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Baron Eduard von Toll's Last Expedition: The Russian Polar Expedition, 1900-1903

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ABSTRACT. *Zarya*, the expedition vessel of the Russian Polar Expedition of 1900-1903 mounted by the Imperial Academy of Sciences and led by arctic geologist Baron Eduard von Toll, sailed from St. Petersburg on 21 June 1900. Toll planned to spend a first winter on the little-known east coast of Poluostrov Taymyr, and a second winter on "Zemlya Sannikova", a landmass which he believed lay to the north of the Novosibirskiye Ostrova. Owing to ice conditions, *Zarya* spent her first winter on the west coast of Poluostrov Taymyr, where the expedition members made substantial contributions to knowledge of the geography, meteorology, geology, biology and magnetology of the area. A search for "Zemlya Sannikova" during the 1901 navigation season proved inconclusive and *Zarya* spent the second winter of the expedition at Bukhta Nerpalakh on Ostrov Kotel'nyy. In spring of 1902 Toll with three companions started north for Ostrov Bennetta by sledge and kayak. *Zarya* attempted to reach Ostrov Bennetta to evacuate the Baron's party but was unable to do so because of severe ice conditions. Two search parties were dispatched in the spring of 1903; one, under M. I. Brusnev, searched the shores of the Novosibirskiye Ostrova; the other, led by A. V. Kolchak, travelled by whaleboat to Ostrov Bennetta. There he found signs that the Baron and his companions had reached the island, and also a note to the effect that they had left the island again, by kayak, in November 1902. No further traces of the four men have ever been found.

RÉSUMÉ. *Zarya*, le vaisseau de l'Expédition Polaire Russe de 1900-1903, montée par l'Académie Impériale des Sciences et menée par le Baron Eduard von Toll, géologiste arctique, navegua de St. Petersburg le 21 juin 1900. Le plan de Toll était de passer un premier hiver sur la côte peu-connue à l'est de Poluostrov Taymyr, et un deuxième hiver sur "Zemlya Sannikova", qui est une masse de terre qu'il croyait située au nord de Novosibirskiye Ostrova. A cause des glaces, *Zarya* passa son premier hiver sur la côte ouest de Poluostrov Taymyr, où les membres de l'expédition contribuèrent substantiellement à la connaissance de la géographie, météorologie, géologie, biologie et magnétologie de l'endroit. Une recherche pour "Zemlya Sannikova" durant la saison navale de 1901 s'est avérée inutile et *Zarya* passa le deuxième hiver de l'expédition à Bukhta Nerpalakh sur Ostrov Kotel'nyy. Au printemps de 1902, Toll et ses trois compagnons portèrent en traîneau et kayak en direction nord pour Ostrov Bennetta. *Zarya* essaya d'atteindre Ostrov Bennetta pour évacuer l'équipe du Baron mais en fut incapable à cause des glaces. Au printemps de 1903, deux équipes de recherche furent envoyées; une sous M.I. Brusnev chercha sur les grèves de Novosibirskiye Ostrova; l'autre menée par A.V. Kolchak, voyagea par baleinier jusqu'à Ostrov Bennetta. Là, ils y trouvérent des indices démontrant que le Baron et ses compagnons avaient atteint l'île et également une note à l'effet qu'ils étaient repartis en kayak au mois de novembre 1902. Aucune autre trace des quatre hommes ne fut trouvée.

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INTRODUCTION

The opening years of this century witnessed an international flurry of activity in the area of arctic exploration; many of the expeditions involved are among the best known in the history of the Arctic. They include, to name only a few: Roald Amundsen's successful voyage through the Northwest Passage in *Gjöa* between 1903 and 1907 (Amundsen, 1908); Otto Sverdrup's remarkably productive exploration of the northern islands of the Canadian Arctic Archipegalo aboard *Fram* (1898-1902) (Sverdrup, 1904); the Duke of Abruzzi's unsuccessful attempt to reach the North Pole via Zemlya Frantsa Iosifa in 1899-1900 (Abruzzi, 1903); and Peary's expedition of 1898-1902 during which he explored much of the north coast of Greenland and set a record high latitude of 87° 06′N (Peary, 1907). It may therefore come as a surprise to many English-speaking readers that during precisely these same years a Russian expedition, sponsored by the Imperial Academy of Sciences, was making important contributions to scientific knowledge of the west coast of Poluostrov Taymyr and of the Novosibirskiye Ostrova; furthermore the expedition ended in a combination of mystery, tragedy and heroism to match anything which happened in the better-known expeditions of the period. This expedition was the Russian Polar Expedition of 1900-1903 aboard

FIG. 1. Baron Eduard Vasil'yevich von Toll.

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the auxiliary schooner *Zarya*, led by Baron Eduard Vasil'yevich von Toll (Fig. 1).

The aims and plan of the expedition are closely bound up with Toll's earlier arctic career. Born on 14 March 1858 (new style) in Reval (now Tallinn), into a titled but rather impecunious Baltic German family, in 1878 Toll entered the University of Yur'yev (now Tartu) where he studied mineralogy, medicine and finally zoology (Vittenburg, 1960). On graduating in 1882 he took part in a zoological and geological expedition to Algeria and the Balearic Islands. After his return from the Mediterranean he defended his candidate's dissertation and joined the staff of the Zoological Institute at the University of Yur'yev as a laboratory assistant. Then there followed a period of research into the Silurian fauna of the Baltic coast, which brought him to the attention of Academician F. B. Schmidt, director of the Geological Museum of the Academy of Sciences and an expert on Silurian fauna. From this sprang a close and lasting friendship between the elderly scientist and the enthusiastic young geologist/zoologist; it was to dictate the direction of Toll's subsequent career.

Following the success of the Russian Geographical Society's expedition to Ostrov Sagastyr' in the Lena delta in 1882-1883 as part of the First International Polar Year, in 1883 Academician Schmidt and several colleagues put forward a plan to the Academy of Sciences for an expedition to explore the mainland coast from the Lena to the Kolyma and also the Novosibirskiye Ostrova (Vittenburg, 1960). The plan was approved in January 1884. Expedition leader was Aleksandr Aleksandrovich Bunge, who had been the medical officer at the Ostrov Sagastyr' station; the other member of the expedition was Toll. Leaving St. Petersburg in December 1884, Toll joined Bunge at Irkutsk. In March they travelled north to Verkhoyansk where they parted company. Toll spent the month of June investigating the Triassic rocks of the Yana basin and checked the sedimentary environment in which a woolly rhinoceros, preserved in the permafrost, had been discovered in 1877, but about which doubts had been expressed when the remains of the animal reached St. Petersburg. On this, his first independent arctic assignment, Toll conducted himself remarkably well; in 38 days of difficult travel he carried out some excellent reconnaissance geology.

Once Toll had rejoined Bunge in mid-July the two scientists travelled by boat downriver to Kazach'ye, carrying out geological work *en route*. Prior to freeze-up Toll travelled west along the coast as far as Bulun in the Lena delta before returning to Kazach'ye where the party wintered. In preparation for extending the work to the Novosibirskiye Ostrova the following season, a cache of provisions was sledged to Adzhergaydakh during the winter. Then during March and April Toll travelled to the Bor-Yuryakh River to investigate the site where a mammoth had been discovered in 1863. After a detailed study of the ice and sediments in which the animal had been preserved, Toll returned to Kazach'ye on 4 May 1886.

On 14 May Toll left Chay Povarnya, just east of Mys Svyatoy Nos, and with two Yakut companions crossed Proliv Lapteva to Ostrov Bol'shoy Lyakhovskiy. While waiting for Bunge to join him he investigated the numerous coastal exposures of massive ground ice and also a site in the northwestern part of the island where one of his companions had found a frozen mammoth carcass in 1860. Bunge and Toll again joined forces at Urassalakh on Ostrov Kotel'nyy.

They soon split into two parties again: Bunge returned to Ostrov Bol'shoy Lyakhovskiy to study the Quaternary sediments with their abundant mammalian fauna, while Toll headed east with two sledges to investigate the sandy wastes of Zemlya Bunge (which he named after his colleague), Ostrov Faddeyevskiy and Novaya Sibir', where he studied the timber-studded Miocene sediments of the Derevyannye Gory on the south coast.

By 26 June Toll was back at the mouth of the Urassalakh on Ostrov Kotel'nyy and heading northwards along the island's west coast; by 26 August 1886 he had reached the northwest corner of the island. That morning, just beyond the mouth of the Mogur-Yuryakh, with excellent visibility, as Toll reports: "we clearly saw, on a northeasterly bearing the outlines of four tabular mountains which merged together to the east into a lowland" (E. V. Toll, 1887:304). Toll was convinced that he was seeing the legendary "Zemlya Sannikova"; he estimated the distance to the landmass as 150-200 km.

"Zelmya Sannikova" had first been reported by the *promyshlennik* Yakov Sannikov during a journey around Ostrov Kotel'nyy in the spring of 1811 as part of M. M. Gedenstrom's expedition to the Novosibirskiye Ostrova (Vize, 1948); he spotted land to the northwest from the north end of Ostrov Kotel'nyy. It should also be mentioned that earlier that year Sannikov had also sighted land from the north coast of Ostrov Faddeyevskiy and had attempted to reach it across the ice; after covering 25 km he was brought to a halt by a polynia (Belov, 1956). At this point the "land" was still clearly visible some 20 km ahead. Moreover, the previous year both Gedenstrom and Sannikov had sighted land to the north of Novaya Sibir'; then too Sannikov had tried to reach the "land" across the sea ice but had been thwarted by open water.

Intrigued by Sannikov's "sightings" of land, in 1820 the Russian Admiralty dispatched an expedition, led by Leytenant P. F. Anzhu, to investigate further (Vize, 1948; Belov, 1956). During the summer of 1821 Anzhu made three attempts to push north from the Novosibirskiye Ostrova: once northwestwards from the northwest corner of Ostrov Kotel'nyy to a distance of some 70 km; once north-northwestwards from the north end of Ostrov Faddeyevskiy to a distance of 14.5 km, and once north-

northeastwards from the north end of Novaya Sibir' to a distance of 23 km. In every case he was halted by thin ice or open water and no land was sighted. But the next spring, on 22 April, from the tip of Ostrov Faddeyevskiy Anzhu spotted a bluish loom to the northwest precisely like a distant landmass. After travelling 20 km across the ice, however, Anzhu found that he had mistaken some pressure ridges for land.

Over half a century later Sannikov was exonerated, at least in part, when Commander George W. De Long and his crew, retreating south by sledge after the wreck of their ship *Jeannette*, sighted Ostrov Bennetta on 11 July 1881 (De Long, 1883; Melville, 1884; Newcomb, 1883). The party landed on the island on 28 July and spent a week there resting and regaining their strength before continuing south by boat. Almost certainly Ostrov Bennetta was the land sighted by Sannikov in 1810, either seen directly or refracted as a mirage.

Anzhu's findings notwithstanding, Baron Toll was convinced that what he saw from Ostrov Kotel'nyy was indeed land. Soon after their return to St. Petersburg, on 10 February 1887 Toll and Bunge presented the results of their work to a meeting of the Academy of Sciences. Toll concluded his report by stating: "We Russians, taking advantage of the experience of our predecessors and our geographical location, are in a better position than any other nation to organize expeditions to explore the archipegalo lying to the north of our Novosibirskiye Ostrova" (E. V. Toll, 1899).

On his second arctic expedition Toll was unable to further his dream directly, although he did reach Ostrov Kotel'nyy and enormously increased his arctic field experience and skills in sledge travel. This expedition, mounted in 1893-1894, was again sponsored by the Academy of Sciences, this time with Toll as expedition leader (Vittenburg, 1960). The main objective was to locate a mammoth carcass reported to be located northeast of Ust'-Yansk, and to deliver it to St. Petersburg. In case this proved to be impossible, Toll was given a relatively free hand to explore unknown areas of the Siberian mainland tundra, especially the basin of the Anabar. On his own initiative Toll decided to expand the scope of the expedition even more. At Fridtjof Nansen's request he had already agreed to arrange for the delivery of sledge dogs, for use on the *Fram* expedition, to Khabarovo on Yugorskiy Shar and to the mouth of the Olenek. Now he also volunteered to establish a series of supply depots on the Novosibirskiye Ostrova in case *Fram* were crushed early in her drift and Nansen and his men were forced to retreat south by boat and sledge (Vittenburg, 1960; Nansen, 1897).

Along with hydrographer Leytenant Ye. I. Shileyko, Toll set off from Kazach'ye for the mammoth site on 25 April 1893. The site on the Sanga-Yuryakh River was located, but the excavation was very disappointing; only small pieces of hide and parts of the legs and lower jaw of a young mammoth were found. This now left Toll free to meet his commitment to Nansen; he started north across Proliv Lapteva on 14 May. By the time he reached the mainland coast again, some five weeks later, three supply depots had been established at pre-arranged sites on the archipelago (Brögger and Rolfsen, 1896; E. V. Toll, 1894). Thus in the event of disaster Nansen and his men now had a sure line of retreat.

Toll himself had had no opportunity to search further for "Zemlya Sannikova" but later that summer Nansen was able to make some contribution, albeit negative, to knowledge of the supposed landmass. In his diary entry for 20 September, when *Fram* was adrift in the ice to the north of the Novosibirskiye Ostrova, Nansen recorded: "Next day the weather was clearer, but still there was no land in sight. We were now a good way north of the spot where Baron von Toll has mapped the south coast of Sanikoff Land, but in about the same longitude. So it is probably only a small island, and in any case cannot extend far north" (Nansen, 1897:203).

On returning to the mainland Toll and his companions set off on a remarkable summer journey west across the tundra, travelling on riding reindeer. Heading west across the Lena and Olenek, the party spent the month of September surveying the lower 400 km of the Anabar River before continuing westward. Travelling up the Khatanga, the little expedition reached Dudinka on the Yenisey on 9 December. By 21 January 1894 Toll was back in St. Petersburg (Vittenburg, 1960).

Toll's next visit to the Arctic occurred under totally different circumstances. Soon after his return from the north, on 19 April 1894, Toll gave a lecture on his recent expedition. Among the audience was Admiral S. O. Makarov, who even then was contemplating the design of his famous icebreaker, *Yermak* (Vittenburg, 1960). The two men became close friends; hence in May 1899, when the scientific personnel for *Yermak's* first arctic cruise was being selected, it was natural that Toll should be appointed expedition geologist, with responsibility also for marine biology. *Yermak* sailed from Tromsø, bound for the ice north of Svalbard, on 29 June 1899; along with the expedition doctor Toll carried out daily marine biology stations. The icebreaker encountered the first ice off Svalbard on 13 July and forged steadily northwards, but next day, at 79° 10'N, it was discovered that her bow propeller (one of her many innovations) was causing problems in the heavy ice and that her hull had developed a minor leak (Pinkhenson, 1962). Makarov decided to head back to Newcastle, where the ship had been built, for repairs. On *Yermak's* arrival at Newcastle on 9 July 1899 Toll received a telegram which ended his involvement with *Yermak*: the Academy of Sciences had asked him to return to St. Petersburg to take command of an expedition to locate and explore "Zemlya Sannikova".

This invitation did not arrive completely out of the blue: on 17 April 1898 Toll had addressed a special committee of the Russian Geographical Society on precisely this topic (Vittenburg, 1960). That same year he had published articles on the subject in the *St. Petersburger Zeitung* (E. Toll, 1909) and also in the *Geographical Journal* (E. V. Toll, 1898). Toll had argued, realistically, that the persistent presence of open water ruled out any possibility of reaching Ostrov Bennetta by dog sledge, as shown by Sannikov's and Anzhu's attempts; on the other hand, while the experience of the *Jeannette* survivors had demonstrated that the area could be reached by boat, a wintering party, which he envisaged as being essential, could not be established and supplied by this means. Hence his choice lay with a ship.

Toll had proposed heading east past Mys Chelyuskina to the mouth of the Lena in the summer of 1899, in a strongly-built Norwegian sealing vessel. The ship would be laden with freight for the Lena valley, which he asserted would assist greatly in financing the expedition, given the exorbitant rates on overland freight to Yakutiya. If possible the ship would enter the river and steam south to Yakutsk where she would winter. The following summer, having taken aboard sledge dogs and drivers in the Lena delta, the ship would push north past the coast of Ostrov Kotel'nyy, taking advantage of the warm, ice-free outpourings of the Lena River. With luck she would be able to reach the most northerly part of "Zemlya Sannikova" or of Ostrov Bennetta if the latter lay farther north. A wintering party would be landed and the ship would then return to the mouth of the Lena. Having spent the winter engaged in meteorological, magnetic, geological and biological investigations, the party would be taken off by the ship in the summer of 1901. Toll had envisaged a scientific wintering party of four: himself, an astronomer, a meteorologist and a topographer, supported by a team of Yakut or Tungus hunters and dog-drivers.

A year later, at a meeting of a special committee of the Academy of Sciences on 14 March 1899, Toll introduced some modifications to this original plan (Vittenburg, 1960). He now proposed spending two winters in the High Arctic: one on the east coast of Poluostrov Taymyr and the second on "Zemlya Sannikova". The choice of the first wintering site was largely dictated by the fact that this area was still almost completely unknown. A further addition to the plan was that after the second winter the expedition would continue east to Bering Strait and the Pacific; the expedition vessel would thus be only the second ship in history to complete a traverse of the Northern Sea Route. This modified plan, involving a budget of 180 000 roubles (Pinkhenson, 1962), was accepted by the Committee of the Academy of Sciences; this was the origin of the Russian Polar Expedition.

Following a return to St. Petersburg from Newcastle, in July 1899 Toll travelled to Norway to find and purchase a suitable expedition vessel. After examining several ships at Bergen and elsewhere, on Nansen's recommendation he bought a sealing ship, *Harald Harfager*, which was renamed *Zarya* for the expedition (E. Toll, 1909; Vittenburg, 1960). Her specifications were: length 44 m; beam 10.2 m; draught 5.4 m; displacement 1082 tonnes fully laden; and 493 tonnes deadweight. She possessed a two-cylinder compound engine of 228 indicated horsepower which gave her a speed of eight knots under favourable conditions. Her frames were of oak, the inner planking was spruce, the second layer was spruce and oak, and the outer sheathing greenheart. A special ice belt of greenheart 3 m wide extended to 2 m beneath the water line, and the bows were sheathed in iron plates. The ship, built at Brink's yard in Christiania in 1873, was originally rigged as a three-masted barque.

After her purchase *Zarya* was moved to Larvik to be refitted at Colin Archer's yard, where *Fram* had been built. Various diagonal braces were installed to strengthen what was already an impressively strong hull, and a new deckhouse with seven cabins and a saloon, all insulated for winter use, was built between the foremast and the mainmast; a powder room, lamp room, bathroom and water closet were also added on the upper deck. In the bows a new fo'c'sle for a ten-man crew, a new galley and a bathroom were built. The original deckhouse between the main and mizzen masts was converted into laboratories. Her rig was changed to that of a barquentine, i.e. fore-and-aft sails on main and mizzen, retaining the square rig only on the foremast.

The engine and boilers were given a thorough overhaul; another coal bunker was built in the engine room and a generator and lathe were also set up there. Living quarters for the four-man engine-room crew were also established here. A steam winch was installed on the fo'c'slehead and another, together with a derrick, was set up by the main mast to handle oceanographic equipment.

Zarya carried six boats: a steam launch, two whaleboats, a lifeboat, a four-oared rowing boat and a two-oared rowing boat. As a precautionary measure she carried a spare rudder, spare steering wheel and spare propeller.

Fitting out of the ship was supervised by Leytenant N. N. Kolomeytsev, who would command the ship during the expedition. In the spring of 1900 he and another officer and a ship's crew were sent to Larvik to bring *Zarya* to St. Petersburg (Vittenburg, 1960); having called at various ports along the way, including Memel where Baron von Toll came aboard, she reached the capital on 28 May 1900 (Kolomeytsev, 1902). Here loading of stores and equipment began and the expedition personnel began to assemble.

Apart from Baron von Toll himself, who naturally was to take care of the geology programme, there would be 19 men on board. Ship's commander was Leytenant Nikolay

Nikolayevich Kolomeytsev, who for many years had been a member of the Chief Hydrographic Administration's Survey Expedition to the White Sea, and who in 1893 as a midshipman had taken part in Leytenant L. Dobrotvorskiy's expedition to the mouth of the Yenisey. First officer was Leytenant Fedor Andreyevich Matisen, who in 1899 had taken part in an expedition to Svalbard; he would be in charge of the meteorological programme on board *Zarya*. The third naval officer on the expedition was Leytenant Aleksandr Vasil'yevich Kolchak, who had a deep interest in polar exploration and had made a favourable impression on Admiral Makarov (Smirnov, 1930; Varneck and Fisher, 1935); hydrological investigations were to be his responsibility on board. In charge of the biological programme was Dr. Aleksey Andreyevich Byalynitskiy-Birulya, senior zoologist at the Academy of Sciences' Zoological Museum; for several seasons he had worked on the marine fauna of the White Sea at the biological station on the Solovetskiye Ostrova and, like Matisen, had been to Svalbard in 1899. He would be assisted by *Zarya's* medical officer, Dr. Herman Eduardevich Val'ter, who in 1899 had taken part in N. M. Knipovich's ongoing expedition to study the marine resources of the Murman coast and Novaya Zemlya (Vittenburg, 1960). The position of astronomer-magnetologist was filled by Fridrikh Georgiyevich Zeberg, a physics teacher who came highly recommended by some of Russia's leading astronomers; he had even volunteered to work as a stoker if no other position were available. The bosun was Nikifor Begichev and the chief engineer, in charge of an engine-room crew of four men, was Eduard Ogrin.

In the midst of all the last-minute bustle there were numerous important visitors to the ship. On 11 June the Tsar paid a visit, accompanied by the Tsarevich and by Grand Dukes Vladimir, Pavel and Konstantin; and on the 19th a church service on board was attended by Her Majesty the Queen of Greece and Grand Duke Konstantin, the latter in his capacity as President of the Academy of Sciences (Kolomeytsev, 1902). The expedition was the talk of the St. Petersburg salons.

On 21 June, a fine, warm day, *Zarya* put to sea to a rousing send-off (Vittenburg, 1960; E. Toll, 1909; Kolomeytsev, 1902; Bolotnikov, 1949). Without the help of a tug Kolomeytsev wove his way through the Neva traffic, bound first for the naval base at Kronstadt. Here *Zarya* took on a final 68 tonnes of coal and a variety of instruments on loan from the Kronstadt Observatory. At a banquet in Kronstadt given by Admiral S. O. Makarov, Commander-in-Chief, the host made a facetious comment that would later turn out to be almost prophetic: he noted that with his gentle and sympathetic manner Toll would function "as a buffer between the officers, the scientists and the crew" (E. Toll, 1909:301).

With 290 tonnes of coal on board, *Zarya* finally put to sea on 23 June, bound first for Reval; Admiral Makarov came aboard and saw the ship off as far as the entrance buoys (Kolomeytsev, 1901). The voyage to Reval proceeded smoothly although trouble with the engine feed pumps meant that *Zarya* had to proceed under sail for the first 15 hours.

At Reval Toll went ashore, planning to travel overland via Helsinki, Stockholm and Christiania to Bergen, picking up instruments and equipment along the way. After a stop of less than two hours at Reval, Kolomeytsev took *Zarya* to sea again on the morning of 25 June. By 8:00 P.M. on the 29th the ship was abeam of Helsingor and emerged into the Kattegat. A persistent westerly wind and some trouble with the condenser persuaded her captain to put into Frederikshafn to correct the problem; while there he also laid in some fresh provisions and gave the crew a rest (Kolomeytsev, 1901). Putting to sea again on the afternoon of 30 June, *Zarya* reached Bergen at midnight on 2 July. Toll arrived by the mail steamer on 3 July (E. Toll, 1909), bringing with him various items which had been ordered in Norway: Nansen sledges, skis, snowshoes, portable kerosene stoves, a canvas kayak and bamboo for building others, arctic clothing and footwear. Other equipment had already arrived, including an assortment of oceanographic instruments.

Even at this stage the ship was leaking quite badly; Kolomeytsev attributed this to the seams working loose during the heavy rolling the ship had experienced in the Kattegat. Two extra pumps were set up in the hold and the captain seems to have been satisfied that he had the situation under control (Kolomeytsev, 1901).

The expedition sailed again from Bergen on 7 July bound for Tromsø, which they reached on 14 July. Here *Zarya* was to load 10 tonnes of coal briquettes, intended both as fuel and as a building material in case a camp had to be established on the ice. But the ship delivering them to Tromsø was delayed and hence it was another week before the voyage was continued. The other major item loaded at Tromsø was 25 tonnes of dried fish for dog food; space was by now so limited that this latter item was stowed atop the deckhouses (Bolotnikov, 1949).

Zarya was abeam of Nordkapp in the early morning of 23 July; by 9:00 A.M. she was abeam of Nordkyn in bright sunshine. Last port of call was Aleksandrovsk-na-Murmane which she reached early next morning. Here the expedition met Professor N. M. Knipovich aboard the *Andrey Pervosvyannyy*, the expedition vessel of the Murman expedition; Toll and his officers were invited aboard for dinner. The main reason for this call at Aleksandrovsk was to pick up 60 sledge dogs. Forty of these were Ostiak dogs which had been delivered by prior arrangement from West Siberia; the remainder were East Siberian dogs from the Ust'-yansk area. They had been brought to Aleksandrovsk by Stepan Rastorguyev, Toll's travelling companion from the 1893 expedition, and Petr Strizhev, a native of Ust'-yansk (E. Toll, 1909). Begichev, as an extremely

conscientious bosun, was far from pleased at the foul state to which the dogs quickly reduced his spotless decks.

Two crew members were discharged at Aleksandrovsk: Malygin for drunkenness and unruly behaviour, and Semyashkin due to illness. Their places were taken by Rastorguyev and Strizhev although Kolomeytsev felt that due to their lack of sea experience this was not an ideal solution (Kolomeytsev, 1901).

The mail steamer *Nikolay* arrived from Arkhangel'sk with the last mail for the expedition. Among the messages was one which was quite discouraging: the schooner *Zabava*, which had been chartered to deliver coal for the expedition to Yugorskiy Shar from Arkhangel'sk, had been damaged by ice and had been forced to turn back (Kolomeytsev, 1901; E. Toll, 1909). A second message advised that she would start out again on 2 August, but this would dangerously delay *Zarya*. As a precaution against the very real possibility that *Zarya* would not make contact with the collier, Toll decided to load the maximum possible amount of coal at Aleksandrovsk. Almost five tonnes of the dried fish was sacrificed to make room for coal; some 80 tonnes of coal were loaded from the Navy's depot, bringing total reserves to 301 tonnes. By the time some lumber and additional fresh water were loaded the ship was extremely deeply laden, drawing 5.69 m aft and 4.86 m forward. The entire greenheart ice belt was submerged and the leaks again increased (Kolomeytsev, 1901; E. Toll, 1909).

To the sound of howling dogs *Zarya* put to sea at 5:00 P.M. on 31 July, after a farewell service had been held on board. Passing north of Ostrov Kolguyev, the expedition occupied its first hydrobiological station the following day; this would be a daily occurrence from now on, keeping Kolchak and Birulya fully occupied. There was a persistent fresh easterly blowing, and the shores of Ostrov Kolguyev were in sight for several days as *Zarya* tacked to and fro. She rolled viciously and many of the expedition personnel were seasick. Progress was painfully slow and it was not until the morning of 7 August that the ship finally reached Yugorskiy Shar.

Just east of Mys Greben *Zarya's* crew sighted the steamer *Pakhtusov*, the expedition vessel of the Arctic Ocean Hydrographic Expedition, which from 1898 to 1906 made a major contribution to the surveying of the Barents and Kara seas. Kapitan A. I. Vil'kitskiy, *Pakhtusov's* commander, welcomed Toll and Kolomeytsev aboard and offered to deliver the expedition's last mail. Not surprisingly there was no sign of *Zabava*, and since Yugorskiy Shar was entirely free of ice and the weather fair, Toll decided to push ahead immediately. It was a decision which would have far-reaching consequences. He left a message for *Zabava's* captain that he should unload his coal cargo at Mys Greben, thus forming an emergency depot on which *Zarya* could fall back if she were forced to retreat from the Kara Sea (E. Toll, 1909).

By 8:00 P.M. that same evening *Zarya* had emerged into the Kara Sea and by 9:00 A.M. was weaving her way through scattered ice in moderate fog. Although the ice became quite heavy, by the next day (9 August) *Zarya* was steaming north along the coast of Yamal in open water. Later both ice and fog reappeared, but by 11 August the ship was rounding Ostrov Belyy; she crossed the mouth of Obskaya Guba at a steady eight knots under sail and steam in fair weather and with no ice in sight.

The harbour at Dikson, in the lee of Ostrov Kuz'kina (now Ostrov Diksona) was reached on 12 August. Kolomeytsev took advantage of the sheltered anchorage to clean boilers and transfer coal. Even before the ship had dropped anchor five bears were spotted on shore and a major hunting operation was immediately mounted. Over the next few days 15 bears were spotted and ten killed and skinned, but the meat of only five animals was used. Dr. Val'ter also shot a reindeer. Transferring coal, cleaning the boilers, salting bearskins, and other chores kept the crew fully occupied for several days, while the scientists pursued their own disciplines. Zeberg pitched a tent on shore to expedite his magnetic work, and even slept ashore. Baron von Toll made extensive geological investigations while Birulya collected bird specimens and Kolchak dredged for marine organisms. To give both men and dogs a rest the latter were put ashore for a short holiday.

By the evening of 18 August *Zarya* was ready for sea again. Before leaving Toll deposited a message in a tin box fastened to the wall of a hut on shore; it read (in Russian and German): "The Russian Polar Expedition stayed here in Zaliv Diksona from 12 August until 18 August 1900. Today *Zarya* is setting off towards Mys Chelyuskina. I hope to reach our intended wintering harbour on the east coast of Poluostrov Taymyr in a few weeks. The work is proceeding well. All members of the expedition are well. *Zarya*, August 18, 1900. Baron Toll" (E. Toll, 1909:59).

After passing to the north of the Ostrova Kamennye on the 19th, *Zarya* took exactly a week to negotiate the labyrinthine complexities of the Shkhery Minina, running aground three times. On the third occasion, on the west side of Ostrov Tsirkul', the ship was aground from 5:15 P.M. on 23 August until noon next day. She was refloated at high tide through the efforts of all on board, including scientists and officers (E. Toll, 1909). With only Nansen's general descriptions to guide them, Kolomeytsev and Toll had great difficulty in orienting themselves; on one occasion they pushed well into the cul-de-sac of Zaliv Minina in the hope that it would lead east. Though their determinations of position and identifications of islands and peninsulas were often quite inaccurate, Toll and his scientists landed at many island and mainland points and contributed numerous useful scientific observations, and gave names to a large number of islands including the entire Shkhery Minina group (Yerashova, 1964). Troitskiy

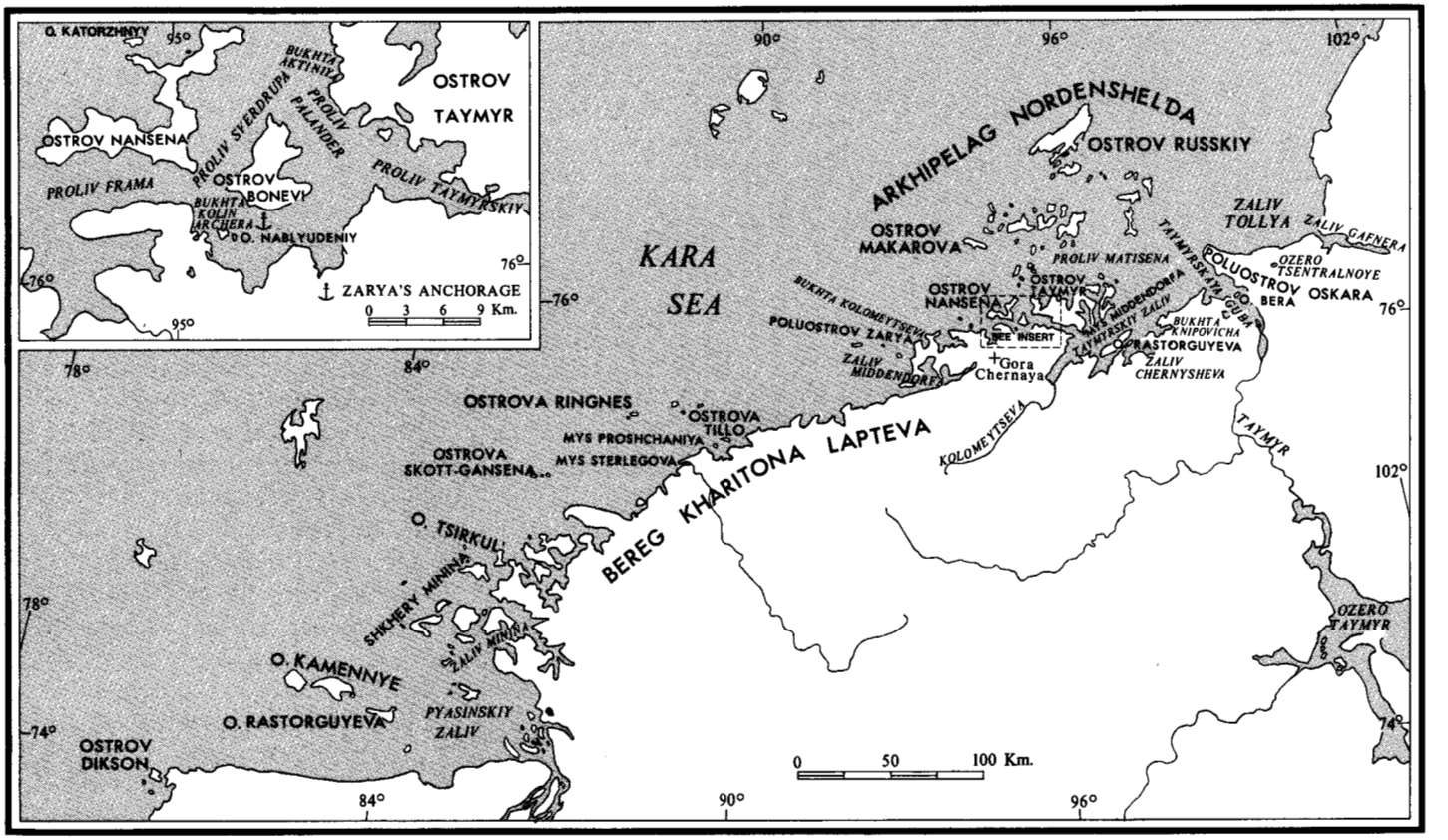

FIG. 2. The west coast of Poluostrov Taymyr, showing *Zarya's* wintering site and the areas explored by Toll's expedition.

(1968, 1972) has unravelled *Zarya's* precise route in an impressively painstaking piece of research (Fig. 2).

Emerging from the Shkhery Minina into open water at noon on 26 August, *Zarya* rounded the Ostrova Skott-Gansena on the west but was forced by ice to pass south of the Ostrova Ringnes and north of the Ostrova Tillo. Running into Zaliv Middendorfa (which was mistaken for Taymyrskiy Proliv) on the morning of 27 August, Toll soon discovered his mistake. But westerly winds had jammed the entrance with ice and it was not until three weeks later, on 16 September, that *Zarya* was able to fight her way clear of this trap (Troitskiy, 1972). The enforced sojourn was spent in scientific and hunting trips; on several occasions Toll pondered in his journal as to whether this would be the final winter quarters.

On September 18 *Zarya* forged steadily northeast in open water to within 20-22 km of Ostrov Makarova, but there ice forced her again to retreat south to the mainland, anchoring in Bukhta Kolomeytseva on the north coast of Poluostrov Zarya. Over the next ten days as ice conditions fluctuated *Zarya* slowly made her way east with her crew expecting that each successive anchorage would become their winter quarters. During September 25-26 the ship steamed through Proliv Frama, between Ostrov Nansena and the mainland, and by the evening of the 26th was anchored in the spot which Toll was convinced would be her final winter quarters—in the bay he named Bukhta Kolin Archera, off the south coast of Ostrov Bonevi, with Ostrov Nablyudeniy to the southeast (76° 08′N, 95° 06′E).

The dogs were moved out onto the ice and preparations for wintering began. But two days later fine, warm weather persuaded Toll that he might be mistaken. On the evening of the 30th the dogs were brought back aboard, and Toll was all ready to weigh anchor again next morning. But by then new ice was forming and floes were drifting into the anchorage. The wintering had begun (Fig. 3).

On 3 October the boiler fires were drawn and stoves were set up in the living quarters and in the laboratories. The sails were stowed away and work began on protecting the engines for the winter (Bolotnikov, 1949). It was decided to set up the scientific station on a small, granite island named Ostrov Nablyudeniy, about 1.5 km south of the ship. While a weather screen, huts for the magnetic and astronomical observations and a hut for the observer were being established there, an hourly schedule of weather observations was maintained aboard ship. Tidal measurements were taken from the ice alongside the vessel. Driftwood was collected from nearby shores and sledged to the ship for fuel.

Toll's journal reveals that he planned to set off on a major sledge trip as soon as there was enough snow for sledging. There were now only 107 tonnes of coal left on board and hence Toll felt it essential to get a message to the Academy of Sciences that a coal depot would be

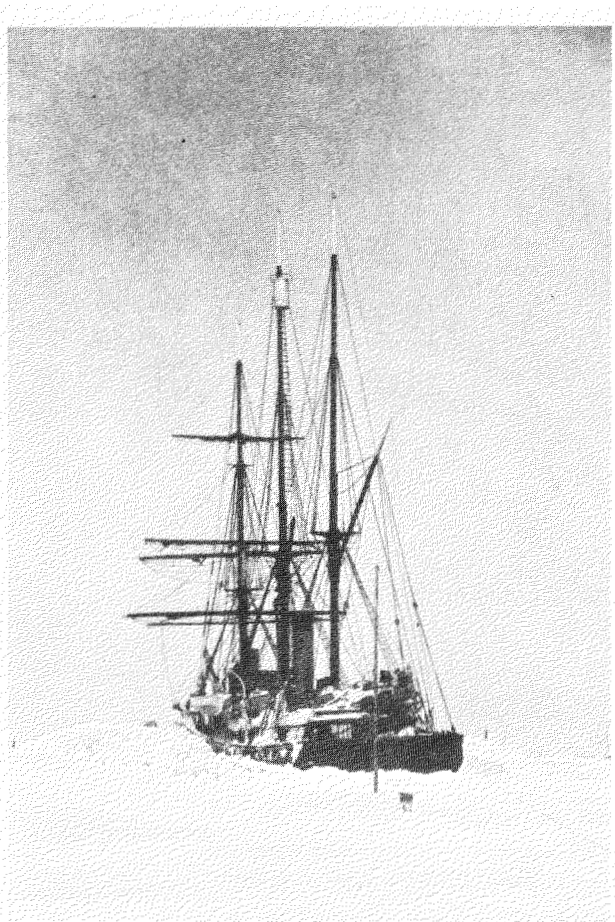

FIG. 3. *Zarya* drifted up with snow in her first winter-quarters in Bukhta Kolin Archera.

needed on Ostrov Kotel'nyy. Toll planned to sledge with Kolchak east to the mouth of the Taymyr, up that river to and beyond Ozero Taymyr, counting on finding reindeer herders wintering at Rybnoye. From there he would continue east across the Khatanga to the Anabar, from where mail could be sent south. On his return trip he planned to travel around the entire coast of Poluostrov Taymyr, carrying out a geological reconnaissance. In his absence Kolomeytsev would be in command and Birulya in charge of the scientific programme. October 14 was the scheduled departure date.

The first couple of weeks of the wintering were spent in exercising the dogs and in writing up reports for delivery to St. Petersburg. But the Baron's plans were not to be realized; by 14 October a mild spell had melted all the snow again and the trip had to be postponed. In the meantime Toll was having some second thoughts. In his diary entry for 20 October he wrote: "I have to abandon the trip to the Khatanga" (E. Toll, 1909:123). In explaining this decision he noted that if word could be sent to St. Petersburg the following spring there would still be time for a coal depot to be established on Ostrov Kotel'nyy. But even more importantly he had "become convinced that things will not go as they ought here without me, and that my presence is absolutely essential, not only as a leader and commander, but also as mediator between two disparate elements" (E. Toll, 1909:124). This is the first hint that all was not well with the morale of the expedition. Nonetheless, in order to take advantage of the remaining daylight Toll decided to establish a depot on Zaliv Gafnera in preparation for a major sledge trip to Poluostrov Taymyr in the spring.

With two dog teams and accompanied by Kolchak, Rastorguyev and Strizhev, Toll set off on this depot-laying trip on 23 October. On this first trip the limitations of Nansen's map soon became apparent (Troitskiy, 1968, 1972). As far as Mys Middendorfa at the southeastern tip of Ostrov Taymyr there was no difficulty, but heading east from there Toll mistook Ostrov Rastorguyeva for Poluostrov Korolya Oskara, considerably farther east. Once this mistake had been made, others were inevitable: Zaliv Karpinskiy was mistaken for Zaliv Tollya and Bukhta Knipovicha for Zaliv Gafnera. Believing that he had reached his goal, Toll camped here for the night of 27 October and spent the following day establishing the cache at the appropriately named Mys Depo. The cache, consisting of enough food for 12 dogs and four men for a month, was located in a semi-permanent snow patch in a gully; the men dug a 1.2 m^3 hole in the snow, placed the supplies in it, covered them with snow and ice and marked the spot with a ski-pole to the top of which a pick-axe was lashed.

The party started back the next day; despite a violent blizzard with severe ground-drifting from the side, they made excellent time and returned to *Zarya* on the afternoon of 31 October. This was the last day on which the sun rose above the horizon at *Zarya's* winter quarters.

Back at the ship wintering preparations were well under way. The hull and upper deck had been banked up with snow for insulation, and work on the Ostrov Nablyudeniy station was well in hand. Zeberg's magnetic hut was built entirely of wood but all the others were built of snow blocks and roofed with bamboo poles and canvas. A guide rope and a telephone line were strung from the ship to the island.

The full programme of weather observations was transferred to the island on 22 November. Each of the seven officers and scientists stood one 24-hour watch on the island per week, taking hourly observations. They were always accompanied by an assistant from among the men; on his first few shifts Toll encouraged each of his assistants to give him a brief account of his life, which he subsequently recorded in his journal. The men were also kept busy with ship's duties but especially with fetching ice for water and driftwood for fuel, using the dog sledges.

Christmas was marked in traditional fashion: Christmas trees, gifts, a variety show by the crew which ran for two nights, and quite a liberal amount of alcohol (Bolotnikov, 1949). Toll reveals something both of himself and of interpersonal relations on board when describing the celebra-

tions after the first night of the variety show: "The actors tippled with their comrades in harmless and friendly fashion until late into the night. It was a little vulgar and yet I would have liked to have been right there, enjoying the harmony of these simple folk" (E. Toll, 1909:197).

After long deliberation over the winter, Toll decided to send Kolomeytsev south to undertake the job of organizing coal depots. He informed the captain of his plans on 18 January; he was to set off with Rastorguyev as soon as the sun reappeared, head up the Taymyr to Ozero Taymyr and then across the tundra to Rybnoye. There, Toll hoped, they would encounter Nentsi who would take them to Dudinka on the Yenisey. Rastorguyev would return from there with the mail while Kolomeytsev set about organizing coal depots on Ostrov Kotel'nyy and at Dikson. In order to ease the supply problem Dr. Val'ter would accompany them with a sledge-load of provisions as far as the mouth of the Taymyr. Once Kolomeytsev had departed Leytenant Matisen would assume command of the ship.

By any standards this was an unusual procedure: as ship's commander, Kolomeytsev's place was with *Zarya*. The answer to this puzzle is not to be found in Toll's own journal; in editing it, his widow specifically stated: "Further, I have omitted as non-essential the details of the mutual relations of the expedition members" (E. Toll, 1909:579). Thus in the edited version of Toll's journal one finds only the argument that Kolomeytsev was the best possible person to undertake the trip, especially in view of his earlier experience on the Yenisey in 1893. There is some evidence, however, that all was not well on board; on the day of Kolomeytsev's departure, Toll referred to his "pleasure at the fact that this difficult problem, and everything connected with it is now cleared up and its solution taken in hand!" (E. Toll, 1909:205).

In his biography of the bosun, Nikifor Begichev, Bolotnikov (1949) is much more specific. He reports that relations between Kolomeytsev and Toll had been strained since as far back as the call at Tromsø, when Malygin had been drunk, disorderly and impertinent. Kolomeytsev had requested an unspecified punishment for Malygin but Toll had refused to approve the punishment; Kolomeytsev interpreted this as undermining his authority.

As the wintering proceeded the sailors began addressing the scientists and even Baron Toll (presumably with the latter's approval) by their Christian names and patronymics: Kolomeytsev saw this as a disastrous breakdown in discipline. According to Bolotnikov, Kolomeytsev ultimately asked Toll in writing to relieve him of his duties as ship's commander and to send him south. According to Pinkhenson (1962), the decision was initially Toll's. As might be expected, there is no mention of this in Kolomeytsev's own official report.

The sledge party set off on 3 February (Kolomeytsev, 1902; E. Toll, 1909). In the ship's documents Toll made the entry: "In place of Leytenant N. N. Kolomeytsev I have appointed Leytenant F. A. Matisen commander of the yacht *Zarya*. Taymyrskiy Zaliv, 76° 08′N, 95° 06′E, January 21/February 3, 1901. Baron E. Toll" (E. Toll, 1909:206). The doctor returned on 13 February but the news he brought was discouraging: Kolomeytsev had been unable to locate the mouth of the Taymyr — scarcely surprising in view of Toll's earlier misidentifications of so much of the coastline. Then it was discovered that prickers for the primus stoves had been overlooked; the stove nipples soon clogged and became inoperative. It had therefore been decided that the doctor would bring the stoves back to be "repaired" while in the meantime Kolomeytsev would locate the mouth of the Taymyr, establish a cache for the second trip, and then return to pick up the stoves.

Immediately after the doctor's return another problem arose. A medical examination of all the crew members revealed that four of the men were showing signs of scurvy: swollen legs, puffy gums, loose teeth. The doctor prescribed, among other things, increased rations of cranberry extract, lemon essence, and vegetables. Almost certainly, however, the root of the problem lay in the almost total absence of fresh meat, since practically no game had been shot by the hunters. A female bear, roused out of her wintering den and killed on 11 February, was fed to the dogs.

Kolomeytsev and Rastorguyev returned to the ship on 20 February, having survived a temperature of -50°C the previous night. After the doctor left they had been obliged to melt water and cook on a primitive kerosene stove fashioned from a tin can with a strip of handkerchief for a wick. They still had not found the mouth of the Taymyr, but had found another river (later named after Kolomeytsev). At this point their dog food was almost exhausted, so they cached their load and started back. Two dogs had died on the return trip and Rastorguyev's hands were badly frostbitten.

After a two-week rest, on 5 March Kolomeytsev and Rastorguyev set off again—via the same intended route—for the Taymyr and ultimately the Yenisey. Two days later Matisen set off with Strizhev, heading north to survey the Arkhipelag Nordenshel'da. The sun had returned by this time and it was anticipated that travelling should be relatively easy for both parties. On 10 March the doctor shot a reindeer, which gave promise of an end to the problem of scurvy.

The first party to return was Matisen's, on 21 March, in excellent health and spirits. Travelling east along the north coast of Ostrov Taymyr, Matisen had struck north through the Arkhipelag Nordenshel'da as far as the south coast of Ostrov Russkiy; from there he had swung southwest, then south through another part of the archipelago. In total Matisen had discovered and named some 40 island, arranged in four main groups: Ostrova Vil'kitskogo,

Ostrova Tsivol'ki, Ostrova Pakhtusova and Ostrova Litke (Yerashova, 1964). Matisen had been able to survey only parts of the coastlines of many of these islands, but was able to amend and extend these surveys on a second trip between 25 March and 7 April, when he was also able to determine accurately the co-ordinates of one island in each of the groups comprising the archipelago.

On 31 March, to everyone's surprise, Kolomeytsev and Rastorguyev reappeared. Baron Toll's reaction may be gauged by the entry in his diary for that day—simply the bald, unembroidered statement: "Kolomeytsev has come back" (E. Toll, 1909:246). The captain reported that after travelling for three days they had reached the cache they had left earlier. Loading up the sledge, they headed south up a small river emptying into Zaliv Chernysheva, apparently hoping that it might be the Taymyr. But after only two days they reached the source of the stream and Kolomeytsev decided to head south across fairly rugged tundra terrain. Their average speed dropped to a miserable 3 km per day. Clearly there was no chance of reaching their goal under these circumstances, so Kolomeytsev swung west to a major river which they followed north to the sea; this was the Kolomeytseva once again. Despite their having clarified more of the geographical detail of this stretch of coast, the outcome of the trip must have been rather discouraging, especially to Baron Toll.

Shortly after his return Kolomeytsev hit on the idea of sledging southwest along the coast to Dikson, then south to Gol'chikha and Dudinka; this route offered the advantage of sea ice for most of the way. He would simply have to follow the coast rather than searching for the elusive Taymyr River; and the hunting potential would be much more promising than on the winter tundra (Kolomeytsev, 1902). It is indicative of the state of interpersonal relations that Kolomeytsev asked Dr. Val'ter to broach the subject with Toll rather than approaching him directly. The baron fully approved of the idea, however, and suggested that Birulya should accompany Kolomeytsev for the first ten days as a support party. After Easter had been celebrated with appropriate solemnity and gaiety and after a further delay of a few days due to bad weather, on 18 April Kolomeytsev and Rastorguyev set off for the third time, accompanied by Birulya and Strizhev.

Since according to the new plans Rastorguyev would not be rejoining the ship, Toll could spare only eight dogs for Kolomeytsev's team. This was scarcely adequate to haul a load of almost 2000 kg. Fortunately the sledge party shot three bears within a few days of leaving the ship, which greatly alleviated the dogfood situation (Kolomeytsev, 1902). On 27 April, some 170 km from the ship and just short of Mys Sterlegova, Birulya and Strizhev started back for *Zarya's* wintering site; they named the spot Mys Proshchaniya (Cape Farewell) to mark the occasion (Vittenburg, 1960).

Having negotiated the labyrinth of the Shkhery Minina, Kolomeytsev set a course due south across Pyasinskiy Zaliv rather than following the coastline; it took them three days, from 26-29 April, to complete the crossing. *En route* they skirted the western cape of a large island which Kolomeytsev named Mys Rastorguyeva after his companion. Throughout this crossing a dark sky to the west indicated open water in that direction. The party reached Ostrov Diksona at midnight on 18 May, having covered 525 km; they camped near the hut left by A.I. Vil'kitskiy's expedition (in which Toll had earlier left his note).

Heading south for Gol'chikha on the last leg of the trip they were making good progress when an accident occurred; the dogs broke the main trace when they started after a fox and it took Rastorguyev five hours to track them down and bring them back to the stranded sledge. The party finally reached Gol'chikha on 27 May having covered the 768 km from *Zarya* in 40 days.

After a brief rest Kolomeytsev and Rastorguyev continued south by reindeer to Dudinka, arriving on 3 June; continuing by boat on 15 June they reached Yeniseysk on 7 July. From there Kolomeytsev was able to dispatch the expedition's mail and telegrams; then he himself continued south to Krasnoyarsk.

At Krasnoyarsk, after lengthy negotiations, he was able to procure 110 tonnes of coal from the Trans-Siberian Railway from its mines at Anzhero-Sudzhensk; then he negotiated with the Yenisey Steamship Company to charter the ancient steamer *Skotiya*. She sailed from Krasnoyarsk with the coal on 17 August, reaching Port Dikson on 3 September. The coal was unloaded, a store-shed built, and the coal stowed in it, all in one night. By 11 October *Skotiya* had returned to Yeniseysk and by 18 October Kolomeytsev was back in Krasnoyarsk. From there he travelled by train to Irkutsk to investigate the next part of his task, i.e. establishing a second coal depot on Ostrov Kotel'nyy, and by 11 November he was back in St. Petersburg where he reported to the Committee (Kolomeytsev, 1902).

Meanwhile, back at the wintering ship, on 20 April Baron Toll and Kolchak (Fig. 4) had set off with 12 dogs in an attempt to survey the coast to Mys Chelyuskina. It was a trip filled with frustration and disasters. Kolchak's windproof clothing fell off the sledge, necessitating a delay of two days while they backtracked to find the missing bundle. Then when they reached the cache at Mys Depo they found that drifting snow had obliterated all trace of it. Four days of digging trenches and adits in the snow proved fruitless. Toll had to resign himself to pushing on with the supplies in hand. The party headed northeast overland from Bukhta Knipovicha and emerged on the shores of a wide inlet on 6 May. Suspecting (correctly) that this might be Taymyrskaya Guba (the mouth of the Taymyr), but reluctant to spend time in exploring it, Toll simply refers to it as Bukhta X in his journal.

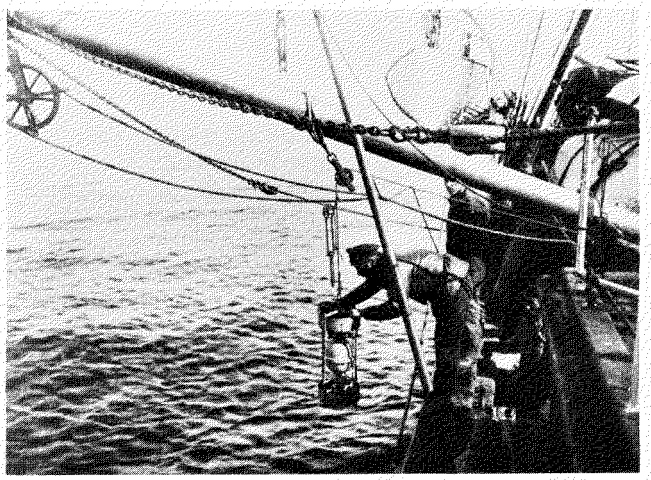

FIG. 4. Aleksandr Vasil'yevich Kolchak taking oceanographic measurements in the Kara Sea.

Crossing the inlet they continued east-northeastwards across the tundra of Poluostrov Oskara. The weather was extremely foggy and as the dogs were starting to suffer from short rations, it was decided on 14 May that any further effort to push on would be pointless. From the last camp, just beyond Ozero Tsentralnoye (which they named Ozero Purgi), Baron Toll made a short foray alone on skis. He came very close to losing his way completely in fog and drifting snow. By Troitskiy's estimation (1972) he did not get within 20-25 km of Gafner Fiord.

Once the decision to start back had been taken, a blizzard pinned the party in their tent for three days at Ozero Purgi. Indeed bad weather persisted for most of the return trip and it nearly ended disastrously. As it was five dogs died (or had to be destroyed) due to starvation and the two men were almost completely out of food and very emaciated when they finally got back to *Zarya* on 31 May. During the 41 days they had been away, nine days had been spent in waiting out blizzards, and four days in the fruitless search for the cache at Mys Depo.

It was some consolation to Toll on his return to find that Birulya had returned safely, having escorted Kolomeytsev to Mys Proshchaniya. He had reached the ship on 6 May and had made a useful collection of vertebrates and abundant notes on arctic biology. It is some measure of Baron Toll's own physical state on his return that, by his own admission, it took him five days to recover.

Over the next six weeks spring slowly arrived at *Zarya's* anchorage; the snow began to melt both on the tundra and on the sea ice and gradually the ice became a maze of turquoise melt pools. Migrant birds began to return from the south: snow buntings, shorebirds, ducks and geese. Both crew members and scientists went out hunting—both for food and for scientific specimens. While the sailors and engine-room crew started to get the ship ready for sea, scientists and officers made several small trips of 3-4 days' duration for scientific purposes and for exploration. Thus on 29 May Birulya and Zeberg headed inland for Gora Chernaya which, at about 326 m in height, dominates this section of the Bereg Kharitona Lapteva. They got a celestial fix from the summit of the mountain: 76° 00'N, 93° 56'49"E, and, at Toll's suggestion, left a minimum thermometer there. This instrument was recovered in the spring of 1939 by Kapitan V. A. Radzeyevskiy of the survey vessel *Toros* (Vittenburg, 1960).

Toll was determined before leaving the area to solve the problem of the precise location of the mouth of the Taymyr. With this purpose in mind, he set off with Zeberg on 18 July, man-hauling a sledge to which a kayak was lashed. Their route lay along the north coast of Ostrov Taymyr, across Taymyrskiy Zaliv, then along the mainland coast to Bukhta X (Taymyrskaya Guba), and in places required sledging across bare tundra. On the morning of 29 July they paddled out to an island in the estuary which they suspected was Ostrov Bera, the most northerly point reached by A.F. Middendorf when he reached the river mouth from the interior in August 1843. This was confirmed when Toll found a large quartz boulder which Middendorf had described (Middendorf, 1860) and when he and Zeberg located the remains of Nikifor Fomin's hut, also described by Middendorf; Fomin had wintered here in the 1740s, during the Great Northern Expedition. There could now be no doubt that the mouth of the Taymyr had been positively located.

They started back on the evening of the 30th, and on 8 August they reached the lost depot on Bukhta Knipovicha. The ski pole marking it had melted out and they excavated the cache sufficiently to extract enough supplies to last them back to the ship. This time they marked the remainder of the cache with a marker 6.9 m long, consisting of a baulk of timber, a bamboo pole and a ski pole. Sledging for part of the way across the melting sea ice and paddling the remainder, the two men returned to the ship in the early hours of 23 August. Both were exhausted and once again they were almost completely out of food.

During their absence final preparations had been made for putting to sea. The station on Ostrov Nablyudeniy had been dismantled and a cairn more than 3 m high erected to mark the expedition's sojourn here (Fig. 5). A brass plate with the details of the wintering engraved on it was fastened to the base of the cairn (Vittenburg, 1960).

The timing of Toll's and Zeberg's return was very opportune. By 7:00 A.M. on 24 August a wide polynia had opened from Ostrov Nablyudeniy to the western tip of Ostrov Bonevi (Matisen, 1902). Matisen ordered steam raised immediately and the men started freeing the ship using guncotton and ice saws (Bolotnikov, 1949). But at 2:00 P.M., long before an adequate head of steam had been raised, the entire floe, some 4 km in diameter, with the ship firmly embedded in it, began moving west under the press of a steady easterly wind. Miraculously the ship passed the northern end of Ostrov Nablyudeniy only 360

FIG. 5. The cairn erected on Ostrov Nablyudeniy.

m offshore and in depths of only 14-15 m, then slowly and impressively drifted west with the ice for the full length of Proliv Frama. Finally at 9:30 P.M., having been carried about 24 km by the ice, the ship was able to break free into open water with drifting floes. Heading north around the west coast of Ostrov Nansena, however, *Zarya* ran into an impassable ice barrier off Ostrov Katorzhniy early next morning. For three days the ship lay at anchor with fires banked, waiting for some improvement, but ultimately Matisen had to withdraw to the northwest coast of Ostrov Nansena and then to the south coast of that island as ice conditions deteriorated. But on 30 August the ice began to clear and at 4:00 P.M. *Zarya* got under way again; by evening she was off the northwest coast of Ostrov Taymyr and at 4:00 A.M. next morning she emerged into open water in Proliv Matisena.

At 5:00 A.M. on 1 September Matisen, who had the watch, roused Baron Toll to report that *Zarya* was abeam of Mys Chelyuskina, the most northerly point on the Eurasian mainland; *Zarya* was only the fourth ship (after *Vega*, *Lena* and *Fram*) known to have reached this point. Because of ice off the cape itself Matisen dropped anchor off the next cape to the east and a party went ashore there. Troitskiy would argue convincingly (and with considerable authority) that the landing site was on Mys Shcherbina (Troitskiy, 1972). With Kolchak's assistance Zeberg made a complete set of celestial observations and determined their position to be 77°34′30″N, 104°35.5′E. Meanwhile the crew members built an impressive cairn consisting of a circular base of slabs of rock set vertically, topped by a column of slabs set horizontally and surmounted by a large block of contrasting white quartzite. For some reason this fine cairn was toppled by the members of Amundsen's expedition during *Maud's* wintering near here in 1918-1919. By 1:00 P.M. the entire party was back on board *Zarya* which, to mark the occasion, was flying the Russian flag at the taffrail and the burgee of the Neva Yacht Club at the main masthead. As she got under way Toll ordered a salute fired to the memory of Semen Chelyuskin.

Zarya headed southeast past the Ostrova Komsomol'skoy Pravdy in open water; at the 115th meridian she swung south. Toll had hoped to land for at least one day on the east coast of Taymyr, in the area where he had initially planned to winter, but on 4 September he found himself groping his way towards a fog-shrouded coast in danger-

ously shoal waters. Wisely he decided the risk was not worth it, and putting the helm over he headed due east for Ostrov Kotel'nyy instead (Matisen, 1902; E. Toll, 1909).

With a fair wind and all sails set and drawing to assist the engine, *Zarya* stormed eastwards across an ice-free Laptev Sea at a steady 5 knots. But on 7 September the wind swung into the east and freshened; to save time, Toll decided to head directly northeast in search of "Zemlya Sannikova". The wind continued to freshen, however, until it reached 30 mps and Matisen was forced to heave-to; many of the scientists were overwhelmed by seasickness and the dogs, housed on the exposed foredeck, were constantly drenched by breaking waves. More seriously, the sludge stirred up in the bilges choked the main pumps and only two hand-pumps remained operational. At 7:00 P.M. on 9 September there were 67 cm of water in the hold; five hours of pumping reduced this to 50 cm and thereafter constant pumping held the water in check at this level.

Once the storm had abated *Zarya's* crew found themselves searching for several frustrating days for the elusive "Zemlya Sannikova"—or failing that Ostrov Bennetta—among scattered ice and dense fog. On 11 September a fogbank suddenly parted to reveal the sheer cliffs of Mys Emma, crowned by Ostrov Bennetta's ice cap, towering close to port not more than 17 km away. But capriciously the fog closed in again almost immediately, although not before it had revealed a solid belt of ice stretching between ship and shore. Toll had been hoping to find a wintering harbour on the shores of Ostrov Bennetta and for the next few days he tried persistently and unsuccessfully to push through the ice to the island. Next the Baron pushed north and west, still in search of "Zemlya Sannikova"; on 14 September *Zarya* even passed the latitude where De Long's *Jeannette* had been crushed, 77°15′N, although somewhat farther west. Finally, daylight on 15 September found *Zarya* lying in a bight at the edge of the continuous pack at 77°32′N, 142°17′E, the most northerly point she was to reach (Matisen, 1902). The ship was almost entirely surrounded by ice, with her only escape route lying to the southwest. The boiler was in urgent need of being cleaned and during the storm the propeller shaft thrust bearing had worked loose and was leaking badly. Toll reluctantly admitted in his journal: "I have decided to go to Kotel'nyy" (E. Toll, 1909:402). It was a wise decision; new ice was already starting to form and *Zarya* was in real danger of being beset—and that could have only one result.

Hence *Zarya* swung south, bound for the sheltered anchorage of Bukhta Nerpalakh on the west coast of Ostrov Kotel'nyy. By noon the same day she had emerged into open water at 77° 5′ 30″N, 141° 16′E. At 9:00 A.M. the next morning the north coast of Ostrov Kotel'nyy appeared, followed at noon by the northern tip of Ostrov Belkovskiy. By 8:00 P.M. *Zarya* was anchored off Bukhta Nerpalakh; a cairn with a flag on it could be seen on one of the entrance spits guarding the entrance to the inner harbour and some 4 km to the south a hut was spotted. A boat was sent ashore and half an hour later the first stranger the expedition members had seen for well over a year came aboard. He was K. A. Vollosovich, leader of the supporting shore party of the Russian Polar Expedition (Matisen, 1902; E. Toll, 1909), whose main function was to lay a series of emergency depots on the Novosibirskiye Ostrova, just as Toll had done for Nansen in 1893, in case *Zarya* ran into difficulties and her crew were forced to retreat south by boat or sledge.

Vollosovich was a geologist with considerable arctic field experience in the Arkhangel'sk area where he had spent some time as a political exile. He had left St. Petersburg along with engineer-surveyor Nikolay Mikhaylovich Orlov in October 1900: travelling via Irkutsk they had reached Yakutsk early in 1901. *En route*, at Irkutsk they were joined by two other members of the party, both political exiles; Osip Frantsevich Tsionglinskiy and engineer-technician Mikhayl Ivanovich Brusnev. They were to handle the expedition's meteorological, zoological and botanical programmes (Vollosovich, 1902). In order to make his preparations for his trip to the islands at Ust'-yansk in good time Vollosovich pushed north from Yakutsk via Verkhoyansk in the coldest part of the winter, arriving on 15 February 1901. Orlov meanwhile also had to inspect the weather station at Verkhoyansk and thus did not reach Ust'-yansk until March. Thereafter he headed for Russkoye Ust'ye to inspect the weather station there.

On 23 April Vollosovich, Tsionglinskiy and Brusnev, accompanied by eight Yakut and Tungus dogdrivers, had set off northwards with five dog sledges and 20 reindeer (Vollosovich, 1902). By 15 September they had established an impressive network of seven depots on the Novosibirskiye Ostrova: one at Maloye Zimov'ye on Ostrov Bol'shoy Lyakhovskiy, one on Ostrov Malyy Lyakhovskiy, three along the west coast of Ostrov Kotel'nyy, the most northerly being at the mouth of the Reshetnikova, and one each on Ostrov Faddeyevskiy and Novaya Sibir'. Nor were the supplies dumped haphazardly; they were placed in pits dug in the permafrost, 70 cm below the active layer, and covered with a layer of logs and then with earth and snow; each site was surrounded by a wooden stockade and a tall post was erected to mark the site. A crowbar, shovel, pick and axe were left nearby along with a map in a box, indicating the locations of all the other depots. Vollosovich and his men had also checked the condition of the depots left by Toll for Nansen in 1893, and had found them in good order. In brief, in the event of *Zarya* being crushed in the ice her crew could have safely retreated across the ice to almost any point on the archipelago to find a well-organized system of depots at pre-arranged sites for their further retreat overland to the south. His main task completed, Vollosovich had then installed himself in the hut at Bukhta Nerpalakh, where it

had been pre-arranged that somebody would be waiting, and had settled down to await *Zarya's* arrival.

While Vollosovich was giving this impressive report *Zarya* was steaming in through the narrow entrance at the head of Bukhta Nerpalakh; suddenly, caught by wind and current, the ship was driven ashore on the northern spit. While an attempt was being made to carry a kedge anchor ashore to the spit a whaleboat was almost swamped in the heavy seas; the boat was only saved by Kolchak heaving the anchor overboard. At 3:00 A.M. the next morning (18 September), at full high tide and with the propeller churning at full astern *Zarya* pulled herself back into deep water, undamaged, and steamed out through the narrows to a safe anchorage. Next day, at the next high tide, Matisen eased his ship back in through the channel and dropped anchor inside the lagoon. Work on such chores as cleaning the boiler and repairing the pumps began immediately.

The rendezvous with Vollosovich and continuing good weather raised Toll's hopes of making one last attempt at reaching Ostrov Bennetta before winter. While the repairs to the ship were being put in hand he proposed that the hut which Vollosovich had built be dismantled and moved aboard; 30 of Vollosovich's dogs would be transferred to Toll's party specifically for hauling supplies and equipment across the ice to Ostrov Bennetta if ice conditions there had still not changed; and *Zarya* would land Toll, Birulya and two Yakuts on the island, then return to Bukhta Nerpalakh for the winter. Vollosovich would now be added to the strength of the main expedition and would winter on shore near the ship.

But by the time the repairs to the engine, boiler and pumps had been effected, the decision to try to reach Ostrov Bennetta had been taken out of Toll's hands. By the morning of 24 September the air temperature was -6.5°C and the entire lagoon was covered with grease ice; any attempt at reaching Ostrov Bennetta would inevitably lead to the ship being beset. *Zarya's* second wintering had begun (Fig. 6) (E. Toll, 1909; Vittenburg, 1960).

By 28 September the ice was 7-8 cm thick and able to support a man's weight; the work of establishing the station buildings on one of the entrance spits began. The abundant driftwood in the area provided the raw material as well as an excellent supply of firewood for the winter. The buildings consisted of a magnetic hut, an astronomical hut made from canvas, a watchkeeper's hut, a bath house and finally Vollosovich's hut, which had been dismantled and moved to this new site.

Prospects for the winter looked quite bright; Toll's only major concern was Dr. Val'ter's health. He had not been well all summer and by 30 September was complaining of acute shortness of breath. Even a slight exertion such as swinging up into his bunk would exhaust him (E. Toll, 1909).

With the work on board and ashore well in hand, on 6 October Toll and Vollosovich set off for a ten-day geological excursion to the Balyktakh River before the winter darkness set in. Each must have enjoyed the company of another trained geologist and they made some interesting observations not only of the bedrock of Ostrov Kotel'nyy (Triassic, Jurassic, Carboniferous and Devonian) but also of Quaternary deposits and massive ground ice bodies. By 17 October they were back on board.

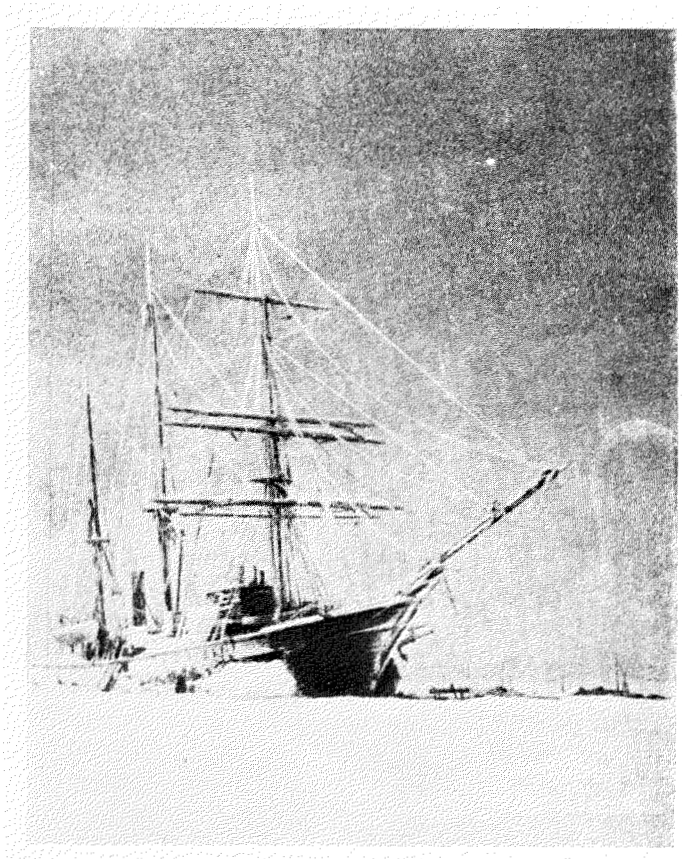

FIG. 6. *Zarya* during her second wintering.

On 1 November the regular schedule of weather observations began. This year, to ease things a little, the weather watches were reduced to 12 hours in length. For a few days thereafter everyone on board was busy with reports and personal correspondence; Volosovich's colleague, Mikhayl Ivonivich Brusnev, accompanied by Strizhev, left for the south with the mail on 12 November, bound via Adzhergaydakh to Kazach'ye. Brusnev would then return with the expedition's mail which should have been accumulating there.

After the mail had gone the little community settled down to a winter routine of scientific observations, hauling firewood and ice for water, and an occasional hunting trip. The doctor's health showed no sign of improvement and on 29 November, at Toll's suggestion, Dr. Val'ter moved ashore to Vollosovich's hut, as being warmer and drier than the ship (Fig. 7).

By 9 December the doctor was suffering severe pain in his right arm, so much so that he could sleep only sitting up. To avoid temptation he gave Toll his supply of morphine and asked him to lock it up. But soon thereafter he

FIG. 7. Dr. Herman Eduardevich Val'ter at work in the meteorology hut.

showed signs of real improvement, and on 19 December he greatly enjoyed a special variety performance put on by the crew in honour of the Tsar's name's day. But it was only a temporary rallying. Despite Toll's urgings, the doctor had insisted on playing his full part in the observing schedule and he was on shift on 3 January 1902. Soon after 11:00 A.M. he was found dead, slumped at a table in the observing hut. The entry for the 11:00 observation was fully recorded.

In a simple, impressive ceremony led by Kolchak, the doctor was buried on the harbour's western entrance cape on 5 January (Fig. 8). Inevitably these events had a profoundly dampening effect on the Christmas festivities (celebrated according to the Gregorian calendar); nevertheless a Christmas tree was put up and decorated, gifts were exchanged and a Christmas dinner served.

There can be little doubt that Dr. Val'ter's death was one of the main factors which influenced Baron Toll to make a trip to the mainland; there is no hint of any such intention in his journal prior to the doctor's death. The alleged reason for the trip was to fetch the mail from Adzhergaydakh. Accompanied by Vollosovich, who was now finally returning south, and the two Yakuts, Nikolay Kurtakh and Basiley Chichag, Toll set off with two dog teams of 14 dogs each on the morning of 28 January. With teams of this size they made excellent progress, and on 13 February covered the 70 km width of Proliv Lapteva in 10 hours of travelling. They reached Adzhergaydakh on 15 February. Some Yakuts were already there but the mail had not yet arrived. Guessing that it must have reached Kazach'ye, Toll dispatched one of the Yakuts with a team of 16 dogs to fetch the mail from that settlement. Other groups of Yakuts turned up at Adzhergaydakh; despite the crowded conditions in the single hut Toll enjoyed himself

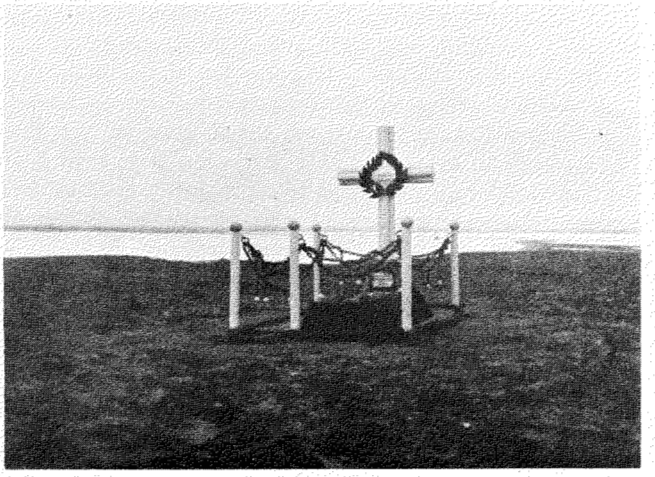

FIG. 8. Dr. Val'ter's grave on the entrance spit at Bukhta Nerpalakh.

greatly, since he knew many of these men from his earlier expeditions.

Strizhev, who had come south earlier with Brusnev, arrived with the mail from Kazach'ye on 21 February. But the mail included no letters although there was an important telegram from Grand Duke Konstantin, President of the Academy of Sciences. His instructions reinforced what Toll had already decided: after spending the summer of 1902 exploring in the northern Laptev Sea, Toll was to take *Zarya* south to the Lena delta and terminate the expedition there rather than attempting to push east to Bering Strait. The idea of trying to establish a coal depot on Ostrov Kotel'nyy had been abandoned, largely for logistical reasons.

Brusnev arrived at Adzhergaydakh next day and on 25 February, when Vollosovich set off to make his way south to Irkutsk, Brusnev departed with him. The latter was to travel west to Bulun in the Lena delta to contact the Norwegian J. Torgersen (who had arrived on board *Lena* in 1878 when that vessel escorted *Vega* round Mys Chelyuskina). Toll hoped to gather from Torgersen details as to the the navigability of the Bykovskiy Channel through the delta with a view to getting *Zarya* into the river. Vollosovich, meanwhile, delivered the expedition's mail to Yakutsk; it included a request to the Governor of Irkutsk to supply a replacement doctor for the expedition.

For almost a month after their departure Toll was left alone at Adzhergaydakh with a varying number of Yakut and Tungus visitors, including old Dzhergeli, his companion and guide on his earlier expeditions. Toll took pains to absorb as much detail of the local culture and atmosphere as possible and his journal for this period provides a fascinating insight into conditions in this remote corner of the Empire at this time.

Finally, on 19 March the long-awaited mail arrived, and simultaneously Brusnev returned from the Lena delta. For a few nights 20 people were crowded into the little hut. Brusnev reported that *Lena*, with a draught of 2.15 m, was barely able to navigate the Bykovskiy Channel; i.e. that it

was impassable for *Zarya*. However, Bukhta Tiksi, just to the east of the mouth of that channel, provided an excellent anchorage. Brusnev also brought a letter from Torgersen offering his services in any way that might be of use. Brusnev volunteered to remain in the area, survey the coast and the anchorage, and erect navigation beacons for *Zarya*.

On 22 March the first northbound party set out, bound for Mys Vysokiy on Novaya Sibir' to establish a cache of fish for dogfood for Birulya's summer survey work. Strizhev was in charge, accompanied by Nikolay Kurtakh, Basiley Chichag and Aleksey. Kurtakh knew the Mys Vysokiy area, having been there with Vollosovich the previous summer.

Two days later, accompanied by the Yakut Nikolay Omuk, Toll himself set off northwards. They crossed Proliv Lapteva in 10 hours of sledging on 25 March, and at Maloye Zimov'ye on the south coast of Ostrov Bol'shoy Lyakhovskiy, they caught up with Strizhev and his companions. After spending a couple of days in studying the exposures of massive ground ice outcropping in the coastal cliffs (and deducing that they represented buried Pleistocene glacier ice), on 30 March Toll continued his northward journey. From Ostrov Malyy Lyakhovskiy he made a detour to the northwest to visit and explore Ostrov Stolbovoy, reaching that island on the evening of 3 April. Toll had hoped to make a fairly protracted geological survey of the island, but shortage of dogfood and the fact that most of the outcrops were still buried under snow persuaded him to curtail his reconnaissance. On the morning of 7 April he and Omuk started northeast across the sea ice for Ostrov Kotel'nyy. They returned to the ship on 11 April to find everyone in good health except for Kolchak and Foma, who were complaining of rheumatism.

Late on the night of 17 April Nikolay Kurtakh and Basiley Chichag arrived from Novaya Sibir' with two sledges; they brought with them a letter from Strizhev to say that a depot had been established at Mys Vysokiy. They had parted company from Strizhev on Ostrov Faddeyevskiy on 10 April, when Strizhev returned to the mainland. Easter was celebrated with full ceremony: a midnight service and an Easter feast which featured reindeer meat and ptarmigan and a liberal amount of rum and brandy.

Then on 30 April the rather depleted ranks on board ship were augmented when Matisen and Zheleznikov returned from a stubborn attempt at sledging north to find "Zemlya Sannikova". They had left the ship on 14 April, bound for the mouth of the Reshetnikova on the north coast of Ostrov Kotel'nyy. From there they had headed northeast across the sea ice but were brought to a halt by a polynia after 13 km of progress (E. Toll, 1909; Vittenburg, 1960); they were unable to determine its width due to fog, and after two days of waiting vainly for it to close, they returned to land. A couple of days later they pushed north again from Mys Maksimovicha; after 40 km their route was barred by impassable pressure ridges and they were again forced to retreat. Abandoning any further attempts at locating "Zemlya Sannikova", the sledge party returned to *Zarya's* winter quarters via Ostrov Figurina, Ostrov Faddeyevskiy, Zemlya Bunge and Mikhaylov post on Ostrov Kotel'nyy. Toll was quite disappointed by this report but pleased by Matisen's report of having seen reindeer throughout the trip.

Just as in the previous year, 1 May saw the conclusion of the intensive meteorological programme, in order to provide time to prepare for various upcoming sledge trips. From now on the officer of the watch took weather observations three times daily. This change in routine also coincided with the onset of continuous daylight, which greatly helped morale as well as facilitating travelling.

Late on the evening of 7 May the watchkeeper unexpectedly announced the approach of a dog sledge. The new arrivals were Strizhev and the new medical officer, Viktor Nikolayevich Katin-Yartsev. Toll describes him as being "a sympathetic personality, tall, powerful and healthy, blonde with a small moustache and with good teeth which flash when he laughs" (E. Toll, 1909: 567). While in the middle of his final medical exams in 1897 he had been arrested and sent first to Irkutsk, then to Yakutsk as a political exile. Vollosovich had invited him to join the expedition on 4 March and once all the formalities had been settled he had started north on 19 March (Katin-Yartsev, 1904). The new medical officer wrote a detailed account of his trip north, by horse-drawn post sleigh, by reindeer, and finally by dog sledge, via Verkhoyansk, Ust'-yansk and Muksunovka. At this latter settlement he met Strizhev, who then started back north to deliver the new doctor to *Zarya*. His arrival was particularly welcome in that he had brought a large batch of personal mail with him; Toll alone received 17 letters from home.

The next major event occured only a few days later; on 11 May A. A. Byalinitskiy-Birulya, accompanied by three Yakuts, set off with three sledges and 45 dogs for Novaya Sibir', where they were to spend the summer in an all-round scientific survey of the island. Toll had arranged with Birulya that *Zarya* would attempt to pick his party up from Mys Vysokiy once navigation had opened, but failing that he and his men were adequately provisioned and equipped and mentally prepared to travel overland back to the mainland after freeze-up if necessary.

A few days later on 16 May another sledge party set out from the ship (E. Toll, 1909; Vittenburg, 1960): Kolchak and Strizhev headed west to Ostrov Belkovskiy in order to survey that island. There then followed a fairly quiet period on board. Toll and Zeberg were busy with final preparations for a major summer trip to Ostrov Bennetta; Matisen, Begichev and several of the sailors went hunting regularly with good success; and Katin-Yartsev was still

learning the ropes. Toll took him out to teach him some rudiments of geology in the field on 24 May.

Next day Kolchak and Strizhev returned; they had travelled round the entire coast of Ostrov Belkovskiy, mapping as they went. Off the south coast they had discovered a small, rocky island which they named Ostrov Strizheva. Kolchak took numerous notes on sea ice conditions and on the geology and also brought back hand specimens for Toll's collection.

After a period of intense preparation, which included the writing of numerous scientific reports and general progress reports, by 3 June Baron Toll was almost ready to start out for Ostrov Bennetta. On that date he handed Leytenant Matisen a sealed envelope with the annotation: "To be opened in the event that the expedition loses its ship and has to retreat to the mainland without me, or in the event of my death" (Matisen, 1903:68). The instructions inside covered a number of tasks which Matisen was to take care of prior to breakup; the main thrust of the orders, however, was that once *Zarya* was able to get under way again she should make every attempt to evacuate Birulya and his party from Novaya Sibir' and then the Baron's own party from Ostrov Bennetta. If, however, coal reserves dropped as low as 15 tonnes and either or both of the parties had still not been recovered, Matisen was to take the ship south to Bukhta Tiksi and, if possible, enter the Lena River (Matisen, 1903; Katin-Yartsev, 1904). One of the final sentences of these instructions has a significant bearing on subsequent events: "In that same event [i.e. if the ship cannot reach Ostrov Benetta] I shall try to return to the Novosibirskiye Ostrova prior to the onset of the severe winter cold, and then by the winter route to the mainland" (Matisen, 1903:68; Katin-Yartsev, 1904:110).

A further note read:

To the commander of the yacht *Zarya*, Leytenant Fedor Andreyevich Matisen.

I commission you to convey all the personnel of the Russian Polar Expedition, the scientific staff and the crew of the expedition ship, in the yacht *Zarya* or by other means referred to by me in my instructions of May 19, to the Siberian coast and then on to home. With a view to the efficient execution of this task, in the event that you are unsuccessful in taking me off Ostrov Bennetta, or in the event of my death, I transfer to you all the rights of leader of the expedition.

Baron Toll,
Zarya, Nerpich'ey Guba, May 30, 1902"
(E. Toll 1909:576).

Prior to his departure Toll also wrote a final telegram to be dispatched to his family:

Today I am setting off for Ostrov Bennetta. All is well. I ask you not to worry if *Zarya* does not pick us up from there. I hope to return to Novaya Sibir' before the winter and to the mainland during the winter, but if necessary I shall winter on Bennett; the birds alone will give us a year's supply of meat. In the latter case I shall return from Bennett in May of next year to Novaya Sibir' and by the summer route across the tundra from Svyatoy Nos to Bulun so that I shall be in Yakutsk by September. Details in my letter, Do svidaniya, Eduard."
(Vittenburg, 1960:163).

FIG. 9. Fridrikh Georgiyevich Zeberg, expedition astronomer-magnetologist.

FIG. 10. Nikolay Dyakonov (left) and Vasiliy Gorokhov (right); with Zeberg, Toll's companions on his journey to Ostrov Bennetta.

After supper on the evening of 5 June Baron von Toll set off with three dog sledges, accompanied by the astronomer F. G. Zeberg (Fig. 9) and the Yakuts Nikolay Dyakanov (Fig. 10) and Vasiliy Gorokhov (Fig. 10), bound for Ostrov Bennetta. Provisions, equipment and two two-man kayaks were lashed to the sledges. Toll's planned route was around the north coast of Ostrov Kotel'nyy, east to Mys Vysokiy and Novaya Sibir', thence north to

Ostrov Bennetta. Having explored the island he hoped to use it as a base for a further search for "Zemlya Sannikova". Two of the sailors, Tolstov and Yevtikheyev, escorted the party for a couple of days; they returned, with a collection of geological samples, four days later (Katin-Yartsev, 1904).

During the brief period between Toll's departure and the end of the sledging season several minor scientific trips were mounted from *Zarya*. On 3 June, i.e. actually a few days before the Baron's departure, Kolchak and Strizhev had set off to explore the interior of Ostrov Kotel'nyy, and having descended the Balyktakh, to explore Zemlya Bunge and Ostrov Faddéyevskiy (Matisen, 1903; Katin-Yartsev, 1904). They returned on 26 June, having investigated the great sand wastes of Zemlya Bunge and the massive ground-ice exposure on the south and southeast coasts of Ostrov Faddeyevskiy.

The new medical officer, who in Birulya's absence had become the resident ornithologist, was kept busy collecting and stuffing specimens as all migrants arrived from the south. But even he found time for two short trips: one in mid-June to collect Devonian coral fossils from an outcrop which Toll had seen at Mys Ogrina, some 20-25 km to the north, on which he was accompanied by Tolstov and Foma, and another with Tolstov by kayak, lasting from 6 to 11 July, to the mouth of the Chukotskaya to augment the ornithological collection and to set up a beacon at the mouth of that river. According to Katin-Yartsev, the beacon they erected was an impressive 8 m in height. Between 19 and 26 June Matisen and Bezborodov, travelling with one sledge, made another visit to Ostrov Belkovskiy, largely because during Kolchak's earlier visit the weather had been uncooperative as regards celestial observations. Matisen remedied this situation and also took a number of photos of various parts of the island.

FIG. 11. The navigation beacons erected on the entrance spits of Bukhta Nerpalakh.

During the month of June last-minute preparations were being made to ready to the ship for sea. A depot of provisions and dogfood was established in the magnetic hut on shore; beacons were set up on both entrance capes (Fig. 11), and the engineers began reassembling the engines. On 8 July a polynia appeared between the two spits and quickly grew in size; the ice in which *Zarya* was embedded was at this point still 90-105 cm thick. In case this ice broke up and the ship were pushed ashore Kolchak had begun blasting with guncotton, and Matisen ordered the work continued after his return (Matisen, 1903; Katin-Yartsev, 1904). Steam was raised on the evening of 10 July and next day the engine was tested. By 14 July *Zarya* was afloat again in the polynia at the mouth of the lagoon. This was cause for considerable relief since the ship had already been drifting helplessly around the lagoon, embedded in her ice floe. Pushing some floes aside, she now steamed out of the lagoon and anchored in the polynia outside.

There followed a lengthy period of frustrating and often tense waiting. Steam had to be maintained the whole time, so that the ship could take evasive action as the great ice masses drifted to and fro; driftwood was used exclusively for this purpose, with the men ferrying it from shore by boat daily. Matisen was frequently forced to shift his anchorage but even so the ship was nipped several times and on 18 July, driven shorewards by the ice, touched bottom with her stern briefly, although fortunately without damage. She was easily warped off again next day.

After a number of similar hazardous incidents, on 8 August the entire ice mass between Ostrov Kotel'nyy and Ostrov Belkovskiy, with *Zarya* firmly held in it, began drifting south-southwest. A week later, still beset in the ice, the ship was off Mys Medvezh'iy at the southern tip of Ostrov Kotel'nyy. To the south Ostrov Malyy Lyakhovskiy was visible. But at this point the wind changed, the ice slackened, and Matisen began fighting his way back north. One extensive polynia even allowed *Zarya* to cover 80 km in open water. On the evening of 17August she eased in through the entrance of Nerpich'ya Guba once again, to the great delight of the two Yakuts who had been left ashore there in charge of all the expedition's dogs. Matisen immediately ordered the boiler fires drawn so that repairs could be made to a leak in the boiler.

Zarya lay in the lagoon for three days while these repairs were being made and firewood was brought aboard. Then the dogs and their two keepers, Semen and Gavriliy, were embarked. By this stage the first snowfall had mantled the land and some new ice was starting to form. On 21 August, with only 60 tonnes of coal left, Matisen took his ship to sea again, aiming to push east around the north coast of the archipelago and then to Ostrov Bennetta. But ice conditions dictated otherwise: after two days of battling the ice off the northwest coast of Ostrov Kotel'nyy with no signs of ice conditions improving, Matisen decided to try another tack; he would round Ostrov Kotel'nyy on the

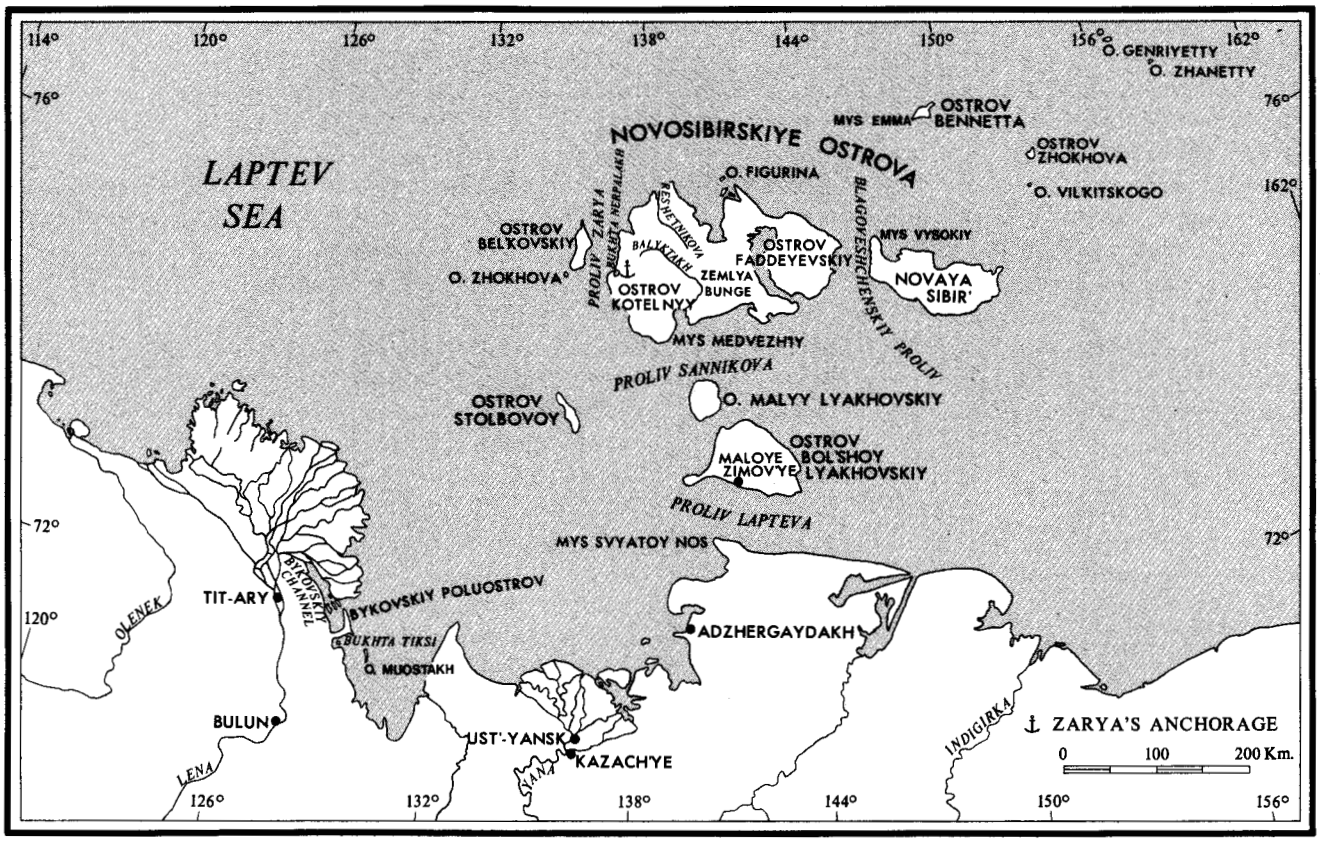

FIG. 12. The Novosibirskiye Ostrova and the Lena delta showing the features associated with Toll's expedition, and with the search for Toll.

south and try reaching Mys Vysokiy via Blagoveshchenskiy Proliv between Ostrov Faddeyevskiy and Novaya Sibir' (Matisen, 1903; Katin-Yartsev, 1904). This plan was implemented with relative ease since from the southern tip of Ostrov Belkovskiy *Zarya* was steaming in open water; thus *Zarya* was the first ship to navigate both Proliv Zarya (between Ostrov Belkovskiy and Ostrov Kotel'nyy) and Proliv Sannikova (between the latter island and Ostrov Malyy Lyakhovskiy). This latter strait was named Proliv Katin-Yartseva after the doctor, but the name has not been retained.

By 25 August *Zarya* was pushing north into the narrowing waters of Blagoveschenskiy Proliv. Soon she found herself battling close ice which was drifting south with a strong current; depths were becoming dangerously shallow and thick fog complicated the situation. A further problem was that the propeller shaft thrust bearing had again developed a serious leak. Moving to the centre of the strait so that the ice drift would not so readily carry his ship ashore, Matisen moored to ice anchors and stopped engines while the engineers repacked the bearing. This task completed, Matisen again began pushing north, but at an estimated distance of only 24 km from Mys Vysokiy, where Birulya and his companions were waiting, he had to concede defeat due to impassable ice. Begichev volunteered to try to get ashore with a whaleboat but Matisen refused this offer on the grounds that he might temporarily lose his bosun and a boat's crew if ice conditions prevented their return (Bolotnikov, 1949). Turning south, Matisen decided to try to reach Mys Vysokiy and Ostrov Bennetta by heading east around Novaya Sibir'.

By noon on 29 August *Zarya* was steaming north in open, ice-free waters some 30 km east of Novaya Sibir'. The next afternoon, with that island still in sight to port, a small, rocky, hat-shaped island was sighted to the northeast. Matisen thought it might be Ostrov Genrietty or Ostrov Zhannetta, but his known distance from them (about 190 km) and the fact that he could see only one island also raised the possibility that it was a new island. In all probability, indeed, it was Ostrov Vil'kitskogo, "discovered" by the expedition on board *Taymyr* in 1913 (Starokadomskiy, 1976).

Pushing on north and northwest through increasingly heavy ice, by the morning of 1 September, off the northeast coast of Novaya Sibir', Matisen was forced to abandon the struggle. Ahead there was nothing but impassable ice; fuel reserves were getting dangerously low; and the start of the winter freeze-up could not be far away. Clearly any further attempt at reaching Ostrov Bennetta or even Mys Vysokiy from this approach would risk the ship's

becoming permanently beset. Reluctantly Matisen again turned back south.

But having promised Baron von Toll to make every possible effort to evacuate his party from Ostrov Bennetta, Matisen refused to give up, even now; he resolved to make one last attempt from the northwest angle of Ostrov Kotel'nyy. Ice conditions in Proliv Sannikova had now deteriorated greatly, and off the south coast of Zemlya Bunge on 4 September a vicious blizzard lashed the ship. The heavy ice now continued all the way north along the west coast of Ostrov Kotel'nyy, but still Matisen pushed northwards. On 5 September the last of the coal was transferred from the hold to the bunkers and was found to amount to only nine tonnes; this was sufficient for only two days' steaming. In view of this, and of the fact that the date until which Toll had agreed to wait at Mys Emma (3 September) had now passed, Matisen finally admitted defeat. Having opened the Baron's sealed instructions, intended for just this situation, he reluctantly headed south for Bukhta Tiksi (Fig. 12).

Zarya made slow progress southwards past Ostrov Belkovskiy and Ostrov Stolbovoy due to heavy ice. Then on the morning of 6 September at 73° 50′N she finally emerged into open water; unfortunately there was a fresh wind and a heavy sea and many of those on board, especially the Yakuts, suffered acutely from seasickness (Katin-Yartsev, 1904). On the morning of the 7th the peaks of the Kharaulaksiye Gory, east of the Lena delta, hove into view; slowly Matisen eased his ship south past Ostrov Mostakh, sounding as he went, and anchored for the night off the south end of Bykovskiy Poluostrov. In order to alert Brusnev, who should, by arrangement, be somewhere in the area, an electric lamp was hoisted to the masthead.

Next morning *Zarya* slowly glided into Bukhta Tiksi; a beacon was sighted on shore, then a hut with people. Kolchak and Katin-Yartsev took a boat ashore, to be warmly greeted by Brusnev and three Yakut companions; one of them was old Dzhergeli.

Brusnev reported that the old steamer, *Lena*, was to make a special run north from Tit-Ary (her usual terminus) out through the delta to make rendezvous with *Zarya* at Bukhta Tiksi. Since there was still no sign of her Matisen decided to make preparations for taking *Zarya* up the Bykovskiy Channel if possible. On 10 September Kolchak portaged a four-oar boat by reindeer sledge across the isthmus joining Poluostrov Bykovskiy to the mainland, with the intention of starting a sounding survey of the Bykovskiy Channel. But that evening at Mys Bykovskiy he learned that *Lena* had left there for Bukhta Tiksi earlier that day. He hurriedly started back next morning, reaching the ship on the morning of the 12th (Matisen, 1903; Katin-Yartsev, 1904). *Lena* had still not arrived, but she hove into view at noon, having ridden out a storm in the lee of Ostrov Mostakh.

On board were V. E. Gorinovich, representative for the Gromov Company (which owned *Lena*), the Bulun policeman P. A. Kvasnikov, and the Norwegian J. Torgersen. Their news as to depths in the Bykovskiy Channel was far from encouraging; *Lena* herself had touched bottom several times in depths of less than 1 m. The only solution was to transship everything to *Lena* and leave *Zarya* at Bukhta Tiksi. This had to be rather a rushed operation, however, since, afraid of his ship being frozen in, Captain A. Yu. Yershevskiy had orders from Gromov, the owner, to start south by 14 September at the very latest. Torgersen agreed to keep an eye on *Zarya* over the winter, with the assistance of Tolstov, *Lena*'s second engineer, and four Yakuts, until the ship was solidly frozen in. Tolstov and the Yakuts would then travel to Ust'-yansk to join Brusnev.

A suitable wintering site for *Zarya* was found in the lee of Ostrov Brusneva. Next morning (14 September) both ships moved to this anchorage; *Lena* moored alongside *Zarya* and the transshipment of equipment, specimens and personal belongings began.

In the midst of this ordered confusion a tragic accident occurred. While cleaning a rifle Bezborodov accidentally shot stoker Nosov in the lower leg with a soft-nosed bullet. As Katin-Yartsev (1904) graphically describes, the wound was a hideous one; the tibia was totally shattered and the exit wound was a gaping hole. Having dressed the wound as well as he could, Katin-Yartsev supervised the tricky operation of transferring the wounded man to one of *Lena*'s diminutive cabins. At 2:00 P.M. on 15 September *Lena* unmoored and put to sea; *Zarya* dipped her flag in salute.

The adventures of the Russian Polar Expedition were still far from over, however. Groping through the shoal waters towards the entrance to Bykovskiy Channel, on the morning of 16 September *Lena* ran hard aground near the top of the tide. Soon an extensive sandbar was emerging around the ship and she lay high and dry (Bolotnikov, 1949); in addition the sight of new ice starting to make on the sea was far from encouraging. The new ice and the extremely shoal waters defeated an attempt to get ashore by boat. Particularly with a severely wounded man on board, the prospects were far from bright. Matisen and V. E. Gorinovich decided to pool all the foodstuffs on board and initiated a system of rationing.

Finally, on the evening of the 20th, with an onshore wind assisting the flood tide, the water level rose high enough for *Lena* to be able to warp herself off the shoal. By now Nosov's condition was grave; the wound was septic but Katin-Yartsev could not amputate with the limited facilities available; he could only keep the wound as clean as possible and hope. Entering Bykovskiy Channel *Lena* made slow but steady progress upstsream. On the evening of the 22nd at Tit-ary Captain Yershevskiy took in tow an iron barge he had left there on his downstream run.

At 6:30 A.M. the next morning Nosov died of septicemia; his body was moved to a large empty cabin on the barge. *Lena* reached Bulun on the 25th and here Nosov was buried in the local cemetery. At this point Brusnev, who had travelled this far in order to discuss details of a search expedition for Toll and Birulya with Matisen, left the ship to return to Ust'-Yansk. *Lena* meanwhile continued her leisurely progress upriver. She reached Yakutsk on 13 October; having travelled overland to Irkutsk after freeze-up, the expedition members took the train from there, reaching St. Petersburg early in December 1903.

Even before the expedition members had reached the capital the first preliminary steps were being taken to mount a rescue expedition to Novaya Sibir'. Matisen had given Brusnev a letter from Baron von Toll, which the latter had written prior to leaving for Ostrov Bennetta (Brusnev, 1904). In it he asked that, if *Zarya* were unable to evacuate him from the island, Brusnev should send several sledges to Novaya Sibir' to meet him in the spring with food, clothing, etc. Brusnev began his preparations almost immediately since an almost total failure of the local fisheries meant that dogfood was in extremely short supply, and he would have to scrape together enough for an expedition from a very wide area. In the meantime, in case either Toll's or Birulya's party returned to the mainland on their own, Brusnev sent food and fur clothing to Chaypovarnya (Mys Svyatoy Nos) and arranged for Dzhergeli and his son to stay at Adzhergaydakh in order to bring either or both parties south to Kazach'ye.

Initially Brusnev was planning to set off for Novaya Sibir' from Kazach'ye in mid-January 1903, but then on 10 January Birulya arrived safely with his party at Kazach'ye. He reported that when they had left Novaya Sibir' on 17 December there was still no sign of the Baron's party. He also brought the news that he had left a large reserve of food and fuel at Mys Vysokiy and hence Brusnev decided to delay his departure until 24 February (Brusnev, 1904).

Soon after Matisen and Kolchak returned to St. Petersburg in December they were invited to present a report to the Academy of Sciences' "Committee for Mounting the Russian Polar Expedition" (Kolchak, 1904). The Committee was seriously concerned about Baron von Toll's situation on Ostrov Bennetta; it was felt that while Brusnev's plan to send parties to Novaya Sibir' to wait for the Baron's arrival was quite sound, something more positive was also needed. Initially it was proposed that coal be transported to Bukhta Tiksi and that Leytenant Matisen should take *Zarya* to sea again in the summer of 1903 in yet another attempt to reach Ostrov Bennetta (Vittenburg, 1960). Matisen opposed this suggestion (Bolotnikov, 1949; Pinkhenson, 1962), partly on the grounds of *Zarya*'s very battered condition and partly because of the time factor; it would barely be possible to organize another voyage aboard *Zarya* in time for the start of the navigation season, and in the meantime there was a very good chance that Toll would have left Ostrov Bennetta and crossed to the Novosibirskiye Ostrova.

In view of these logical arguments it was decided to send a rescue party to Ostrov Bennetta by sledge and boat; the man selected to lead the party was Leytenant A. V. Kolchak, who received his orders on 22 January 1903 (Kolchak, 1904, 1906). Two of *Zarya*'s crew, the bosun Begichev and seaman Zheleznikov, volunteered to go with him; for the rest of the party it was suggested that Kolchak try to recruit some seal hunters from Mezen' on the White Sea, men with a lifetime's experience of handling small boats in ice.

With this aim, and also to examine the boats the seal hunters used with a view possibly to transporting some of them to the Novosibirskiye Ostrova, Kolchak left for Mezen' on 1 February. There he succeeded in hiring six seal hunters but decided that given the logistical problems and the time factor it was not feasible to transport one of their boats to Siberia. Instead Kolchak opted to take one of *Zarya*'s whaleboats; to save time he sent a telegram from Arkhangel'sk to Pavel Vasil'yevich Olenin, curator of the Yakutsk Museum, asking him to travel north to Bukhta Tiksi and transport one of the ship's boats by dogteam to Kazach'ye. Kolchak got back to St. Petersburg on 17 February and on the 22nd he started east by train for Irkutsk. Travelling with Kolchak's party was Leytenant Matisen; his instructions were to recover the scientific equipment from *Zarya*, unload the ship and ensure that she was safe from ice movement during the breakup. From that point on the ship would become the property of the Gromov Company (Matisen, 1904).

While Matisen, Kolchak and his party were rolling east on the Trans-Siberian, Brusnev's expedition was getting under way. With five sledges, 65 dogs and a party of seven (including Tolstov), Brusnev set off north from Kazach'ye on 24 February, bound for Novaya Sibir' (Brusnev, 1904).

Kolchak reached Kazach'ye on 17 April and on the 21st Olenin, assisted by Begichev, arrived with the whaleboat, which they had sledged the 420 km from Bukhta Tiksi using two sledges and 24 dogs (Bolotnikov, 1949). Somehow Kolchak managed to assemble 160 dogs, some from as far away as the Indigirka. To alleviate the severe shortage of fish for dogfood, he was obliged to buy reindeer meat instead.

The expedition which got under way from Kazach'ye in early May consisted of the whaleboat, mounted on two sledges and hauled by 30 dogs, another ten sledges hauled by 13 dogs each, and 17 men, including eight Yakut dog drivers. Rough sea ice, the onset of the melt, the heavy loads and the poor condition of the dogs made for very slow progress. However, some success in hunting reindeer on Ostrov Bol'shoy Lyakhovskiy eased the situation somewhat by providing dogfood.

On 5 June the party reached Mikhaylov post on the south coast of Ostrov Kotel'nyy. The dogs were split between two groups who were to spend the summer on that island; their primary task was to keep as many dogs as possible alive over the summer by hunting. Kolchak himself, with a six-man boat's crew, stayed at Mikhaylov post, impatiently waiting for the ice to break up.

Finally, by 31 July the ice had sufficiently broken up in Proliv Lapteva that they were able to load the boat and get under way. Despite almost constant chilling, wet snow, maddeningly shallow depths along the south coasts of Ostrov Kotel'nyy, Zemlya Bunge and Ostrov Faddeyevskiy, and heavy ice drifting rapidly to and fro with the tides in Proliv Blagoveshchenskiy, on 13 August they reached Brusnev's camp at Mys Visokiy on Novaya Sibir'.

On the evening of the 15th Kolchak and his companions put to sea again, northward-bound across the open ocean for Ostrov Bennetta; the sea was almost completely ice-free and dead calm, and apart from brief stops on large ice floes to eat and rest the party made good progress under sail and oars. Despite thick fog on the latter part of the voyage Kolchak managed to make a perfect landfall on Ostrov Bennetta at 1:30 P.M. on 17 August. Given the foggy conditions this was an impressive piece of seamanship. As the whaleboat eased ashore on the south coast of the island Zheleznikov, standing in the bow, fished the lid of an aluminum pan from the shallows with a boathook. Clearly Toll's party had reached the island (Kolchak, 1904,1906).

The next day after a good rest, Kolchak, Begichev and Rogachev walked to Mys Emma where Toll had arranged to leave any messages. There they found a cairn with a kayak paddle projecting from it; at the foot of the cairn was a bottle containing three notes. The first announced the safe arrival of the Baron and his party on the island on 3 August 1902; the second contained a map of the island and directions as to how to find the hut which Toll and his men had built; and the third, written by Zeberg, clarified the second and noted a change in the location of the hut.

Kolchak and his party located the hut without any difficulty, but there was no sign of life. It was half filled with snow which had turned almost into ice, from which the rocks of a fireplace protruded. An assortment of abandoned equipment lay scattered around the hut. In a box among the rocks of the fireplace they found the fourth and last document, addressed to Grand Duke Konstantin, President of the Academy of Sciences.

Toll reported (1909) that having left *Zarya*'s winter quarters they had sledged east to Mys Vysokiy. From there they had started north across the sea ice on 13 July 1902. Breakup was imminent and only 5 km from shore, where the party had camped on a floe, the ice began disintegrating during a storm. Since further travel would now be by kayak the dogs were killed. An opportune northerly drift carried the party's floe some 80 km northwards in 4½ days. When the drift direction reversed, the party took to the kayaks and safely covered the remaining 37 km, reaching Ostrov Bennetta on 3 August.

Toll's note reported briefly on their exploration of Ostrov Bennetta and ended with a message that, even now, leaves many questions unanswered: "Today we start on the return trip south. Our travelling supplies are sufficient for 14-20 days. We are all in good health. Baron E. von Toll. Guba Pavla Keppena, Ostrov Bennetta, October 26 (November 8). 76° 38′N, 149° 42′E" (E. Toll, 1909:592).

Further excavation among the snow and debris failed to turn up any further clues as to the fate of the Baron's party, so Kolchak set off back across the island to his camp, arriving at 6:00 A.M. on 19 August. He sent three men back to make an even more careful search of the hut and to retrieve some of the Baron's geological specimens. Next day, having built a cairn at their campsite and having erected a board with the dates of his own and Toll's visits to the island, Kolchak and his party started south, taking with them part of the Baron's geological collections.

Ice conditions were now very different; there was a great deal of ice and as they approached Novaya Sibir' they had to contend with strong winds, heavy seas and snow. They reached Brusnev's camp again on 24 August and after a rest of three days (Brusnev, 1904) they set off once again across Blagoveshchenskiy Proliv. Conditions were as bad as ever here and it took them over two days to reach Ostrov Faddeyevskiy.

As they pushed south along the coast of Ostrov Faddeyevskiy, then west to Ostrov Kotel'nyy, there were frequent falls of snow and grease ice began forming on the sea. Nonetheless they reached Mikhaylov post safely on 9 September. Here they were joined by Olenin's party and the other group which had summered on Ostrov Kotel'nyy. Both had done an excellent job of keeping their dogs alive through their hunting efforts.

There now began a frustrating wait for the straits to freeze. Not until 29 November were Kolchak and his men able to start south by dog sledge (Bolotnikov, 1949); even then the ice was extremely thin in places. Having crossed Proliv Lapteva for the last time, Kolchak reached Kazach'ye on 14 December, having executed a very impressive arctic expedition in its own right. On 19 December Brusnev and his party arrived at Kazach'ye from Novaya Sibir'.

Reasoning that Toll's party must have met with an accident north of Novaya Sibir', Brusnev had concluded that if anything had been washed ashore it would have reached the coast of Novaya Sibir' if anywhere, and had decided to make one last swing around the north and east coasts of the island (Brusnev, 1904). He had set off from his camp near Mys Vysokiy on 5 September and was back again by 1 October having made a careful search of the entire coast.

Blagoveshchenskiy Proliv had frozen over on 1 Decem-

ber and on the 4th Brusnev had started for home with three sledges. On reaching Ostrov Bol'shoy Lyakhovskiy he deduced, correctly, from the tracks that Kolchak and his party were not far ahead. He and his party reached the mainland safely on 12 December, and by the 19th had joined Kolchak at Kazach'ye.

Begichev was dispatched south on 23 December with an urgent telegram containing a summary of the expedition's activities, and the main party followed on 2 January. By this time the temperature at Kazach'ye had dropped to -55°C, and at Verkhoyansk when the expedition passed through in early January 1904, it was -60°C. The party finally reached Irkutsk on 10 March and there split up, Kolchak and Begichev heading east to join the Pacific squadron, embroiled with the Japanese at Port Arthur (Kolchak, 1904), and the remainder east to St. Petersburg.

This journey of Kolchak's by dog sledge and whaleboat out to Ostrov Bennetta and back in search of news as to Baron Toll's fate is one which rivals the efforts of many of the better-known arctic explorers. Ironically, however, in view of Kolchak's later role as commander of the White Russian forces in Siberia, his name has been almost totally erased from Soviet versions of the history of the Russian Polar Expedition. Some accounts, e.g.those of Vittenburg (1960; Pinkhenson, 1962) or Starokadomskiy (1976) simply do not mention Kolchak by name; at the other extreme, on reading Bolotnikov's account (1949) one might be excused for assuming that Begichev, the bosun, had been in sole command of the expedition to Ostrov Bennetta.

To complete the record of the Russian Polar Expedition, having travelled east by rail with Kolchak to Irkutsk early in 1903, Leytenant Matisen had also headed north, bound for *Zarya*'s wintering site at Bukhta Tiksi (Matisen, 1904). Accompanied by Rastorguyev and Ogrin, he reached the deserted ship on 21 April and spent the first few days digging her clear of snow. Hence he and his party were in residence when Olenin arrived to pick up one of the ship's whaleboats and were able to help him get under way. Then began a spell of unrelenting hard work for Matisen and his men; they stripped much of the ship's equipment, packed all the scientific equipment, and hauled everything ashore by reindeer sledge. This work was finished by 24 June. Since the hull was leaking quite badly, requiring the use of the hand pumps every two to three days, Matisen beached the ship and made her fast to a deadman on shore, only some 60 m from the ship. The hull was then allowed to fill with water. Matisen spent the next few weeks in sounding and charting the approaches to Bukhta Tiksi.

On 1 August 1903, *Lena* dropped anchor in Bukhta Tiksi for the second time within a year. Matisen was now able to hand over *Zarya* and much of the stores which had been landed to Captain Yershevskiy, representing the Gromov Company; personal items which had been overlooked and scientific equipment were forwarded to St. Petersburg. On 6 August Leytenant Matisen lowered the flag of the Neva Yacht Club for the last time and left *Zarya*. Nothing further was ever done with her, and the remains of the ship still lie at Bukhta Tiksi. Matisen returned to Yakutsk on board *Lena*.

By the time Kolchak's report reached St. Petersburg, some 15 months had elapsed since Toll and his companhad left Ostrov Bennetta; in view of this time lapse, and the lack of any clue as to where a search might be focussed, no further expeditions were mounted to search for the Baron and his companions. Nonetheless the committee responsible for the expedition authorized the posting of a reward of 5000 roubles for the discovery of the party, or of 2500 roubles for proof of definite traces of them (E. Toll, 1909). Notices of this reward were sent to Yakutsk, Yeniseysk, Arkhangel'sk and Mezen' for distribution among hunters and trappers. Translated into the appropriate languages, the announcement of the reward was also sent to the British, American, French, Italian, German, Swedish and Norwegian governments. Despite these efforts no trace of Baron von Toll and his party has ever been discovered. On 5 December 1904 the Committee of the Academy of Sciences released a statement to the effect that all members of Toll's party must be considered dead (Pinkhenson, 1962).

The real mystery concerning Toll's death is that he should have elected to leave Ostrov Bennetta at a time when the ice conditions would still have been predictably treacherous and when the period of winter darkness had already begun. According to the weather records kept by Birulya near Mys Vysokiy, at the time Toll and his party started south the temperature was fluctuating between -18° and -25°C. Under these conditions the ice south of Ostrov Bennetta would have been a maze of pressure ridges, level floes, open leads and polynias and treacherous areas of thin ice powdered with new snow. The kayaks and paddles would rapidly have become encased in ice as the party travelled across polynias, and the fragile kayak skins would have quickly been sliced open by new ice.

Kolchak (1906), who was probably as familiar with these potential hazards as anyone, has presented some logical arguments as to what might have driven Toll to embark on such a trip. The party still had adequate shelter and fuel on Ostrov Bennetta, so the motivation must have been lack of sufficient food to last the entire winter. Kolchak found three bearskins on the island; the meat of three bears should have sustained a party of four for a good part of the winter. Also in his message left in the hut Toll referred to killing a number of reindeer. And finally, Ostrov Bennetta teems with birds, especially murres, in summer, yet among the items Kolchak found were 30 shotgun shells, indicating that shortage of ammunition was clearly not the problem.

Kolchak argued that the presence of reindeer on the

island, combined with ill-placed optimism regarding *Zarya*'s chances of reaching the island, had lulled the Baron and his companions into a false sense of security, and that they had not laid in any significant reserves of food over the summer. But the reindeer herd totalled only 30 and those that were not shot may well have fled out onto the sea ice; by this time the seabirds had probably migrated south. With inadequate food reserves to survive until the sun reappeared, Toll and his companions must have been forced to attempt an emergency crossing to Novaya Sibir' at probably the worst time of the year. This is as logical a reconstruction as one can make with the information available, and it is unlikely that any further clues will ever come to light after this lapse of time.

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