Scientia Canadensis
Canadian Journal of the History of Science, Technology and Medicine
Revue canadienne d'histoire des sciences, des techniques et de la médecine

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Volume 44, Number 1, 2022

Photography: Science, Technology and Practice

URI: https://id.erudit.org/iderudit/1098140ar
DOI: https://doi.org/10.7202/1098140ar

See table of contents

Publisher(s)

CSTHA/AHSTC

ISSN

1918-7750 (digital)

Explore this journal

Cite this article

Fjellestad, M. T. (2022). Photography in the Arctic Archipelago during the First International Polar Year, 1882–1883. *Scientia Canadensis*, *44*(1), 50–67. https://doi.org/10.7202/1098140ar

Article abstract

August 1, 1882, marked the start of the First International Polar Year, IPY-1, when natural science researchers conducted observations from stations positioned across the Arctic and Antarctic. IPY-1 took place as photography increasingly played a part in Arctic exploration, and with the polar year came an opportunity to further photographic experimentation and the emerging photographic documentation of Arctic lands. Here, I do a first review of the use of photography during three IPY-1 expeditions to the Arctic Archipelago, arguing that focused and strategic planning was key to the development of Arctic photography from an almost incidental expedition activity to a ubiquitous pursuit for images.

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Abstract: *August 1, 1882, marked the start of the First International Polar Year, IPY-1, when natural science researchers conducted observations from stations positioned across the Arctic and Antarctic. IPY-1 took place as photography increasingly played a part in Arctic exploration, and with the polar year came an opportunity to further photographic experimentation and the emerging photographic documentation of Arctic lands. Here, I do a first review of the use of photography during three IPY-1 expeditions to the Arctic Archipelago, arguing that focused and strategic planning was key to the development of Arctic photography from an almost incidental expedition activity to a ubiquitous pursuit for images.*

Résumé : *Le 1er août 1882 a marqué le début de la première Année polaire internationale (API1), au cours de laquelle les scientifiques ont effectué des observations depuis des stations situées dans l'Arctique et l'Antarctique. L'API1 a eu lieu alors que la photographie prenait de plus en plus d'importance dans l'exploration de l'Arctique, et cette année polaire a été l'occasion de poursuivre l'expérimentation photographique dans l'Arctique. Cet article examine la photographie au cours de trois expéditions dans l'Arctique pendant l'API1, soutenant qu'au cours de celles-ci, la photographie arctique est passée d'une activité d'expédition presque accessoire à une recherche intentionnelle et continue d'images.*

Key words: Adolphus Greeley, Arctic Archipelago, George W. Rice, International Polar Year, Photography

August 1, 1882 marked the official start of what would become known as the First International Polar Year, IPY-1. Over the course of a year, scientists conducted observations from 14 stations positioned across the Arctic and Antarctic (**Fig. 1**).[1] Organizers hoped that collecting and comparing synchronized observations in meteorology and geophysics would, through focused effort and international collaboration, further polar research in a way never seen before. IPY-1 took place as photography increasingly played a part in Arctic exploration, and in the communication of such activities to various audiences, from policy-makers to the general public. The Polar Year thus represented a unique opportunity for furthering photographic experimentation in Arctic conditions and contributing to an emerging photographic documentation of Arctic lands. In practice, however, the participating countries made uneven use of the still-developing technology. Here, I examine the use of photography during three IPY-1 expeditions to what is now the Canadian Arctic Archipelago. These were neither the earliest instances of Arctic photography nor the most successful; however, their varied approaches integrated in the IPY-1 framework make them well suited to illustrate the medium's early trajectory in Arctic scientific work. I argue that focused, strategic planning was key for the development of Arctic photography in its transformation from an almost incidental expedition activity to a ubiquitous pursuit of images.

 Marthe Tolnes Fjellestad, "Photography in the Arctic Archipelago during the First International Polar Year, 1882–1883," *Scientia Canadensis* 44, no. 1 (2022): 50-67.

From Exploration to Science

The execution of IPY-1 hinged on international collaboration and the coordination of continued scientific observation at carefully selected locations. At the time, these were fairly radical ideas, as previous Arctic and Antarctic exploits were predominantly driven by imperialist and nationalist interests in geographic exploration and commerce. While IPY-1 did not do away with such concerns and approaches to Arctic exploration, it can be seen as the starting point for the international partnerships that characterize much polar science today, from the makeup of internationally diverse research teams and shared use of transport, equipment, and even research stations, to the co-authoring of papers.[2] As Nanna K. L. Kaalund points out, IPY-1 also represents a "transition in the [way] established scientific practices took place, from a focus on general scientific investigation in the Arctic to a more coherent Arctic science."[3] As early as 1882, at the outset of IPY-1, British Royal Navy Lieutenant George T. Temple stated that with IPY-1, "polar investigation … might now be considered as an accepted branch of study."[4]

The idea for IPY-1 originated with Austrian naval officer Karl Weyprecht who, following his return from the Austro-Hungarian North Pole Expedition of 1872-1874, suggested in a presentation to the Academy of Sciences in Vienna that Arctic science should be based on systematic observation.[5] Other key individuals involved with the Polar Year were Georg von Neumayer—German geophysicist, explorer, and first Chairman of the International Polar Commission (IPC), 1879-1880—and Swiss-born Heinrich Wild, head of the Main Physical Observatory in St. Petersburg and, from 1880, second Chairman of the IPC.[6] As plans for IPY-1 took form in the 1870s, "political will did not match scientific will and this created problems" for the mission's planning and execution.[7] Only if enough nations agreed to fund and operate a minimum number of research stations would the project produce significant scientific results.[8] Between 1879 and 1881, representatives from several polar countries met at three specifically convened conferences to gauge interest, secure participation, and draft observation instructions. Despite the organizers' enthusiasm, getting polar nations to commit to a plan took time, and the start date for what became the Polar Year was repeatedly postponed.

Twelve countries, including Canada, eventually participated in IPY-1. Of these, the UK was particularly late to commit and long remained lukewarm to the scheme, a factor that would directly influence Canada's involvement. Scholars have cited at least two issues as central to British reluctance: first, the focus on observation rather than more traditional exploration with a view to resource extraction and development, and second, the prohibitive costs.[9] Early in April of 1882, however, the Canadian government announced that it would support a British expedition with $4,000.[10] This may well have been what swayed the British government, as the same day, mere months before the start of the observation year, the UK committed to operate a meteorological observation station at Fort Rae in the Northwest Territories.[11] As noted by Kaalund, Canada's involvement in this venture was "supportive" though the government "did not take part in determining the makeup of the expedition."[12]

Before the observation year commenced, the newly formed International Polar Commission (IPC) laid out overall aims and instructions to gather directly comparable observations in a range of fields, focusing in particular on meteorology and weather

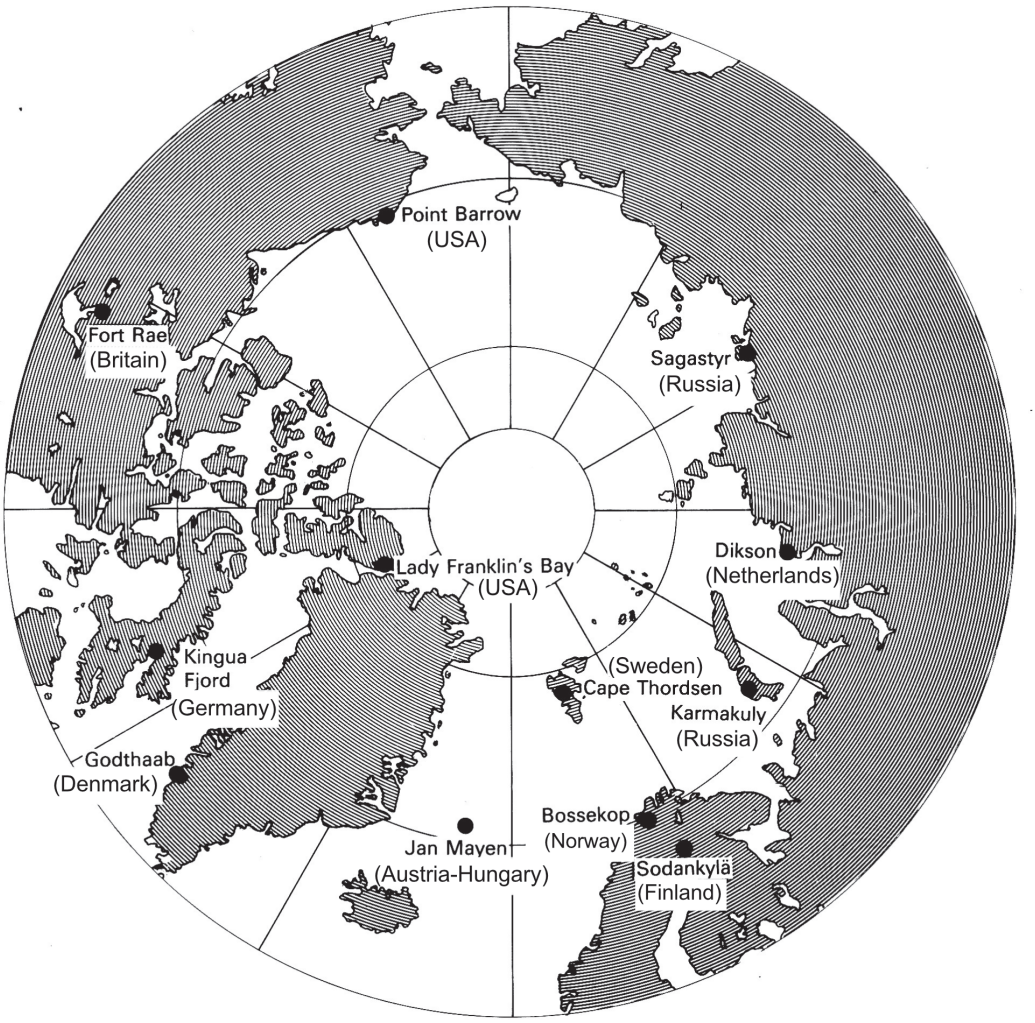
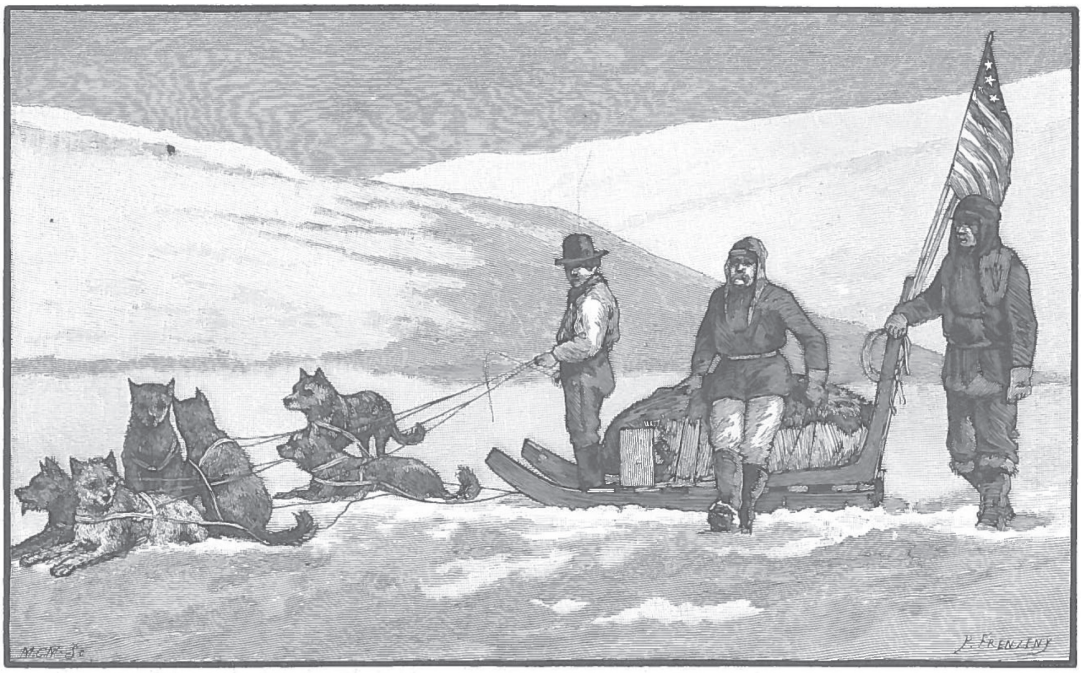


Figure 1. *Map of the 12 Arctic IPY-1 stations. From G.A. Corby, "The First International Polar Year (1882/83)," WMO Bulletin 31, no. 3 (1982): 201. Country names in brackets added by M. T. Fjellestad.*

forecasting, areas of enormous importance for international trade and economy. The "necessary observations" were to include meteorological, magnetic, auroral, and astronomical data, and to this end, IPC's instructions detailed the use of verified and standardised measuring instruments.[13] As Sydney Chapman points out, "technical observing experience" was not, at that point, well developed in polar exploration, and despite the Greenwich Magnetic Observatory's standardized use of photographic registration of meteorological and astronomical observations, only one IPY-1 expedition—that of France in the Antarctic—chose to employ photographic registration of magnetic observations.[14] Today, we can only speculate as to why the IPC did not specify or even suggest the use of photography. One possibility is that the Commission overlooked the potential benefits of the still-developing technology; another is that it considered the likelihood of obtaining comparable results so slim that it would not justify the time and effort needed to train expedition members. As it were, the variety of observations and the



LIEUT. LOCKWOOD, BRAINARD, AND CHRISTIANSEN RETURNING FROM 83° 24′ N.

(*From a photograph.*)

Figure 2. *Full-page illustration from Adolphus Greely,* ***Three Years of Arctic Service, An Account of the Lady Franklin Bay Expedition of 1881–84 and the Attainment of the Farthest North****, Vol. 1 (London: Richard Bentley and Son, 1886), 347. Wood engraving by Paul Frenzeny from a photograph by George W. Rice. Note the changes to the original negative shown in Figure 3; the dogs in particular have had a makeover.*

frequency of observation times constituted a taxing scientific programme for expedition.

To succeed, the various research teams had to balance scientific expertise and skill with experience from expeditions and familiarity with local Arctic conditions. As such, they included naval officers, sailors, and surgeons, scientists from disciplines such as astronomy, physics, and botany, as well as surveyors, carpenters, and cooks. Though handpicked, their backgrounds and previous experiences on scientific observations differed considerably, as did each expedition team's composition, size, and preparation time. These differences, despite the IPC's standardizing efforts, are reflected in the expeditions' official reports. Of varying length, format, and style, these reports typically contain observation data, sometimes framed by detailed analysis or an expedition narrative.[15] Together, these reports also provide the most comprehensive collection of IPY-1 photographs—or more accurately—illustrations based on photographs.[16]

Like photography itself, printing technologies were steadily developing, and the majority of images reproduced "from photographs" in the IPY-1 reports are photo-engravings, phototypes (a type of photoengraving), and lithographs, though the Dutch report did include a number of beautiful collotypes, or photolithographs.[17] Choosing engraving techniques rather than photographic image reproduction allowed authors and publishers to augment the sometimes technically lacking photographs to their liking, as seen in one image from the American expedition to Lady Franklin Bay. In it, we can see clearly in the published wood engraving (**Fig. 2**) a group of sled-dogs that appear blurred in the original photograph (**Fig. 3**). The engraver has also touched up

Figure 3. *"Lady Franklin Bay Expedition members Lt. Lockwood, Sgt. Brainard, and Eskimo leaving Conger, April." Photo: George W. Rice, 1881–1884. Digital file from b&w film copy neg. Courtesy the Library of Congress Prints and Photographs Division, Washington, D.C. Available from https://www.loc.gov/item/2006676074*

the line separating the snow-clad mountains in the background from the sky, its blue tones rendered invisible by nineteenth-century photographic chemistry.[18]

Early Photography in the Arctic Archipelago

By the time of IPY-1, exploration and mapping had taken place in the vast Arctic region for several decades, mainly under British leadership. Several attempts had also been made at photography. Western audiences had a seemingly insatiable appetite for images from the Far North, and photographic technology, increasingly popular in the 1860s and 1870s, promised views that were "true to nature" and taken "on the spot."[19] Belief in photography's "mechanical objectivity" and apparent lack of human agency persisted throughout the nineteenth century, albeit alongside a fascination for the medium's equally lauded artistic and subjective possibilities.[20] Extant photographs demonstrate that nineteenth-century photographers in the Arctic ascribed to both views, producing images with the express aim of documentation, but also for artistic purposes.

The first instance of a camera being taken to the Arctic is believed to have occurred during Sir John Franklin's 1845 expedition.[21] Several subsequent rescue expeditions included photographic equipment, and a small number of images from such expeditions

Figure 4. *"Hunting by steam in Melville Bay [Greenland], the party after a day's sport killing six Polar Bears within the twenty-four hours." Photo: Dunmore & Critcherson with Bradford, 1869. From an albumen positive print. Courtesy the J. Paul Getty Museum, Los Angeles. Available from https://artsandculture.google.com/asset/AgG_DtMGudyoWw*

have survived.[22] Also extant are photographs of Inuit people, taken from the mid-1860s on by Hudson's Bay Company (HBC) traders based in Little Whale River.[23] George McTavish, Bernard Rogan Ross, Charles Horetzky, James Cotter, James Anderson, and William Bell Malloch are known as the "Moose Factory Group," from the HBC station at Moose Factory where they were stationed.[24] In 1875, the British Arctic Expedition, led by Sir George Strong Nares, included two amateur photographers—Thomas Mitchell, assistant paymaster on board HMS *Discovery*, and his colleague George White, engineer on board HMS *Alert*—both of whom had access to cameras and dark room facilities. Nares's expedition set out with clear and stated photographic aims, and "throughout the northward trip, the photographers methodically photographed topographic features, in accordance with their instructions."[25] Most of Mitchell and White's extant photographs depict landscapes with and without their respective ships, while a small number are posed group photographs of expedition members and Inuit people in Greenland. In 1878, six of their landscape photographs appeared as Woodburytypes[26] and another five as engravings—each of the latter labeled "From a Photograph"—in Nares's account of the expedition.[27] Later, US Army Captain Henry W. Howgate reproduced two of the images in his report arguing in support of establishing an American polar colony,[28] a scheme that eventually materialized as the American IPY-1 expedition to Lady Franklin Bay.

Figure 5. *Full-page illustration in Neumayer's expedition report: "Der Wimpelberg (Kingua-Fjord) von Süden gesehen." Lithograph by H. Denys from a photograph (Neumayer, 1891, vol. 1, facing p. 56).*

Perhaps the most successful early photographic results, however, came out of an Arctic journey undertaken with the express aim of gathering photographic views for American artist William Bradford. In 1869, Bradford hired photographers John L. Dunmore and George P. Critcherson from the Boston studio of J.W. Black to make images that later could be used as visual guides for paintings.[29] In 1873, Bradford published *The Arctic Regions*, a lavish, photographically illustrated book with some 140 albumen prints hand-tipped into each of the 300 copies produced.[30] The motifs chosen by Bradford and the earlier, less prolific photographers present a picture of the Arctic Archipelago as a world of rugged shorelines, snow, and ice, peopled as much by Inuit with kayaks, sleds, and dogs as with bearded explorers arriving on masted ships, tropes informed by earlier, pre-photographic depictions of the Arctic that have constituted visual constructs of the Arctic until our own time.[31] One of Dunmore and Critcherson's photographs (**Fig. 4**) is a typical example: a hunting party poses with its catch of polar bears, the men silhouetted against the expanse of white ice and cloudless sky, framed between dark water and the steamer *Panther*'s proud bowsprit.

IPY-1 Photography in the Arctic Archipelago

Three of the official IPY-1 research stations were established in territory claimed by Canada: the British at Fort Rae; the American at Lady Franklin Bay; and the German at Kingua (now Clearwater) Fjord on Baffin Island. Additionally, two one-person auxiliary expeditions took place at Ungava Bay and Labrador.[32] From the outset, the three official expeditions put different emphasis on photography—a natural consequence, perhaps, of its use not being outlined in IPC's overall instructions. While it is clear from the

Figure 6. *"Expeditionary stores, game stand and house – Discovery Harbor." Photo: George W. Rice, August 1881. Digital file from b&w film copy neg. Courtesy the Library of Congress Prints and Photographs Division Washington, D.C. Available from https://www.loc.gov/item/91786302/*

expedition reports that photographic apparatus was part of each research team's outfit, the results varied considerably.

The least photographically successful expedition to Canadian-claimed territory was the British-Canadian expedition to Fort Rae. On 3 April 1882, Robert Scott of the British Royal Society's Meteorological Council sent a telegram to Heinrich Wild of the IPC: "England will send expedition to Great Slave Lake. Canada helps. News this instant received. Scott."[33] With monetary help from Canada, Britain had decided to make use of Fort Rae, an existing HBC post in the Northwest Territories to establish what was the smallest of the official IPY-1 expeditions.[34] The station benefitted from being situated close to the Magnetic North Pole and was also a logistically sound choice.[35] Fort Rae had been in operation since HBC established the trading post on Great Slave Lake's north arm in 1852, and planning efforts could therefore concentrate on science equipment and provisions rather than on building and equipping a station. Even this task, however, was a challenge. Because of the short timeframe, the team of four Royal Artillery officers had to forego planned training sessions[36] and bring what measuring instruments they could find readily available rather than have suitable apparatus made.[37] Despite the hurried preparation, the expedition included in its equipment list "2 cameras

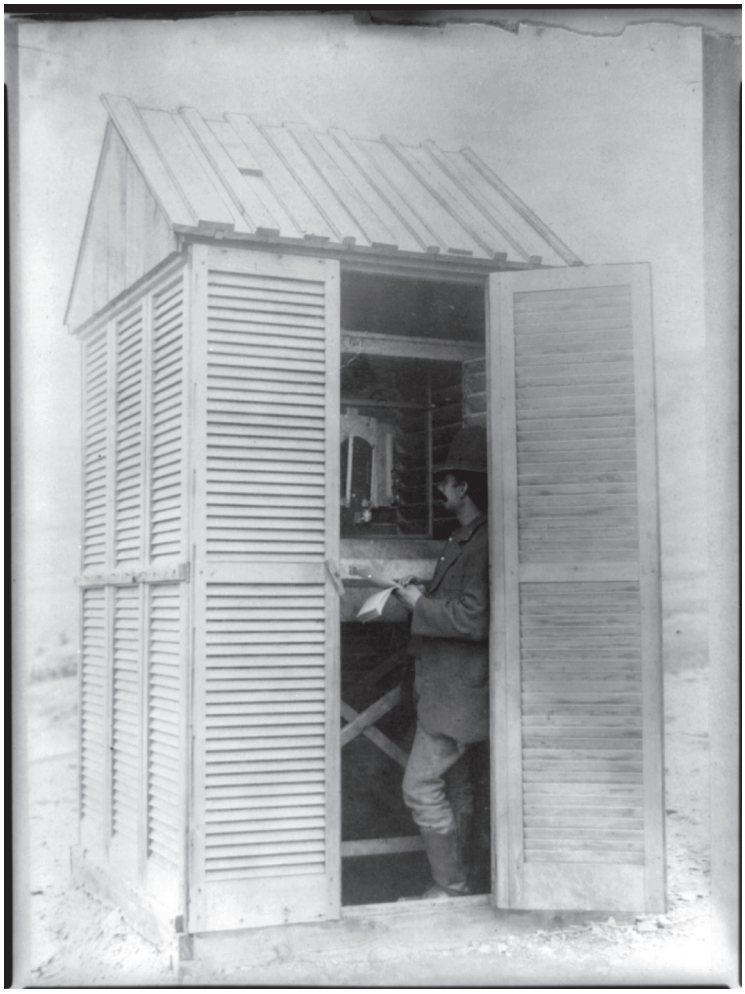


Figure 7. *"Sergeant Jewell taking meterological [sic] observation at Fort Conger, August, 1882." Photo: George W. Rice, August 1882. Digital file from b&w film copy neg. Courtesy the Library of Congress Prints and Photographs Division Washington, D.C. Available from https://www.loc.gov/item/cph33986/*

with dry plates, &tc," as well as a spectroscope with camera, of "Capt. Abney's pattern," made to be used with dry plates.[38] Had the team managed to photograph the aurora, it would have been a breakthrough both for the field of astrophysics and for photography.

The report from the Fort Rae station is exceptionally short: just seven pages of text, followed by observation data presented as 326 pages of tables and a total of 32 diagrams, or "plates."[39] In the introduction, expedition leader Henry P. Dawson stated that "It was not found possible to obtain photographs either of the aurora or of its spectrum. Captain Abney suggests that this was probably due rather to the effect of the low temperature on the sensibility of the plate than to the faintness of the light of the aurora."[40] The inclusion of these sentences in the very limited report suggests the expedition team considered the possibility of aurora photography of some importance and even attempted to clarify why their efforts failed upon their return to Britain. There is, however, no mention of attempts to use the cameras for any purpose other than capturing the northern lights, and, given the lack of information available from the Fort Rae expedition, one can only

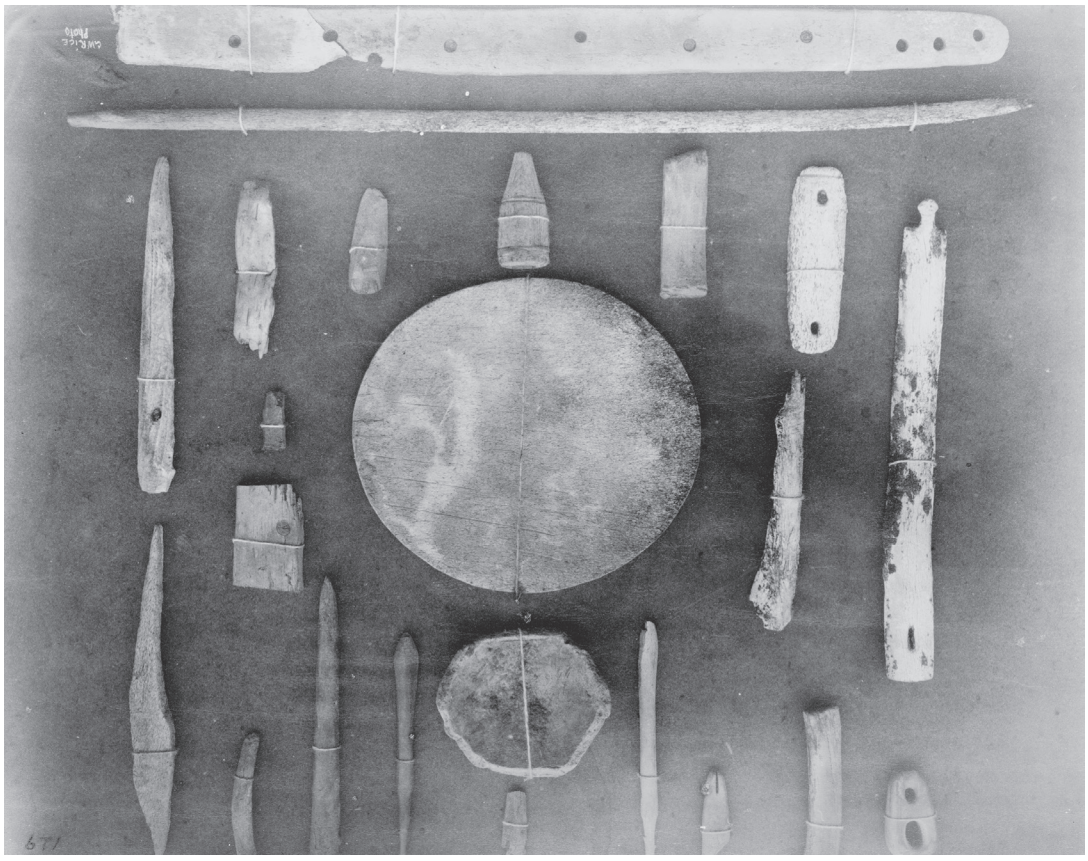


Figure 8. *"Eskimo relics found in the vicinity of [Fort] Conger." Photo: George W. Rice, 1881–1884. Digital file from b&w film copy neg. Courtesy the Library of Congress Prints and Photographs Division Washington, D.C. Available from https://www.loc.gov/item/2009634180/*

speculate as to whether the team did attempt to capture other subjects or, if not, why.[41]

Germany's expedition to Kingua Fjord did produce photographic results, although to what extent and quality is uncertain. Like Britain, Germany committed to IPY-1 late, in November 1881.[42] The two-volume report published from the German expeditions, one to Kingua Fjord and one to South Georgia in the Antarctic, is illustrated with black-and-white landscape drawings and etchings and two-colour schematic drawings and maps. One illustration in the section about the Canadian station is a lithograph depicting a landscape with a flagpole on a cliff, a few scattered objects that could be observation instruments, and two men sitting on a rock (**Fig. 5**).[43] The illustration credit line specifies that the engraving was made "from a photograph;" however, no other mentions of expedition photography appear in the otherwise thorough report.[44] The report editor was Georg von Neumayer, the first IPC Chairman and an avid geophysicist and explorer with a particular interest in the Antarctic. Neumayer also seems to have had some interest in photography: five albums, all from the nineteenth century, are part of his archives in Bad Dürkheim, Germany.[45] One album contains photographs of the members of the South Georgia expedition, though none of the Kingua Fjord team, a reflection perhaps of Neumayer's predilection for Antarctic science.

Figure 9. *"Chattel's Grotto in Watercourse Ravine, Oct. 1882." Photo: G. W. Rice, 1882. Digital file from b&w film copy neg. Courtesy the Library of Congress Prints and Photographs Division Washington, D.C. Available from https://www.loc.gov/item/2009634176/*

Of the three IPY-1 expeditions to Canadian-claimed territory, by far the most ambitious and successful in terms of photography was the American expedition to Lady Franklin Bay. Also known as the Greely expedition, this would become the most famous of all the IPY-1 expeditions. Originating in Henry W. Howgate's idea to establish a permanent American scientific polar colony, the Lady Franklin Bay expedition had been under way for a year before IPY-1 observations commenced in August 1882. Lieutenant Greely's own account, *Three Years of Arctic Service: An Account of the Lady Franklin Bay Expedition of 1881-84 and the Attainment of the Farthest North*, was published well before any official IPY-1 report and gave a detailed, illustrated account of the expedition that eventually claimed 19 lives.[46]

Photography was an explicitly stated aim for the American team. General Order Number 8 (in a list of nine) stipulated that "accurate representations, either by the photographic process or sketching, will be made of all phenomena of an unusual character, or of whatever is characteristic of the country."[47] Nova Scotian George W. Rice joined the expedition as its designated photographer, as he "hoped to add to his reputation in that art by service with the expedition," according to Greely.[48] Several of Rice's earliest images document the station buildings as they were being erected, while others give

an impression of the enormous supply stores needed on an expedition that was to last years (**Fig. 6**). These subjects constitute a relatively large part of the extant expedition photographs, probably because Greely and Rice arranged for the glass plates to be returned to the US with the *Proteus*, the steamer that transported the team to Lady Franklin Bay in August of 1881.[49]

In his diary, Rice noted on 14 August: "during the past week I have been making photographs daily of our camp as it increased in size and our house [a]s it assumed from day to day the appearance of a human habitation. I am kept incessantly employed. Many letters to write, as no other opportunity may be offered for years, at least one year, and my experience of this season rather shakes my belief in the ability of the ship to reach this latitude every season. It is a mere chance."[50] Rice's duties in the Arctic did not stop at photography; he was also closely involved with assembling the station buildings and gathering supplies. In early September 1881, Rice was suffering from debilitating rheumatism and later injured his shoulder in a fall. He died of exposure in April 1884, just weeks before the rescue of the remaining team members.[51]

In August 1883, upon completion of its IPY-1 duties and following previous orders Greely's team travelled south by boat, carrying expedition diaries, medicine, instruments, and 48 glass plate negatives.[52] At this point, according to Geoffrey Clark, "anticipating that no one might survive, Greely placed the records, instruments and plates in a cairn on a small islet where a passing ship would eventually find them, and indeed it was the Navy's discovery of the cairn that lead [sic] to their timely rescue. That Greely took such pains to bring back the plates is a testament to the importance of photography as part of the expedition's work."[53] Greely's report underscores this argument, as he repeatedly mentions Rice's work and title, stating initially that

> the engravings are faithful reproductions of an unequalled series of Arctic views, the work of Sergeant Rice, the photographer, except field sketches – always noted – and original drawings made under my supervision, for the correctness of which I personally vouch.[54]

Rice, wrote Greely, "indefatigably" made his images despite obstacles such as adverse weather conditions and lack of direct sunlight, creating views that, although not always "valuable as a photograph," could provide useful topographical information, help determine species, or serve as a correction to previous, more subjective artistic illustrations.[55]

Rice's images from the Arctic expedition point to a photographer keen to explore the medium's possibilities. While the glass plate negatives from the expedition are presumed lost, extant positive photographs and illustrations based on his photographs include the following subjects:[56]

- Documentation of the research station construction;
- Station exteriors and interiors;
- New and old cairns, storage depots, and remains of previous expeditions;
- Archaeological finds and Inuit relics;
- Coastal landscapes, often with a ship and sometimes with people and sledges visible;
- Ship studies;
- Icebergs with and without posed expedition members;
- Portraits of expedition teams and a small number of individual portraits;

- Exhibition members posing with dog teams and preparing skins from hunts;
- Animals and fish specimens, mostly dead but also musk ox calves in captivity;
- Images from settlements in Greenland including Godhavn and Upernavik and group portraits of Inuit with and without expedition team members.

Only one extant photograph is a direct reference to the scientific work of the IPY-1 expedition (**Fig. 7**). Rice photographed meteorologist Winfield S. Jewell taking observations in the "instrument shelter," a task performed on the hour every day, with additional registrations to be completed on so-called "term days." Additionally, images of archaeological finds and zoological specimens demonstrated an interest in broadening the scientific scope of the expedition. Rice photographed several sleds *in situ*, and also created displays of smaller found objects such as combs, sled runners, and lamps (**Fig. 8**). Of particular interest from a photographic point of view are two interior views of the station, and one notable photograph showing the interior of a grotto or cave (**Fig. 9**). Taken from the inside of the cave, the light, spilling in through the opening, appears as an abstract, almost painterly, swirl against the darkly rendered and ice-encrusted wall. Requiring a full-day exposure, this and other images are a testament to Rice's skill and willingness to attempt even difficult photography in harsh conditions.[57] His work for the American expedition to Lady Franklin Bay arguably represents a stage in the development of Arctic photography that warrants greater scrutiny in both the history of photography and the history of scientific exploration in the North.

Conclusion

IPY-1 was the largest international research initiative yet undertaken and the precursor for later transnational polar research. The IPC, formed in 1879, prepared and published instructions on the type of observations and how they should be made, with what types of instruments, and when, so the results would be directly comparable. Even so, the individual polar station teams varied in size and expertise, which affected their potential for research activities beyond official directives, whether issued from the IPC or nationally. Photography was one such activity. Despite photography's increasing importance for science, whether as a tool for researchers or a means to gather moral and monetary support for scientific work, photography did not merit a mention in the IPC's instructions.[58]

We can speculate about the Commission's oversight. Perhaps its members disagreed on the nature, applications, and potential usefulness of the new technology for scientific study. Or possibly it had more to do with the costs and practical difficulties in relation to the anticipated benefits. For the expedition teams, the observation locations certainly provided very specific challenges in terms of access, terrain, and climatic conditions—not just for conducting research, but also for creating photographs. Though photography was made easier by the replacement of wet-plate collodion negative with dry plates, it still entailed transporting heavy and cumbersome equipment and good images depended as much on the photographer's skills as on light and temperature conditions. Previous expeditions had all but proven that Arctic photography required more resources than the IPC could demand from the observation teams.

As is evident in their respective instructions and reports, the three IPY-1 expeditions to the Arctic Archipelago varied in size and difficulty, from the smallest, British-Canadian four-man expedition to Fort Rae, to Greely's American team of 25 men. Of the three IPY-1 expeditions on Canadian-claimed territory, Greely's expedition to Lady Franklin Bay was the most successful in terms of creating a photographic record. The American expedition's instructions explicitly stated that photography was a goal; the team included a trained photographer who was allocated time to experiment and perfect their craft. Additionally, written records such as travelogues and diaries testify to the belief, held by Greely and others, that photography's many uses made it a worthwhile pursuit.

A combination of foresight and luck ensured that more than 100 photographs by Rice survived from the Greely expedition. Today, they constitute a comprehensive record of a late nineteenth-century Arctic expedition, including the construction and layout of living quarters to the documentation of supplies, means of transportation, aspects of daily life, landscapes, and natural phenomena. The photographs found a multitude of uses: they provided evidence, during the expedition's absence, to the US Army Signal Corps that work was progressing in the Arctic. Published subsequently in expedition proceedings, the photographs helped create and maintain positive public opinion about the expedition as a whole and for commander Greely in particular.[59]

Significantly, IPY-1 photography in the Arctic Archipelago included visual documentation of scientific activities. Unlike the French expedition to Antarctica, however, neither of the research teams in Canada produced visual data for scientific analysis. Greely used photographs to illustrate expedition proceedings and his own published narrative written for a broader public audience, in the US and abroad. While the British-Canadian expedition included photographic equipment, its goal of photographing the northern lights was not yet technically feasible, and it would be another ten years after IPY-1 before German astronomer Martin Brendel made the first successful photograph of the aurora borealis in Norway in 1892.[60] As for the German expedition, nothing is currently known about its embrace of photography, although one illustration "from a photograph" suggests the team had the use of a camera. While British and German reports show an apparent lack of interest in using photography (in Britain's case, on subjects other than the aurora), this may not have been the case. While the American expedition to Lady Franklin Bay was thoroughly documented in official and personal accounts, sources for the British-Canadian and German expeditions are far less detailed, leaving us with questions for further research. Did the British and German teams, in fact, make unsuccessful attempts at photography that they chose not to mention in their reports? Did equipment malfunction, become lost, or damaged? Or were plates misplaced along the way or upon their return to Europe? Did economy play a role in what type of equipment the teams brought or the training they had in using it?

What this research suggests is that the photographs produced during IPY-1 were employed more for illustrative and promotional purposes, rather than for research and analysis. It demonstrates that the three IPY-1 expeditions—their successes and failures, and sources and silences — offer evidence that photography as an image-making technology had yet to be fully comprehended and embraced for its ability to serve scientific

ends. This research also points to historically situated expectations for applications of, and interest in, photography that have escaped critical notice and contextual comment — gaps in the historiography of Arctic science that need filling. Lastly, it demonstrates that IPY-1 photography represents a vital step in the development of Arctic photography, taking place, as it did, when practices changed from being characterized by personal initiative and inconsistent experimentation to the dedicated and valued activity it is today.

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Endnotes

1 The official stations included Fort Rae at Discovery Harbour, Kingua Fjord in the Cumberland Sound and Fort Conger at Lady Franklin's Bay, all in what is now Canada; Godthaab in Greenland; Cape Thordsen in Iceland; Jan Mayen and Bossekop in Norway; Sodankylä in Finland; Karmakuly, Dikson and Sagastyr in Russia, Point Barrow in the US; and two sub-Antarctic stations at Cape Horn and South Georgia.

2 Dag W. Aksnes and Dag O. Hessen, "The Structure and Development of Polar Research (1981–2007): a Publication-Based Approach," *Arctic, Antarctic and Alpine Research,* 41, no. 2 (2009): 155-163, doi: 10.1657/1938-4246-41.2.155

3 Nanna K. L. Kaalund, *Explorations in the Icy North: How Travel Narratives Shaped Arctic Science in the Nineteenth Century* (Pittsburgh, PA: University of Pittsburgh Press, 2021), 6.

4 George T. Temple cited in Kaalund, *Explorations in the Icy North*, 6.

5 Weyprecht distributed written transcripts of his presentation to international colleagues, and also rewrote it as a list of principles for Arctic research. For a review of this literature and its field of impact, see Erki Tammiksaar, Natalia G. Sukhova and Ian R. Stone, "Russia and the International Polar Year, 1882-1883," *Polar Record*, 45, no. 3 (2009): 216–217. My source is the Norwegian translation of Weyprecht's presentation; Karl Weyprecht, "Fremtidens Nordpolsexpeditioner og deres sikre Resultat, sammenlignet med de hidtilværende Forskninger paa det arktiske Omraade," in *Nordisk Tidsskrift for almendannende og underholdende Læsning* (Copenhagen: Gyldendal, 1876), 48-67.

6 The prelude to IPY-1, including and especially Weyprecht's role in its inception, has been covered in detail by a number of scholars. See, for example, William Barr, *The Expeditions of the First International Polar Year 1882-83* (Calgary: The Arctic Institute of North America, 2008) and Erki Tammiksaar, Natal`ya Georgievna Sukhova, and Cornelia Lüdecke, "The International Polar Year 1882–1883," in Susan Barr and Cornelia Lüdecke (eds.), *The history of the International Polar Years (IPYs)* (London/New York: Springer, 2010), 7-33. An account of the history and intentions behind the IPY can also be found in Cornelia Lüdecke, "The First International Polar Year (1882-83): A Big Science Experiment with Small Science Equipment," *Proceedings of the International Commission on History of Meteorology*, no. 1 (1), 2004, 55-64. In his comprehensive work on science in the Canadian Arctic, Trevor H. Levere notes that the idea of coordinated international scientific efforts was shared and expressed by several prominent figures in countries including the US, Germany and Austro-Hungary. Trevor H. Levere, *Science and the Canadian Arctic: A century of Exploration 1818–1918*, (Cambridge: Cambridge University Press, 1993), 308-310. Tammiksaar et. al. further emphasise the groundwork laid in previous scientific initiatives in regard to international weather forecasting and observations. Tammiksaar, Sukhova and Lüdecke, "International Polar Year 1882–1883," 7-8.

7 Aant Elzinga, "Through the Lens of the Polar Years: Changing Characteristics of Polar Research in Historical Perspective," *Polar Record* 45, no. 3 (2009): 314.

8 In 1879, the IPC found that a minimum of eight Arctic stations were necessary to "ensure [IPY-1's] success." N. H. de V. Heathcote and A. Armitage, "The First International Polar Year," in *Annals of the International Geophysical Year, vol. 1* (London/New York/Paris: Pergamon Press, 1959), 6.

9 Levere, *Science and the Canadian Arctic,* 314-316; Barr, *Expeditions of the First International Polar Year,* 255; Susan Barr, Louwrens Hacquebord, Erki Tammiksaar, and Natal`ya Georgievna Sukhova, "The Expeditions of the First Polar Year," in Susan Barr and Cornelia Lüdecke, eds., *The History of the International Polar Years (IPYs)* (Berlin/Heidelberg: Springer, 2010), 59-60. Nanna K. L. Kaalund also points out that the perceived and implicit criticism of previous British explorations caused central British figures to view IPY-1 with skepticism. Kaalund, *Explorations in the Icy North,* 162.

10 Barr, Hacquebord, Tammiksaar, and Sukhova, "Expeditions of the First Polar Year," 61.

11 Levere, *Science and the Canadian Arctic,* 324; Barr, *Expeditions of the First International Polar Year,* 256.

12 Kaalund, *Explorations in the Icy North,* 161.

13 The instructions can be found in Heathcote and Armitage, "First International Polar Year," 9-13.

14 Sydney Chapman, "Introduction to the History of the First International Polar Year," in *Annals of the International Geophysical Year, vol. 1* (London/New York/Paris: Pergamon Press, 1959), 3.

15 Nanna K. L. Kaalund notes that the IPY-1 took place as research and publication practices were changing, from traditional travel narratives to shorter accounts including scientific reports and sometimes publication in several different forms. Kaalund, *Explorations in the Icy North,* 166-167.

16 Following the observation year, there was a lack of coordinated effort to gather and analyze data from the various expeditions, and the official reports, published over a number of years, thus constitute the main sources to IPY-1 research. See, for example, Elzinga, "Through the Lens of the Polar Years," 316. No central depository of original imagery exists, though a large number of IPY-1 photographs and other illustrations can be found at a helpful web resource compiled by NOAA researchers Kevin R. Wood and James E. Overland, available from https://www.pmel.noaa.gov/arctic-zone/ipy-1/index.htm

17 Maurits Snellen, *De Nederlandsche Pool-Expeditie 1882–83* (Utrecht: L.E. Bosch en zoon, 1886).

18 Because of the photographic plates' sensitivity to blue light, sky and clouds were often overexposed in order to correctly capture the warmer light of colors such as red, green, and brown.

19 For an investigation of the evidentiary status of Victorian photography and its use in science in the 19th century, see Jennifer Tucker, *Nature Exposed. Photography as Eyewitness in Victorian Science* (Baltimore: The Johns Hopkins University Press, 2005).

20 Lorraine J. Daston and Peter Galison, *Objectivity* (New York: Zone, 2007), 133-137, 187-189.

21 Douglas Wamsley and William Barr, "Early Photographers of the Arctic," *Polar Record* 32 (183) (1996): 295-296. This paper gives a detailed account of early photography in Greenland and the Arctic Archipelago and has been an important source for the following summary.

22 Wamsley and Barr give detailed information on those rescue parties that included photographic equipment, and their varied results. Ibid, 297-303.

23 South of the Arctic Circle, Little Whale River lies within other Arctic boundary definitions, such as that devised by AMAP, see https://www.amap.no/documents/doc/definitions-of-the-arctic-region/248

24 Wamsley and Barr, "Early Photographers of the Arctic," 295. See also Cath Oberholtzer, "The Legacy of William Bell Malloch, M.D.: The McGill, Moose Factory and McCord Connection," *Fontanus*, 2003, 61-95, DOI: 10.26443/fo.v11i.176, available from https://fontanus.library.mcgill.ca/article/view/176. Several photographs by the Moose Factory Group are available at the Library and Archives Canada, Ontario; see the Sandford Fleming fonds at https://recherche-collection-search.bac-lac.gc.ca/eng/home/record?app=fonandcol&IdNumber=4868361&new=-8585528815133903828

25 Wamsley and Barr, "Early Photographers of the Arctic," 312. Photography is not mentioned directly in the "Sailing Orders" reproduced in Nares' book, however photography undoubtedly was one of the "new appliances" referred to by Clements R. Markham, secretary of the Royal Geographic Society and cousin

of the expedition's second-in-command, Albert Markham, when he stated that "The tradition of English polar adventure will thus be continued, and the noble work will be carried onward by another generation, with the advantages of the accumulated experience of their predecessors, of new appliances, and of recent improvements in provisioning and equipments." Clements R. Markham, The Threshold of the Unknown Region (London: Sampson Low, Marston, Low, and Searle, 1875, third edition), 325-326.

26 Woodburytypes, a type of photomechanical image invented by Walter B. Woodbury in England c. 1964, were most commonly used for fine book illustrations, due to its ability to reproduce fine details and continuous tone.

27 George S. Nares, *Narrative of a Voyage to the Polar Sea, during 1875-6 in HM Ships 'Alert' and 'Discovery.', vols. 1 and 2* (London: Sampson Low, Marston, Searle, & Rivington, 1878). The Thomas Mitchell fonds at Library and Archives Canada holds 22 watercolors on paper and 2 albums with all together 105 photographs from the Nares expedition, see https://www.bac-lac.gc.ca/eng/CollectionSearch/Pages/record.aspx?app=FonAndCol&IdNumber=158438

28 Geoffrey E. Clark, "Arctic Ambitions: The Photographs of the Lady Franklin Bay Expedition of 1881–1884 George W. Rice Photographer" (University of New Hampshire, MA thesis, 2011), 9. Available from https://scholars.unh.edu/thesis/188/

29 See Frank Hurch, "Photographs and Paintings by William Bradford," *The American Art Journal,* vol. 5, no. 2, November (1973): 61-80, and Russell A. Potter, "The Photographic Artist – William Bradford and the Close of the Panoramic Era," in Russell A. Potter, *Arctic Spectacles: The Frozen North in Visual Culture, 1818–1875* (Seattle: University of Washington Press, 2007), 190-202.

30 William Bradford, *The Arctic Regions. Illustrated with Photographs taken on an Art Expedition to Greenland* (London: Sampson Low, Marston, Low, and Searle, 1873). A digital facsimile of the book, the first ever book to illustrate the Arctic photographically, can be accessed at https://www.whalingmuseum.org/arctic-regions-illustrated-photographs-taken-art-expedition

31 Marthe T. Fjellestad, "Picturing the Arctic," *Polar Geography*, 39:4 (2016): 229.

32 Lucien M. Turner, at Ungava Bay, and Karl R. Koch, in Labrador, both independently conducted IPY-1 measurements and additional research, particularly in ethnology (Turner) and astrophysics (Koch). Barr, 347-356, 365-366. Turner's report is richly illustrated with drawings depicting objects related to the Nenenot (now Innu) people as well as two landscape images seemingly from photographs, provenance unknown. Lucien M. Turner, "Ethnology of the Ungava District, Hudson Bay Territory," in Smithsonian Institution – Bureau of Ethnology, *Eleventh Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution 1889–90* (Washington: Government Printing Office, 1894), 159-350, available from https://library.si.edu/digital-library/book/annualreportofbu1118891890smit. Several drawings and a total of fourteen photographs (of which five are stereo views) relating to Turner's expedition and perhaps attributable to him are available at the Smithsonian Libraries and Archives. Deborah Shapiro, email to author, 28. October 2021, see https://archives-manuscripts.dartmouth.edu/repositories/2/resources/1206, None of these are reproduced in his report. Koch, on behalf of Germany, oversaw a network of six Moravian missionary stations recast as weather stations for the duration of the IPY-1. His accounts contain a small number of sketches of aurora as well as a landscape depicting the Nain (Nunainguk) settlement. Karl R. Koch, "Geschichte der supplementären Expedition unter Dr. K.R. Koch nach Labrador," in G. von Neumayer (ed.), *Die internationale Polarforschung 1882-1883. Die Deutschen Expeditionen und ihre Ergebnisse, vol. 1* (Berlin: Verlag von A. Asher & Co, 1891), 145-188, and Karl R. Koch, "Die Polarlicht-Beobachtungen auf den Stationen Nain und Kingua-Fjord," ibid., 210-234.

33 Barr, *Expeditions of the First International Polar Year,* 255-256.

34 C. J. Taylor, "First International Polar Year, 1882-83," *Arctic* vol. 34 no. 4 Dec (1981): 371-372.

35 Barr, Hacquebord, Tammiksaar, and Sukhova, "Expeditions of the First Polar Year," 61.

36 Barr, *Expeditions of the First International Polar Year,* 258.

37 Henry P. Dawson, *Observations of the International Polar Expeditions, 1882-83. Fort Rae* (London: Trübner & Co, 1886), ix.

38 Dawson, *Observations,* viii, and William Abney, "Cantor Lectures on Photography and the Spectroscope" (London: Society for the Encouragement of Arts, Manufactures, and Commerce, 1885), available from https://archive.org/details/cantorlectureson00abneuoft/page/n5/mode/2up

39 Dawson, *Observations,* viii.

40 Dawson, *Observations,* xiv.

41 Barr, *Expeditions of the First International Polar Year,* 263.

42 Barr, Hacquebord, Tammiksaar, and Sukhova, "Expeditions of the First Polar Year," 50.

43 Georg von Neumayer, "Kapitel 3. Die Expedition nach dem Kingua-Fjord, deren Verlauf und Rückkehr," in Georg von Neumayer, *Die internationale Polarforschung 1882–1883. Die Deutschen Expeditionen und ihre Ergebnisse*, *vol. 1* (Berlin: Verlag von A. Asher & Co, 1891), 41-90.

44 Georg von Neumayer, *Die internationale Polarforschung 1882–1883. Die Deutschen Expeditionen und ihre Ergebnisse*, *vols. 1 and 2* (Berlin: Verlag von A. Asher & Co, 1891).

45 Hans-Jochen Kretzer, "The Georg von Naumayer Polar-Archives in Bad Dürkheim, Germany: A Field of Study of the POLLICHIA-Museum," *Mitteilungen der POLLICHIA*, supp. 88, 2001, 113-116, available from https://www.zobodat.at/pdf/Mitt-Pollichia_Sup_88_0113-0116.pdf

46 Adolphus Greely, *Three Years of Arctic Service: An Account of the Lady Franklin Bay Expedition of 1881-84 and the Attainment of the Farthest North*, vols. 1 and 2 (London: Richard Bentley and Son, 1886).

47 A comprehensive set of instructions, including the "Instructions for commanding officers of the international polar stations occupied by the Signal Service," are reproduced in *Proceedings of the "Proteus" Court of Inquiry on the Greely Relief Expedition of 1883* (Washington: Government Printing Office, 1884), Appendix. Instruction pertaining to photography, 8.

48 Greely, *Three Years of Arctic Service*, vol. 1, 39. Rice's diary from the Lady Franklin Bay expedition, along with eight photographs from Greenland, are available at Dartmouth Library Archives & Manuscripts, see https://archives-manuscripts.dartmouth.edu/repositories/2/resources/1206

49 Clark, "Arctic Ambitions," 75.

50 George Rice, August 14, 1881, cited in PBS The American Experience, "The Greely Expedition. Primary Source. Journal: Sgt. Rice", available from https://www.pbs.org/wgbh/americanexperience/features/greely-rice-journal/

51 Greely, *Three Years of Arctic Service*, vols. 1 and 2.

52 Greely, *Three Years of Arctic Service*, vol. 2, 68.

53 Clark, "Arctic Ambitions," 3.

54 Greely, *Three Years of Arctic Service*, vol. 1, vi.

55 Greely, *Three Years of Arctic Service*, 82, 68, 46, and vol. 2, Appendix xii.

56 Reproductions of close to 140 photographs attributed to Rice can be found in Clark, "Arctic Ambitions". See also Greely, Three Years of Arctic Service and Adolphus Greely, *Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land, vols. 1 and 2* (Washington: Government Printing Office, 1888).

57 Clark, "Arctic Ambitions," 126.

58 As noted above, some of the national directives, notably those of the US team, did refer to photography, though even here it was outlined as an option alongside drawing. *Proceedings of the "Proteus" Court of Inquiry on the Greely Relief Expedition of 1883* (Washington: Government Printing Office, 1884), Appendix. Instruction pertaining to photography, 8.

59 Upon the return of the surviving men, the Greely expedition was dogged by rumors of cannibalism and poor leadership. Illustrated travelogues and reports helped restore the research mission's standing in the public eye.

60 Brendel made the 7-second exposure in Bossekop outside Alta, Norway—close to the site of the Norwegian IPY-1 station—on January 5, 1892. Marthe T. Fjellestad and Solveig Greve, *Starman – Sophus Tromholt Photographs 1882–1883* (Oslo: Forlaget Press, 2018), 110.