

Hypothesis Versus Fact: August Petermann and Polar Research

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ABSTRACT. The history of polar exploration has witnessed several conceptions of the climate, presence of lands, conditions of ice, and currents in the Arctic Ocean that were hypothetical or based on scarce research data. One such conception was the view of the physical geography of polar areas put forward in 1865 by the German geographer and publicist August Petermann, which was based mainly on the findings of English and Russian polar explorers. Although the actual course of polar research disproved Petermann's hypotheses, his conception not only exerted considerable influence on the development of the theoretical knowledge of polar areas, but also promoted practical steps in Arctic exploration during the second half of the 19th century.

Key words: August Petermann, history, exploration, Arctic Ocean, open polar sea, Gulf Stream, extension of Greenland, Ostrov Vrangelya (Wrangel Island)

RÉSUMÉ. L'histoire de l'exploration polaire a été témoin de conceptions variées du climat, de la présence de terres, de conditions de la glace, et de courants dans l'océan Arctique, conceptions fondées sur des hypothèses ou de rares données de recherches. Une de ces conceptions, remontant à 1865, concernait la géographie physique des régions polaires telle que la voyait le géographe et publiciste allemand August Petermann, qui s'appuyait surtout sur les travaux d'explorateurs polaires anglais et russes. Bien que le cours récent de la recherche polaire réfute les hypothèses de Petermann, non seulement sa conception exerça une influence considérable sur le développement des connaissances théoriques des régions polaires, mais elle pava aussi la voie à des étapes pratiques dans l'exploration arctique durant la deuxième moitié du XIXe siècle.

Mots clés: August Petermann, histoire, exploration, océan Arctique, mer polaire ouverte, Gulf Stream, extension du Groenland, Ostrov Vrangelya (île Wrangell)

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INTRODUCTION

The German publicist and geographer August Petermann (1822–1878) delineated his view of the physical geography of the Arctic Ocean on the map entitled *Karte der arktischen und antarktischen Regionen zur Übersicht des geographischen Standpunktes im J. 1865, der Meere strömungen* (Map of the Arctic and Antarctic Regions Reflecting the Geographical Points of View in 1865, [and] the Sea Currents) (Petermann 1865d; Figure 1). The three most important hypotheses put forward by Petermann concerned a continuous warm current in the Arctic Ocean coming from the south (the Gulf Stream); an extension of Greenland to the north; and the navigability of certain polar sea areas from March to October (Petermann, 1865b; Weller, 1911).

The present paper surveys the works on which Petermann based his views, points out the great importance of Petermann's ideas for polar research, beginning in the 1860s, and discusses why his views were so popular.

PETERMANN AND POLAR RESEARCH

The adopted son of the noted German cartographer Heinrich Berghaus (1797–1884), August Petermann of Gotha began to take an interest in the geography of polar regions during his stay in England in the 1850s (Petermann, 1852, 1853). First he took part in the compilation of *The Physical Atlas* (1848), by Alexander Keith Johnston (based on Berghaus's *Physikalischer Atlas* of 1837–48). Later he worked as head of the geographical department of the journal *Athenaeum*. In London, the young cartographer met several well-known British geographers and read through the rich geographical literature available in the libraries. In 1855, Petermann founded the journal *Mittheilungen aus Justus Perthes' Geographischer Anstalt über wichtige neue Erforschungen auf dem Gesamtgebiete der Geographie* (Reports from Justus Perthes' Geographical Institution upon Important New Investigations in the Whole Subject of Geography), which in the second half of the 19th century had an important position

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among the journals disseminating geographical knowledge in Europe (Tammiksaar and Sukhova, 1997).

The launching of the first polar exploration projects in Germany and Austria-Hungary can also be associated with Petermann's name; he is known as "father of German polar research" (Hübsch, 1978; Krause, 1992). An active publicist, he wrote over 600 articles on the practical course of polar exploration. As a consequence, polar research began to advance in Russia, Sweden, France, and Norway during the second half of the 19th century. Petermann's concepts also served as an impetus to several British and American expeditions to the Arctic Ocean, especially those exploring Greenland (Hübsch, 1978). In the 1860s, Petermann gradually became an authority in Germany, where his views on the geography of the polar regions were never criticized (Krause, 1992). Later studies have shown that several European polar researchers and scholars overvalued the views and hypotheses proposed by the devoted armchair geographer (see Tammiksaar and Sukhova, 1997). The first critical remarks on Petermann's views came from Russia and England. Petermann took every opportunity to prove the validity of his hypotheses on the physical geography of the Arctic Ocean, even though the actual results of polar exploration did not confirm them.

THE ORIGIN OF PETERMANN'S HYPOTHESES

The first to provide information on the severe weather and ice conditions in the Arctic Ocean were English and Dutch seafarers, who tried to find a northeast passage at the end of the 16th century. To the same period belong the first suppositions of undiscovered polar lands. The controversial suppositions that came into being in the course of polar exploration in the 17th and 18th centuries—such as mild climate in the region of the North Pole, the presence of extensive land or a continuous ice field, or data about numerous lands and islands seen in the polar sea by nomads—were reproduced, with smaller or greater variations, in the polar literature and on the maps of the 19th century. Because there was little navigation in the Arctic, it was almost impossible to check their validity.

The investigation of the system of currents in the Arctic Ocean became an important aspect of polar exploration in the 19th century, as knowledge of currents could be conducive to reaching the North Pole or discovering a northeast passage. Such investigations were performed mainly by the British expeditions to the coastal waters of the American continent and Greenland. Their results gave reason to believe that two extensive cold currents directed toward the Atlantic Ocean were present in this region: one between Greenland and the American mainland, and the other between Iceland and Greenland. In the region of Greenland and the Labrador peninsula, those streams joined to form one: the Labrador stream. The two cold streams made ship expeditions from the directions of Labrador and Greenland impossible.

The English navigator Martin Frobisher (1535–94) was the first (in 1578) to suppose that the warm, northeast-directed current (the Gulf Stream) extended from the American coast to the Norwegian coast (Kohl, 1868). The 1806 whaling expedition under the leadership of William Scoresby (1789–1857) proved that the extension of the Gulf Stream reached the western coast of Spitsbergen and prevented the arctic current from entering the North Sea (Scoresby, 1820). In 1827, relying on the research results of Scoresby, Sir William Parry (1790–1855) attempted to approach the North Pole in this region on a ship and sledged boats. Although the expedition advanced as far as 82°45' N, the attempt to reach the pole failed because of difficult ice conditions. Another unsuccessful attempt in the same region, which was not made known in Europe, had been undertaken in 1765 and 1766 by Vasilij Chichagov (1726–1809), who followed the instructions of Mikhail Lomonosov (1711–65) (Belov, 1956). Despite the failure of all those expeditions, Sir William Parry in 1845, Sir John Barrow (1764–1848) in 1846, and others still supported the idea of an expedition from Spitsbergen to the North Pole (Malte-Brun, 1868).

The Baltic-German explorer Ferdinand von Wrangell (1797–1870) considered it impossible to approach the Pole by ship (regarding the spelling of his name, see Tammiksaar, 1998). As the leader of the Russian North-east-Siberian expedition, carried out on dog-sledges along the coast of the Arctic Ocean in 1820–24, Wrangell was well aware of the ice conditions and currents in the Arctic Ocean. Relying on his own experience, he suggested that only a dog-sledge expedition along the coast of Greenland could be successful. He thought that Greenland extended up to the Pole (Wrangell, 1848). The English polar researcher Sherard Osborn (1822–75) supported this view (Osborn, 1865).

The Baltic-German scholar Karl Ernst von Baer (1792–1876), known as the founder of contemporary embryology, was also an active geographer. Baer was the first to conclude—on the basis of materials from expeditions by William Barents (1594–97), Friedrich Lütke (1821–24), and Petr K. Pakhtusov (1833–34)—that a branch of the Gulf Stream extended as far as the coast of Novaya Zemlya (Kohl, 1868). During his expedition in 1820–24, Ferdinand von Wrangell had discovered a polynya—an extensive open-water area—that extended from Ostrov Novaya Sibir' to Mys Yakan regardless of the season (Wrangell, 1839). This discovery largely determined the views of the next generation of geographers and polar explorers on the ice and climate conditions in the Arctic Ocean. The results of Wrangell's expedition were first published by Georg Friedrich Parrot (1767–1852), professor of physics of the University of Tartu (Parrot, 1827). Parrot wrote that the water polynya discovery allowed Wrangell and his companions to believe that an exit to the Bering Strait existed in the vicinity of Novaya Zemlya. Petermann's plan for a polar expedition, which he put forth as an alternative to Osborn's plan, was based on the incomplete research data discussed above (Petermann, 1865a).



FIG. 1. A section of A. Petermann's (1865d) "Map of the Arctic and Antarctic Regions Reflecting the Geographical Points of View in 1865, [and] the Sea Currents."

PETERMANN'S HYPOTHESIS ON THE GULF STREAM IN THE ARCTIC OCEAN

Even in the 1860s, the attempts to reach the North Pole were based not so much on observational data as on the supposition that land or ice-free water could exist in the region of the Pole. In 1865, relying mainly on the observation results of Lütke (1828), Baer (1838), and Wrangell (1844), Petermann hypothesized that a warm current was present in the Arctic Ocean (Petermann, 1865a, b, c, d, Fig. 1). Although he could not give any proof that the water polynya extended from Ostrov Novaya Sibir' up to the northern coast of Novaya Zemlya (Petermann, 1865d), he associated the polynya's existence with the Gulf Stream, which he supposed to extend as far as Mys Yakan. The data presented by British seafarers convinced Petermann that a steamer would be able to pass a ca. 200-nautical-mile drift-ice belt in due time (probably in March) in the region of Spitsbergen and Novaya Zemlya, reach the ice-free water, and from there move on to the Pole in three or four weeks (Petermann, 1865b). Petermann's idea of the Arctic expedition was even approved by several British seafarers, including Admirals Sir Edward Belcher (1799–1877) and Robert Fitzroy (1805–65) (Malte-Brun, 1868).

Thus, Petermann deduced his idea of the existence of the ice-free polar sea from the research data of British polar explorers and his own conclusion that the extensive

warm Gulf Stream exerted influence on the deeper layers of the Arctic Ocean. However, the German (1869–70) and Austro-Hungarian (1872–74) polar expeditions, encouraged by Petermann's idea of the warm Gulf Stream and launched in the region of Spitsbergen and Novaya Zemlya, could not pass the ice-belt. The Germans had to confine themselves to exploring Spitsbergen, while the Austro-Hungarians, quite by accident, discovered Zemlya Frantsa Iosifa (Franz Josef Land). These last two expeditions and others measured the water temperature in the northeastern part of the Barents Sea (Middendorff, 1871). Their measurements proved that Petermann had overestimated the influence of the Gulf Stream on the surface layers of the Arctic Ocean as a whole and on the ice conditions there (Tammiksaar and Sukhova, 1997). On the other hand, several important geographical discoveries in the region of Novaya Zemlya and Spitsbergen were due to these misconceptions.

In the 1860s, the dominant view was that the Arctic Ocean had two separate, extensive, Atlantic Ocean-directed cold streams that originated in the region of the Bering Strait: one near the Siberian coast and the other near the North American coast (See Fig. 1). The cause of these two currents was uncertain. Two explanations of the phenomenon were the existence of an unknown, but powerful sea current in the central area of the Arctic Ocean (Mühry, 1869) and the presence of islands that separated those two currents in the region from Mys Yakan up to the coast of Greenland (Shilling, 1865).

At first, Petermann did not share Osborn's and Wrangell's supposition that Greenland extended as far as the North Pole (1865a). Some months later, however, he adopted their view that a Greenland peninsula or conglomerate of islands extended from the middle part of the Arctic Ocean up to Mys Yakan (Fig. 1; Petermann, 1865d). Petermann gave the supposed peninsula his own name, although he had no convincing proof of its existence.

THE ORIGIN OF PETERMANN'S HYPOTHESIS ON THE EXTENSION OF GREENLAND

The most important geographical discoveries made by Russian Cossacks and travellers in the 17th century concerned the numerous islands located in the coastal waters of Siberia. In spite of the very important discoveries made, the picture of the Siberian coastline still remained incomplete, and the northern extent of the Alaska peninsula remained unknown. The navigator James Cook (1728–79), during his third circumnavigation in 1778, attempted to sail through the Northeast Passage from the side of the Bering Strait. On the basis of measurements of the depth and ice conditions in the sea, as well as ornithological observations carried out by the crew members, he concluded that a mainland connection between Alaska and Eurasia existed in the region of the North Pole (Cook, 1784). However, Ferdinand von Wrangell (1839)

disagreed with the view of Cook and Cook's crew member, James Burney (1750–1821). In the course of the North-east-Siberian expedition, Wrangell had not only proved that the Asian and American continents were not connected, but also succeeded in disproving the presence of extensive land north of the Medvezh'i Ostrova (Bear Islands). The Cossack Stepan Andreyev had reported seeing that land during the 1763–1764 expedition, and it had been drawn on British maps (Burney, 1819; Cochrane, 1824). Another land, between Capes "Erri" (Mys Shelagskiy) and "Irkajpij" (Cape North, today Mys Shmidta), had been described by a Chukchi chief in these words: "One might in a clear summer's day descry snow-covered mountains at a great distance to the north" (Wrangell, 1844:325). Wrangell could not prove the presence of this land; nonetheless, he considered the Chukchi's data reliable enough for the land north of Mys Yakan to be drawn on a map, accompanied by the Chukchi chief's description. Having proclaimed Andreyev's data incorrect, Wrangell wrote that he definitely did not want to declare that there could not be any undiscovered land in any region of the Arctic Ocean. On the contrary, he admitted that 530 Russian versts (ca. 565 km) east of the Kolyma River, north of Mys Yakan, there was an undiscovered land; however, this land had nothing to do with the so-called discovery of Andreyev, which, in fact, did not exist (Wrangell, 1839).

The results of the Wrangell expedition, which were published in German (1839), Russian (1841), French (1843), and English (1844), elicited different interpretations. Some considered Wrangell's most important conclusion to be that there was no land north of Mys Shelagskiy. Others considered the data on the land north of Mys Yakan to be most important. Still others supported the idea of the existence of "Andreyev land," but not the mountains the Chukchi chief had claimed to see on clear summer days. Despite these multiple interpretations, Heinrich Berghaus included the land that Wrangell believed to exist on a map of his atlas (Berghaus, 1838).

In 1849, the British polar explorer Henry Kellett (1806–75) discovered a land in the region Wrangell had indicated (Petermann, 1868) and called it Plover Island. Not very widely known is the fact that the first person to succeed in landing there was the German whaler Eduard Dallmann (1830–96) in 1866 (Dallmann, 1881). In 1867, the American whaler Thomas Long (died in 1875) confirmed the existence of this land and plotted its location as 70°40' N, 178°51' W. In honour of Ferdinand von Wrangell, he named it Wrangell Land (Anonymous, 1868).

DISCUSSIONS CONNECTED WITH THE NAME OF THE LAND DISCOVERED BY LONG

Petermann (1868) considered Long's choice of name absolutely unsuitable: Long seemed not to know that it was actually Wrangell who had done everything possible to

contest and throw doubt on the existence of lands in the Arctic Ocean. For that reason, Petermann thought it would be more appropriate to give this land the name of Andreyev or Kellett or somebody else. Controversial data about "Andreyev land"—and even more, the discoveries of Kellett and Long—convinced Petermann that his hypothesis concerning the extension of Greenland towards the northeast coast of Siberia was correct. Petermann's hypothesis proceeded in part from the multiple interpretations of Wrangell's work on the land opposite Mys Yakan, in part from the influence of Berghaus's maps, and partly also from Wrangell's and Osborn's supposition that Greenland extended as far as the North Pole. Petermann was well aware of the various concepts of the physical geography of the Arctic Ocean. Wishing to be more particular than Berghaus, Wrangell, or Osborn, he put forward his view that the supposed land represented an extension of the eastern part of Greenland. He denoted it as "Wahrscheinlich Land oder Inseln (Petermann)" (Probably land or islands [Petermann]), as shown in Figure 1. According to Petermann, the land discovered by Long (which Petermann located at 73°30' N, 180° W) exactly coincided with the land drawn on his own map of 1865 (Petermann, 1868:5).

Petermann's critical attitude towards the name "Wrangell Land," which Long had given to the newly discovered land, gave rise to lively interest and opposition in Russia. The geographer Nikolai von Schilling (1822–1910) pointedly wrote that Petermann found Wrangell's name unacceptable because he regarded the land as his own geographical discovery (Schilling, 1868). In Schilling's opinion, Petermann "confused people who were not specially active in the field of geography" as he began to draw his suppositions on the map not with a dotted line, but as if the lands had been discovered long ago (Schilling, 1868:62).

Most resolute in defending Wrangell was his friend Karl Ernst von Baer (1868). Baer proved once again the invalidity of Andreyev's views concerning the land north of the Kolyma River and explained that Wrangell had not denied the presence of a land north of Mys Yakan. To prove Wrangell's point of view, Baer suggested that Gerhard von Maydell (1835–94), the leader of the North-east Siberian expedition (1861–71), check Wrangell's supposition of the presence of a land that was seen north of Mys Yakan on bright summer days (Maydell, 1870). Although for some reason Maydell did not reach Mys Yakan, and thus could not fulfill the task, the information he received from the local people confirmed the existence of such a land (Maydell, 1893).

Baer was one of the few scholars who criticized Petermann's overall hypothesis. He compared the extension of Greenland drawn by Petermann with a huge "elephant trunk" or a "plait," writing sceptically that if Petermann's hypothesis could be proved, it would be right to give the peninsula Petermann's name (Baer, 1868).

In his article "Das neu entdeckte Polar-Land" (The newly discovered Polar Land) in 1869, Petermann repeated

his disapproval of giving Wrangell's name to Long's discovery, reminding readers that this land had been discovered and named Plover Island by Captain Kellett 20 years previously. However, Petermann also mentioned that the name Wrangell Land should not be used north of the 71st. parallel, because Kellett's land started there (Petermann, 1869a). It means that to some extent Petermann (1869b) took into account Baer's remarks, and accepted the existence of Wrangell Land in the southern part of his supposed peninsula, which he even drew on his map. Hence, he never gave up his hypothesis (Petermann, 1874).

The publications of numerous authors at the end of the 19th. century confirmed that Petermann's abstract conception exercised greater influence on them than did the data presented by Wrangell and Baer (e.g., Chavanne, 1874; Nordenskiöld, 1881). Even the authors who considered it correct that the land discovered by Long should bear Wrangell's name believed that the extension of Greenland, as suggested by Petermann, actually existed (Helmersen, 1876; Hiekisch, 1883). Nils Adolf Erik Nordenskiöld (1832–1901), as well, in his monograph on the well-known *Vega* expedition through the Northeast Passage (1878–79), considered Andreyev's data to be more reliable than those of Wrangell (Nordenskiöld, 1881).

In 1876, the first true archival materials on Andreyev's expedition were published (Helmersen, 1876). They confirmed Baer's view that Andreyev's data concerning the discovery of land had been "a falsification" (Baer, 1868:20). Although Helmersen and Baer had successfully disproved the existence of "Andreyev land," it was impossible to check the validity of Petermann's hypothesis that Greenland extended as far as the coast of Siberia.

In 1876, Petermann met James Gordon Bennett (1795–1872), the publisher of the *New York Herald* and a generous patron of geography. Bennett told Petermann about the intention of George de Long (1844–81) to conquer the North Pole. Petermann recommended that de Long plan his route not via Smith Sound, but through the Bering Strait as far as the southern end of the peninsula of Greenland, and from there on to the Pole. If the ice prevented reaching the Pole by boat, Petermann thought, it would be possible to go there by sledges along the mainland. However, contrary to expectation, de Long's expedition on the *Jeannette* in 1879–81 proved instead that Wrangell Land was an island. This fact was confirmed by the rescue expeditions dispatched in search of the *Jeannette*, e.g., that led by Berry in 1881. Despite this evidence, the belief in the existence of "Petermann land" persisted tenaciously; however, the location of the land was now thought to be considerably closer to the Pole. Fridtjof Nansen (1861–1930) also proved the invalidity of the "Petermann land" hypothesis. His audacious drift in the Arctic Ocean in the *Fram* (1894–97), from the mouth of the Yenisey River to Franz Josef Land, allowed him to confirm that there was no "Petermann land" in the region of the North Pole. The supposition that the Arctic Ocean was shallow, based on data of Wrangell and Joseph Wiggins

(1832–1905), also turned out to be a fantasy (Nansen, 1898–1905).

CONCLUSIONS

August Petermann based his concept of the physical geography of the Arctic Ocean along the Siberian coast on very scarce data. The disproving of Petermann's geographical creation in the course of advancing polar research showed how difficult it was to refute a hypothetical creation, even when observational data disproving the hypothesis were at hand. Petermann wanted no more than to secure evidence supporting his own ideas and to refer to the ignorance of those who had criticized him. Critics of popular notions are seldom listened to. This is clearly revealed by the fact that discussions about the suitability of attaching Wrangell's name to the land discovered by Long continued until the 1880s. Furthermore, even as late as the beginning of the 20th century, there were supporters of the concept of Petermann land, although the expedition of the *Fram* (1894–97) under Fridtjof Nansen, which comprehensively demolished it, had already taken place.

Petermann's concept was a false deduction based on contemporary knowledge of the Arctic Ocean. This wrong conception influenced not only the theoretical views in the field of the geography of the Arctic Ocean, but also the practical course of Arctic exploration in the second half of the 19th century. Although most of Petermann's hypotheses on the physical geography of polar areas proved to be wrong, it should not be forgotten that Petermann was an important figure in German polar research. On his initiative, the first German Arctic expeditions were organized, and polar exploration in England, France, Sweden, Norway and Russia began to advance. Petermann's instructions were also followed in the preparation of the Austro-Hungarian polar expedition. The latter, in its turn, was the precondition for organizing the first international polar year in 1882–83.

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