

Konstantin Karlovitch Saint-Hilaire (1866-1941) and His Biological Station at the White Sea (1911-1940)

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ABSTRACT - Konstantin Karlovitch Saint-Hilaire was a Russian zoologist, histologist and hydrobiologist, a graduate of St. Petersburg Imperial University (1891), and then professor at Juriew [Dorpat] (1903-1918) and Voronezh (1918-1941) universities. Based on his work with students, he developed a teaching philosophy that a biologist could not consider his education complete if he had never observed marine life. In 1908, Saint-Hilaire established the first students' fieldwork on the White Sea, in the village of Kovda (Karelia, Russia). He visited Kovda annually from 1911 until 1940 (with some breaks), at first with students from Juriew University and then with students from Voronezh University. The Station received official status only in 1937. Unfortunately, the materials of those 30 years of fieldwork (including a manuscript of about 2000 pages with maps, schemes and tables, as well as the personal archives of Saint-Hilaire) were lost in Voronezh during the Second World War. Saint-Hilaire's publications and archival materials, collected by the authors, allow us to appreciate his White Sea investigations and to recognize his accomplishments as a scientist and a teacher. Besides his teaching aims, the Station allowed the professor to complete a comprehensive hydrobiological study of the Kovda region. Saint-Hilaire focused his investigations on the dynamic aspect of the lives of particular zoological organisms and ecological systems. There are some practically unknown pages in the history of biological stations in Northern Europe. For instance, the figure of Konstantin Karlovitch Saint-Hilaire, the founder of the first Russian biological station (1911) devoted to the education of students and their involvement in marine fieldwork has, until very recently, remained in the shadows.



Fig. 1 - K.K. Saint-Hilaire before graduation from the Imperial St. Petersburg University (ISPbU), 1890/91, SPb. (Archive of the Department of Zoology Invertebrate, SPbGU)

K.K. Saint-Hilaire was born on 19th September 1866 in St. Petersburg, Russia. His father, Karl Karlovitch Saint-Hilaire (1834-1901), was a magister of zoology (PhD) and author of several zoological textbooks including *Elementary zoology* (1861) and *General course of zoology with some summer tasks for the zoological practice* (1869). After graduating from ISPbU, Saint-Hilaire senior was a teacher of natural science in St. Petersburg's gymnasium № 2 where, incidentally, he taught N.N. Micloucho-Maclay, who was later to become a famous Russian ethnographer. He then taught natural sciences at the Pedagogical Courses for Women and, for over 20 years, was director of St. Petersburg's Main Teacher Institute, where he gave lectures in pedagogy and zoology. He was also the editor of translations of several important foreign zoological editions including *The Life of Animals* (1895-1896) by A. Brehm.

Konstantin Karlovitch graduated from ISPbU in 1891. (Figure 1) His embryological study, made under the instruction of academician A.O. Kowalewsky, was awarded a silver medal by the University. After graduation he worked as an assistant to professors A.O. Kowalewsky, A.S. Dogiel and N.E. Vvedenskiy. In 1898 Saint-Hilaire defended the thesis *About floating cells in the digestive tract of sea-urchins* as his magister's dissertation, then became a *Privatdocent* in the University. (Figure 2) Throughout the years he also conducted research in Germany, Switzerland, Austria, France and Italy. During these European trips, he paid special attention to zoological museums, gardens and aquariums (Saint-Hilaire 1909b; Figure 3).

During his time as a student, Saint-Hilaire had visited (1890) the Solovky Biological Station established in 1881 by his university teacher, Prof. N.P. Wagner. After his graduation he worked in many different biological stations across Europe including Solovky (1893; Figure 4), Murman (1902), Trieste (1892, 1905 and 1913), Naples (1892, 1898/99 and 1927) as well as Villafranca and Roscoff.



Fig. 2 - In the Zootomical Cabinet of ISPbU. From left to right: G.Ph. Arnold, D.D. Pedashenko, M.N. Rimskiy-Korsakov, K.K. Saint-Hilaire. SPb., 1897 (?). (Archive of the Department of Invertebrate Zoology, SPbGU)



Fig. 3 - Part of the first page of the Saint-Hilaire article, 1909b with his autograph. (Archive of S.I. Fokin)



Fig. 4 - Scientists and students at the Solovetskaya Biological Station. From the left: G.G. Yakobson (fifth), V.M. Shimkewitsch (sixth), A.N. Korchagin (tenth), K.K. Saint-Hilaire (eleventh). Solovky, 1893. (Archive of S.I. Fokin)

At the age of 37, Saint-Hilaire was awarded a professorship at Juriew [Dorpat] University (nowadays the University of Tartu), and moved from St. Petersburg to Juriew. (Figure 5) In 1905, at ISPbU, he defended his doctor of sciences degree with the cytological-histological dissertation *Investigations on the metabolic processes in cell and tissue*. At the University he established the Zootomical Cabinet and Zoological Museum and managed several scientific-educational exhibitions and a special students' scientific study group. For three years (1907-1909) he was editor of the biological journal *The Biologist's Reference List*, established by him, which published current scientific reviews, abstracts, chronicles and announcements (Fokin et al. 2006).



Fig. 5 - Prof. K.K. Saint-Hilaire (first row in the center) and other professors of the Physical-mathematical Faculty of Juriew [Dorpat] University, 1910. (Archive of N.A. Goryashko)

By the age of 40 Saint-Hilaire was an experienced teacher and scientist and, at this time, he developed his philosophy that a naturalist-biologist could not consider his education complete if he had never observed marine life. However, there was no marine biological station at the time that offered this particular kind of student activity. In 1906 at Juriew University, thanks to Saint-Hilaire's initiative, university officials discussed the possibility of the organization of regular student excursions to carry out fieldwork under the direction of teachers (Saint-Hilaire 1909a). The professor strongly emphasized the necessity and

practicability of student summer fieldwork at the White Sea, having investigated in advance several regions of the coastline to find the most suitable location (Saint-Hilaire 1908). For the first excursion in 1908, the old village of Kovda, located on the Karelian coast of the White Sea's Kandalaksha Bay, was selected (Figure 6).



Fig. 6 - Coast line of Berezoviy Island (?) near by Kovda. 1917. (Archive of T.V. Sklyarova)

At that time the village was quite a lively place. Three sawmills were located nearby. It was possible to buy food in the stores, a post office existed, and steamship connection with Arkhangel'sk and Kandalaksha was quite regular. At the same time the landscape was very picturesque, the variety of marine fauna was high, and the sea was rather shallow. (Figure 7) A number of accommodating bays and streams permitted work even during bad weather. All these characteristics promised to provide plenty of zoological material (Fokin et al. 2006).

In the middle of June 1908, Prof. Saint-Hilaire arrived in Kovda along with 13 students, one technical assistant and his own son. The group brought scientific paraphernalia and marine-biological literature all the way from Juriew. The fieldwork lasted about one month. During this time, the professor and his students collected materials for the University's zoological course and teaching collections. From this year onwards, Saint-Hilaire began to direct his activity towards the establishment of a permanent marine biological station with a pedagogical focus in Kovda. He formulated his main idea for the Station as follows: "It would be nice to create the Station [...] as an educational one with a mainly pedagogical aim. Students could come to the Station for familiariza-



Fig. 7 - The Kovda bay map. Left: Locations of the Station at different times are indicated by “houses”. Modified from: Saint-Hilaire, 1908. Right: laboratory room in Saint-Hilaire’s station, 1911. (Saint-Hilaire 1913/1914, 575)

tion with marine fauna [...], as well as to complete practical zoological courses with living material” (Saint-Hilaire 1909a, 21).

Saint Hilaire published several articles about this point and tried to get help from his own University and the North Russia Investigation Society (Arkhangel’sk city). His discussion of establishing this new concept of a pedagogical station is interesting. According to this idea, such a station could be visited not only by university students but also by teachers and secondary school (gymnasium) students. “Contact with new regions – which due to the characteristics of the north will mean an acquaintance with marine fauna – will widen a young person’s mental outlook. The quite inclement climate and the asperity and risk of marine journeys will strengthen the body and spirit” (Saint-Hilaire 1908, 3).

The professor hoped that the idea of the pedagogical station would be supported by all the Russian universities and, via their help, a network of this type of stations would be established (Saint-Hilaire 1911). This idea was indeed realized at the White Sea, but it took 50 years to achieve. In fact, despite all of the professor’s efforts, for a long time even his own biological station in Kovda did not receive official status or sufficient financial support. However, from the summer of 1911, field research at the White Sea became an annual occurrence (with some exceptions) until 1940. Until 1917, participating students came from Juriew University and, from 1921, also from Voronezh University. Only in 1937 did the Station receive official status as the Biological Station of Voronezh University (Saint-Hilaire 1939).

For the entire 30 years of its existence, Saint-Hilaire's Marine Biological Station had no permanent location in Kovda and participants were housed in several different places according to agreements with the local authorities. In 1908, they stayed in the empty customs house on Berezoviy Island close to Kovda and then, until 1917, they stayed in the customs house on the Island of Elovetz. (Figure 7) From 1921 onwards, Saint-Hilaire mainly rented some houses in the village.

According to the teaching plan of Juriew University, student summer excursions were alternately dedicated to zoology, botany and geology. Thus, the second time Saint-Hilaire came to Kovda was in 1911. That year he brought 17 students, whose main aim was to complete practical studies on the anatomy of different invertebrate groups (Saint-Hilaire 1912). One of the students, V.E. Rozov, started an investigation of a fishery in the region (Rozov 1913). After this excursion, Saint-Hilaire came to Kovda annually and wrote frequently about the biological station (although he used the term biological excursions) in his articles and field reports (Saint-Hilaire 1916b). The number of visitors to Kovda varied from year to year (Fokin et al. 2006). In 1912 there were only 6 visitors, but in 1913 there were about 20. Among of them were not only students but also some researchers (Saint-Hilaire 1913; 1914).

The 1913 summer field season involved a hydrological investigation in the Kovda region and the study of the distribution of fauna relative to the salinity of the water in the bay by the Kovda river (Saint-Hilaire 1914). In the same year Saint-Hilaire made a discovery, the meaning of which he probably did not completely realize at the time. He was the first scientist to reveal the special auto-oscillation morphogenetical process, or grow rippling – the way that the hydrozoa polyps develop. The top of the growing buds of animals is always periodically elongating and shortening during the process. He did not publish his observation until a long time afterwards (Saint-Hilaire 1926; 1930), and when he did it was not noted by the scientific community. Only in the 1960s was this phenomenon independently re-described by different authors as a remarkable example of auto-organization of metazoan colonies (Skufin and Belousov 1991).

During the first five years of the Station's activity, 53 students and teaching staff from Juriew University visited (Saint-Hilaire 1915; 1916b). The Station was also visited by several excursions from the Riga Women's gymnasium, the University of Kharkov, the High Women courses and the Moscow Agricultural Institute – adding up to around 100 people. More than 300 species of sea animals were noted in the Kovda bay and some new species were also discovered in the sea. Plant flora from the coastline and further inland were also checked and collected to create a herbarium, whilst a collection of local fish was donated to the Zoological Museum of the St. Petersburg Academy of Sciences. Data on the regional fishery and fish biology were also published at this time. Some animals were caught for use in university practical lessons and a number of collections of sea fauna were donated to different museums and pedagogical institutions (Saint-Hilaire 1916a; 1916b).



Fig. 8 - Prof. K.K. Saint-Hilaire on the First All-Russian Meeting of zoologists, anatomists and histologists. Petrograd, 1922. (Archive of S.I. Fokin)

In 1918, Juriew was occupied by German troops, the University was reestablished as the German University of Dorpat, and all Russian staff members of the institution were evacuated to Russia. In accordance with the Soviet government's decision, the institution moved to Voronezh city where a new university was opened and Saint-Hilaire was given the chair of zoology. (Figure 8) In spite of the very difficult situation in Russia during the first years of Soviet rule (including the Civil war, starvation and the collapse of the economy) the professor did not give up his idea about the White Sea biological station. He organized the next journey to Kovda from Voronezh as early as 1921 (Saint-Hilaire 1925).

It is not known how many times the Kovda Biological Station was used after 1921, as all the Voronezh University archives as well as Saint-Hilaire's own materials were lost during the Second World War. Reliable information has so far only been found about student fieldwork at the Station in 1927, 1934 and 1938 (Saint-Hilaire 1935a; 1939; Figures 9 and 10). In 1935 Saint-Hilaire published an article collecting all the results of the Station's activity since 1911 (Saint-Hilaire 1935b). There he wrote: "Kovda is one of the most studied pieces of sea in the USSR (perhaps with the exception of the Bay of Sevastopol). In an area of 30 square kilometers of sea, more than 1200 samples were taken. [...] This precise investigation lays the foundations for further work which could only be done at the biological station" (Saint-Hilaire 1935b, 7). After this article appeared, other publications written by Saint-Hilaire's students and based on research at Kovda came to light (Kopteva 1939; Moreva 1939; Bukhalova and Dmitriev 1944).

Prof. K.K. Saint-Hilaire died in Voronezh in November 1941 when the city was very close to the centre of the war fighting. Almost all his working materials connected with 35 years at the White Sea were lost. Investigation protocols, daily notes, manuscripts of unpublished articles (including a huge monograph dedicated to the Kovda marine research which was close to 2000 printed pages with maps, schemes and tables), and a large collection of invertebrates all disappeared in 1942 when the city was disrupted by the war. In the University archives and museum, none of the professor's materials can be found, not even an official CV or a list of his publications (Goryashko 2008).

However, some publications of K.K. Saint-Hilaire do remain. Over 20, mainly connected with his investigations at the White Sea, and a few archival materials (including recollections by his students) have been collected by the



Fig. 9 - Prof. K.K. Saint-Hilaire and students are sorting out benthos material. Kovda bay, 1938. (Archive of N.A. Goryashko)



Fig. 10 - Prof. K.K. Saint-Hilaire and his guests, PhD students and regular students of Moscow University, before their departure from Kovda. 1938. (Archive of N.A. Goryashko)

authors. These allow us to appreciate both his White Sea investigations and also his accomplishments as a scientist and a teacher (Goryashko 2008). In addition, some of his materials were used in the book of his younger colleague K.M. Derjugin, *The White Sea Fauna and Circumstances of its Existence* (1928).

The main aim of K.K. Saint-Hilaire's studies in the Kovda bay, as he stressed in his publications, was not purely taxonomic but rather to investigate the fauna's development and the conditions of its existence related to salinity, streams, temperature, bottom profiles, etc. "All conditions should be taken in account for they are inter-related," he wrote (Saint-Hilaire 1939).

The dynamic aspect of particular organisms and the whole marine ecosystem were very important for K.K. Saint-Hilaire. The *leitmotif* of the professor's scientific activity was an interest in the relationships and connections between living and non-living matter. He tried to shift the focus of his studies from the level of cells and tissues to the relationships between living and non-living parts of the ecosystems level (Skuf'in and Belousov 1991).

Following a 35-year hiatus, student-biologists appeared again in the village of Kovda. From 1974 the Summer Biological Station of the Moscow Secondary School № 520 has worked there. Based on the firm foundations laid by Saint-Hilaire's studies, schoolchil-

dren are continuing to analyze the dynamics of the bay's benthos community (Litvinceva et al. 1989; Vinogradov et al. 2001). Thus, K.K. Saint-Hilaire's life-work continues today (Goryashko 2008).

References

- Bukhalova V.I. and Dmitriev A.P., 1944, "Drevotochetc limnoria v Belom more" ["Teredo limnoria in the White Sea"], *Priroda*, № 5-6: C. 119-120.
- Fokin S.I., Smirnov A.V. and Layus Y.A., 2006, *Morskie biologicheskie stancii na Russkom Severe (1881-1938)* [Marine biological stations at the Russian North], Moskva: Tovari-zhestvo nauchnih izdaniy KMK.
- Goryashko N.A., 2008, "Delo professora Sent-Ilera" [Affair of professor Saint-Hilaire], *Moskovskiy zhurnal*, № 5: 48-59.
- Kopteva K., 1939, "Naselenie drevesnih ostatkov v Kovdenskom zalive Belogo morya" [Wood remains animal population in the Kovda bay of the White Sea]. In: Savorostin P.V. (main editor), Kozo-Polyanskiy B.M., Saint-Hilaire K.K. (editors of the Biological section), *Nauchnie raboti studentov. Chast' vtoraya. Biologiya, Geologiya*, Voronezh: VGU, 131-137.
- Litvinceva A., Lubimova A. and Khudyakova O., 1989, "Analiz donnogo naseleniya Kovdinskogo zaliva Belogo morya cherez 80 let posle issledovaniy K.K. Saint-Hilaire" [Benthos analysis of the Kovda bay of the White Sea after 80 years from K.K. Saint-Hilaire investigations], *Pantodopa*, № 3-4: 1-10.
- Moreva Z., 1939, "Midievie banki v Kovdenskom zalive Belogo morya" [Mussel bed in the Kovda bay of the White Sea]. In: Savorostin P.V. (main editor), Kozo-Polyanskiy B.M., Saint-Hilaire K.K. (editors of the Biological section), *Nauchnie raboti studentov. Chast' vtoraya. Biologiya, Geologiya*, Voronezh: VGU, 119-125.
- Saint-Hilaire K.K., 1908, "O neobshodimosti ustroystva biologicheskoy stancii na Belom more" [On the necessity of a biological station at the White Sea], *Estestvoznaniye i geografiya*, 10: 1-9.
- Saint-Hilaire K.K., 1909a, "Otchet ob ekskursii na Beloe more studentov estestvennikov Yurevskogo universiteta letom 1908 goda" [Students of natural sciences from Yuriev University's excursion to the White Sea. Report], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 3: 1-67.
- Saint-Hilaire K.K., 1909b, "Otchet o zagranichnoy komandirovke letom 1909" [Report about journey abroad in summer 1909], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 3: 111-123.
- Saint-Hilaire K.K., 1911, "Proekt treh nauchno-pedagogicheskikh uchrezhdeniy" [Project of three scientific-educational institutions], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 5: 1-15.
- Saint-Hilaire K.K., 1912, "Otchet ob ekskursii studentov'estestvennikov Imperatorskogo Jur'evskogo Universiteta na Belom more letom 1911 goda" [Students of natural sciences of Juriev University's excursion to the White Sea in summer 1911. Report], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 2: 1-24.
- Saint-Hilaire K.K., 1913, "Orziv ob 'Otchete A.I. Aleksandrova, komandirovannogo fisiko-matematicheskim facultetom dlya zanyatiy po zoologii na Beloe more letom 1912-go goda'" [in Latin letters please]. [Review of A.I. Alexandrov report about his zoological study at the White Sea in 1912], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 10: 1-13.

- Saint-Hilaire K.K., 1913/1914, "Über die Organisation von zoologischen Exkursionen an der Universität Jurjew (Dorpat)", *Zeitschrift für den naturwissenschaftlichen und erdkundlichen Unterricht*, 9: 569-576.
- Saint-Hilaire K.K., 1914, "Otchet ob ekskursii studentov Jur'evskogo Universiteta na Beloe more v 1913 godu" [Excursion of students from Juriew University to the White Sea in 1913. Report], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 3: 1-59.
- Saint-Hilaire K.K., 1915, "Plan issledovaniya Kovdenskogo zaliva i ego okrestnostey" [Plan of the Kovda's bay and its surrounding study], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 3: 1-21.
- Saint-Hilaire K.K., 1916a, "Otchet ob ekskursii studentov Fisiko-Matematicheskogo fakulteta I.J.U. na Beloe more letom 1915 goda" [Students of natural sciences of Yuriew University's excursion to the White Sea in summer 1915. Report], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, 2: 1-12.
- Saint-Hilaire K.K., 1916b, "Vremennaya biologicheskaya staniya v sele Kovde (Arkhangel'skaya gub.) za pyat' let ee suzhestvovaniya" [Temporal biological station in the Kovda village (Arkhangel'sk district) during 5 years of its existing], *Uchenie zapiski Imperatorskogo Jur'evskogo Universiteta*, № 6. P. 1-10.
- Saint-Hilaire K.K., 1925, "Na Belom more letom 1921 g. Kratkiy otchet ob ekspeditsii Voronezhskogo Gosudarstvennogo Universiteta" [Short report on the expedition of Voronezh State University to the White Sea in summer 1921], *Trudi Voronezhskogo gosudarstvennogo universiteta*, 1: 398-422.
- Saint-Hilaire K.K., 1926, "Formoobrazovanie periderma hydroidov (*Gonothyrea loveni* Allm.)" [Periderm formation of hydrozoans (*Gonothyrea loveni* Allm.)], *Bulleten' Obzhestva estestvoispytateley pri Voronezhskom gosudarstvennom universitete*. Voronezh: izd. Voronezhskogo Obzhestva estestvoispytateley, I, 2-4: 108-118.
- Saint-Hilaire K.K., 1930, "Morphologische Untersuchungen der nichtzellulären Gebilde bei Tieren", *Zoologisches Jahrbuch, Abteilung für Allgemeine Zoologie und Physiologie der Tiere*, 47: 511-622.
- Saint-Hilaire K.K., 1935a, "O rezultatah Belomorskoy ekspeditsii kafedri zoologii Voronezhskogo universiteta leta 1934 g" [About results of the White Sea expedition made by the Zoological Department of zoology, Voronezh University in summer 1934], *Trudi Voronezhskogo gosudarstvennogo universiteta. Otdelenie zoologii*, 8,3: 6-26.
- Saint-Hilaire K.K., 1935b, "26 let issledovaniya Kovdi" [26 years of the Kovda investigation], *Karelo-Murmanskiy kray*, 8-9:1-60.
- Saint-Hilaire K.K., 1939, "Kovdinskiy zaliv (Beloe more) s faunisticheskoy i geograficheskoy tochki sreniya" [Kovda bay (White Sea) from faunistic and geographical points of view], V: Sverdlov B.A. (main editor). XX let Voronezhskogo gosudarstvennogo universiteta. *Proceedings of Scientific ubilay session. Voronezh: VGU edition*, 1-14.
- Skuf'in K.V. and Belousov L.V., 1991, "Poiski biologicheskogo sinteza v rabotah K.K. Sentllera" [Searching of biological synthesis in K.K. Saint-Hilaire's studies], *Voprosi istorii estestvoznaniya i tehniki*, 3:19-24.
- Vinogradov G.M., Kobuzeva I.A., Sorokina O.S., Kupriyanova E.A., Litvinova E.Y., Kalyakin M.V., Makolin O.I., Nigmatov A.A., 2001, "Sovremennoe sostoyanie donnih soobzhestv Kovdinskoy gubi Belogo morya 1. Kanskoe more i Gorelaya guba" [Current condition of the benthos communities of the Kovda bay, the White Sea, the Kanskoe sea and Gorelaya bay]. In: Kuznetsov A.P. and Zezina O.N. (eds), *Sostav i struktura morskogo donnogo naseleniya: sbornik nauchnih trudov editors* [Collection of scientific articles], Moscow: VNIRO, 110-117.

