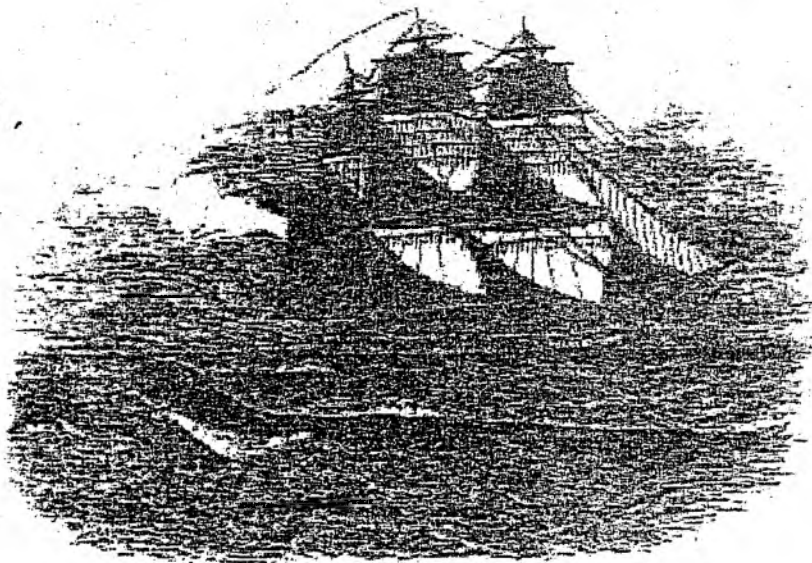


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THE PACIFIC AND BEYOND

Edited by Keith R. Benson and
Philip F. Rehbock



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Germania in Pacifico: Humboldt, Chamisso and Other Early German Contributions to Pacific Research, 1741-1876

Gerhard Kortum¹

Introduction: From Berlin to the Pacific

In the vicinity of the present unpretentious building occupying the site in Oranienburgerstraße in central Berlin where Alexander von Humboldt (1769-1859) lived for many years compiling his *Kosmos*, until his death in 1859, is the Montbijou Park. In one corner, most hidden behind trees and other plants, there is the monument of another important, although less well known Berlin natural scientist, Adelbert von Chamisso (1781-1838). He was indeed a "Weltbürger, Naturforscher und Dichter" (cosmopolite, naturalist and poet), as Robert Fischer subtitled his recent biography.²

Both Humboldt and Chamisso did marine research work in the Pacific in the early 19th century. They had much in common: both started with botany and became respected and popular authors. They first met in Paris in 1810 after Humboldt's return from Latin America in 1804. The relationship between these two natural historians, however, remains unexplored up to now. Chamisso's account of his voyage around the world contains a number of references to Humboldt's works published up to 1825, when the three volume Kotzebue-report was printed in Vienna. However, they did not become close friends, although Chamisso was appointed a member of the Berlin Academy of Sciences

on Humboldt's own recommendation in 1835, three years before Chamisso's death. Most likely he alluded to Humboldt when he explained his admiration of a great man, who took no notice of him.³

Humboldt's and Chamisso's contributions to early Pacific research within the more general framework of German scientific activities in the Great Ocean, at the time we can summarize as the period of circumnavigations, have not been studied in detail up to now. The present chapter attempts to direct attention to the early German contributions to ocean sciences in the days of sail.⁴

Humboldt's important general contributions to marine sciences are well known, although not yet in a popular edition. But why Chamisso and the *Rurik* as a subject at a congress about the history of marine sciences, especially in the Pacific? This French-born German poet with a background in botany and natural philosophy will be known primarily to experts of German literary history, especially the period of romanticism. Chamisso's Pacific experience is connected to an even less known, rather unpretentious Russian vessel of some 180 tons, sent around the globe to the Pacific Ocean under the command of O. von Kotzebue at the beginning of the 19th century, mainly to promote Russian commercial interests in Alaska. This oft forgotten poet, and this poorly known scientific, but mainly exploratory and commercial enterprise, studied and newly interpreted in the broader context

of the history of ideas, are a challenge for the modern reader and historian of science, especially marine science.⁵

In this paper some new aspects are presented. Certainly Adelbert von Chamisso was no oceanographer in the strictly modern sense; the term "oceanography" did not emerge until the end of the nineteenth century. M. F. Maury got the title for his "Physical Geography of the Sea" (1855) from Alexander von Humboldt, who, like Heinrich Berghaus, did not use this specific expression for maritime or oceanic studies. For them and many other natural historians of the early 19th century, "hydrography" with its physical, nautical, and cartographic aspects was part of general "Physical Geography of the Sea" as first outlined by B. Varenius in his "Geographia Generalis" (1651).

Like many of his contemporaries in the age before the division and specialization of the natural sciences Chamisso regarded himself a natural philosopher. He had a broad interest in biology (especially botany), geology, ethnography, physical geography and, last but not least, hydrography. In a way we return to this early state of natural philosophy in the modern concepts of ecology, observing, and describing nature in its interrelated unity.

Chamisso joined the *Rurik* cruise and had almost four years to observe the natural phenomena at the surface of the sea and to study the ecology of the Pacific and the Pacific rim. He assisted Johann Friedrich Eschscholz, another participant on the cruise, in making

aerometer observations and sub-surface temperature measurements with a Six thermograph. As deep sea research was not very well developed at that time, we may thus regard him as an "early" pioneer of oceanography.

We agree with the basic assumption that there is a fundamental difference between "Entdeckungsgeschichte" (history of discoveries) and "geographischer Disziplin-geschichte" (history of geographical ideas). We are aware of the fact, that the conceptual development of innovative scientific ideas (whether true or false) was often started by scholars, who never had the opportunity to personally collect empirical environmental observations from the seas. As far as the development of oceanography in the German cultural area is concerned J. Fr. W. Otto, H. Berghaus, A. Petermann, and O. Krümmel represent this type of academic scholars working hard in their private study as collectors and compilers, looking for and finding some kind of system or order in the flood of marine information that existed even in those early days.⁶ Humboldt on the other hand was in the favorable and exceptional position to be both, as his *Kosmos* was based in many parts on his own personal experiences,⁷ and Humboldt had extensive Pacific ambitions himself, as will be seen later.

The Age of the Circumnavigations

Due to political and geographical circumstances Germany did not emerge as a major maritime nation with its own hydrographic institutions before the 1870s. This may explain at least partly why the general subject "Scientists and the Sea"

and the national development of marine sciences in Germany can only be fully understood in close connection with the theoretical background of classical geography. The special conceptual ideas of the German approach to marine sciences may be summarized by the term "geographische Meereskunde."⁸ This tradition persisted in Germany until about 1945.

In discussing "German Scientists and the Sea," we must not forget those German scientists who joined the great number of circumnavigations as officially appointed naturalists and their travel accounts. This period of "scientific circumnavigations" with German scientists is well defined for the German cultural area by J. R. and G. Forster, who joined Cook's expedition on the *Resolution* (1772-1775); and the first two modern oceanographic cruises of the *Challenger* (1872-1876, with German participant R. v. Willemoes-Suhm as marine biologist), and of the *Gazelle* (1874-1876), whose scientific staff for astronomy and deep sea oceanography and biology was K. Börgen and T. Studer. For the Pacific Ocean, the list in preparation for a systematic comparative analysis of this time is longer and started with G. W. Steller (1709-1746) and V. J. Bering's cruise, 1741-1742. Countries organizing the circumnavigations in the 18th and 19th centuries had good reasons to attach scientists to the crew. The general advancement of knowledge sometimes was a welcome alibi for the promotion of political and commercial interests overseas and made it easier for governments or national scientific institutions to raise money for those enterprises.

The more important German scientific contributors are listed according to the ship's names, years of cruise, nationality and ship's masters, destination and mission as well as the qualification and background of the scientists participating in the expeditions. All enterprises were interrelated in some way. So this period, at least from the German perspective, may be regarded as a specific period in ocean sciences. Many details are known, others have to be rediscovered.⁹ From the beginning it was an international and interdisciplinary affair, qualities which have continued in modern marine research as well.

Objectives and methods changed considerably, and certainly there was progress in understanding the ocean. The qualifications of the scientists ranged from natural sciences in general ("natural history"), botany and geography, astronomy, physical sciences, biology and geology to oceanography or hydrography, as it was called in those years. In most cases there were crude and sporadic observations using instruments such as chronometers, barometers, and thermometers. Humboldt as well as Chamisso and others used microscopes on their voyages as well. Sometimes, however, it is not possible to specify their scientific role during the cruise, because they were obliged to register all kinds of observations made on board for the official reports. Many of the reports were published in the German language. As far as marine sciences are concerned, "German" with respect to scientific personnel has no political implications here, but is a cultural term, as outlined in more detail in the history of the *Geography of the Sea*.¹⁰ Scientists of

he German cultural area came from Austria and the German Language University of Dorpat in Estonia. Prof. Behn of Kiel University (*Galatea* cruise, 1845-1847) and Willemoes-Suhm (*Challenger* cruise, 1872-1876), came from Schleswig-Holstein. When they were born, Schleswig-Holstein belonged to Denmark politically.¹¹ It is interesting to note that Willemoes-Suhm, the Forsters, and Chamisso, were all appointed in last minute decisions to replace others. To mention another common point of the century of circumnavigations: the expedition reports belong to the best of travel literature in German in literary history. This aspect is especially important for Chamisso. None of the historians of marine sciences has tried to study these cultural and literary aspects, e.g., the perception of the South Sea and North Pacific descriptions by European readers. And what about the wonderful work of the artists and painters assigned to the expeditions for documentation in that pre-photographic age? A more complex and comparative analysis of all important circumnavigations will reveal other aspects of common interest.

Lists that try to organize a vast field of scientific information could be prepared for other nations. In a British list, Charles Darwin's cruise with the *Beagle* (1831-1836) would have a prominent position. Humboldt's name does not fit very well in the list, as he made use of Spanish government ships on regular service for his voyages. His oceanic observations, although valuable, were more of a transient character and not part of a planned circumnavigation.

Humboldt's Pacific Interests

Humboldt intended to go across the Pacific from Acapulco to the Philippines, but he changed his plan. So the Pacific Ocean as a whole remained closed to the personal experience of this great German natural philosopher of the 19th century. Humboldt was able to go from Callao to Acapulco, however, and so he could study at least the equatorial Eastern Pacific. He never stopped to acknowledge the strong influences Georg Forster had on him. It was Forster who led Humboldt to the sea on the Belgian sea shore in 1790, when both studied the marine life of the tidal zone on their travel along the Lower Rhine to England. Humboldt recollected this fact with admiration, when he first saw the Pacific Ocean from a pass high in the Andes. Furthermore it is well known from several of Humboldt's statements that he had intended to make a circumnavigation as Forster did, but he failed to join the French Baudin expedition. While in Mexico he planned to cross the Pacific from Acapulco to Manila with one of the Spanish regular services to the Philippines. Had he done this, the early history of natural sciences, especially in their marine aspects of the Pacific area, would have been more complex.

There are numerous hints of the Pacific Ocean in Humboldt's works. A short look into the index-volume of the *Kosmos* amply shows how much the author was interested in Pacific affairs. In planning his South American expedition Humboldt changed his intention, so he only made the voyage in the tropical eastern Pacific from Callao to Acapulco. His observations and temperature measurements were

partly published by Berghaus. Without covering all details here, it seems clear that Humboldt was the first scientist who described the regular anomalies of meteorological conditions in the coastal zone of the "El Niño" area. This evidence has been neglected in the present day "El Niño" discussions up to now. Although 1802 was not an El Niño-year, Humboldt advanced a very modern explanation of the precarious ocean-atmosphere equilibrium in that area. He even proposed a long-term observation research program near Cabo Blanco. So, Humboldt's contributions to Pacific research certainly are more than an episode.¹² Humboldt in the Pacific Ocean could be the subject of another special paper. In this connection it is more appropriate to draw attention to his classic description of the ocean current off Peru later bearing his name.¹³

Political Background: Russian Interests in the North Pacific

Adelbert von Chamisso was luckier than Humboldt in his Pacific opportunities, although he was far less prepared for his circumnavigation on board the Russian vessel *Rurik*. Both men met in Paris and later in Berlin, but unfortunately no intimate personal contacts evolved between these scientists for reasons unknown. Scientific cooperation between them would have promoted Pacific research considerably.

With the exception of the important activities of the Prussian Maritime Trade Institute¹⁴ (*Seehandlungsgesellschaft*, seven cruises of *Prinzess Louise*, 1826-1844) and the Commercial Mission to East Asia (1860-1862) with F. v. Richthofen, the founder of the first

German Institute of Oceanography in Berlin 1900, German scientists were dependent on foreign ships until the *Gazelle* cruise. On the other hand, German scientists, with their academic potential, were welcome on foreign vessels. Because none of the German states at that time had any colonial or far-reaching maritime ambitions, national jealousy and competition did not stand in the way of German participation in voyages sponsored by other countries.

Russian political interests in the North Pacific and attempts to develop the Kamtchatka Peninsula as a permanent base for regional activities were inaugurated by the maritime expedition of Vitus Bering (1680-1741), a Danish-born navigator, with the two vessels *St. Peter* and *St. Paul* (1741-1742). This clearly exploratory enterprise, like all the following cruises of Russian vessels in these North Pacific waters were necessarily circumnavigations, because going west around South America was the most convenient way to the Pacific and back to Europe. The German G. F. Steller (1704-1746) from Franconia joined that voyage as physician and natural philosopher. This was the beginning of German scientific engagement in the Pacific on Russian ships. The Bering cruise took place thirty years before Cook's second voyage in the *Resolution*.

The fur trade between Alaska and China seemed to be a very profitable business and the merchant G. I. Schelichow (1747-1795) had established the first permanent Russian trading post on Kodiak Island in 1784. In 1799 the Russian American Trading Company started its activities and commercial penetration of the American coast

down to California. A number of high-ranking Tsarist officials were among the leading shareholders. For a long time A. A. Baranow (1747-1819) was the leading organizer of the commercial activities in Alaska and the Northwest American coast down to San Francisco, then still a Spanish outpost. On their Pacific cruise Chamisso and Kotzebue were involved in a diplomatic confrontation between the Spanish governor of Monterey and the Russian agent Kuskotff at Port Bodega, the southernmost Russian base in California. Tzar Alexander I (1801-1825) sponsored all activities of the company in the North Pacific in cooperation with Admiral Modusino, then Secretary of the Navy, and Count Romanzoff, then secretary of commerce of the Russian empire and patron of the *Rurik* cruise, hence the title of Chamisso's account: *Romanzoff'sche Entdeckungsexpedition*.¹⁵

Krusenstern's Pioneer Role in the Pacific

All maritime activities in the following years were closely related to Adam Johann von Krusenstern, born 1770 in Haggard, Estonia. After his school years in Reval (today Tallin) he joined the marine cadet corps in Kronstadt until 1788, and was later attached to the command of Captain Mulowski, who was appointed to lead the first Russian circumnavigation with the German natural scientist Georg Forster (1754-1794). But this expedition was canceled because of political difficulties, and so the Forsters left Russia for Britain and Cook's expedition. Krusenstern was attached to the British Navy for some time and returned full of new ideas and goals. In a report to his government he stressed the

need to take action in the North Pacific in order to gain full control of the Kamtchatka and Aleut areas. Accordingly, in July 1809, Krusenstern left St. Petersburg with the two British-built vessels *Nadeshda* (450 t) and *Neva* (370 t). The Far East and America Company joined the expedition with their agent Resanow, and the two leaders often had quarrels about the scientific and commercial objectives of the enterprise.

Krusenstern was unable to engage all the scientists he wanted for the cruise. But finally his staff consisted of three well known and qualified persons, all from the German cultural area:

- Johann Caspar Horner (1774-1834), a Swiss-born physical scientist and astronomer, was promoted after return and became adjunct of the Academy of Sciences in St. Petersburg; he later compiled the cruise instruction for the *Rurik*.¹⁶
- Wilhelm Gottfried Tilesius (1769-1857) from Leipzig, a well known naturalist, was responsible for drawing and painting.¹⁷ His studies of *Mikroskopische leuchtende Meeresinsekten* are the beginnings of plankton research (there called "infusoria").
- The German natural scientist Georg Heinrich von Langsdorff (1774-1852), published his own account of the voyage under the title *Bemerkungen auf einer Reise um die Welt in den Jahren 1803-1807*.¹⁸

This well prepared Russian circumnavigation took almost four years. Krusenstern's three-volume account was published in Russian (1809-1813) and in German (1810-1812).¹⁹

The illustrative and famous *Atlas zur Reise um die Welt*²⁰ presented numerous well drawn charts and other figures important for the later *Rurik* cruise, as this voyage followed closely the course of the Krusenstern expedition in parts of the Pacific. All information we have shows that Krusenstern had an excellent rapport with his scientific staff. Later, he developed personal academic ambitions as well, as his hydrographic studies show.²¹ Krusenstern's voyage was one of the most important scientific enterprises in the Pacific after Cook's three cruises. He earned unexpected literary and academic esteem after his circumnavigation. Moreover, his successful enterprise laid the foundation for a global Russian maritime presence. Krusenstern became a member of many leading scientific societies in Europe and received a doctor degree *honoris causa* from Dorpat University. Furthermore he was among the founders of the Russian Geographical Society and was promoted admiral and director of the St. Petersburg Navy Academy. Humboldt met Krusenstern in Dorpat on his expedition to Central Asia in 1827.

Preparing a New Circumnavigation

The *Rurik* cruise was a follow-up expedition. One of Krusenstern's officers on the *Nadeshda* was Otto von Kotzebue (1797-1846) from Uval in Estonia, the son of a German author and dramatist living in Russia at that time. In this and other ways the great Russian admiral was behind the *Rurik* expedition, which started some eight years later with a much smaller vessel. There are numerous references in Chamisso's journal and notes to

Krusenstern as well as to Forster. Their discoveries and observations in the Pacific are often given in longer quotations. Tilesius and Langsdorff are mentioned many times as well.

Kotzebue was an experienced navigator and made three circumnavigations (1803-1806, 1815-1818 and 1823-1826). J. C. Horner was asked by Krusenstern to compile the sailing orders and scientific cruise instructions for Kotzebue. All of these documents are printed in Kotzebue's own account of the enterprise.²² An extensive introduction was written by Krusenstern himself. Horner's *Instruktionen für die astronomischen und physikalischen Arbeiten auf der Reise zum Nordpol* recommended observation of all natural phenomena in as much detail as possible and measurement of all things which could be measured.²³ As far as oceanography (hydrography) was concerned, Horner asked for measurement of the tides, ocean currents, waves, depth and salinity, and surface evaporation as well as sub-surface temperatures and color and transparency of the sea water with a white disk. In addition, phosphorescence and meteorological conditions were to be observed. Geophysical phenomena, such as deviation of the compass needle, polar light, and exact fixing of positions by astronomical instruments, were on the research program as well. Looking for mineral resources and drawing charts of coastlines were other important tasks the cruise instructions required. Perhaps this very extensive list was too long for the *Rurik* staff members considering the limited space on board and crude instrumentation.²⁴

The nautical instructions for the *Rurik* were written by Krusenstern himself. Obviously Kotzebue got some secret orders as well concerning the North East Passage, but they were not disclosed to Chamisso or the other members of the expedition. Without going into all details of the cruise here, it is obvious that the scientific goals were only partly achieved on the *Rurik* expedition, because in those years instrumentation was rather simple. Kotzebue picked up some modern instruments in Plymouth including chronometers, barometers, aerometers, and thermometers. At that time systematic temperature measurements were possible only in a rather crude way. Nevertheless Horner and later Eschscholz and Lenz made the first subsurface ocean temperature observations after Forster's first attempts on Cook's expedition, using simple water bottles on Kotzebue's second voyage (1823-1826) with the *Predpriyatje*.²⁵

Following Chamisso's account, the observatory of the *Rurik* was installed on shore whenever possible. This was a most important procedure, and it was the task of the captain who personally supervised this work and took care of the chronometers that were necessary to fix the exact longitude. Chamisso's major instrument however was the microscope, and he made systematic "infusoria" studies with it on the expedition. He and Tilesius, long before Ehrenberg, may be regarded as among the fathers of marine plankton research. Chamisso's contribution to natural sciences on his voyage clearly was more in the field of marine biology. This discipline was not covered in the scientific

instructions of Horner outlined above. Eschscholz was responsible for the physical measurements, but Chamisso assisted him. They cooperated in a wonderful way. So the *Rurik* temperature transect from California to Hawaii is partly Chamisso's work as well.

Adelbert von Chamisso, His Life and Career

Before discussing some other scientific results of the *Rurik* circumnavigation in the years 1815 to 1818, it might be useful to draw attention to some biographical and technical details. Throughout his life Chamisso, who was born 1781 at Boncourt Castle in the Champagne in France (as Louis Charles de Adelaide de Chamisso) did not know whether he was or should feel French or Prussian. In this respect he may be compared to Humboldt, who was cosmopolitan in his views and much attracted by French culture for a long time. Chamisso's family had to leave France after the Revolution and finally settled in Berlin in 1796, where Adelbert was engaged as a miniature painter for the Royal China Manufacturing Company for some time. Chamisso became a popular poet in later life, but his scientific career and merits have not been well recognized.

In 1796 Chamisso became attached to the court of Queen Frederike Louise of Prussia and he was given the chance to visit the distinguished "collège française" in Berlin, a well respected educational institution of the French emigrant community in the Prussian capital. From 1798 to 1806 he served in the Prussian Army. His early literary ambitions started with some poems in French and the edition of the "Musenalmanacs"

(1804-1805), an anthology of poems. He was a leading member of the "Polarsternbund," a literary circle. We must look at his literary career more closely to understand him as a natural scientist. Chamisso went back to France for some time, where he first met Humboldt, Ludwig Uhland, and August Wilhelm Schlegel. The last two were outstanding representatives of the romantic period in German literary history.

Chamisso started his academic career rather late. Like Humboldt, he found that botany was his door into the natural sciences, and it was his friend de la Foye who opened it to him on excursions in Switzerland, where he had stayed in the company of Frau von Stael. In October 1812 at the age of thirty-one he became *studiosus medicinale* of the newly established Berlin University. He studied anatomy, botany, and zoology, later on classical languages, mineralogy and, in 1814, natural philosophy, magnetism, and electricity. During his life-time he witnessed major innovations in technology, such as steam boats and telegraph lines, which he mentions not without some enthusiasm several times in his narrative of the *Rurik* voyage.

But Chamisso was mainly fascinated by botany and made long excursions with his friends D. F. L. v. Schlechtendahl and K. S. Kunth in the surroundings of Berlin. His first botanical publication and at the same time his most important and popular novel²⁶ were written in Kunersdorf 1813, where he had retreated for some time to forget about the political upheavals of the Napoleonic wars.

His friend and admirer, J. E. Hitzig, who later first published his complete works and letters, helped

him to get the official assignment as natural scientist (*Titulargelehrte*) for the *Rurik* expedition replacing in a last minute decision by Admiral Krusenstern, the Dorpat University Professor Ledebour, who had to resign because of his bad health. Hitzig wrote a letter of recommendation to his long time friend August von Kotzebue, Otto's father, who was councilor of state in Königsberg at that time and brother-in-law of Admiral Krusenstern. Chamisso received the letter of appointment from Reval on 12 June 1815 and had to hurry to Copenhagen via Kiel (22 July 1815) to join the *Rurik* expedition. Details of the *Rurik* voyage around the world, which changed his life completely, are well-documented and easily available in modern editions of Chamisso's complete works. They should be studied again for their importance to early Pacific research.

Chamisso came back to Berlin in November 1818 with new ideas and numerous collections of specimens of plants and minerals. The following year he received the doctorate *honoris causa* from Berlin University, and he became a member of important scientific societies in Vienna and Moscow. And, most important for him at the time, he got permanent positions as both assistant of the Botanical Garden and curator of the Royal Herbarium in Berlin. In 1829 he was co-founder of the famous Gesellschaft für Erdkunde in Berlin. It was possible for him now to establish his own family, and he married Hitzig's fosterdaughter. So his participation in the circumnavigation helped his career a great deal. In 1835 he was appointed a member of the famous Berlin Academy of Science on recom-

commendation of Humboldt and his longtime friend K. S. Kunth. This position entitled him to give lectures at Berlin University.

His *Bemerkungen und Ansichten* were not published until 1825.²⁷ Chamisso did not start to work on the *Tagebuch* (journal) before 1834, four years before his death. But he had the opportunity to publish many special results of the *Rurik* observations in scientific journals, and to come back to his second—first—profession as a poet. But it is clear that, apart from his successful novel *Peter Schlemihl*, he first got recognition in the public as a scientist, and not as a poet. One of his last scientific papers was about the Hawaiian language (1838). He had to retire because of bad health and died the same year.

The Voyage of the *Rurik*

Chamisso embarked on board the 80-ton cutterbrig *Rurik* on 9 August 1815 in Copenhagen. The vessel had left St. Petersburg on 27 July and was entitled to fly the Russian Navy flag. The ship was put into service only shortly before Abo (today Turku in Finland). The *Rurik* was rather small in comparison to the ships *Krusenstern* and *Shtetser* launched ten years earlier. The crew consisted of Captain Kotzebue, then only twenty-eight years old, two deck officers, and twenty sailors.

However, the *Rurik* turned out to be very suitable for the long voyage, and there were no damages or accidents, even not in the Polar Ocean north of the Bering Straits. Furthermore the ship had good sailing qualities, and Admiral *Krusenstern* had ordered the best instruments then available in England. In Plymouth, Kotzebue got the sextants, chronometers, tel-

escopes, hydrometers, thermometers, barometers, and even a small apparatus for desalination. Kotzebue made best use of them, and he was a good navigator and cartographer. Chamisso, then thirty-four years old, was not the only scientist on board. Officially he was assigned as *Titulargelehrter*. He was on very good terms with the twenty-two-year-old physician and zoologist (mainly entomologist) J. Eschscholz, with whom he made most studies in close collaboration. Eschscholz joined Kotzebue's next expedition on the *Predprijatje* 1823-1826 as well. His scientific contributions were published in Vol. III of Kotzebue's *Entdeckungs-reise*.²⁸

In Copenhagen where Chamisso met the Kiel University professor Paff, the Swedish natural scientist Wormskiöld joined the expedition as a paying passenger (or visiting scientist in modern terms), but he was unable to integrate in the research team of the *Rurik* and finally disembarked in St. Peter and Pauls, Kamtchatka. The artist Louis Choris' job was to paint and draw all objects of scientific interest which could not be collected. Today a good camera would have done his job only partly, as his documentation published in *Voyage pittoresque autour du monde* became an outstanding piece of art itself.²⁹

The twenty-nine persons on board the *Rurik* had to live in a kind of microcosm moving round the globe. Life at sea was hard and without convenience. Space was scarce, and there was no special laboratory for the scientists. In the beginning Chamisso's relation to the captain was rather difficult because of status problems and some misunderstandings. Later their relationship eased, with benefits for the results of the expedition.

But in his account of the journey Chamisso did not hesitate to criticize Kotzebue's ideas and actions whenever possible. Up to the last minute the scientific staff had no exact idea of the nautical instructions and the mission of the *Rurik*, which turned out to be of a more exploratory character in search of the Northeast passage along the Alaska coast north of the Bering Strait. It was there that the *Rurik* made its major new discoveries from 3 to 13 August, 1816. The new discoveries were named Kotzebue Sound, Chamisso Island, Eschscholz Bay, and Cape Krusenstern (all about 66°N and 160°-165°W). But the waterway they entered turned out to be a sound only, and not the Northeast passage they were looking for. In the next year, they could not penetrate farther north, so the mission actually was a failure.

The other discoveries made in the Pacific were of less importance (e.g. Romanzoff Island). All of the other islands had been visited by other European navigators before, although the positions given by Kotzebue were more accurate in many cases. The first leg of the voyage began in St. Petersburg on 30 July 1815 and went to Plymouth, the Canary Islands, St. Catarina in Brazil, around Cape Horn to Chile (Talcuano). Until February 1818 the *Rurik* cruised in the Pacific, first crossing this ocean to the northwest visiting the Easter Islands and the Tuamotu group to Ratak Islands of the Marshall group (March 1816), which were visited again in summer the following year. The Russian Far East base Petropavlovsk was visited from June 1816 to take on new supplies, before the first attempt to find the Northeast Passage was undertaken.

The eastern Aleut Island of Unalashka was visited several times and San Francisco, then still formally under Spanish rule, but under commercial pressure of the Russian-American trading company, was visited from October 1816. The Sandwich islands (Hawaii) were visited twice. The return voyage went west after stopovers in the Philippines, Batavia, the Cape of Good Hope, and the *Rurik* arrived back safely in St. Petersburg on the 3rd of August 1818.

Chamisso as a Natural Scientist and his Marine Interests

Chamisso's *Bemerkungen und Ansichten* were compiled in Berlin in 1819 as an official contribution to the report of the expedition long before his diary was published (1835). The notes were revised sixteen years later according to Chamisso's "Vorwort" without referring to new discoveries and recent scientific literature about the Pacific. Chamisso often criticized Kotzebue and Choris and their publications about the expedition. Furthermore he refers to his numerous contributions in *Linneai*, a scientific journal of botany edited by his long time friend Schlechtendahl.³⁰ Chamisso's scientific notes contain sixteen papers concerning regional matters with much ethnographical, geographical, and local information about Chile, California, the Philippines, Guam and the Marianes, Radack Group, Romanzoff Island, Hawaii, and Easter Island. All fit well into a complex maritime geography of the Pacific, and therefore his paper *Überblick des großen Ozeans, seiner Inseln und Ufer* included in the collection of notes is the most interesting from the geographer's point of view.

Unfortunately there is no specific section about the physical geography of the sea. Oceanographic information, which here mainly means surface information about the ocean, is scattered over all papers and observations made in his journal. For example Chamisso as a botanist was a good interpreter of ocean currents. He collected and analyzed trees and fruit that had drifted to tropical islands, so he was able to outline the basic current system of the Pacific Ocean in a simple way. Humboldt used this method in the Atlantic.

It is true that Horner's and Eschscholz's scientific contributions to Pacific oceanography are more important, but Pacific research by that time was more complex and involved charting and surveying as well as botanical and geological studies and ethnography of islands and the Pacific rim. The *Rurik* cruise is an early example of the international character of marine research in the age of the circumnavigations. At the same time it shows that German natural scientists were in high demand worldwide and especially in Russia. It is only today that these old traditional ties between Germany and Russia are being rediscovered for a new age of cooperation in marine research.

According to Schmid, who made a first assessment of Chamisso's scientific work in his bibliographic approach,³¹ Chamisso was the author of 119 scientific contributions and co-author of sixty-two other papers. The first edition of his complete works (Hitzig) consists of 500 pages of lyrical poetry and two longer prose works.³² The second part "Bemerkungen und Ansichten" (Observations and Notes) has a sci-

entific character. Furthermore Chamisso is the author of seventy-eight printed pages with zoological descriptions, eighty-five pages dealing with geographical and geological matters, and a great number of plates with descriptions of new or less known Pacific plants.

His first scientific publication as a result of his cruise with the *Rurik* was *De animalibus quibusdam e classe....* This was a success for marine science because he (in collaboration with Eschscholz) actually was the first to discuss the two-generation cycle in the reproduction of molluscs (Salpen), an achievement which has been ascribed to W. Hofmeister (1849) for a long time. In addition, Chamisso contributed some notes concerning plants, algae, volcanoes, and coral reefs to Louis Choris own work *Voyage pittoresque...* (1820-1822).

The first half of the 19th century produced perhaps a larger number of great scientists and scholars as well as poets and philosophers than any other time, and Chamisso knew most of them personally. He had close contacts with Paul Ermann (1773-1858), an old friend from the "collège française" in Berlin and later physical scientist on the circumnavigation of the Russian vessel *Saenjawin* under Captain Lütke 1826-1829. Ermann was a specialist in terrestrial magnetism like Humboldt. The list of Chamisso's personal and scientific friends is long; only some can be mentioned here:

- Louis de la Foye (1780-1847), like Chamisso a French emigrant in Berlin, later professor of physics and mathematics in France;
- Julius Klaproth (1783-1835), a specialist in Oriental Studies and chemistry;

geschichtliche Entwicklung seit 1650 und heutiger methodischer Stand," *Kieler Geograph. Schriften*, 60, (1984).

11. Willemoes-Suhm, who joined the *Challenger* staff as a biologist, died in the Pacific on the way from Hawaii to Tahiti on 13 September 1875 (cp. Obituary notes in "Challenger"-Reports, vol. I, 2nd Part, 1885, 769-771).

12. On 30 December 1802, Humboldt registered 20.4°C at the surface of the sea and 22.2°C in the atmosphere 12 English nautical miles west of Punta Parina (4°42'S, 4°13' west of the Callao). The depth was 90 fathoms. A more detailed appreciation of Humboldt's Pacific activities and research perspectives is in preparation.

El Niño: It was on Christmas Eve 1802, when Humboldt went to sea in the Pacific. He arrived in Acapulco on 22 March 1804. His list of the temperature measurements between Callao and Guayaquil (13 stations between December 24th to 31st) is an important document of early Pacific research (Table: "Meeres- und Luftwärme von Callao de Lima nach Guayaquil," cp. Humboldt in Krümmel 1904, p. 26).

13. "Das erste Geschäft eines reisenden Physikers, wenn er nach langer Abwesenheit in Gebirgsgegenden an die Meeresküste gelangt, ist die Bestimmung der Barometerhöhe und der Temperatur des Wassers. Ich war mit letzterer beschäftigt in der Gegen zwischen Truxillo und Guaman, bei Callao de Lima und auf der Schifffahrt von Callao nach Guayaquil und Acapulco in einer Strecke des Stillen Meeres von mehr als hundert deutschen Meilen. Zu meinem größten Erstaunen fand ich das Meer an der Oberfläche unter Breiten, wo es außerhalb der Strömungen 26° bis 28°,5 ist, bei Truxillo, Ende September, 16°,0; bei Callao, Anfang November 15°,5. Die Lufttemperatur war in der ersten Epoche 17°,8, in der zweiten 22°,7, also (was wichtig zu bemerken ist) 7° wärmer als der Ozean in der Strömung. Die Luft konnte also nicht das Meer erkälten haben, und ohne noch eine nähere Kenntnis von dem Klima von Lima oder der Epoche zu haben, in der die "Garua" herrscht, d.h. in der die Sonne von einer Nebelschicht verschleiert ist und Monate lang eine

scharfbegrenzte rotgelbe mondartige Scheibe darbietet, faßte ich schon in Truxillo, bei der ersten Annäherung an die Küste, die seitdem durch viele Seefahrer bestätigte Ansicht, daß die peruanische Strömung eine Polarströmung sei." A. von Humboldt, *Der Perustrom*, 575-583. Also in O. Krümmel, ed., *Ausgewählte Stücke aus den Klassikern der Geographie für den Gebrauch an Hochschulen*, 17-26.

14. H. Berghaus, *Sammlung physikalischer und hydrographischer Beobachtungen, welche an Bord der Preussischen Seehandlungsschiffe auf ihren Reisen um die Erde und nach Amerika angestellt worden sind*, 1. Abt. Reisen um die Welt (Breslau, 1842).

15. A. von Chamisso, *Reise um die Welt mit der Romanzoffischen Entdeckungsexpedition in den Jahren 1815-1818 auf der Brigg Rurik, Kapitän Otto von Kotzebue*, 1. Theil: Tagebuch, 2. Theil Anhang. Bemerkungen und Ansichten (Wien, 1825).

16. J. C. Horner, in O. Kotzebue, (1825); see note 22.

17. W. G. Tilesius published his lesser known book *Naturhistorische Früchte der ersten Kaiserlich Russischen Weltumsegelung* in St. Petersburg, 1813.

18. G. H. Langsdorff, *Bemerkungen auf einer Reise um die Welt in den Jahren 1803-1807*, 2 vols. (Frankfurt/M., 1813).

19. A. J. von Krusenstern, *Reise um die Welt in den Jahren 1803, 1804, 1805 und 1806*, 3 vols. (St. Petersburg, 1810).

20. *Atlas zur Reise um die Welt, unternommen auf Befehl seiner Kaiserlichen Majestät alexander I auf den Schiffen Nadeschda und Neva unter dem Kommando es Kapitäns von Kotzebue*, (St. Petersburg, 1814).

21. A. J. von Krusenstern, *Beiträge zur Hydrographie der großen Ozeane*, (Leipzig, 1819).

22. O. J. von Kotzebue, *Entdeckungsreise in die Südsee und nach der Bering-Strasse zur Erforschung einer nordöstlichen Durchfahrt*, 3 vols. (Wien, 1825).

23. *Ibid.*, vol. 1, p. 106.

24. It should be mentioned here in the more general context that a detailed comparative analysis of all cruise instructions for the 18th and 19th century circumnavigations is the most rewarding way to outline the progress of marine scientific ideas. After all it was Humboldt himself, who compiled the instruction for the Austrian *Novara*

cruise (1857-1859) shortly before his death.

25. Eschscholz Rank "List of 116 stations" was published in the expedition report (Kotzebue, 1825, Vol. 3, Annex, 300-309, "Aerometer-Beobachtungen vom 18 July 1816 bis zum 13 April 1818, Temperatur des Meer-wassers, in verschiedenen Tiefen) and commented and analyzed by Horner (C. Horner "Bemerkungen..." *Ibid.*, 310-315).

26. Peter Schlemihl's *wundersame Geschichte*.

27. See note 22.

28. *Ibid.*

29. L. Choris, *Voyage pittoresque autour du monde*, (Paris, 1820-1822).

30. D. F. L. von Schlechtendahl, ed., *Linnaea*, Ein Journal für die Botanik in ihrem ganzen Umfange, vol. 1 (Berlin, 1826); and Contribution of Chamisso, "De plantis in expeditione Romanzoffiana observatis"

31. G. Schmid, *Chamisso als Naturforscher, eine Bibliographie*, (Leipzig, 1942).

32. Peter Schlemihl and the 800-page-long *Rurik* material *Reise um die Welt mit der Romanzoffischen Entdeckungsexpedition in den Jahren 1815-1818 auf der Brigg Rurik, Kapitän Otto von Kotzebue*.

33. Hitzig 1842, Hoffmann 1975; Biographies: J. E. Hitzig, ed., 1842, "Leben und Briefe von Adelbert von Chamisso," in *Werke*, Bks. 5 and 6, (Leipzig, 1839); K. Fulda, *Chamisso und seine Zeit*, (Leipzig, 1881); W. Feudel, *Adelbert von Chamisso*, (Leipzig, 1980); P. Lahnstein, *Adelbert von Chamisso. Der Preusse aus Frankreich. Lebensbilder*, Ullstein-Buch 17547 (Frankfurt/M, 1987); R. Fischer, *Adelbert von Chamisso. Weltbürger, Naturforscher und Dichter*, (München, 1990) But there are some exceptions: As early as 1913 Möbius discussed Chamisso's importance for the development of botany. Du Bois-Reymond (1888) described Chamisso as a natural scientist. Furthermore one should look at the dissertation of Kelm discussing Chamisso's role as ethnographer of the South Sea. Schmid worked on Chamisso as a important natural scientist and Krüger was the first to discuss Chamisso and the *Rurik* expedition in the context of the history of German-Russian scientific cooperation in coastal and ocean

Christian Gottfried Ehrenberg (1795-1876), geologist and paleontologist, usually recognized as one of the first planktologists as well, who introduced the microscope to systematic studies in biology;

B.G. Niebuhr (1770-1831), son of Carsten Niebuhr, the famous traveler to Middle Eastern countries;

Christian S. Wiess (1780-1851), geologist in Berlin, with whom Chamisso studied the minerals collected on the *Rurik* cruise;

Georges Charles Cuvier (1769-1831) and Joseph Banks (1743-1820), whom Chamisso met in England;

Johann Christian Poggendorf (1796-1877), founder of the famous journal *Annalen* for chemistry and physics;

furthermore Chamisso met Dumont d'Urville in Paris in 1875, had contacts with Alexander and Wilhelm von Humboldt as well as Carl Ritter (1779-1859)—founders of modern geography—and Carl Friedrich Gauss (1777-1855).

Chamisso read papers at the congresses of the "Versammlung deutscher Naturforscher und Ärzte" in Berlin in 1828 and Hamburg in 1830, then the most respected forum for natural sciences in Germany. This amply shows that he was highly accepted in the academic world, a fact not considered by most of Chamisso's biographers, critics, and editors up to the present day.³³

New Horizons

The final question, however, remains open. Chamisso's character and personality were ambiguous: was he a natural scientist or romantic

poet? He stands for the Janus character of his age. Certainly there are some interactions between both spheres not very well understood up to now. But a careful analysis of Chamisso's ideas reveal some new relations between romanticism and sciences and the history of scientific ideas at the beginning of the 19th century. Many descriptions concerning natural phenomena and the human ecology of Pacific cultures clearly have a romantic background. In the end, perhaps, there is no fundamental difference between the arts and sciences, as some feel today. After all, many mathematicians or biologists were good musicians at the same time. To illustrate this final and summarizing point it will be appropriate to close with some rather melancholic lines of a poem Chamisso composed in the Bering Strait. It must be an adventure to study poetry and marine sciences in their interrelation!

*Bering Strait Summer 1816
4th Strophe*

*O, Brother, I quiver on my
stray track
through the fogs about the sea.
Icy rocks I evoke with love.
But the cold walls echo in
emptiness,
in tongue and life I am the man
putting each syllable on a scale
with care.*

*Home I come as I left before.
A child of old age.*

(Translation G. Kortum)³⁴ ■

Notes

1. Institut für Meereskunde an der Universität Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany.

2. R. Fischer, *Adalbert von Chamisso. Weltbürger, Naturforscher und Dichter* (München, 1990).

3. A. von Chamisso, *Sämtliche Werke in zwei Bänden*, ed. V. Hortmann, (München, 1975).

4. K. H. Paffen and G. Kortum, "Die Geographie des Meeres. Disziplinengeschichtliche Entwicklung seit 1650 und heutiger methodischer Stand," *Kieler Geograph. Schriften* 60 (1984); and Ian Jones and Joyce Jones, *Oceanography in the Days of Sail* (Sydney, 1992).

5. Nikolaus Schweizer wrote his version *A Poet among Explorers: Chamisso in the South Seas*; and, in 1986, a first English translation of the journal *A Voyage around the World with the Romanzov Exploring Expedition in the years 1815-1818 in the Brig Rurik* was published 1986 by Henry Katz in Honolulu.

6. J. Fr. W. Otto, *Abriß einer Naturgeschichte des Meeres*, 2 vols., (Berlin, 1792-1794). H. Berghaus, *Sammlung physikalischer und hydrographischer Beobachtungen, welche an Bord der Preussischen Seehandlungsschiffe auf ihren Reisen um die Erde und nach Amerika angestellt worden sind*. 1. Abt. *Reisen um die Welt* (Breslau, 1842); A. Petermann, "Der Große Ozean, Eine physikalisch-geographische Skizze," *Peterm. Geogr. Mitt.* 3 (1857): 27-48; and O. Krümmel, *Handbuch der Ozeanographie*, 2 vols., (Stuttgart, 1907-1911).

7. A. von Humboldt, *Der Perustrom* in H. Berghaus, *Allgemeine Länder- und Völkerkunde*, Bd. 1, (Stuttgart, 1837), 575-583. Also in O. Krümmel, ed., *Ausgewählte Stücke aus den Klassikern der Geographie für den Gebrauch an Hochschulen*, 2 Reihe, (Kiel und Leipzig 1905), 17-26; *Kosmos. Entwurf einer physischen Weltbeschreibung*, 4 vols., (Tübingen, 1845-1862); *Reise in die Aequinoctial-Gegenden des Neuen Continents*, 6 vols., (Stuttgart, 1861-1862).

8. G. Kortum, "Berlins Bedeutung für die Entwicklung der geographischen Meereskunde, Das Vermächtnis der Georgenstraße," *Berliner Geograph. Studien*, 25 (1987): 133-156.

9. G. Kortum, "Scientist and the Sea (1650-1980) — The German Perspective," in *Aquatic Information Resources. Tools of our Trade*, eds. E. Fuseler and S. Wüst, Proceed. 18th Ann. IAMS LIC Conference. IAMS LIC Conference Series, 1993, pp. 21-33.

10. K. H. Paffen and G. Kortum, "Die Geographie des Meeres. Disziplin-

research. These last mentioned papers cover the main points of Chamisso's geographical, morphological, geological, and biological ideas. What was missing up to now, is a synopsis of his hydrographic and oceanographic as well as marine biological observations.

34. *Aus der Behringstraße im Sommer 1816*

(4th strophe):

So, Bruder, schauderts mich auf irrer
Bahn,
Wann düstre Nebel ruhn auf trübem
Meer;
Beeiste Felsen ruf ich liebend an,
Die kalten Massen widerhallen leer;
Ich bin in Spruch und Leben ja der
Mann,
Der jede Sylbe wäget falsch und schwer;
Ich kehre heim, so wie ich ausgegangen,
Ein Kind, vom greisen Alter schon
umfängen.