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Steller's Sea Cow – Benedykt Dybowski's Little-known Contributions to European Zoological Museography

The article presents the contributions of Benedykt Dybowski to the natural history of Steller's sea cow – a marine mammal species, that had become extinct in the 18th c. Dybowski's impact is highlighted in his iconic discoveries concerning the biology of this species. Namely, he revealed and described the sexual dimorphism of the Steller's sea cow and was the first to propose the climatic hypothesis concerning its extinction. Furthermore, Dybowski sent the largest number of skulls and bones representing this species to European museums in the 19th c. Today, these artifacts are deposited in seven museums in five countries (England, Ukraine, Poland, Austria, and Monaco). Unfortunately, specimens sent to Polish scientific institutions were looted or destroyed during both world wars. Sources examined in the present paper picture Dybowski as a prominent zoologist who worked within an international network of other outstanding specialists of that time – especially Władysław Taczanowski of the Warsaw Zoological Cabinet. The documents analyzed here shed new light on the work of naturalists and museum workers, revealing behind-the-scenes complexities of purchasing scarce and valuable zoological specimens.

Keywords: Steller's sea cow, osteology, natural history collections, Benedykt Dybowski, Władysław Taczanowski, history of zoology

Słowa kluczowe: krowa morska Stellera, osteologia, kolekcje przyrodnicze, Benedykt Dybowski, Władysław Taczanowski, historia zoologii

In 1741, Georg Wilhelm Steller (1709–1746),¹ a medical doctor and naturalist and participant in the Russian expedition to the Commander Islands in the Bering Sea led by Vitus Jonassen Bering (1681–1741), discovered a large marine mammal species,² reaching 11 tons and up to 10 meters in length, known today under its common name, Steller's sea cow³ The species became extinct shortly after its discovery around 1768. Already in the mid-19th c., the remains of Steller's sea cow became a desirable object for natural history museums and scientists. To this day, they are considered a great rarity and are highly valued in zoological collections.

In 1780, German zoologist Eberhard August Wilhelm von Zimmermann (1743–1815) provided the first scientific description of the species, introducing it within the zoological nomenclature system under the name *Manati gigas*.⁴ Fourteen years later, a Swedish naturalist Anders Jahan Retzius (1742–1821), unaware of Zimmermann's paper, redescribed the species, assigning it to the newly erected, monotypic genus *Hydrodamalis*, and introduced the name *Hydrodamalis stelleri* Retzius, 1794.⁵ Due to the principle of priority of the International Code of Zoological Nomenclature,⁶ this specific name has become a junior synonym of Zimmermann's *Manati gigas*. Both Zimmermann and Retzius based their works on Steller's descriptions and notes published after his death in 1751.⁷ The fascination of subsequent authors with the species contributed to the introduction of even more synonymous names dispersed over several genera, e.g. *Halogyna* Billberg, 1827; *Manati* Steller, 1774; *Nepus* Fischer von Waldheim, 1814; *Rytina* Illiger, 1811; *Sirene* Link, 1794; *Stellera* Bowdich, 1821, and *Stellerus* Desmarest, 1822. The resulting nomenclatural ambiguity was fixed only in 1985 by the International Commission of Zoological Nomenclature after the publication of a specific decision in the *Bulletin of Zoological Nomenclature*.⁸ Based on this publication, the generic name *Hydrodamalis* Retzius, 1794 has been placed on the Official List of Generic Names in Zoology with the Name Number 2262, while the specific epithet proposed by Zimmermann was recognized as a valid name and was included in the Official List of Species Names in Zoology (Name Number 2965). As a result, †*Hydrodamalis gigas* (Zimmermann, 1780) is currently considered a valid scientific name for Steller's sea cow. In contrast to the International Commission's decision, the scientific community all over the world has recognized Retzius's intention to dedicate the specific name of the species (*Hydrodamalis stelleri* Retzius, 1794) to Steller by continuing to use

1 Numerous biographies on Steller are available. His legacy in form of letters, documents, and maps is compiled and presented as part of the activities of the International Society of Georg Wilhelm Steller, see *Internationale Georg-Wilhelm-Steller-Gesellschaft Halle e. V.*, www.steller-gesellschaft.de [accessed 30.06.2023].

2 G.W. Steller, *Beschreibung von dem Lande Kamtschatka dessen Einwohnern, deren Sitten, Nahmen, Lebensart und verschiedenen Gewohnheiten*, Frankfurt, Leipzig 1774.

3 Steller's sea cow is classified in the order of sirenians, the family of Dugongidae, which includes a single extant species – *Dugong dugon* (Müller, 1776). According to Steller's observations, these animals were monogamous and lived in small family groups protecting their young.

4 E.A.W. Zimmermann, *Geographische Geschichte des Menschen, und der vierfuessigen Thiere*, [in:] *Enthält ein vollständiges Verzeichniß aller bekannten Quadrupeden*, vol. 2, Leipzig 1780, p. 1–432.

5 A.J. Retzius, *Anmärkningur vid Genus Trichechi*, "Kongliga Vetenskaps Academiens nya handlingar" 1794, vol. 2, no 15, p. 286–300.

6 *The International Commission on Zoological Nomenclature*, iczn.org [accessed 30.06.2023].

7 G.W. Steller, *De Bestiis Marinis*, "Novi Commentarii Academiae Scientiarum Imperialis Petropolitanae" 1749, vol. 2, p. 289–398.

8 R.V. Melville, *Opinion 1320. Hydrodamalis Retzius, 1794 and Manatus inunguis Natterer in Pelzeln, 1883 (Mammalia, Sirenia): Conserved*, "The Bulletin of Zoological Nomenclature" 1985, vol. 42, no 2, p. 175–176.

the common names such as 'Steller's sea cow,' 'Steller's mermaid,' 'krowa morska Stellera,' 'Rhytine de Steller,' 'La vaca marina de Steller,' or 'Stellers Seekuh.'

The first skull of Steller's sea cow was found in 1844, and the first skeleton in 1855. An inventory of the known remains of the species showed the existence of 27 skeletons, 62 additional skulls, and 550 different bones in 51 museums at 42 locations. It is likely that few (between two and four) complete skeleton reconstructions stored in natural history collections originate from single individuals; the rest were assembled from the bones of several individuals (varying between two to 16 specimens).⁹

Benedykt Dybowski, one of the main researchers of the Steller's sea cow, might have collected the largest number of remains of the species. Between 1879 and 1882, he conducted intensive fieldwork on the Commander Islands while officially employed as a medical doctor in Kamchatka. As mentioned before, the Commander Islands (named after Commander Bering) were where Steller's sea cow was originally discovered, and later constituted the richest source of its osteological materials.

In 1883, Dybowski's note on the sexual dimorphism of Steller's sea cow skulls was announced at the Zoological Society of London meeting.¹⁰ The text was sent to London by Władysław Taczanowski (1819–1890) and was received on 15 February 1883.¹¹ In his report, Dybowski described numerous remains of the species and his joint field trips with Dr. Leonhard Hess Stejneger (1851–1943) (see below). His key findings concerning sexual dimorphism were based on the direct measurements of eight skulls and an overview of his photographs of two additional skulls. Dybowski was probably the first author to notice that the skeletons preserved in different natural history museums were often assembled from bones originating from several individuals. Taczanowski, together with Ślósarski (1843–1897),¹² used the data presented by Dybowski to determine that the skull of the Steller's sea cow preserved in the Zoological Cabinet in Warsaw probably belonged to a female specimen (letter dated 17 November 1882):

Together with Ślósarski we have compared your drawings with the skull from the Cabinet, which also seems to be of a female: it has the same prominence and the general contour is similar, with the difference that the front end is complete, while it is missing in the drawing.¹³

The above-mentioned collaborator of Dybowski, Dr. Stejneger, was an American zoologist, traveler of Norwegian descent, and curator of the Smithsonian Institution.¹⁴ In his publications on the Commander Islands and Kamchatka, he often mentioned his cooperation with Dybowski, whom he considered one of the most outstanding zoologists in the world.

9 S. Mattioli, D.P. Domning, *An Annotated List of Extant Skeletal Material of Steller's Sea Cow (Hydrodamalis gigas) (Sirenia: Dugongidae) from the Commander Islands*, "Aquatic Mammals" 2006, vol. 32, no 3, p. 273–288.

10 B. Dybowski. *Notice sur la différence sexuelle entre les crânes de la Rhytina stelleri*, "Proceedings of the Zoological Society of London" 1883, p. 72–73.

11 Władysław Taczanowski (1819–1890), zoologist, curator of the Zoological Cabinet in Warsaw.

12 Antoni Ślósarski (1843–1897), zoologist and educator, an assistant at the University of Warsaw.

13 K. Kowalska, A. Mroczkowska, B. Zielińska, *Władysław Taczanowski. Listy do Antoniego Wagi, Konstantego Branickiego i Benedykta Dybowskiego*, Wrocław, Warszawa, Kraków 1964, (Memorabilia Zoologica, vol. 12), p. 220 (all sources quoted in the present publication were translated by Marcin Kamiński).

14 L. Stejneger, *Contributions to the History of the Commander Islands*, "Proceedings of United States National Museum" 1883, vol. 6, p. 58–89.

Steller's sea cow occupies an important place in Dybowski's description of the exploration of the Commander Islands.¹⁵ In his memoirs, he recalled the story of Bering's expedition, the discovery of this species, and the figure of Georg Steller himself. When passing through Tyumen – the place of death of the German naturalist – Dybowski searched for traces of Steller's grave. As he did not find any direct mementos of him, he raised an initiative to erect a monument dedicated to the explorer. During his expedition, Dybowski did not meet any inhabitants of the Commander Islands who directly remembered Steller's sea cows. As such, he considered any information on the species provided by the local community members to be unreliable.

The initially proposed theory concerning the extinction of Steller's sea cow assumed that representatives of this species were relatively slow-moving and could be easily targeted by local communities, which hunted them for meat, fat, and skins. Benedykt Dybowski presented an alternative hypothesis. He did not consider intensive human hunting as the main driver of the extinction of these mammals because, as he emphasized, part of the Steller's sea cow population inhabited the coastal area inaccessible to hunters. According to Dybowski, the unfavorable phenomenon that significantly reduced this species' survival chance was the complete freezing of a large sea area around the islands and the resulting inaccessibility of food.¹⁶ To this day, scientific papers continue to discuss the reasons for the extinction of Steller's sea cow, and the climate hypothesis, as stated by Dybowski, occupies an important place in these considerations. The latest findings, based on the results of ancient DNA analysis of bone remains, indicate a significant decline in genetic diversity as a possible cause of the extinction of this species.¹⁷ It is likely that the simultaneous unfavorable impact of all the factors mentioned above, climatic, intra-population, and human pressure, caused the severe population decline at the beginning of the 18th c. and, finally, the rapid extinction of Steller's sea cow.

Although at the time of Dybowski's expedition, the Steller's sea cows were already extinct, several bone remains of these animals were present on Bering Island. Based on this observation, the Polish scholar proposed a dedicated scientific program for collecting them:

One should only search under the guidance of an expert osteologist and geologist, otherwise, nor do we can find a complete skeleton of the animal, nor do we know the circumstances among which it has been buried, which at least partly could explain the mystery of his disappearance; and that's why I consider it necessary to arrange – while it is time – an expedition that would in organize matter accumulated these precious remains. Because the bones lie on the coast itself, slightly higher than today's sea level (at 2 or 3 fathoms), where the surface of the earth is covered with lush, high -grass, the search should be carried out either in late autumn, when the grasses are already withered, or what is best, during Spring, when there is no vegetation at all.¹⁸

15 B. Dybowski, *Wyspy Komandorskie*, Lwów 1885.

16 Steller's sea cow was a herbivore, feeding mainly on kelp, large marine algae of the brown algae class, forming dense coastal kelp forests; some species of these algae grow up to several meters in length.

17 F.S. Sharko, E.S. Boulygina, S.V. Tsygankova, N.V. Slobodova, D.A. Alekseev, A.A. Krasivskaya, S.M. Rastorguev, A.N. Tikhonov, A.V. Nedoluzhko, *Steller's Sea Cow Genome Suggests this Species Began Going Extinct before the Arrival of Paleolithic Humans*, "Nature Communications" 2021, vol. 12, no 2215.

18 B. Dybowski, *Wyspy Komandorskie*, p. 17.

The first skeleton was sent to the British Museum, currently the Natural History Museum in London. It was assembled by Edward Gerrard (1810–1910), one of the most outstanding preparators in the world. In a letter dated 12 June 1880, Władysław Taczanowski wrote to Dybowski:

Owen is interested in obtaining many bones, in particular, the skull of *Rhitina Stelleri*; he probably wrote you a letter in this interest. It would be worth it if you could try to get it, the English can pay well, and besides, it would deserve a similar favor in return. The letters of Nördenskiöld¹⁹ indicate that this should be doable, and you are the only one that could arrange this.²⁰

Richard Owen (1804–1892) passed his request to Dybowski via Taczanowski by Robert Damon (1814–1889), a geologist and a shell expert, at the same time a trader of natural history specimens (see Taczanowski's letter to Dybowski dated 31 May 1880).²¹ Damon visited the Zoological Cabinet in Warsaw in the company of Konstanty Branicki (1824–1884). It was then that he began the efforts to acquire the skeleton and paid an advance of 80 pounds for this purchase. In his letter from 17 November 1880, Taczanowski urged Dybowski to send the skeleton to London:

You probably already received or will receive a letter from Owen in the interest of acquiring a *Rhitina* skeleton. I will report to him that you can fulfill this need, without mentioning anything about the price. He will definitely write back and maybe give some suggestions. Wrzeźniowski²² claims that he might manage to obtain some funds to purchase this specimen for our Cabinet. However, in my opinion, it would be better to send this skeleton to Owen; he would efficiently use it for scientific purposes; furthermore, he could pay well, and you could use this fund for the greater good, which might also benefit our Cabinet. Your plan of collecting larger quantities of skulls is excellent and, in fact, can allow us to achieve great results.²³

Soon after, two skeletons of Steller's sea cows were sent to London via Odessa (see Taczanowski's letter to Dybowski dated 18 August 1882).²⁴ Albert Günther (1830–1914), curator of the zoological department of the British Museum, reproached Taczanowski for agreeing to Damon's commercial brokerage (letter of 10 February 1882).²⁵ This was not unjustified, given that Dybowski finally received 80 pounds, while the British Museum paid Damon 200 pounds for the skeleton.²⁶

According to the inventory of osteological remains of Steller's sea cow published in 2006,²⁷ the materials provided by Dybowski are currently located in seven museums in five countries (Austria, England, Monaco, Poland, and Ukraine). A significant portion of these

19 Adolf Erik Nördenskiöld (1831–1902), geologist and mineralogist, polar explorer.

20 K. Kowalska A. Mroczkowska, B. Zielińska, *Władysław Taczanowski*, p. 170.

21 *Ibidem*, p. 168.

22 August Wrzeźniowski (1836–1892), zoologist, profesor at the University of Warsaw.

23 K. Kowalska A. Mroczkowska, B. Zielińska, *Władysław Taczanowski*, p. 174.

24 *Ibidem*, p. 211.

25 *Ibidem*, p. 208.

26 S. Mattioli, D.P. Domning, *An Annotated List*, p. 277.

27 *Ibidem*, p. 273–288.

bones was sent to Lviv, from which two skeletons were forwarded to Kyiv in 1951 and 1955 and one to Kharkiv in the 1970s. The remaining skeleton in Lviv was given to Dybowski by the Aleuts – the indigenous inhabitants of the Komandorski Islands – and was brought in 1904 by Józef Morozowicz (1865–1941).²⁸ In Vienna, the Naturhistorisches Museum houses an almost complete skeleton donated by Dybowski in 1897 to Ludwig von Lorenz (1856–1943), former director of this institution. The Oceanographic Museum of Monaco houses a skull, mandible, and other bones brought in 1910 by Józef Nusbaum-Hilarowicz (1859–1917), who included an excellent drawing of the skull in a zoology textbook for secondary schools.²⁹

The value of Steller's sea cow remains is also reflected in legal claims concerning the restitution of the natural history collections from areas lost by Poland after World War II. The following statement has been raised by Kazimierz Sembrat, a zoologist from Lviv and later from Wrocław:

The zoological museum created by Benedykt Dybowski, a member of the National Government from 1863, should be returned to Polish universities, which suffered major losses during the war. The collections and the library are of great scientific value (for example the priceless skeleton of the extinct sea cow *Rhytina stelleri*) and were donated by a Pole to a Polish university, and as such, they should be given to Polish scientists.³⁰

The skeleton of Steller's sea cow assembled by Ślósarski, together with many valuable exhibits from the Zoological Cabinet in Warsaw, was taken by the Russians in 1915 during the transfer of the Imperial University of Warsaw to Rostov-on-Don. In his letters to Janusz Domaniewski (1891–1954), Dybowski expressed his frustration, clearly wishing for the transported specimens to be returned to Warsaw.³¹

In 1919, the remaining specimens of the former Zoological Cabinet in Warsaw of the University of Warsaw were incorporated into the National Museum of Natural History, which was established after Poland regained its independence. The skull of Steller's sea cow was the pride of the new museum, later renamed the State Zoological Museum. In 1936, this institution was moved to the building at 64 Wilcza Street (Warsaw). In 1939, the skull was hidden from looting, which, in an accidental and organized way, affected the Polish natural history heritage.³² Unfortunately, in 1944, just after the fall of the Warsaw Uprising, the Germans deliberately set fire to the museum's headquarters, irretrievably destroying the entire entomological collection of over 3 million insect specimens and with them the skull of a Steller's sea cow. In his memoirs, Professor Maciej Mroczkowski (1927–2007) wrote:

28 Józef Morozowicz (1865–1941), geologist and mineralogist, participant of the expedition to Commander Islands in 1903.

29 J. Nusbaum-Hilarowicz, *Zoologia dla klas wyższych szkół średnich*, Lwów 1917.

30 M. Junkiewicz, *Starania Kazimierza Sembrata i Akademii Umiejętności o restytucję polskich kolekcji przyrodniczych ze Lwowa*, "Zeszyty Historyczne" 2008, vol. 163 (542), p. 128–137.

31 P. Daszkiewicz, D. Iwan, *Removal of Warsaw Zoological Collections in 1915 – Evacuation or Unpunished Theft?*, "Rocznik Muzeum Górnośląskiego w Bytomiu" 2020, vol. 26, p. 1–10.

32 P. Daszkiewicz, D. Iwan, H. Kowalski, D. Mierzwa-Szymkowiak, R. Zaborowski, *Zygmunt Fedorowicz, Stanisław Feliksiak. 150-lecie Gabinetu Zoologicznego w Warszawie (1818–1968)*, Warszawa 2018 (Memorabilia Zoologica, new series, vol. 1).



Fig. 1. The only remaining skull of Steller's Sea Cow – †*Hydrodamalis gigas* (Zimmermann, 1780) currently deposited in Polish research collections (photograph taken on the display of the Nature Education Centre of the Jagiellonian University, Krakow, Poland)

Entomological collections, the Archives of the State Zoological Museum were completely destroyed, as well as the skull of Steller's sea cow (*Hydrodamalis gigas*), a large herbivorous marine mammal (length up to 10 m, weight up to 4 tons) from the order of sirens, discovered in 1741, completely extinct 30 years later. This unique skull, a gift from Benedykt Dybowski, was hidden from the Germans between entomological cabinets.³³

The only remaining skull that survived in Polish collections up to this day is the one collected by Dybowski in 1882 and donated to the Jagiellonian University in 1896. This osteological rarity is currently stored in the Nature Education Centre of the Jagiellonian University in Krakow (CEPUJ, *Centrum Edukacji Przyrodniczej Uniwersytetu Jagiellońskiego*) (Fig. 1).

Thanks to the inventory of the remains of Steller's sea cow,³⁴ we can investigate the history of skeletons, skulls, and individual bones obtained by Dybowski, which are now dispersed throughout European natural history collections. However, we are still unsure if these are the only exhibits this famous Polish naturalist acquired. For example, the ethnographic exhibition of artifacts from Kamchatka and the Commander Islands, shown in 1885 in several Polish cities, included two skulls of Steller's sea cow³⁵ Most of the ethnographic artifacts from that exhibition were deposited in the local Ethnographic Museum in Kraków.³⁶ However, the fate of the two mentioned skulls remains unknown.

33 Archiwum Muzeum i Instytutu Zoologii PAN w Warszawie [AMiIZ PAN] (Archives of the Museum and Institute of Zoology of the Polish Academy of Sciences in Warsaw), Spuścizna po prof. Macieju Mroczkowskim, sygn. 83, Początki pracy naukowej (1948–1952).

34 S. Mattioli, D. P. Domning, *An Annotated List*, p. 273–288.

35 B. Dybowski, *Katalog wystawy etnograficznej Kamczatki i Wysp Komandorskich*, Lwów 1885.

36 *Benedykt Dybowski*, etnomuzeum.eu/syberia/darczynca/benedykt-dybowski [accessed 30.06.2023].

The history of the remains of Steller's sea cow complements the already well-known picture of Benedykt Dybowski as an experienced field researcher and organizer of scientific life. He was simultaneously involved in acquiring valuable osteological materials and sharing them with a larger scientific community while being one of the most prominent naturalists working on this extinct species of marine mammal. Furthermore, the documents discussed in this paper reveal the close international interactions between Władysław Taczanowski and the Zoological Cabinet in Warsaw in general with prominent zoologists of that era. Finally, analyzed sources provide insights from behind the scenes concerning the daily work of 19th-c. zoologists, including details on the often very complicated transactions of purchasing extremely rare and valuable specimens.

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Krowa morska *Stellera* – mało znane zasługi Benedykta Dybowskiego dla europejskiej muzeografii zoologicznej

Artykuł przedstawia badania Benedykta Dybowskiego nad historią krowy morskiej i pozostałości, które wysłał do różnych muzeów i zbiorów przyrodniczych. Dybowski był jednym z najważniejszych badaczy tego gatunku, który wymarł w XVIII w. Odkrył dymorfizm płciowy krowy morskiej *Stellera*; był autorem oryginalnej hipotezy klimatycznych przyczyn wymarcia gatunku; i wysłał największą liczbę kości i czaszek krowy morskiej *Stellera* europejskim muzeom w XIX w. Można je dziś znaleźć w siedmiu muzeach w pięciu krajach (Anglia, Ukraina, Polska, Austria i Monako). Okazy wysłane polskim instytucjom naukowym zostały zrabowane lub zniszczone podczas obu wojen światowych. Dybowski pracował w ramach sieci międzynarodowych powiązań wybitnych zoologów, blisko współpracując z Władysławem Taczanowskim i Warszawskim Gabinetem Zoologicznym. Jego praca jest świadectwem pracy przyrodników, którzy byli również pracownikami muzealnymi, pokazując zakulisowe sceny niekiedy bardzo skomplikowanych transakcji kupna szczególnie rzadkich wartościowych okazów.