

Soil invertebrate studies headed by Prof. P. B. Šivickis from helminthology-related works passed on to vast-scale investigation of soil fauna, its ecology, pedobiont cenoses and habitat media (soil). Starting from 1958, this trend has been successfully developed for 50 years thanks to an array of qualified specialists of this field. Since 1968 the studies were headed by Dr. (later Dr. habil., Prof.) Irena Eitminavičiūtė, one of the authors of this article, who throughout many decades had made the key contribution into investigation of soil biology in Lithuania. Quite recently a monograph on the above mentioned theme was published (Eitminavičiūtė, 2011). However, due to unfavourable circumstances and the end of professional career of many senior scientists recently this trend has gone on a great decline. Hopefully, in the future new directions may be explored and new leaders appear among researchers.

Professor P. B. Šivickis started to work as an assistant at the university during his studies in Chicago in 1920. Philippines, Lithuania, namely Kaunas and Vilnius, where the locations of his work at universities, including preparation of lectures, synopses, manuals, supervision of master and doctoral theses (Minkevičius, Petrauskas, 1980; Pavilonis, 1980). Professor was a highly qualified specialist of broad-brush erudition not only in the area of experimental biology but also in the field of many medicinal disciplines, for instance, comparative anatomy, embryology, histology and others. Therefore upon his arrival at Kaunas in 1929 he was appointed Head of Cabinet of Comparative Anatomy founded by Prof. Tadas Ivanauskas at Faculty of Mathematics-Natural Sciences, University of Lithuania. There he delivered lectures on comparative anatomy and embryology, conducted seminars and practical training (Biziulevičius, 1999). At that time at Sector of Biology a group of students later to become outstanding professors defended theses, among them Antanas Minkevičius, Kazys Bieliukas, Jonas Dagys, Povilas Snarskis, Juozas Maniukas. The majority of works dealt with comparative anatomy and morphology. As Head in the Chair of Histology and Embryology, Faculty of Medicine, Vilnius University, established by himself, Professor prepared synopses of lectures and wrote a chapter on embryology and histology of face, mouth and teeth for the stomatological manual of University's odontologist Stasys Čepulis. At that time one of Professor's students was Salezijus Pavilonis who in 1948 defended doctor thesis „Veido, burnos ir dantų morfologija“ (“Morphology of face, mouth and teeth”) (Arnastauskienė, Jakimavičius, 1997). In 1987 he was among the first to be awarded Academician Pranciškus Šivickis Prize (Table 2).

Nominal Prize of Academician Pranciškus Šivickis (Lithuanian Academy of Sciences) was established in 1982 in commemoration of Professor's 100th birth anniversary. In compliance with Resolution of General Meeting of Lithuanian Academy of Sciences dated 18 May 1993 alongside with other prizes established after new names of the most famous Lithuanian scientists, Prize of Academician Pranciškus Šivickis was renamed in the following way: *Lithuanian Academy of Sciences Pranciškus Šivickis Nominal Prize* (*Biology*). To commemorate Prof. P. B. Šivickis, every three

Table 2. **Laureates of Lithuanian Academy of Sciences Pranciškus Šivickis Nominal Prize**

Name / Surname	Topic	Year
Juozas Maniukas	For a particularly great creative contribution in the area of experimental zoology	1984
Salezijus Pavilonis	Works in the field of anthropology	1987
Stasys Biziulevičius	For works in the field of medicinal parasitology	1990
Tamara Arnastauskienė	Experimental research into biology of coccidiomorpha protozoa	1993
Valerija Kiselienė	Development cycles of trematodes	1993
Irena Eitminavičiūtė	Impact of human activities on soil biocenoses and their role in utilization of anthropogenic substrates	1996
Ona Kublickienė	Research into parasite–host interrelations	2001
Algirdas Skirkevičius	Pheromone distribution among live organisms	2004
Romualda Petkevičiūtė	Investigation of parasitic *planaria* and bivalve molluscs by karyological and molecular methods	2007
Vincas Būda	Studies of information interaction by chemical compounds among organisms	2011

years Prize was awarded for the best works in the area of experimental zoology. Presently like in case of all other nominal prizes of Lithuanian Academy of Sciences it is awarded every four years. Currently, until 2011 inclusive, Prize went to 11 scientists (Table 2).

In 1984 Prize went to Juozas Maniukas for a particularly creative contribution into the field of experimental zoology, in 1987, as had been mentioned above, Prize was awarded to S. Pavilonis for works in the sphere of anthropology, in 1990 – to Stasys Biziulevičius for works in parasitology. These first prizes were given for the entirety of works associated with nominees' experimental studies in the indicated branch of science. Afterwards prizes were awarded for a concrete theme in the area of experimental zoology. In 1993, they were given to Dr. T. Arnastauskienė and Dr. V. Kiselienė, in 1996 to Prof. Dr. habil. I. Eitminavičiūtė, in 2001 to Prof. Dr. habil. O. Kublickienė, in 2004 to Prof. Dr. habil. Algirdas Skirkevičius, in 2007 to Dr. Roma Petkevičiūtė and in 2011 to Prof. Dr. habil. Vincas Būda.

This brief summary of key scientific branches that Prof. P. B. Šivickis was involved in allows us to state that his most profound works of theoretical character in experimental zoology were in the field of morphogenesis, tissue regeneration and from a faunistic viewpoint – in malacology. His research also covered hydrobiology, parasitology and soil zoology. He trained a wide array of students: 5 in hydrobiology, 17 in parasitology, 5 in pedobiology and in other branches. In all the above mentioned branches of zoology invertebrates and their ecology were the research object. Based on the theoretical analysis of Arnastauskienė and Jakimavičius (2005) on the regularities of formation of an independent scientific school, we are in a position to agree that in Lithuania Prof. P. B. Šivickis was a founder of a scientific school of invertebrate faunistic-ecological research.

Pranciškus Baltrus Šivickis devoted his whole life to scientific work. This year we commemorated his 130th birth anniversary and with deep respect we can state that he was a great scientist, citizen and personality.

CONCLUSIONS

In Lithuania during the period of 1928–1968, throughout 40 years of his active career, Prof. Pranciškus Baltrus Šivickis created a scientific school of faunistic-ecological research of invertebrates which was able to boast a large number of followers. Under Professor's supervision thirty (30) defended theses by research trend could be grouped in the following way: tissue regeneration – 1, anthropology – 1, hydrobiology – 5, parasitology – 17, pedobiology – 5. In general, three research trends have been developed in Lithuania: hydrobiology, parasitology and pedobiology.

Professor spurred forward hydrobiological research in Lithuania to cover not only invertebrates but also quite a number of other aquatic animals. The work is distinguished by investigation of miscellaneous biological aspects and wide-scale application in the country's economy.

Currently parasitology in Lithuania is among top scientific topics with good perspectives. P. B. Šivickis Laboratory of Parasitology, Institute of Ecology, Nature Research Centre can boast fundamental results in taxonomic and experimental studies of haemosporidian parasites and in other fields which makes its scientists well-known not only in Lithuania but also in foreign countries.

Starting with research into soil zoology in 1958 throughout the period of fifty years pedobiology underwent great changes and expanded the scope of investigations, however, recently this research trend had severely declined. Alas, works in the area of morphogenesis and tissue regeneration in country's scientific institutions have no continuation and future. The same can be said about malacology.

In science Academician Professor P. B. Šivickis' name has been perpetuated by giving his surname to four species of invertebrates: hydrobionts – *Charybdea sivickisi*, *Pleonogaster sivickisi*, soil-inhabiting mites – *Scutacarus shivicki* and a unicellular parasite – *Eimeria shivicki*.

Key monographs of Academician Professor P. B. Šivickis:

An Outline for Laboratory Work in Elementary Zoology. Manila, 1927, 52 p.

Gyvoji gamta ir mes: gamtos mokslų populiarizacija. Kaunas: Sakalas, 1940, 378 p. (in Lithuanian).

Parazitų apibūdinimas. Vilnius, 1956, 336 p. (in Lithuanian).

Lietuvos moliuskai ir jų apibūdinimas. Vilnius, 1960, 352 p. (in Lithuanian).

Gyvoji mintis: pagal prof. P. B. Šivickio atsiminimus. Sud. R. Šivickytė-Simokaitienė, M. Vitkauskaitė. Vilnius, Lithuania; 2005, 291 p. (in Lithuanian).

In total, Professor wrote about 210 scientific and popular articles.

Unpublished works (stored at the Wroblewski Library of Lithuanian Academy of Sciences, Vilnius, Lithuania, fond F.-144:

Histologija. Trumpas konspektas (Rankraštis), 1946, 135 p.

Biologija. I–III dalis (paskaitų konspektai), 201 p.; 408 p.; 359 p.

Genetika (Paskaitų tezės, konspektas, 39 p.

Histologija. Histologijos vadovas, 359 p.

Histologijos ir embriologijos paskaitų konspektas.

Histologijos pagrindai.

Įvadas į biologiją, 201 p.

Lyginamosios anatomijos praktikos darbai. II d., vadovėlis, 38 p.

Veido, burnos ir dantų embriologija ir histologija, 71 p.

Zoologijos pamatai (paskaitos), 89 p.

Zoologinių terminų žodynas, 126 p.

Key publications about P. B. Šivickis:

Akademikas Pranciškus Šivickis. Sud. V. Petrauskas. Vilnius: Mokslas; 1980, 177, [3] p. (in Lithuanian with English summary).

Arnastauskienė T., Jakimavičius A. Lietuvos zoologai. XVIII–XX a. Vilnius; 1997. (in Lithuanian with English summary).

Gurskas A. Profesoriaus Pranciškaus Šivickio malakologinė kolekcija, Kaunas; 2002, 78, [2] p. (in Lithuanian with English summary).

Jakimavičius A. Pranciškus Baltrus Šivickis. Mokslo ir gyvenimo pėdomis, Vilnius; 2003, 63 p. (in Lithuanian).

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REFERENCES

1. Арнастаускене Т. 1977. К вопросу о зараженности животных кокцидиями на Таймыре. Проблемы эпидемиологии и профилактики природноочаговых болезней в Заполярье. Омск; 135–143.
2. Arnastauskienė T., Jakimavičius A. 2005. Akademiko Pranciškaus Šivickio mokslinė mokykla ir jos tęsėjai. Ekologija. Vol. 1: 1–10 (in Lithuanian with English summary).
3. Arnastauskienė T., Jakimavičius A. 1997. Lietuvos zoologai. XVIII–XX a. Vilnius, 432 p. (in Lithuanian with English summary).
4. Biziulevičius S. 1999. Lietuvos zoologijos istorijos bruožai. (Lietuvos mokslas, 20 knyga). Vilnius, 543–665 (in Lithuanian).
5. Franz V. 1938. Die europäicshe Flussdeckelschnecke (*Viviparus fasciatus*) in starkem Ström des Njemen. Archiv für Molluskenkunde. Bd. 70: 9–30.
6. Gurskas A. Lietuvos sausumos sraigės. Kaunas, 1997, 116 p. (in Lithuanian).
7. Gurskas A. 2002. Profesorius Pranciškus Šivickio malakologinė kolekcija. Kaunas, 80 p. (in Lithuanian).

7. Kiselienė V. 1980. 3. Malakologija. Akademikas Pranciškus Šivickis. Vilnius, 38–45.
8. Lazauskienė L. A., Sevastjanov V. D. 1974. Keturios naujos Scutacaridae (Trombidiformes) šeimos erkių rūšys. Acta Parasitologica Lituanica. Vol. 12: 199–204 (in Russian with English summary).
9. Maniukas J. 1980. Hidrobiologija. Akademikas Pranciškus Šivickis, Vilnius, p. 35–38.
10. Eitminavičiūtė I. 2011. Dirvožemio ekologijos raida Lietuvoje. Vilnius: Gamtos tyrimų centras, 208 p. (in Lithuanian).
11. Eitminavičiūtė I. 1980. Vaikystė, jaunystė, gyvenimas svetur. Akademikas Pranciškus Šivickis. Vilnius, 7–16.
12. Minkevičius A., Petrauskas V. 1980. Kauno universitetas. Akademikas Pranciškus Šivickis. Vilnius, 17–21.
13. Pavilonis S. 1980. Vilniaus universitetas. Akademikas Pranciškus Šivickis. Vilnius, 22–26.
14. Slavėnienė L. 1980. Morfogenezė. Akademikas Pranciškus Šivickis, Vilnius, 30–35.
15. Šivickis P. 1968. Fauna of Mollusks as Found in Lake Žuvintas and on its Shores. The Reservation of Žuvintas. Vilnius, 221–223 (in Russian with English summary).
16. Šivickis P. 2005. Gyvoji mintis: pagal prof. P. B. Šivickio atsiminimus. Sud. R. Šivickytė-Simokaitienė, M. Vitkauskaitė. Vilnius, 291 p. (in Lithuanian).
17. Šivickis P. 1960. Lietuvos moliuskai ir jų apibūdinimas. Vilnius, 352 p. (in Lithuanian).
18. Šivickis P. 1938. Moliuskų pasiskirstymas Lietuvoje. Kosmos, N 10: 353–363. Kaunas; (in Lithuanian).
19. Šivickis P. 1956. Parazitų apibūdinimas. Vilnius, 335 p. (in Lithuanian).
20. Šivickis P. 1923. Studies on the physiology of reconstitution in *Planaria lata*, with a description of the species. Biological Bulletin (Concaster Pa). Vol. 44(3): 113–152.
21. Valius M. 1980. Jam buvo svetima autoreklama. Akademikas Pranciškus Šivickis. Vilnius, 107–111.

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AKADEMIKO PRANCIŠKAUS BALTRAUS ŠIVICKIO TYRIMŲ KRYPTYS IR STUDENTAI

Santrauka

Straipsnis parengtas minint akademiko, profesoriaus Pranciškaus Baltraus Šivickio (1882–1968) – vieno iškiliausių XX a. Lietuvos biologų – 130-ąsias gimimo metines ir yra skirtas jo pradėtų biologinių tyrimų plėtotei bei kai kurių laimėjimų rezultatams priminti. Pateikiami duomenys apie profesoriaus mokslinę veiklą, nurodomos pagrindinės mokslinės kryptys. Profesorius P. Šivickis žinomas ir pagrįstai laikomas eksperimentinės zoologijos ir tokių mokslo šakų kaip morfogenezė, audinių regeneracija, hidrobiologija, parazitologija, malakologija, pedobiologija pradininku Lietuvoje. Daugiausia dėmesio publikacijoje sukoncentruota į profesoriaus parengtų mokinių tyrimus ir jų disertacinius darbus atskirose mokslo srityse. Svarbiausiomis laikomos trys biologijos mokslo šakos: parazitologija, hidrobiologija ir pedobiologija.

Raktažodžiai: malakologija, hidrobiologija, parazitologija, pedobiologija