

The rise and development of protistology in St. Petersburg, Russia

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On the threshold of a new century and millennium it is useful to look back. In St. Petersburg, the city where the Russian Academy was founded and where Russian scientists have traditionally occupied a leading place in natural sciences, a look back opens a great panorama of the history of national natural sciences. St. Petersburg University, my *alma mater*, the oldest Russian University, whose foundation dates back to 1724, has always been one of the centres of natural sciences development. The subject of the present article is protistology – the science studying unicellular organisms – the development of which in Russia is closely connected with St. Petersburg.

More than 30 phyla of unicellular animals, fungi and algae are the objects of protistology (Karpov, 1990; Illustrated glossary of Protoctista, 1993). Its rise, development and formation, as well as that of some other filial branches of science – embryology, evolutionary morphology, comparative physiology and biology of development – at first took place within the framework of classical zoology and botany. One of the first protozoological investigations, carried out in St. Petersburg, was that of professor of zoology of St. Petersburg University Stepan Semenovich Kutorga (1805–1861) “Natural history of the development of Infusoria” (Kutorga, 1839, Figs 1, 2). The German translation of this book – “Naturgeschichte der infusionsthier” was published in 1841.

Some information on microorganisms, mostly ciliates and molds, as well as fungi, was given already in the book of Pavel Pheodorovich Gorjaninov (1796–1865): “Zoology and Zootomy used for the general benefit, especially for medicine” (Gorjaninov, 1837, Fig. 3). P.Ph.Gorjaninov was professor of botany of St. Petersburg Military Surgical Academy, and, it seems, a biologist with a wide range of interests. It is especially important that Gorjaninov, long before Darwin, was a transformist, considering the system of nature to be based on “a common natural connection and progressive development” (Raikov, 1951). He thought plants and animals to have common origin. According to Gorjaninov, the kingdom of “animals-plants” or “zoo-phytes” corresponded to this common phylogenetical root.

He placed ciliates (which at the time also included both sarcodines and flagellates) at the basis of the animal kingdom, on the whole correctly constructing the phylogenetical tree from the lower to the higher forms.

In the Europe of that time protozoological views of Christian Gottfried Ehrenberg (1795–1876) predominated. Ehrenberg treated ciliates as very small but perfectly organized animals with all the organ systems of multicellular animals (Ehrenberg, 1838). This approach was non-critically shared by Kutorga, who in his work of 1839 actually gave a synopsis of Ehrenberg’s famous research “Die Infusionsthierchen als vollkommene organismen” (1838), stating, among other things, that there was absolutely no connection between animal and plant world.

An undoubted service of Kutorga was that he made Russian scientists familiar with the cellular theory of Schwann, having written in 1841 an article where he underlined that Schwann’s book “opened a new field of microscopical investigations, provided new views and notions on living and plant organisms and in some way changed the direction of natural sciences” (Kutorga, 1841). Kutorga himself, however, later left zoology and concentrated mostly on geology and palaeontology. It was only in the beginning of the 50ies that Kutorga, in his university lectures, attributed protozoa – rhizopods and ciliates – to the group of “primary animals”, underlining their unicellular nature and lack of complicatedly organized organs (Banina, unpublished manuscript).

A great stimulus to the development of biological sciences in the second half of the 19th century was the triumph in natural sciences of evolutionary principle, stated by Darwin in his famous book of 1859. In this situation, the study of lower life forms, including unicellular animals and fungi, acquired a special interest and importance. L.S. Cienkowski (1822–1887), professor of botany of St. Petersburg University (1854–1861), was one of the first to recognize this, even before the publication of Darwin’s “The origin of species”. He must be justly considered one of the founders of Russian protistology and microbiology (Raikov, 1949).

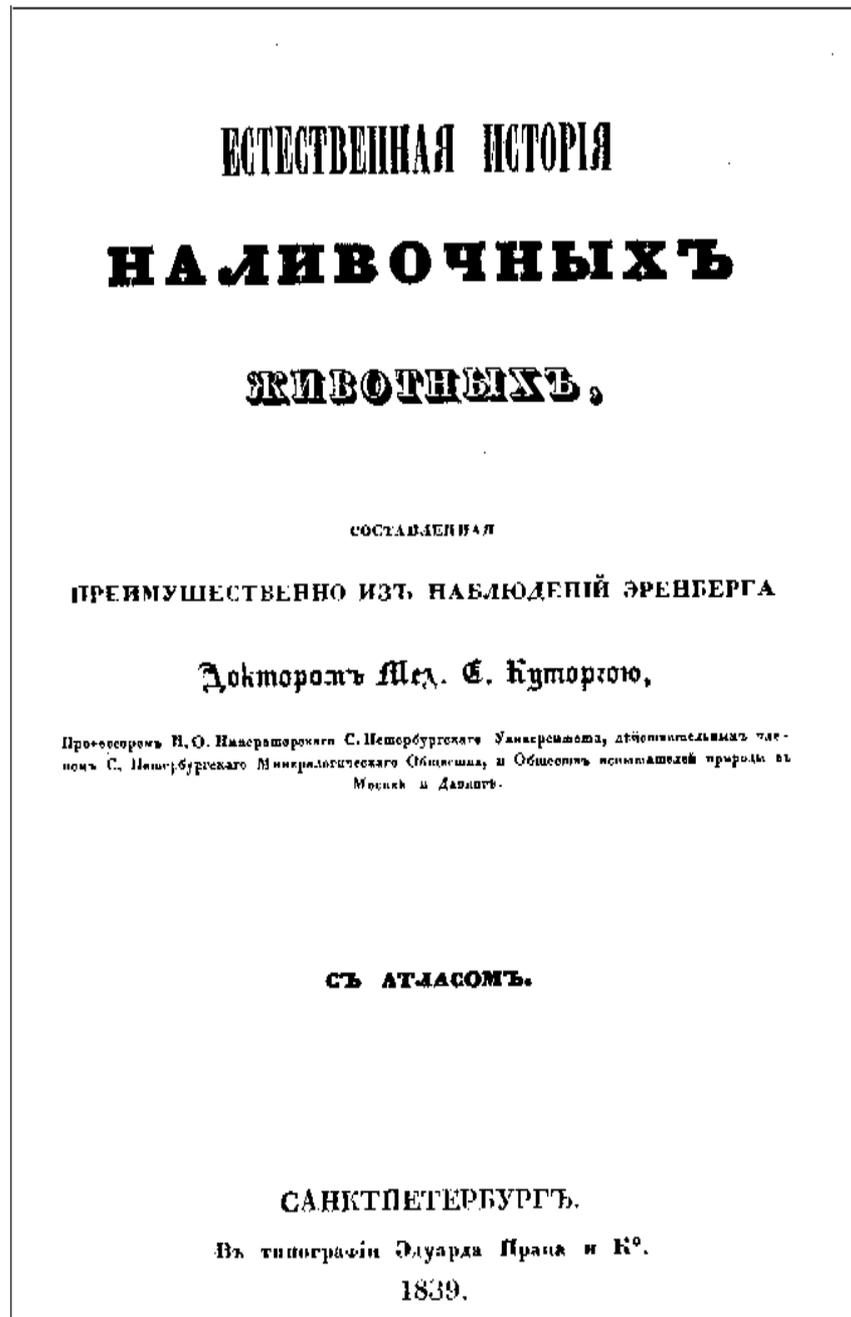


Fig. 1. Title of S.S.Kutorga's book "Natural history of development of Infusoria". St. Petersburg, 1839.

His doctoral thesis "On the low algae and ciliates" (Cienkowski, 1856) convincingly demonstrated that morphological and physiological processes on the border of animals and plants coincide and no clear characters, delimitating the two kingdoms, can be found. Cienkowski was the one to introduce the microscope into the practice of university teaching in Russia; he discovered and described several dozens of various protists and traced life cycles of many of them. He was one of the first to investigate cyst formation in ciliates and to show experimentally the impossibility of self-birth in protists (Cienkowski, 1859). In his public lectures, Cienkowski propounded the

idea of the connection between unicellular and multicellular animals and was the first to draw attention to the phenomenon of symbiosis in lower organisms. Actually, it was the first Russian course of general biology.

Professor L.S.Cienkowski is rightly considered one of the few "pre-Darwin" evolutionists. Life circumstances didn't allow his to create a real protistological scientific school. In the second half of his scientific career L.S.Cienkowski switched completely to microbiological investigations (Metelkin, 1950). However, his protistological ideas and works gave rise to a number of disciples and followers (A.S. Famintzin, A.Wrzesniowsky,

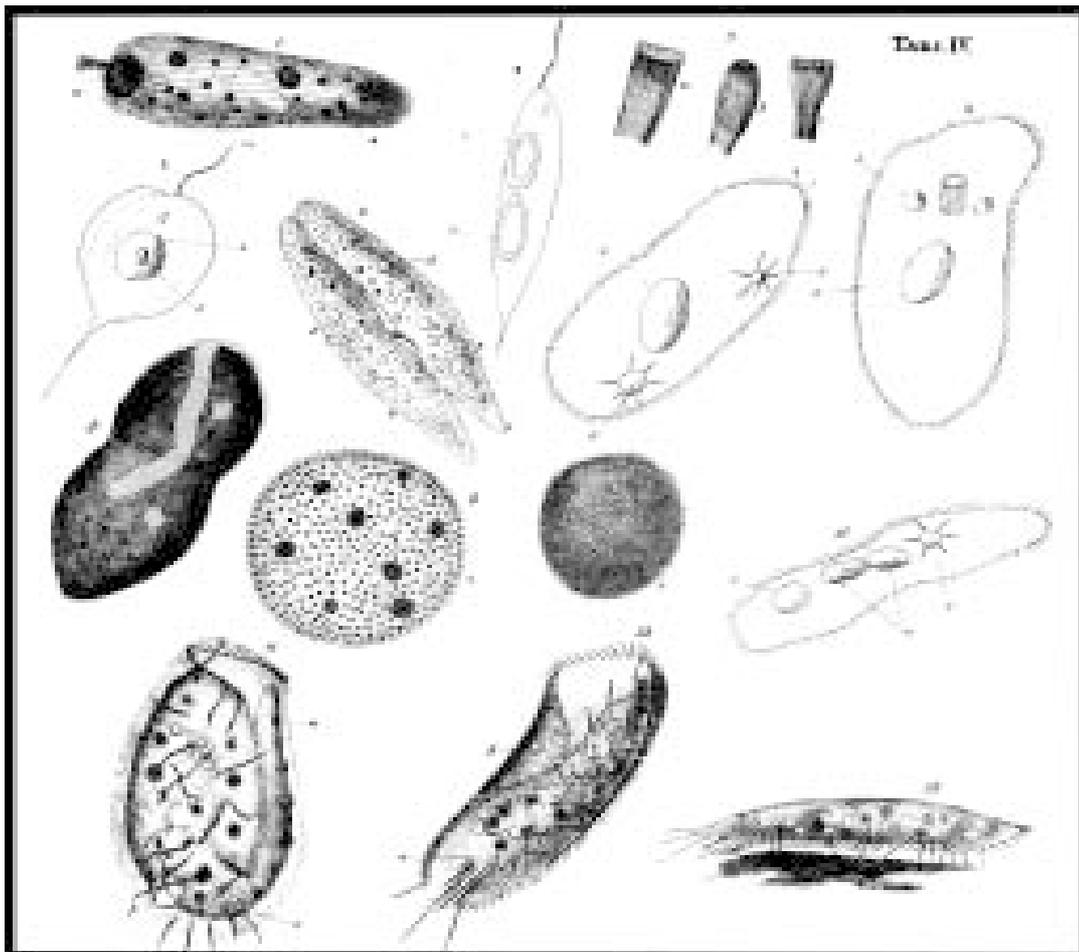


Fig. 2. Part of the figure plate IV from Kutorga's atlas of Infusoria. St.-Petersburg, 1839. 1 – *Nassula elegans*, 2 – *Euglena spirogira*, 3 – oral region of *N. elegans*, 4 – *Chilodon cucullus*, 5 – *Euglena longicauda*, 6 – *Paramecium caudatum*, 7 – *P. aurelia*, 8 – *Ophryoglena arta*, 9 – *Volvox globator*, 10 – *P. aurelia*, 11 – *Himantopus charon*, 12, 13 – *Stytonichia mytilus*.

M.S.Voronin, K.D.Mereschkowsky, P.I.ĭtrophanov, N. Keppen, O.Grimm, S.M.Perijasltzeva, U.Andrusova and some others). Owing to their joined efforts in various Russian Universities, by the end of the 19th century Russia had become one of European protistological centres.

In the 90ies of the 19th century major Russian protozoological research again concentrated in St. Petersburg University. At that time the head of the chair of zootomy was W.T.Schewiakoff (1859–1930) (Fig. 4), who acquired an international reputation as a specialist on ciliates, and later on radiolaria (Fokin, 2000).

The disciple of professor N.P.Wagner (1827–1907) in St. Petersburg University (1881–1885) and professor Ī.Butschli (1845–1920) in Heidelberg University (1885–1894), W.T.Schewiakoff devoted all his life to the research of protists. He laid the foundation of protist zoogeography and experimental protozoology by his monographs “Die Geographische Verbreitung der Susswasser-Protozoen” (Schewiakoff, 1893) and “On the biology of Protozoa” (Schewiakoff, 1894). His classical monograph “Organization and systematics of Infusoria aspirotricha (Holotricha auctorum)” (Schewiakoff, 1896) brilliantly

completed the series of works by Friedrich von Stein (1818–1885), devoted to the major ciliate groups (Stein, 1859, 1867) and has long remained the basic, if not the only, compilation of data on the morphology and systematics of this group of ciliates. The last work of his life – the monograph devoted to the radiolaria of the Bay of Naples (Die Acantharia des Golfes von Neapel), the completion of which took 27 years (Schewiakoff, 1926) – remains up to now the only handbook of acantharia. The systematics of this group, elaborated in this truly fundamental research, has not lost its significance until the present time.

Since that time (the 90ies of the 19th century) we can speak about the beginning of the formation of St. Petersburg protistological school. Professor Schewiakoff taught several well-known protozoologists. His best disciple professor V.A.Dogiel (1882–1955) (Fig. 5), a zoologist with a wide scope of interests, was first of all a protistologist. He studied protists from various systematic groups: gregarines, flagellates, ciliates, microsporidia, radiolaria (see: Mazurmovich and Poljansky, 1980). A fundamental monograph “General protozoology” (Dogiel, 1951) was the

ЗООЛОГИЯ,

ОСНОВАННАЯ НА ЗООНОМИИ И ПРИМЕНЕННАЯ
КЪ ОБЩЕЙ ПОЛЬЗЕ, ОСОБЕННО КЪ МЕДИЦИНЕ,

СЪ

ПРИСОЕДИНЕНИЕМЪ ОБЩЕЙ ОРГАНИКОЛОГИИ
И КРАТКОЙ АНТРОПОЛОГИИ.

Сочиненіе

Павла Горяникова,

ИМПЕРАТОРСКОЙ С-ПЕТЕРБУРГСКОЙ МЕДИКО-ХИРУР-
ГИЧЕСКОЙ АКАДЕМИИ ОРДИНАРНАГО ПРОФЕССОРА, ДОКТОРА
МЕДИЦИНЫ, ЧЛЕНА МЕДИЦИСКАГО СОВЕТА, МЕДИКО-ФИЗИ-
ОЛОГИЧЕСКАГО КОМИТЕТА, ИМПЕРАТОРСКАГО
МОСКОВСКАГО ОБЩЕСТВА ИСПЫТАТЕЛЕЙ ПЕРЕВОДА И
РАЗНЫХЪ ДРУГИХЪ УЧЕНЫХЪ ОБЩЕСТВЪ И ПР.

ЧАСТЬ I.

*Органикологія, Зоологія общая; Животныя-
растенія, Членики и Грудныя животныя.*

САНКТПЕТЕРБУРГЪ.

ВЪ ТИПОГРАФИИ ШТАБА ОТДЕЛЕНІЯ КОРПУСА ВЪРХНЕЙ СТРАЖИ.

1837.



Fig. 4. Professor W.T.Schewiakoff.
St. Petersburg, 1907.



Fig. 5. Professor V.A.Dogiel. Leningrad, 1930.

Fig. 3. Title of P.Ph.Gorjaninov's book "Zoology and Zootomy used for the general benefit, especially for medicine". St. Peterburg, 1837.

result of 40 years of investigations of professor Dogiel and his disciples and of the university course "General Protistology" which Dogiel had read for many years. It was the first Russian handbook in this field of biology. Fourteen years later it was published in English, after the text had been reworked by Dogiel's disciples (Dogiel et al., 1965). Professor Dogiel taught many protozoologists, the Russian science of Soviet period can be proud of. Among his disciples also were a well-known English protistologist C.A.Hoare (1892–1984) and the founder of the Polish Academy of Sciences, protozoologist J.Dembowski (1889–1963). The most famous of Dogiel's disciples, professors Yu.I.Poljansky (1904–1993), A.A.Strelkov (1903–1977), E.M.Cheissin (1907–1968), I.B.Raikov (1932–1998) and L.N.Seravin (1931), who had worked in

Leningrad-St. Petersburg, were, in their turn, the teachers of almost all modern Russian protozoologists (see: Skarlato, 1999; Müller, 1999) and of many researchers of protists in other countries.

Coming into the second century of its existence, Russian protistological school remains an active part of the world-wide community of the scientists, fascinated by a wonderful and yet full of mysteries world of cells-organisms.

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