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# **Bryozoans of the Krusenstern Expedition (1803-1806)**

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1. Introduction
  2. The Expedition
  3. The Bryozoans
  4. Summary and Conclusions
  5. Acknowledgements
- References

## **1. Introduction**

In the late 18<sup>th</sup> century, the western world was well into the Age of Sail, with schooners, sloops, corvettes and frigates increasingly able to cross whole oceans, bringing home scientific specimens from unimaginably distant lands and seas. Among these natural treasures were strange stony creatures, not unlike corals but also not quite like them either. These so-called “zoophytes” were a taxonomic mystery for some time.

By the end of the 18<sup>th</sup> century, species that would later be known as bryozoans had been described by, among others, Ellis (1755), Linnaeus (e.g., 1758), Pallas (1766), and Ellis and Solander (1786), but in most cases they had been classified as corals. The notion of a group of “polypiers” (*sensu* Lamouroux 1812, 1816; Lamarck, 1816) was yet to come, and the phyla Polyzoa (Thompson 1830) and Bryozoa (Ehrenberg 1831) would not be defined for several decades.

At the same time, Captain Adam Johann von Krusenstern (1770-1846), (also known as Ivan Fjodorovitch Krusenstern) (Figure 1), who had been born in Estonia, and who had served in the English navy for some time, proposed that direct communication between Russia and China could be best achieved by sailing round Cape Horn and then the Cape of Good Hope (Fedorova 2011). Tsar Alexander I subsequently appointed him to command a voyage to the east coast of Asia, which would later prove to be the first



Figure 1. Adam Johann von Krusenstern (1770-1846)

circumnavigation of the world by a Russian expedition. While the main purposes of the voyage were to establish or enhance trade links with China, Japan, South America and possibly even California, amongst the crew were a number of naturalists who undertook the diligent collection of flora and fauna, which were brought back to Europe for subsequent examination, analysis, illustration and publication.

Here we describe, firstly, the expedition and its achievements; secondly, the research carried out on the bryozoans collected; and thirdly, discuss the various bryozoan genera erected from this material.

## 2. The Expedition

At the beginning of the 19<sup>th</sup> century, Tsar Alexander I and Baron Nikolai P. Rezanov (1764-1807) commissioned Captain Krusenstern to explore the northern Pacific, establish trade with China and Japan, enhance links in South America, and consider the possibility of using California as a Russian colony (Fedorova 2011).

The importance of this voyage to Russia is difficult to overstate. It was the first time that a Russian ship had crossed the Equator (Vinkovetsky 2001), and the Tsar himself farewelled the ships at Kronstadt (the main seaport of St Petersburg, Russia), and later welcomed them back on their return. The maritime connection between the far-distant ends of the Russian Empire was an important innovation for trade and communication; at



Figure 2. Yuri Fyodorovich Lisiansky (1773-1837) (Portrait by Vladimir Borovikovskiy (1757–1825); from [www.nasledie-rus.ru](http://www.nasledie-rus.ru))

the same time, observations as to how other major powers managed their colonies informed Russian aspirations regarding their own (Vinovetsky 2001). Participants left accounts that continue to be cited in both current natural history and ethnographic research (Fedorova 2011).

The Russian-American Company acquired for the expedition two British vessels. The HMS *Leander*, a 430 tonne, three-masted sloop built in 1800, was re-christened *Nadezhda* (meaning ‘Hope’), and placed under the command of Captain Krusenstern. There were 58 crew and 16 guns aboard (Tredrea & Sozaev 2010). The sloop-of-war HMS *Thames* was re-named *Neva* (after the river that flows through St Petersburg) and placed under the command of Captain-Lieutenant Yuri Fyodorovich Lisiansky (1773-1837) (Figure 2). She was the smaller vessel at 61 m and weighing 380 tonnes, with a crew of about 50, and was equipped with 14 guns (Tredrea & Sozaev 2010). The two ships arrived ready for duty in the Baltic Sea in May 1803.

The *Nadezhda* and the *Neva* set sail from Kronstadt on 7 August 1803 (Krusenstern 1810-14), and Baron Rezanov was on board, bound for diplomatic negotiations in Japan (Tumarkin 1979, Vinkovetsky 2001). They travelled across the Baltic and Atlantic Oceans, past the Canary Islands and Brazil, rounded Cape Horn, where they were separated by a storm. The *Neva* went to Easter Island, whereas the *Nadezhda* sailed to the Marquesas Islands, where the ships were reunited in May 1804. Both ships then sailed on to the Hawaiian Islands (Tumarkin 1979).

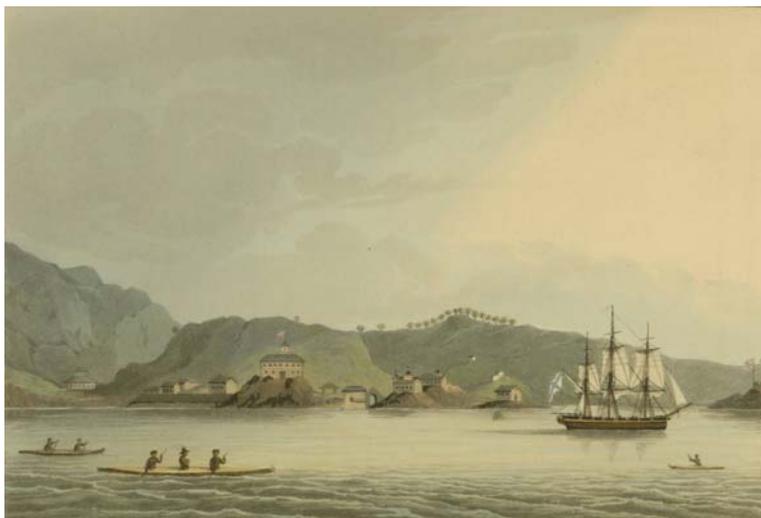


Figure 3. *The Neva* entering the harbour of St Paul at Kodiak Island, Alaska (from Lisiansky 1814).

After they reached Hawaii, the two ships split up (Tumarkin 1979). The *Neva* stayed in Hawaii for a time, then went on to Russian America (Figure 3), ending up in Sitka, Alaska, where she took part in the battle of Sitka, defeating a native Tlingit uprising. Meanwhile the *Nadezhda* travelled to Kamchatka and on to Japan, where she spent six months in Nagasaki harbour (Fedorova 2011). The ships met up again briefly in Macao (Nov 1804 – Feb 1805) but sailed separately thereafter. The *Neva* reached home first, on 22 July 1806. Meanwhile Krusenstern and the *Nadezhda* rounded the Cape of Good Hope and travelled north along the African coast, visiting the island of St Helena before reaching the Baltic Sea, arriving back at Kronstadt on 19 August 1806, just over three years after they had left, with all hands safe on board (Figure 4).

A visit by the expedition was described in *Swiss Family Robinson* (Wyss 1812); indeed, the Swiss astronomer on board brought along one of the (fictional) Robinson children in order to provide further education in astronomy.

Tsar Alexander I made sure that this expedition had the best officers, top scholars, and finest artists on board (Vinkovetsky 2001). Aside from the Captains, Krusenstern and Lisiansky, and the emissary Rezanov there were several naturalists on board: the German, Dr Wilhelm Gottlieb Tilesius, or Vilgelm Gotlob von Tilenau, (1769-1857) stayed with the *Nadezhda*, whereas Grigori Ivanovitch Langsdorff (aka Georg Heinrich von Langsdorff) (1774-1852) left the ship in Kamchatka and explored Alaska for several years before returning in 1808. Johan Caspar Horner (1734-1834) of Zurich was a physicist and astronomer on board.

After completing her circumnavigation of the world, *Nadezhda* became a merchant ship, delivering goods from Russia to the USA. In December 1808 she was caught in ice near Denmark and lost (Tredrea & Sozaev 2010). At least one gulf, four capes, a strait,

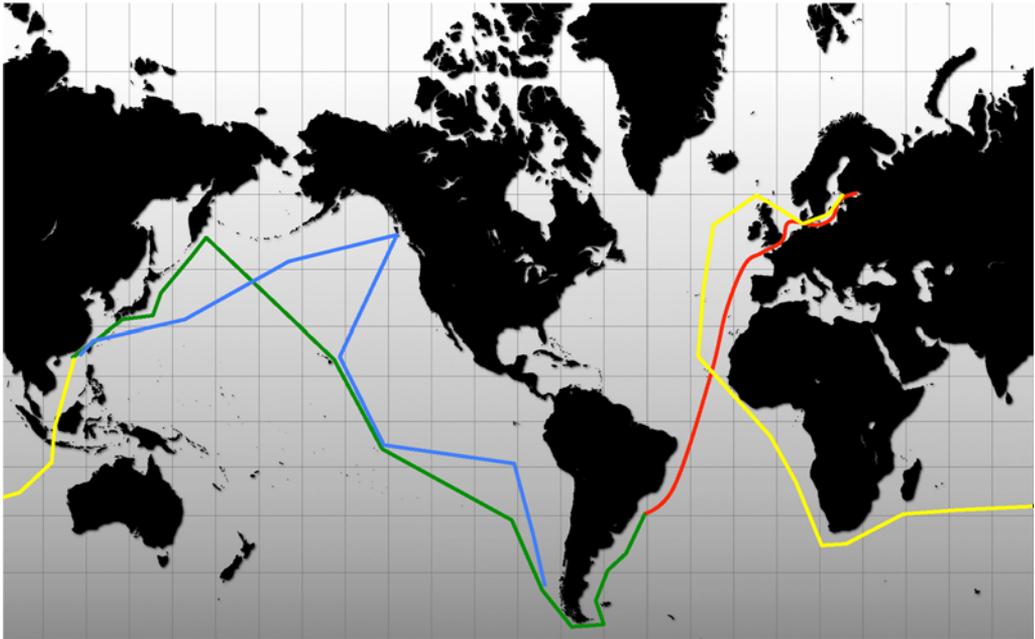


Figure 4. Route of the Krusenstern Expedition. Red line = 1803, Green line = Nadhezda in 1804, Blue line = Neva in 1804, Yellow line = Nadhezda in 1805-6. Obtained from original charts in Krusenstern (1810-1814).

and an island are named for this famous vessel. In 1949 Russia acquired a four-masted barque from Germany as part of war reparations, which was re-named *Krusenstern*. 200 years after the first circumnavigation, this tall ship re-traced the route of the *Nadzhda* in 2005-2006.

*Neva*, on the other hand, went on to become the first Russian ship to visit Australia in June 1807 (Massov 2007), initiating the first official relations between the two countries, on its way back to the Russian colonies in Alaska.

Upon his return, Krusenstern wrote a detailed report, *Reise um die Welt in den Jahren 1803, 1804, 1805 und 1806 auf Befehl Seiner Kaiserliche Majestät Alexanders des Ersten auf den Schiffen Nadeschda und Newa* (Journey around the World in the Years 1803, 1804, 1805, and 1806 at the Command of his Imperial Majesty Alexander I in the Ships *Nadzhda* and *Neva*) published in three volumes between 1809 and 1812 in St Petersburg. It was published in Berlin in 1811-1812, in English in 1813 and subsequently in French, Dutch, Danish, Swedish, and Italian. His other major scientific work, which includes an atlas of the Pacific based on his travels, was published between 1815 and 1827 in St Petersburg, and gained him honorary membership of the Russian Academy of Sciences.

Krusenstern became a member of the scientific committee of the Russian marine department, and also served as director of the Russian naval school. He was made an admiral in 1841 and awarded the Pour le Merite (Civil Class) in 1842. He died in Estonia in 1846 and is buried at the Tallinn Cathedral. He is remembered today in a wide range

of ways: an island in the Bering Strait, a small island group in the Kara Sea, a cape and a lagoon in western Alaska, and a crater on the Moon all bear his name. In 1994, a Russian stamp was issued showing Krusenstern, his ship and the route they took. Nowadays, there is a fictional steamship named after him in a well-loved Russian animated film series, and even a rock band called “Kruzenstern & Steamship”.

Krusenstern donated collections from his voyages to the Museum of Geology at the University of Tartu, increasing their collection dramatically. Other parts of his collection were given to the Tallinn History Museum.

The other commander, Lisiansky, also wrote a book, entitled *A Voyage Round the World in 1803-1806* in two volumes (Lisiansky 1812, 1814), was ennobled and decorated with the Order of St Vladimir, 3rd Degree. Many places are named after him: Lisianski Island in the northwestern Hawaiian Islands, a peninsula of Baranof Island, Alaska, a bay, a strait, a river, a cape in North America, an undersea mountain and a peninsula on the Okhotsk Sea.

The German naturalist Wilhelm Gottlieb Tilesius described a number of species from the North Pacific, particularly fish (e.g., Tilesius 1813), as well as publishing works in other areas (e.g., dermatology; see De Bersaques 2011). Scientifically valuable drawings and watercolours by Tilesius illustrating landscape, peoples, as well as flora and fauna mainly of China and Japan, are housed at the University of Leipzig archives. He contributed many specimens to museums (see, e.g., Woelkerling *et al.*, 2008) and researchers.

Other crew members recorded diaries or wrote memoirs of the voyage, some of which were published at the time, some rediscovered many years afterwards, and, it is thought, some of which remain to be discovered (Tumarkin 1979).

### 3. The Bryozoans

One of the scientific results of the Krusenstern expedition was the discovery, collection, and naming of many new invertebrates, among them various bryozoans. Most of them were collected off Kamchatka, and brought back to Europe for description by experts.

Despite publishing his own work on a wide variety of subjects (from Mammoths to fish to cows), Tilesius did not describe many invertebrates that he had collected during the expedition. Most of them were passed onto to European experts, such as Lamouroux. Tilesius' main invertebrate contribution from the expedition was a paper on isopods, shrimps and entomostracans (Tilesius 1815) (see Damkaer 2002, p. 156).

Jean-Vincent-Félix Lamouroux (1779-1825) was an enthusiastic and successful professor of natural history who founded the Muséum d'Histoire Naturelle de Caen. He concentrated his research on algae, polyps and zoophytes (as they were then called). He described well over 500 species in the course of his career, and was honoured in his time by various Academies of Science (d'Hondt 1991). His collection, including the type specimens of many bryozoans, was lodged in Paris, and apparently destroyed during World War II (d'Hondt 1991; Mongereau 1972).

In his 1821 report “Exposition méthodique des genres de l’ordre des polypiers, avec leur description et celles de principales espèces figurées dans 84 planches; les 63 premiers appartenant à l’histoire naturelle des zoophytes d’Ellis et Solander”, Lamouroux described the then known fossil and extant genera of “Polypiers” – about 127 of them, including many bryozoans, sponges, corals, and algae. He was meticulous in giving credit to those who had provided or collected the specimens, so we know that several were provided by or commemorate people on the Krusenstern expedition.

### ***Pherusa***

The genus *Pherusa* was erected by Lamouroux (1816), into which he placed *Flustra tubulosa* (Ellis and Solander, 1786), from the Mediterranean and Caribbean. Its range was considerably widened by material provided by Tilesius from Portugal, Brazil and “the Archipelago of China”, described and figured by Lamouroux (1821, p. 3, plate 64, figs 12-14) (Figure 5A). At least some of Tilesius’ material (probably that from China) may have come from the Krusenstern expedition, though it is not made explicit by Lamouroux. Of *Pherusa tubulosa*, Lamouroux notes “I strongly doubt that the same species can be found at such different localities.” (translated from Lamouroux, 1821, p. 3).

Soule (1951) identified several homonymies and thus renamed the genus *Pherusella*. There are currently three acknowledged species: the genotype *P. tubulosa* (Ellis and Solander, 1786), known from European waters; *P. brevituba* Soule, 1951 from the California coast; and *P. flabellaria* (Kirkpatrick, 1890) from the China Sea. It seems most likely that the Krusenstern material provided by Tilesius could be this species, though it is not at all clear into what species the material from Brazil should be placed.

### ***Krusensterna***

The genus *Krusensterna* was described by Lamouroux in 1821, with a nominated genotype of *Krusensterna verrucosa* (Lamouroux 1821, p. 41, plate 74, figs 10-13) (Figure 5B). “This genus is dedicated to the celebrated voyager Krusenstern by his friend and collaborator M. Tilesius, the expedition’s naturalist. I am only his intermediary in dedicating this bryozoan to the Russian navigator who has so improved our knowledge of the world’s geography” (translated from Lamouroux, 1821, p. 41). He placed it among other reteporiform bryozoans.

Twenty-three years later Agassiz (1844, p. 14) listed the genus as *Krusensternia* Agassiz, 1844-5, either an unjustified amendment or an objective synonym. In any case, the genus *Krusensterna* had been already synonymised by de Blainville (1834, p. 406) with *Fron dipora* Link, 1807 in the Frondiporidae: Cyclostomata. Lamarck (1836) commented that de Blainville “thinks that the species figured by Lamouroux and coming from the seas around Kamchatka is distinct from those of the Mediterranean.” (translated from Lamarck, 1836, p. 276).

In 1850, King commented, with some disgust, on the confusion (in coral nomenclature) between Blainville’s *Fron dipora* and Lamouroux’s *Krusensterna*. “it involves scientific nomenclature in the greatest possible confusion, and without any prospect of its being

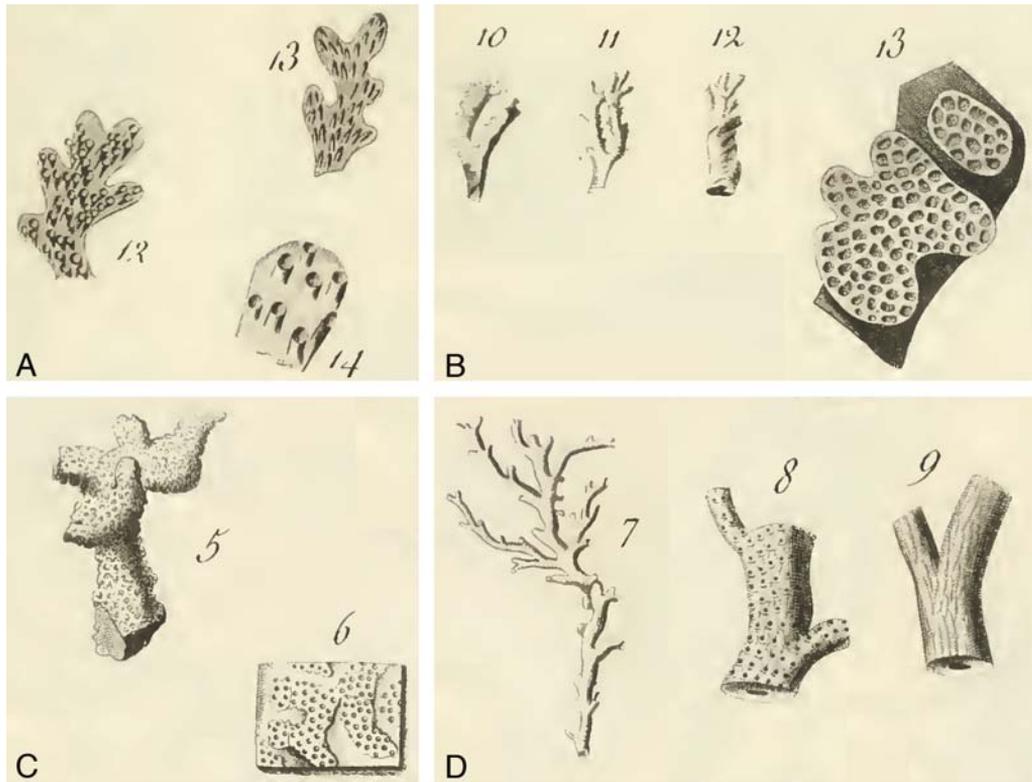


Figure 5. Bryozoans of the Krusenstern Expedition or named after naturalists on that expedition illustrated in Lamouroux (1821). A. *Pherusa tubulosa* (from Plate 64, figs 12-14); B. *Krusensterna verrucosa* (from Plate 74, figs 10-13); C. *Tilesia distorta* (from Plate 74, figs 5-6); D. *Hornera frondiculata* (from Plate 74, figs 7-9).

ended.”

But by 1879 the position was clearer, with *Fron dipora verrucosa* properly cited by A.W. Waters (1879). Later still, S.F. Harmer (1933) grappled with the genera then considered to be in the Reteporidae. He assigned the genus *Fron dipora* (“= *Krusensterna* Lamouroux”) to the Cyclostomata. There is a pencil note (of unknown date and authorship) in the Natural History Museum (London) copy of Lamouroux’s book, suggesting that the species is now known as *Fasciculipora fratica* MacGillivray. But Bassler (1953, p. G56) regarded *Krusensterna* Tilesius & Lamouroux, 1821 as a synonym of *Fron dipora* Link, 1807.

The most likely situation is that the material from Kamchatka is *Fron dipora verrucosa*, now known from a number of locations, including Naples, the Adriatic, Oran (Algeria) and perhaps elsewhere in the Mediterranean, Madeira, the Red Sea, Japan, Kerry (Ireland), Senegal, and off Accra (Ghana). Also reported from the Miocene of the Czech Republic by Zagorsek (2010, p. 33)

### *Tilesia*

Lamouroux (1821) dedicated the cyclostome bryozoan genus *Tilesia* to Tilesius, to thank him “for the beautiful polypides with which he has enriched my collection” (translated from Lamouroux, 1821, p. 42). The genotype was *Tilesia distorta* Lamouroux, 1821 (p. 42, plate 74, figs 5-6) (Figure 5C). It was not a specimen from the Krusenstern expedition, but instead a “rare and singular” Jurassic-Cretaceous fossil bryozoan from Caen in north-west France.

By the time de Blainville was looking for it, the type specimen of this species had disappeared (de Blainville 1834, p. 415). He regarded Lamouroux’s description and figure to be “inadequate,” but considered that it might be a bryozoan of some kind. In 1854, Haime combined Lamouroux’s two genera *Tilesia* and *Theonoea*, retaining the latter name and thus the genotype *Theonoea clathrata* in the Theonoidea: Cyclostomata (Haime 1854). Bassler (1953, p. G57) listed the genus *Theonoea* Lamouroux, 1821 (= *Tilesia* Lamouroux, 1821), with a range of Jurassic-Cretaceous.

*Tilesia* could have been a confusing name to keep. It was also used for a fish by Swainson in 1838 (p. 318), a dipteran (fly) by Robineau-Desvoidy in 1863 (vol. 2, p. 364), and a hexacoralline anemone by Andres in 1883, who designated *Actinia brasiliensis* Milne Edwards, 1857 as the type species (Neave, 1939). The replacement name *Tilesiusia* for the bryozoan was published by Bronn (1848, p. 1264), according to Neave (1939). Incidentally, there is also a genus *Tilesia* in the family Compositae encompassing at least three species of South American flowering plants.

### *Hornera*

The genus *Hornera* and subsequently the family Horneridae were named by Lamouroux (1821) for Johan Caspar Horner (1734-1834), physicist and astronomer of Zurich. The dedication reads: “This polyzoan is dedicated to Mr. Horner, astronomer with the expedition around the world commanded by Captain Krusenstern, in the name of his friend Mr. Tilesius” (translated from Lamouroux, 1821, p. 41). The species *H. frondiculata* (Figure 5D) had been collected by Tilesius from Kamchatka. *Hornera* has been occasionally misspelled *Horneria* (see, e.g., Bronn, 1848, p. 596). Some 136 species have been described, and about 120 remain valid (see Smith *et al.*, 2008 for a detailed history of the Horneridae).

## 4. Summary and Conclusions

The genus *Pherusa*, erected by Lamouroux in 1816, had its range considerably extended by material contributed by Tilesius from the Krusenstern expedition. Now called *Pherusella flabellaria* (Kirkpatrick, 1890), this ctenostome bryozoan is known from the China Sea. *Krusensterna*, named for the expedition’s captain, was a reteporiform bryozoan later synonymised into *Fron dipora verrucosa*. The fossil genus *Tilesia*, too, was synonymised with *Theonoea* and the name disappeared. It is in only the genus *Hornera*, a widespread and speciose genus of cyclostome bryozoan, that the Krusenstern

expedition continues to be memorialised among bryozoologists.

## 5. Acknowledgements

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