The contribution of photography to Arctic expeditions 1851 to 1881

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Frontispiece
The Arctic regions by William Bradford
Detail of the embossed cover
(Bradford 1873)

Declaration

In accordance with University of Cambridge regulations, I do hereby declare that:

This thesis entitled *The contribution of photography to Arctic expeditions 1851 to 1881,* represents my own original work and conforms to accepted standards of citation in those instances in which I have availed myself of the work of others.

This thesis is not now being submitted nor has been submitted in the past for any other degree, diplomas, or similar qualification at any university or similar institution.

This thesis does not exceed the maximum allowable length of 20,000 words, excluding footnotes, tables, appendices, and bibliography.

Richard G Ferguson

14 June 1993

Abstract

The arrival of photography in 1839 opened up new methods of visually recording the natural world. Well established-methods of visually recording discoveries on expeditions were soon challenged by the accuracy of the photograph. However this was not immediate, as limitations of the processes used, made photography in the field unreliable. It was not until the development of the wet plate process, that photography was in a position to become a significant means of recording what was encountered by expeditions.

A selection of photographs from three Arctic expeditions are analysed through the use of a key word system. Qualitative and quantitative assessment forms part of the image group analysis, which, combined with the key word analysis, forms a unique record of the application of photography in the Arctic.

This thesis evaluates to what extent between the years 1851 to 1881 this new medium was used in the Arctic and examines aspects of the nature of its contribution to expeditions. This use and contribution is compared to the application of photography on expeditions outside the polar regions as a means of establishing what was possible by the photographic medium during the same period. It is shown that photography was of a lower quality and quantity compared to non polar expeditions.

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Note: Images in figures are cited to indicate their source, which is listed in the bibliography. Where the source is not a publication the source and catalogue number are listed after the abbreviation. The following abbreviations are used. **BS**: Boxed set; British Arctic Expedition 1875-76, **BLS**: Benjamin Leigh Smith 1873, 1880

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1. Introduction

Between the years 1851 and 1881, exploration of the globe proceeded at an increasing pace spurred on by technological developments such as steam power and the telegraph, which also had the effect of speeding communications, decreasing the degree of isolation of remote areas of the world.

Photography also played a role in decreasing the isolation of nations and improving awareness between their populations. Images from remote and exotic locations were for the first time recorded in a realistic medium for dissemination to the public at large rather than a small elite. The realism was such that it suggested to the viewer that those photographing the new locations were controlling them as they explored (Lemagny and Rouille 1986: 59).

Technical developments of the period included the refinement of the photographic process. First publicly launched in August 1839, the daguerreotype process as developed by Louis Daguerre (1787-1851), signalled the emergence of a means for mechanically recording visual phenomena. At the same time as the development of the daguerreotype - a direct positive process - William Henry Fox Talbot (1800-1877) developed his paper negative Talbotype process. It did not, however, produce the clear images of the daguerreotype, making it less favourable for the mass audience. While both new technologies had limitations, both achieved the fixing of the latent image which ultimately led to the development of the wet plate process. This thesis will examine photographs produced through the use of wet plates with a view to assessing various aspects of the contribution of photography to Arctic expeditions between 1851 and 1881.

Although it is known that photographic apparatus was taken to the Arctic on several expeditions between 1851 and 1881, this thesis will show that the extent to which photography was used is a subject of some confusion. Despite an extensive literature search it was found that few of the contemporary expedition accounts, both published and unpublished, make mention of photography or the photographic processes used on expeditions, even with regard to those expeditions that are known to have used photography. This lack of clarity is added to by the

scarcity of surviving images, particularly from the period 1851 to 1861, which suggests that photography was only slowly being applied in the Arctic in contrast to elsewhere. Between 1851 and 1881, there were over 100 maritime expeditions to the Arctic of a broadly exploratory, scientific or sporting nature, all of which categories provided a suitable platform for photography. There were also many hundreds of commercial hunting and trading expeditions, which, although less suitable, did sometimes carry passengers as tourists, who could have taken photographic equipment with them (Holland in press). The opportunities for photography were therefore plentiful, but the evidence suggests that the opportunities were under used.

Three of the different kinds of expeditions making particularly successful use of photography in the Arctic will be examined in this thesis, with a view to providing a means for establishing the scope and type of contributions made by photography to the Arctic expeditions of the period 1851 to 1881. The three groups are: 1869 - William Bradford; 1873 and 1880 - Benjamin Leigh Smith and 1875-76 British Arctic Expedition (George Strong Nares). These three groups of expeditions were selected because, firstly they represent three contrasting styles of expeditions of the period. Secondly the number of images surviving are of similar quantity for each expedition. Thirdly all groups of images could be individually viewed and analysed.

With regard to types of expedition, those studied provide one example of an expedition mounted by a private individual for artistic purposes; one private expedition undertaken partly for pleasure but with some scientific aims; and one official national exploring and scientific expedition.

Each expedition provided a particular working environment for photography. Whether the working environment was that of a private expedition, such as Bradford's 1869 West Greenland cruise, or that of a formal agency, such as the Royal Navy as with the expedition led by Nares, the photographic process used would inevitably reflect "...the perception of a social agency..." and consequently its "...expectations, aims, and assumptions..." (Beloff 1985: 17). For this reason, it is meaningful to examine the material grouped together by specific agency or leader and not the work of the individual photographers.

Photography in the Arctic regions, with their harsh climatic conditions, presents a challenging work environment for the photographer. Environmental difficulties presented by the Arctic included cold, low humidity, low visibility, low light angles, and prolonged periods of darkness. The environments of other regions of the globe, such as the dry deserts of Egypt, the high mountains of Kashmir and the tropical regions of Africa, can and do effect the results that are obtained but they can not account totally for the photographic results of a particular expedition. This thesis will examine the technical challenges faced by the nineteenth century Arctic photographers John Dunmore, George Critcherson, William Grant, Thomas Mitchell and George White. In order to provide a point of comparison for what was achievable elsewhere with the photographic technology of the period one group of images from outside the polar regions will be examined briefly: this will be the work of Samuel Bourne, in northern India in 1864 and 1866.

This thesis will not enter into discussion on the merits of photography as a means of artistic expression. However, it will be appropriate to discuss photography as the basis for creating an image through manual artistic techniques. One example of this is the use of photography as a basis of illustrations in the newspapers of the period, such as *The Illustrated London News*.

While it is difficult to draw distinct lines across the development of photographic processes, it is recognised that 1851 marked the date of the emergence of wet plate photography as the more reliable means of photographic recording than earlier processes (Greenough 1989: 20). Almost as soon as the wet plate process was marketed, the daguerreotype began to recede and it was soon entirely replaced by the more convenient and effective alternative. The emergence of the new process made photography in the field a practical option for those who wanted to document the natural world, which had, during the time of the daguerreotype, remained out of the scope of the studio photographers (Lemagny and Rouille 1986: 30). For this reason, 1851 marks the commencement of this thesis.

The 30 years after 1851 saw an acceleration in the development and refinement of photographic methods and techniques, and therefore an increased documentation of the natural world. Such was the demand for reliable photographic processes that the wet plate process was under constant pressure for improvement. Development of the dry plate process accelerated in the

1870s, reaching a commercially reliable stage in 1881. The advent of the dry plate process promoted an increase in the use of photography even in polar regions of the world, as was seen in the International Polar Year of 1882 to 1883. Events such as the International Polar Year contributed to the formalisation of the application of photography on scientific expeditions to the polar regions. New photographic technologies and new mass printing methods combined to give rise to a greater number of images and a higher level of circulation. The proliferation of photography from polar regions brought on by these and other developments are a significant and worthy area of inquiry in a more comprehensive study, but these same changes make it necessary to have 1881 as the concluding date of this thesis.

2. Arctic expedition photography: the context of the visual arts and early applications in the field

2.1. Established practices prior to photography

Visual components of the expedition record can make a significant contribution to the portrayal of a voyage. The association between art and the expedition, or voyage, have been examined by Smith (1960, 1984), Stafford (1989) and others. Travel accounts illustrated with original images, or with images generated from original images produced on voyages, have a long and rich history.

Bucher's (1981) structural analysis of deBry's Great Voyages, which includes images of the Americas and was published over some thirty volumes between 1590 and 1634 (Bucher 1981: 3), examines the context and interpretation of the visual expedition record. Detailed studies like this are a potential source for further research in early uses and interpretations of the visual record. While it is not within the scope of this thesis to examine the broader topic of the artistic and visual record of expeditions, it is worthwhile to consider some of them briefly in relation to their links with the use of photography.

Manually recorded topographical records and photography have links preceding the advent of the chemically fixed image. Drawing instruments such as the camera obscura were used by artists to obtain "...a more accurate and empirical rendering of their views..." (Wilton and Lyles 1993: 135). This device, first recorded in published form in 1521, varied in size from being large enough for the artist to walk into, to a smaller transportable apparatus which was invented in the mid-1640s, but not able to be easily carried by an individual. Further refinements led to the development, in 1657, of a portable box camera obscura, which is the predecessor to the apparatus used in early photography (Gernsheim 1982: 14).

The quest for accuracy in graphic transcription of scenery of all kinds - natural and constructed - led to the further development of the camera obscura (Rosenblum 1984). The camera obscura and photography were closely related and became fully intertwined in 1827 when Joseph Niépce achieved the development of a chemically fixed image (Gernsheim 1982: 34).

The "real views" recorded, with or without the aid of drawing instruments, by topographical draftsmen of Europe, such as the Englishman Paul Sandby (1731-1809), provided an accurate record of the landscape of England during the 17th and the early 18th century. Training in topographical illustration was given by accomplished artists and illustrators, at institutions such as the Woolwich Military School (Stacey 1988). Sandby and other artists played a significant part in the transition of topographical illustrations into "...a more expressive and significant branch of landscape painting..." (Wilton 1993), and was in a position to promote particular methods or canons of depicting the landscape.

2.2. New lands and new views: depicting the unfamiliar

Visual depiction of new lands was on occasion exaggerated as a result of the subject being recorded by an artist lacking points of familiarity to his own environment. Absence of familiar features, different lighting conditions and inappropriate methodologies are some of the factors contributing to inaccurate visual depiction of the Arctic (Stacey 1988).

The lack of realistic depictions of the Arctic persisted until either those recording came to terms with how to represent the landscape, or another means of recording became available. The arrival of photography in 1839 made available a potential means of correcting this apparent visual misrepresentation and progressing toward a more accurate visual depiction.

Visual records from expeditions were often used as a potential scientific resource. Drawings of zoological and biological specimens collected were returned to and stored in the various national scientific institutions. Authorities based in centres such as London had at their disposal visual and physical collections gathered at the same time, in the same work environment, which created complementary sets of information. Study of preserved pelts and skins, associated with the publishing of scientific reports for the expeditions, was at times difficult or inconclusive. Loss of colour due to preservation methods, inaccurate records, loss of labels, at times contributed to difficulties in the classification of specimens. Drawings and paintings could provide accurate and detailed information which could be absent in the physical specimen. Visual records of the specimens possibly showing them *in situ*, or recording details of colouration at the time of collection, aided identification of specimens some time after the conclusion of the expedition that collected them. An example of this was the clarification of the

classification in 1879 of a Prion, through examination of drawings from the 1874-75 British Transit of Venus expedition to sub-Antarctic Kerguelen Island (Sharpe 1879: 139).

2.3. Expedition visual records redefined:

photography challenges the established visual arts

While shortage of familiar subjects did not prevent the recording of new and unfamiliar polar landscapes, it did on occasions give rise to a romantic or unrealistic representation. Drawing instruments such as the camera lucida, patented in 1806 by William Wollaston, were a means of making more accurate drawings through the aid of optical devices which enabled an image to be projected onto a surface to aid accurate depiction of a scene (Arnold 1977, Schaaf 1992). Greenough (1989: 36) states that the "...camera lucida is not a camera at all, but is a prism mounted to a metal dowel...". The use of a prism in the camera lucida as opposed to the camera obscura which used a pinhole, or lens, to project an inverted image into a darkened room are the basic differences between the two drawing instruments. Projection of the image through an aperture made the camera obscura the forerunner of the camera. Figure 2.3.1 shows a larger type of camera obscura which developed from its origins as a pinhole camera in the sixteenth century, to one utilising a lens constructed for a specific form of depiction in the early nineteenth century, such as landscape or portraiture (Gernsheim 1982, Greenough 1989). How useful this device was to artists in the period prior to the emergence of the fixed photographic image is open to debate. However it is quite clear that the camera obscura was the means of obtaining a chemical rendition of the image produced by the apparatus.

Smith (1960, 1984) highlights some of the benefits of the camera lucida as used in the south polar regions by the artists Drayton and Agate on the United States Exploring Expedition of 1838-42. Equipped with such apparatus the artists were in a good position to accurately record their discoveries of the Antarctic coastline, claims relating to which caused controversy on the expedition's conclusion. It has not been possible to ascertain if the artists used their camera lucida apparatus to record the Antarctic coastline but it is known that they did use it to record, on two separate occasions, the crater of Mauna Loa on Hawaii (Smith 1960, 1984). Wilkes hoped that the documents would enable him to see if any "...alterations should take place..." between their visits. The potential for an objective rendering of a view as seen through the

cameral lucida used by Drayton and Agate, foreshadowed one of the scientific and topographical applications of photography.

Romantic depictions of the landscape did not end, but were challenged, with the announcement in August 1839 of Daguerre's photographic process. Such depictions were soon to become open to comparison. Once the photographic medium was no longer tied to the structure of a camera obscura and able to be easily transported, it was more readily put to use in the field. This took 10 years from the time of the appearance of the daguerreotype because the "...manipulation of the process out of doors with an unpredictable brightness range and other factors was too complicated..." (Haworth-Booth 1984: 22). By the time photography was able to achieve reliable results outdoors, "...explorers and travellers immediately appreciated the value of photographic records..." (Beloff 1985: 3). One group that was eager to apply the photographic medium was the scientific fraternity. Of this transition from painting to photography in scientific expeditions, the art historian Bernard Smith has written:

> The invention brought the close alliance between art and science which had characterised the exploring expeditions of the preceding seventy years to a close. Science adopted photographic methods for making its graphic records; art became increasingly a vehicle of personal expression (Smith 1984).

Photography enabled the documentation of the wide view. The artists, accompanying the expeditions, who had revealed a "...tendency to move away from a preoccupation with the graphic delineation of surfaces..." for example the landscape, were free to continue their move "...towards an analytical interpretation of the structure of things..." (Smith 1960, 1984). Figure 2.3.2 shows a scientific illustration from the *Challenger* expedition (1872-76) showing how the illustrative techniques used at the time of the emergence of photography lent themselves to depicting, often in minute detail, the structure of biological specimens. This change of focus of the artists from the broader view to the more detailed, though not exclusive, opened the way for photographers to concentrate on the new landscapes revealed on expeditions to the polar regions.

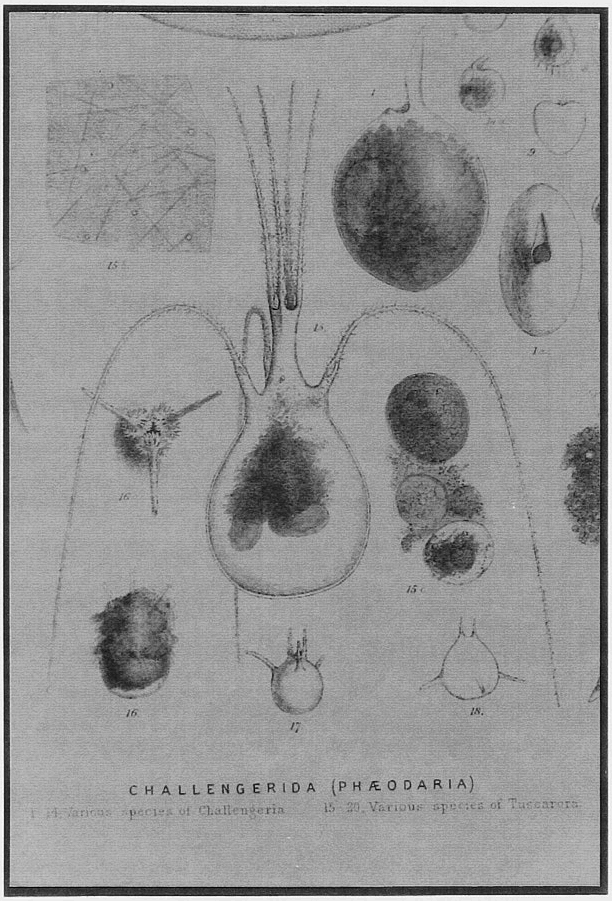


Figure 2.3.2
Detail of Challengerida (Phaeodaria), a scientific illustration from the 1872-76 *Challenger* expedition (Tizard and others 1885, Vol 1: 226)

2.4. Early applications; urban and ship based origins

Her Majesty's ships *Erebus* and *Terror* may well have been the means by which photographic apparatus was introduced to both polar regions of the globe. The 1839-43 British naval expedition to the Antarctic, commanded by James Clark Ross, sailed in *Erebus* and *Terror,* as did the Northwest Passage expedition commanded by Sir John Franklin in his last Arctic command commencing in 1845. It is known that there was discussion about whether photographic equipment should be carried on both expeditions but there is some uncertainly as to whether the equipment was actually used in the Antarctic regions. If not, then it was in the Arctic regions that polar photography began.

Headland (1989) states that on the Ross expedition "...photographic apparatus was carried...but not used in Antarctic regions..." (Headland 1989: 191); and Fogg (1992) also suggests that there was no record of photographic processes being used (Fogg 1992: 81, 82). Smith (1986), on the other hand, suggests that while Sir James Clark Ross agreed to have photographic apparatus on board, it is uncertain if the expedition actually carried the equipment to the Antarctic. Further study of this issue may reveal if the surgeon Robert McCormick and assistant surgeon Joseph Hooker received training in using the daguerreotype process; it is known that Talbot offered training for his process (Arnold 1977: 118). Schaaf (1992) discusses some events relating to attempts to equip the Ross expedition with daguerreotype apparatus but states that by mid-October 1839 "The hope of the infant photography aiding the Ross expedition was beginning to fade." (Schaaf 1992: 80).

The link between photography and polar expeditions entered a more tangible stage with the Northwest Passage expedition that departed England on 19 May 1845 under the command of Franklin. Prior to the departure of the Franklin expedition it was arranged for some of the officers and men to be photographed aboard the *Erebus*. This was carried out by the London based photographer Richard Beard (1801-1855). As one of only two patent holders of the daguerreotype process in England, (the other was Antoine Claudet, FRS,) Beard was able to monopolise the use of the new process. Beard like Claudet specialised in portraiture, which for Beard included photographing several other Arctic expeditions prior to their departure, one example being the British naval Franklin search expedition under the command of Sir Edward

Belcher, which left London on 15 April 1852 (Cooke and Holland 1978). Not only did these photographs provide a record of some of the officers and men, the commission gave prestige to Beard's London operations, which reached a maximum of four studios operated under licence after 1846 (Pritchard 1986: 13).

Beard was commissioned by Lady Franklin to photograph the officers and crew of 1845. It was reported in *The Illustrated London News* that Beard was also "...commissioned to supply Sir John Franklin with a complete daguerreotype apparatus, to take out with him..." (*The Illustrated London News* 1851, 13 Sept: 330), but is unclear if the apparatus remained on board for use in the Arctic, or was removed once the portraiture sessions was completed. Two sets of daguerreotype portraits, the only known photographic records of members of the Franklin expedition, were made at the same sitting, one for Lady Franklin, and one set retained by Beard. Lady Franklin's set of 12 images is held in the Scott Polar Research Institute, Cambridge, and copies of Beard's set of 14 are held in the National Maritime Museum, London. At the time of writing the location of the Beard originals is uncertain.

Five days after the expedition's departure *The Illustrated London News* published a full-page article giving details of the expedition and the ship's novelties including, auxiliary screws powered by steam engines specially fitted to the polar ships (*The Illustrated London News* 1845, 24 May: 328). The portrait of Sir John Franklin published as part of the article, depicts a rather rotund, balding man, in what appears to be civilian dress. Although there were two sets of photographic portrait of Franklin they were not used as the basis for this illustration of Franklin. There is only one illustration in *The Illustrated London News* of 1845 that credits a portrait being taken from a recent photograph: that of Earl Spencer (1782-1845), published on October 11 1845 (*The Illustrated London News* 1845, 11 October: 229).

It was, at the time, a practice to use photographic images as the basis for illustrations in the publication though their photographic source was not always credited. Use of the photographic images of the Franklin officers as a basis for illustration in *The Illustrated London News* does not appear to have occurred until 1851. On 13 September of that year *The Illustrated London News* published an article entitled "The Arctic Searching Expeditions", which made extensive use of Beard's images (Smith 1986) which are shown in Figure 2.4.1. It is probable that their

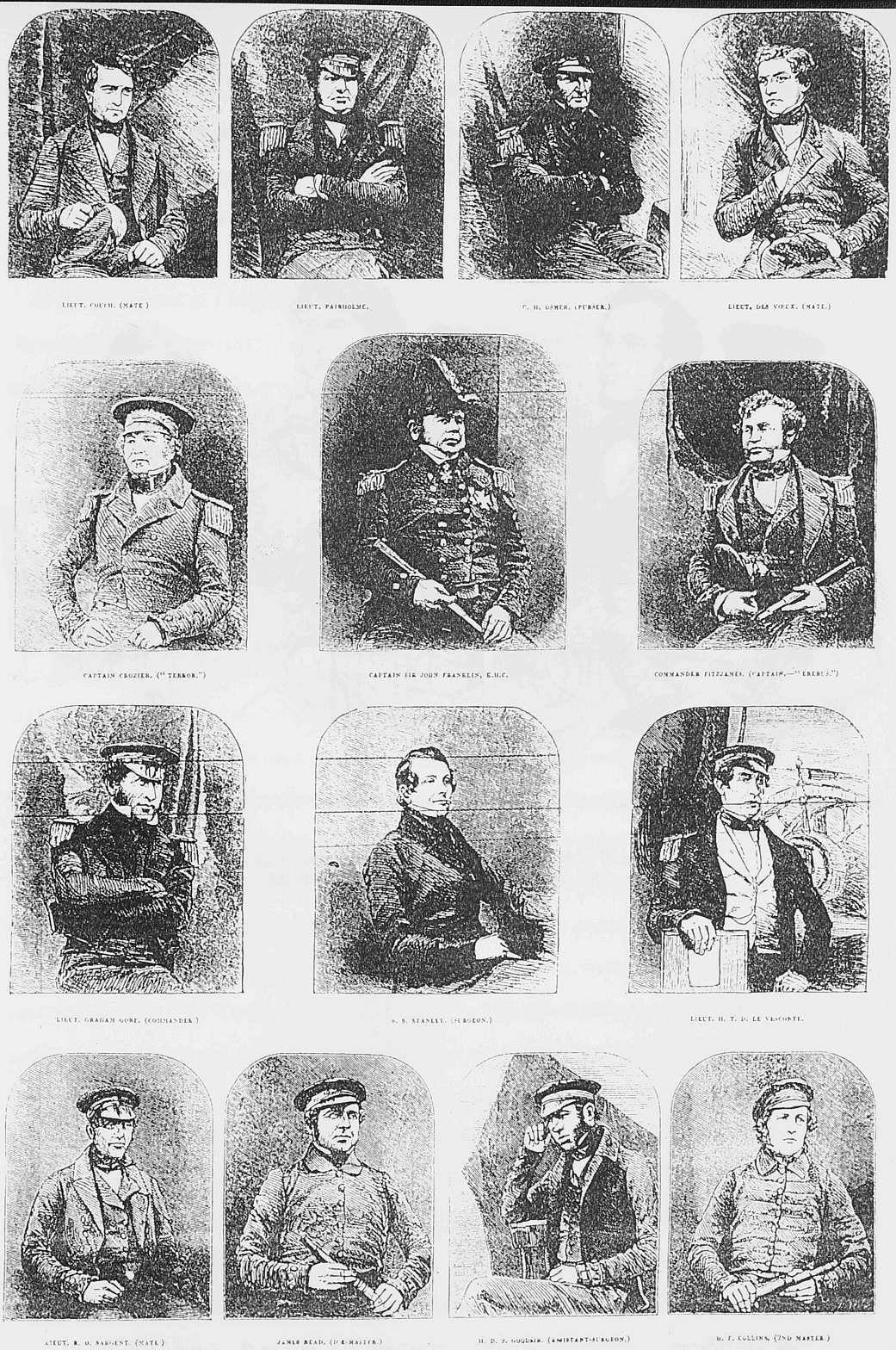


Figure 2.4.1
Portraits of Captain Sir John Franklin and his crew
(*The Illustrated London News* 1851, 13 Sept: 329)

LIEUTENANT OSBORN, COMMANDER OF THE "PIONEER." MR. ALLARD, MASTER OF THE "PIONEER." COMMANDER M'CLINTOCK ("INTREPID.") MR. PULLEN, MASTER OF "THE NORTH STAR." COMMANDER RICHARDS ("ASSISTANCE").

Figure 2.4.2
The Arctic searching squadron (from a photograph by Beard)
(*The Illustrated London News* 1852, 1 May: 336)

first publication as late as 1851 was related to the rise in interest in the search for the Franklin expedition. By then, the practice of using contemporary photographs as a basis for illustration had become established, and the portraits of the officers of the British Franklin search expedition under the command of Sir Edward Belcher were published soon after they were taken in April 1852. These appeared in two articles covering the expedition, the first on 24 April and the second on 1 May (*The Illustrated London News* 1852, 24 April: 321, *The Illustrated London News* 1852, 1 May: 336). While the images, as shown in Figure 2.4.2, were not true photographs the line drawings were copied from the daguerreotypes, thereby establishing a link between photography and the popular press which would play a significant role in the dissemination of Arctic photographs.

2.5. Arctic expedition photography; limited success on ice

It is known that photographic apparatus was taken to the Arctic on several expeditions between 1851 and 1881. Figure 2.5.1 shows the Arctic regions, and some of the locations visited by the expeditions which will now be discussed. It is not intended that this be a comprehensive survey of the use of photography on Arctic expeditions, but a brief outline of selected applications. To what extent photography was used and what records remain of these early application of the medium in the Arctic are subject to some confusion, since many of the contemporary expedition accounts (both published, and unpublished) make little mention of photography. This coupled with the scarcity of surviving images suggests that photography was only slowly being applied in the Arctic. Psutka and others (1977) review some aspects of the use of photography in the Canadian Arctic to coincide with the exhibition *Arctic Images* which began touring Canada in 1977. Condon (1989) briefly reviewed the use of early Arctic photography and covers land based and maritime expeditions. Two groups of material cited by Condon were George Simpson McTavish, working for the Hudson's Bay Company Trading post at Little Whale River in the early 1860s, and Edward W. Nelson, who was stationed at the St Michael trading post in western Alaska in 1877. As both men photographed land-based activities, they are not included in this study, which will concentrate on maritime-based expeditions.

William Thomas Domville surgeon the 1852-54 British Franklin search expedition took the first photographs of the Arctic. Domville used the calotype process, some of which survive and are

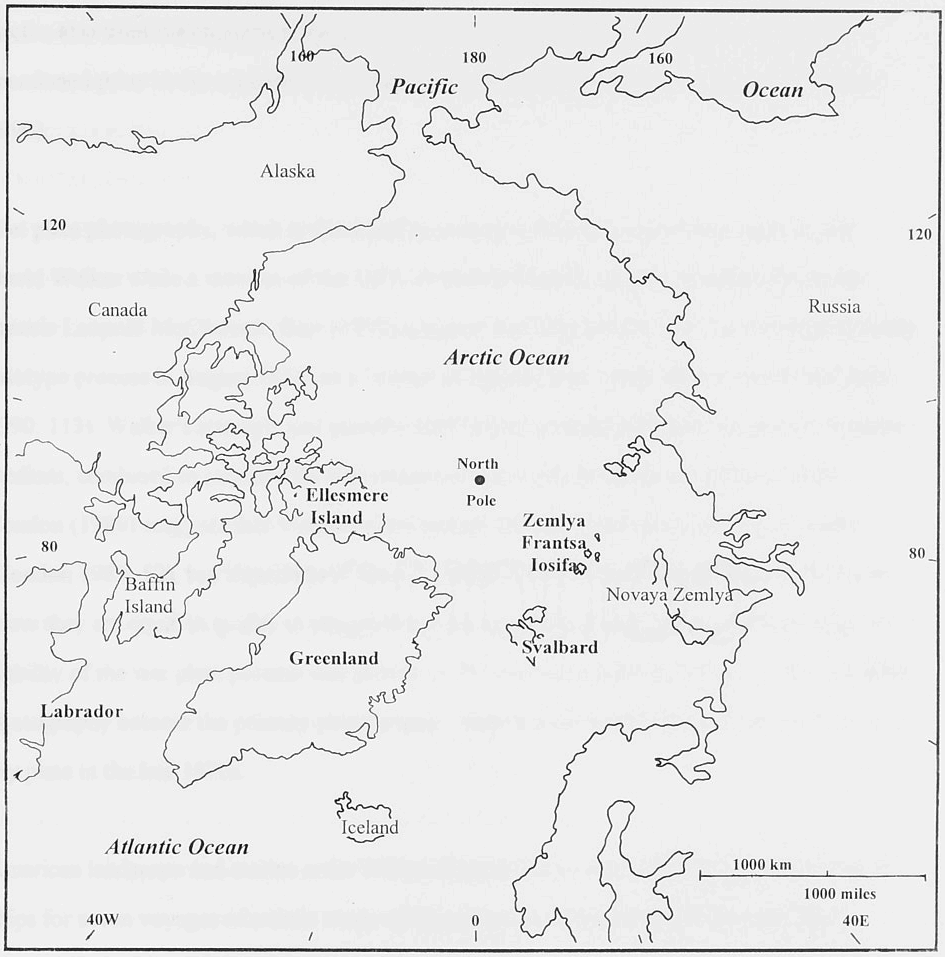


Figure 2.5.1
The Arctic regions

held in National Maritime Museum, Greenwich. Amos Bonsall on the 1853-55 United States Franklin Search Expedition, led by Elisha Kent Kane, was the second to photography the Arctic, also used the daguerreotype process. These images did not survive, as they were abandoned prior to the expedition's retreat from the Arctic (Kane 1856, Bonsall 1902, Barr 1990).

Wet plate photography, which is discussed in section 3, was first used in the Arctic by Dr David Walker while a member of the 1857-59 British Franklin search expedition led by Sir Francis Leopold McClintock. Barr (1990) suggests that McClintock had experimented with the calotype process in August 1854, as a "means of passing time" while aboard *North Star* (Barr 1990: 113). Walker's attempts and possibly McClintock's earlier personal experiences with the medium, combined to produce the first images of the Arctic from the wet plate process. Condon (1989) suggests that Walker's photographs are not of any great number or quality (Condon 1989: 52), but inspection of these 12 images, held at Scott Polar Research Institute, show they are equal in quality to images from later attempts. From these small beginnings the viability of the wet plate process was proven in the extreme conditions of the Arctic. Wet plate photography became the primary photographic medium used in the Arctic till the emergence of dry plate in the late 1870s.

American landscape and marine artist William Bradford was responsible for the chartering of ships for seven voyages of artistic study off the coasts of Labrador and West Greenland between the years 1861 and 1869. In 1864 he organised a cruise in *Benjamin S. Wright* to Labrador which was one of several voyages on which he encouraged an alliance between art, science and photography. John Dunmore and George Critcherson were contracted as photographers to assist Bradford in documenting the polar regions for his own artistic purposes. Bradford appears not to have published an account of the 1864 cruise, but several albums of photographs showing ice conditions are known to have been compiled. *Photographs of Arctic ice* is one such album, and is held by the US Army snow and ice permafrost research establishment (Bradford 1864, Johnson 1990: 63, 199). The majority of the photographs show icebergs, and their negatives are available in the Library of Congress. In the absence of an account by Bradford, some indication of the use of photography can be gleaned from Alpheus

Spring Packard's account of this voyage in his book *The Labrador coast a journal of two summer cruises to that region* (Packard 1891). Within this work Packard uses photographs, taken by a Mr Pierce, to illustrate his scientific enquires, including the study of geology, glaciation and native peoples. Johnson (1990: 63, 199) and other evidence suggests that John Dunmore and George Critcherson, not Pierce, were the photographers on the 1864 cruise. While there are not a great number of illustrations in this account it gives an indication of how photography and science became more and more complementary towards the end of the nineteenth century. Bradford was to work with photographers Dunmore and Critcherson again in 1869 on the *Panther*'s cruise to West Greenland. In contrast to the 1864 cruise, an account of 1869 cruise was published in a bound volume in 1873 (Bradford 1873).

One of the expeditions of the period to have used photography most successfully was the *Vega* expedition led by A. E. Nordenskiöld in 1878-80. Nordenskiöld was a veteran of ten Arctic expeditions between 1858 and 1883. In 1858 and 1861 he was a member of the Swedish scientific expeditions, led by Otto Torell. He was later leader of the Swedish scientific expeditions of 1864, 1868, 1870, and 1872-3; and three expeditions to European Russia and Siberia, which combined science and commerce in the development for trade of the Northern Sea Route in 1875, 1876, and 1878-80 (Nordenskiöld and Otter 1869, Nordenskiöld 1881, Holland in press). Nordenskiöld made extensive use of photography, one example being on the *Vega* expedition 1878-80. Geographical and scientific subjects, and other photographic records, were used in the popular account; *The voyage of the Vega round Asia and Europe* (Nordenskiöld 1881). This book contains 298 woodcut illustrations many of which are acknowledged as being based on photographs (examples of these are shown in Figures 2.5.2 and 2.5.3.) A large proportion of them were by the captain of the *Vega*, A. L. Palander.

Another expedition that made use of photography in the Arctic was the Austro-Hungarian Exploring Expedition of 1872-74 in the *Tegetthoff*. Led by Karl Weyprecht and Julius von Payer of the Austrian navy and army respectively, this expedition discovered Zemlya Frantsa-Iosifa and carried out extensive scientific field work (Kirwan 1959). The original account by Payer (1876a) was published in German and contained 146 illustrations, all accredited to the author, and with no mention of photography as a source of illustration. The

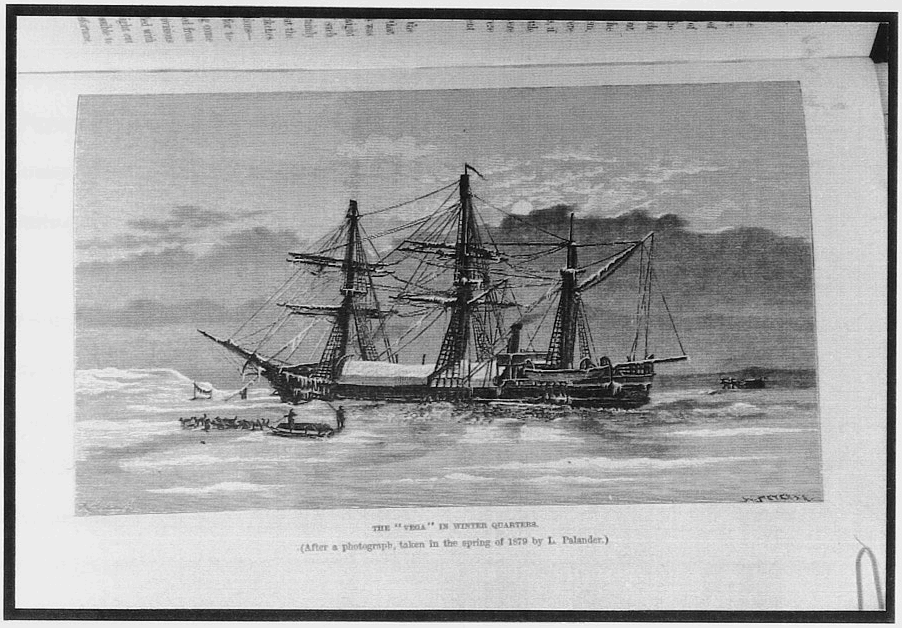


Figure 2.5.2
The *Vega* in winter quarters
(Nordenskiöld 1881, Vol 1: 470)

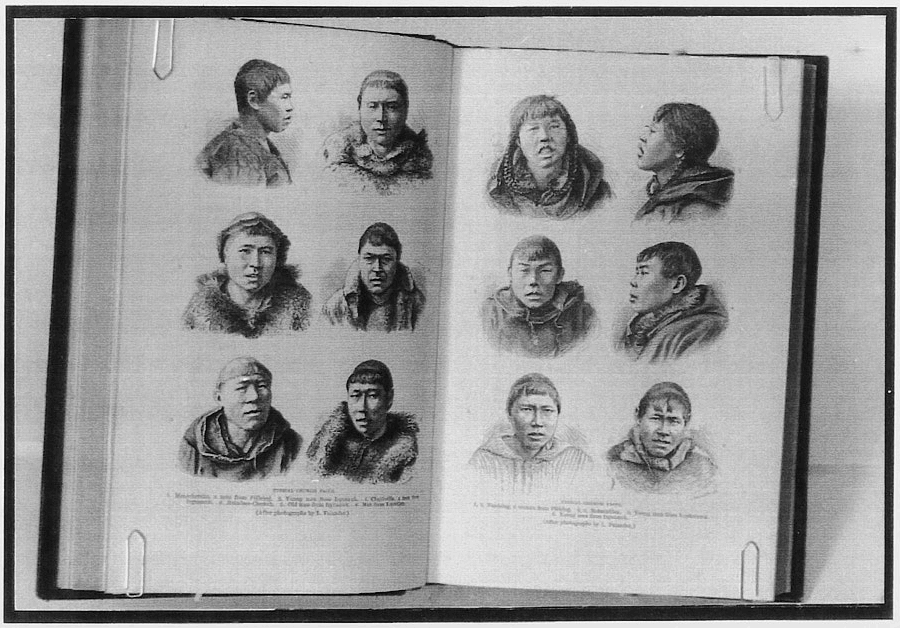


Figure 2.5.3
Typical Chukchi faces
(Nordenskiöld 1881, Vol 1: 84-85)

English translation, *New lands within the Arctic circle* (1876b) contained only 92 illustrations. All illustrations in the English edition were credited as drawings from the author. While none of the illustrations were from photographs, Payer did ensure photographic apparatus was carried and used (Payer 1876b). The abandonment of *Tegetthoff* in April 1874 and the retreat by small boats to Novaya Zemlya would have made carrying the bulky photographic apparatus very difficult, limiting the scope for a comprehensive photographic record.

Sir Allen Young's voyages in *Pandora* in 1875 and 1876 combined the aims of navigating the North-West passage and searching for relics from the Franklin expedition (Young 1879). Young, as sailing master of *Fox* on McClintock's Franklin search expedition of 1857-59, was aware of David Walker's photographic activities during that expedition. It is possible that this early involvement with Arctic photography on the *Fox* stimulated his interest in the use of photography in his own expeditions. In 1876 on the second voyage of *Pandora* Young hoped to navigate the North-west Passage via Smith Sound, but was requested to meet up with the Nares expedition. William. J. A. Grant "...volunteered as photographer..." and Young appointed him as a member of the expedition (Young 1879: 88). Grant's photographs from the *Pandora* expedition were of such high quality that they earned him the bronze medal from The Society of Photographic Exposition of London (Markham 1885: 178). "...Encouraged on both sides to continue in the path he had chosen..." Grant went on to be official photographer as a member of the Dutch Arctic Expedition on *Willem Barents* in 1878 (Markham 1885: 178) and again in 1879 (*The Illustrated London News* 1879, 25 Jan: 82), and *Eira* in 1880. Grant's work on *Eira* in 1880 forms part of the material examined later from the cruises of Benjamin Leigh Smith.

Grant was probably the most experienced Arctic photographer during this period and took the initiative to ensure that he got out into the field. Between 1876 and 1883 Grant was photographer on seven Arctic expeditions. In addition to the three mentioned above he was photographer on *Willem Barents* again in 1881, and 1883. His final Arctic expedition was in 1883 with Gore Booth. Grant was described in *The Illustrated London News*, "...as a most enthusiastic young explorer...who had succeeded in executing an admirable series of photographs under the greatest possible difficulties owing to the confined space..." on the

Dutch Arctic expedition (*The Illustrated London News* 1879, 25 Jan: 82). One of two illustrations from Grant's photographs taken on the Dutch Arctic expedition is shown in Figure 2.5.4. In contrast Young did not acknowledge use of Grant's photography in his account of the two summer cruises (Young 1879) which contained only nine illustrations, none of which was attributed as having been based on a photograph, despite an official photographer having been on at least one the voyages (Boissevain 1885: 178, Credland 1980: 133).

George Tyson of the American Howgate Preliminary Arctic Expedition of 1877-78 to Davis Strait and Baffin Island received specific instructions as to the use of photography (Howgate 1879). While Howgate was clearly conscious of the potential value of photography to the "...general public..." and the "...scientific student..." (Howgate 1879: 10) the account of the expedition by Howgate did not use any illustrations. While it is surprising there are no illustrations, the instructions about the value of photography were in keeping with the organisation responsible for the expedition. Dupree (1957) examined specific aspects of the U.S. Army and Navy and their involvement in Arctic and other exploration. In contrast to the British navy, he found that the U.S. Navy showed a "...progressive, experimental temper in seeking improved tools..." such as steam vessels and photography to aid the activities of the Coast Survey (Dupree 1957: 103).

In addition to the expeditions mentioned above, at least two, possibly more, expeditions made use of photography: Benjamin Leigh Smith's 1873 cruise to Svalbard; and George Nares's British Arctic Expedition of 1875-76. The published records of these and other expeditions vary greatly in their use of illustrations or photography. Bradford published his account in 1873, choosing to illustrate it with 141 photographic prints, Smith did not publish an account of his voyages. However, an account by Smith was read to the Royal Geographical Society by Sir Clements Markham on 17 January 1881 (Markham 1881). The official account of the British Arctic Expedition was first published by Nares in 1876, and the second edition appeared in 1878 (Nares 1878). This account contained 50 illustrations, six of which were photographs reproduced through the Woodburytype process. Figure 2.5.5a shows one of the six Woodbury prints published from an original photograph, which is seen in Figure 2.5.5b. This was the only publication examined to use the Woodburytype process for illustration. One illustration (Nares

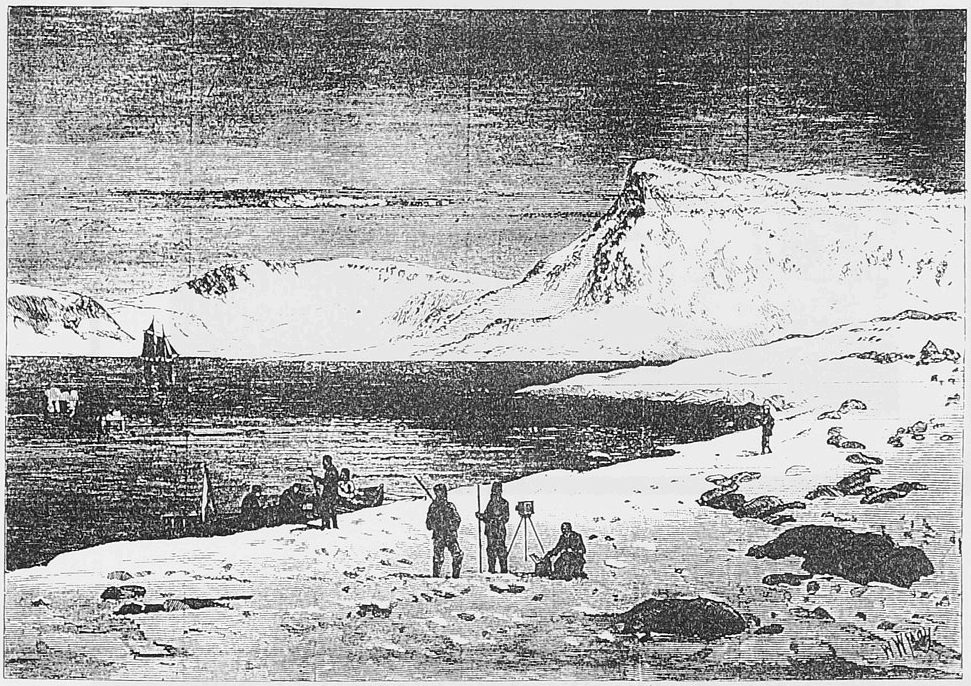


Figure 2.5.4
Zeeuwsche Uitkyk, North Spitsbergen. Based on a photograph by W.J.A. Grant
(*The Illustrated London News* 1879, 25 Jan: 81)

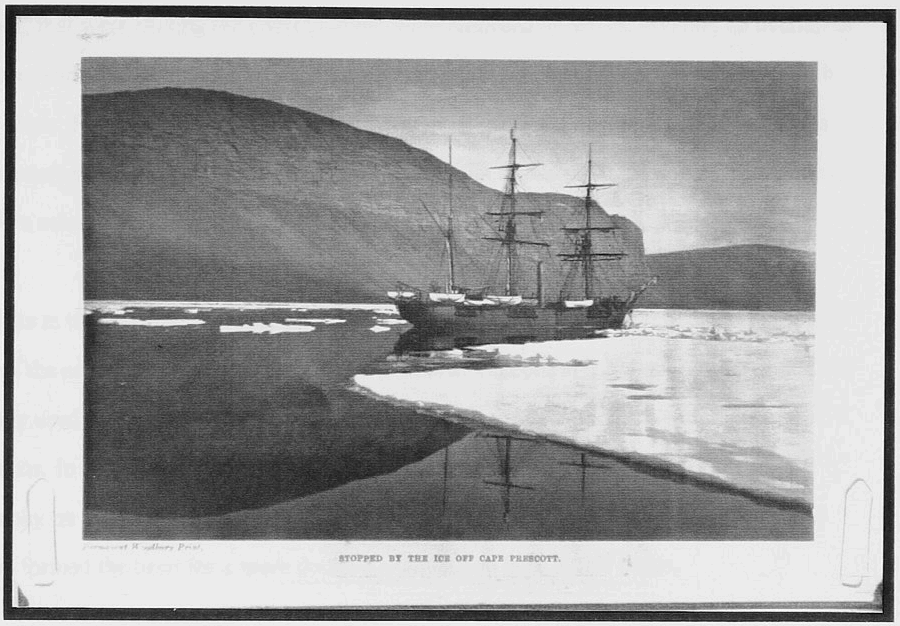


Figure 2.5.5a
Stopped by the ice off Cape Prescott
(Nares 1878, Vol 1:84-85)

Figure 2.5.5b
Fast to the floe under Cape Prescott, Franklin Pearce Bay, 9th Aug 1875,
having arrived at the northern end of the water channel
(BS: 26)

1878: 210) was a colour lithograph of bird's eggs, sketched by the naturalist Moss. Movement and colour, that were eluding the photographer, were recorded by artists, creating an overlap of visual documentation methods, that would persist on polar expeditions well into the twentieth century. Moss. Figure 2.5.6 shows the colour and Figure 2.5.7 the movement, that Moss was able to capture with his artistic techniques. Of the other illustrations, 44 were woodcuts, five of which were acknowledged as being from a photograph.

Illustrations in the accounts of expeditions of this time did not necessarily reflect the scope and success of the actual photographic record of a particular expedition. Limitations of cost and the technology used for reproduction methods contributed to and restricted the wider use of photographs. In order to make a more accurate and comprehensive evaluation of the use of photography on expeditions, photographic records from the last three expeditions mentioned here have formed the basis for a more detailed examination later in this thesis.

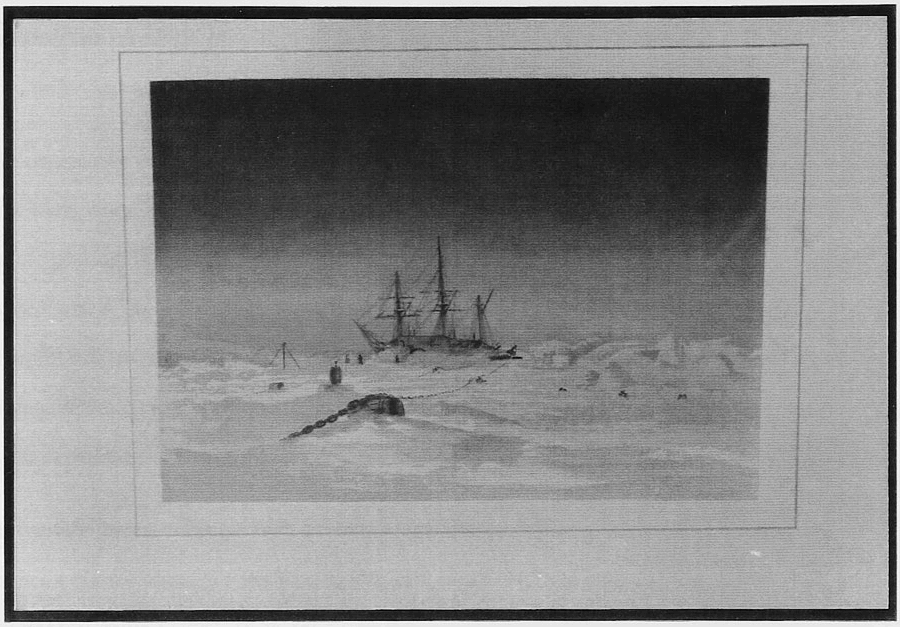


Figure 2.5.6
The dawn of 1876, HMS *Alert* in winter quarters
(Moss 1878: 48)

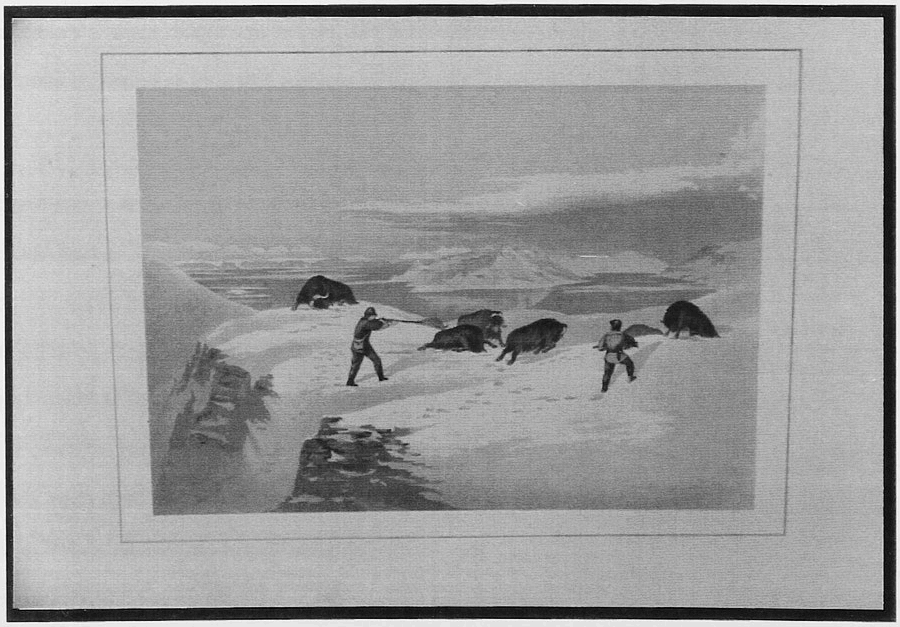


Figure 2.5.7
Musk-ox hunt, Discovery Harbour, midnight, August 25 1875
(Moss 1878: 24)

3. Arctic photography: technical and physical considerations

3.1. Obtaining the photographic record in the Arctic; technical and physical considerations.

Successful application of photography as a means of visually recording what lay before the camera has been, since its development, inextricably linked with the technical aspects of the photographic process. Technical aspects can both tie down and release the mechanical recording process. Also, technology plays a significant part in how photography is applied and how successful it is in each application. It is important to establish what aspects of photographic technology contributed to the eventual application of the medium as a means of obtaining an expedition's visual record.

Technical considerations combine with environmental conditions to present to the photographer a combination of components that can, if not understood, hinder the securing of a successful photographic record. In recent times detailed manuals and guides for cold-weather photography in remote regions, such as *Cold weather photography* (US Naval Photographic Centre 1955) and *Photography on expeditions* (John 1965) have provided the aspiring polar photographer with a means of preparing for the challenges of using photography in an inhospitable environment. More specialised works for the aspiring polar photographer are at times produced by organisations that operate in these environments (Antarctic Division, DSIR 1989).

Although manuals and guides to assist the aspiring photographer of the twentieth century are an established part of literature documenting the technical aspects of photography, guidelines for appropriate technical methods to be used by the aspiring photographer in the 1850s and 1860s were scarce. One scientific and technical manual that ignored photography was the two-volume work edited by T. Rupert Jones (1875a, 1875b) for use on the British Arctic Expedition of 1875. But the most important such work was the *Manual of scientific enquiry* edited by Sir John Herschel and first published in 1849, at a time when he was at the height of his power in Victorian scientific society (Herschel 1851, Knight 1974). The British Admiralty, the Royal Society and the Royal Geographical Society put considerable effort into the production of the manual, as it was needed to assist the staff of important expeditions in

obtaining the most accurate information, which would ultimately be integrated in publications, maps and particularly the Admiralty charts and pilots.

Herschel's work was published in several editions, which covered many aspects of the natural sciences and the documentation of geographical discovery. Suggestions to the reader as to the appropriate subjects for recording through sketching appeared at frequent intervals within the text. In the section dealing with geography, the manual stated that the notebook and compass should be "...constant and inseparable companions..." and in using his notebook "...he should not forget that slight sketches of the country, and peculiar forms of hills...". The manual continued to remind the reader the merit of the visual record "...however hastily made..." as an aid for recollection of features and assisting explanation to others, as opposed to a "...long and elaborate description..." (Herschel 1851: 134). This was one of many mentions in the manual that suggested an awareness of the benefits of a visual record. Other specific mention of obtaining visual records through manual means occurred in sections dealing with geology, mineralogy, meteorology, zoology, botany and ethnology.

Yet, despite Herschel's evident recognition of the value of the visual record, throughout the second edition of the *Manual of Scientific Enquiry* (Herschel 1851) there was no mention of the direct use of photography or of the potential of the photographic medium. This is somewhat surprising, particularly when it is considered that Herschel was intimately involved with the development of photography in England, aspects of which are covered by Schaaf (1992). Herschel's close involvement in scientific experiments relating to the chemistry of photography, and his relationship with Talbot, is covered by Arnold (1977).

Societies aimed at encouraging the development of specific interests, such as geology, geographic exploration, science and photography gained popularity in the second half of the nineteenth century. The Photographic Society was formed in late 1851 in response to increased interest in photography, which according to Roger Fenton, landscape photographer and founding member, "...was about to enter into a new phase of its history..." (Fenton 1853). Such societies flourished in the mid-1800s, and, through their meetings and weekly publication the *Journal of the Photographic Society of London*, aspiring and successful photographers such as Samuel Bourne, corresponding from India, were able to exchange ideas and keep

abreast of improvements in the medium. Lack of appropriate and available documentation relating to photographic practices forced individuals to seek out tuition or to join groups such as The Photographic Society. Society member Captain Abney published an account of his role in the Nares expedition in the journal of 1876. Abney had "...been entrusted with fitting out both ships with a needful supply of apparatus and chemicals...". He also recounted his role in instructing two officers prior to the Nares expedition departing England (Abney 1876: 8).

Thus it appears that groups and individuals invested time and effort in training others in the use of photography on expeditions to remote regions; however, it is apparent that at the same time the Admiralty was not encouraging the use of photography.

Technical principles

> "...Although today the photographic process finds many applications, photography is still primarily a method of making pictures..."
> (Jacobson 1978: 13)

Evolution and development of chemicals and materials had a great impact on the achievements of photography. Since the inception of the photographic process, there was a steady decrease in the time required to expose light sensitive emulsions in order to obtain a latent image. Figure 3.1 illustrates the magnitude of this development.

Emulsion sensitivity - Speed at f11.	
Approximate date	Time required for exposure
1829	28,000 sec [480 minutes]
1839	4,000 sec [66 minutes]
1840	80 sec
1900	1/50 sec
1980s	1/500 sec
1990s	1/2000 sec

Figure 3.1
Times for correct exposure 1829 to 1990
(Condon 1989)

Light, whether natural of artificial, is the critical requirement for obtaining a latent image. Light is required to be registered on the light sensitive emulsion before any of the various photographic processes can proceed. Sensitivity of the emulsion had a direct bearing on the length of time required to effect a correct exposure. The longer the exposure, the greater the

chance of movement, hence blurring, being registered. Photographs from the period covered commonly had blurred or ghosted images.

There were many formulae for emulsions. While the ingredients of emulsions may have varied, the aim and principle of them was essentially the same. The emulsion needed to be sensitive to light in order to register the image that was allowed to pass through the camera lens. Once registered on the emulsion the chemical reaction with the emulsion was arrested by development and fixing of the emulsion. If successful, a negative image of the recorded scene would remain on the glass plate. To complete this process, another step was required. Sensitised paper was exposed to light that was passed through the glass plate, and a negative image registered on the paper, which in turn was chemically fixed, leaving a positive reproduction of what had been photographed. Consistency of temperature was critical for the chemicals and emulsion used in the process, and failure to maintain constant temperatures of chemicals used in all aspects of the process could slow the action and reaction of the chemicals with the emulsion or cause physical deformities of the emulsion (Bourne 1866a: 618). Figure 3.2 shows a print from a negative with a cracked emulsion from the Nares expedition.

Without sunlight, during the long Arctic night, which in high latitudes lasts more than four months, the activities of the Arctic photographer would have been severely curtailed, as would have been the case on the British Arctic Expedition of 1875-76. Artificial light sources from battery powered electric light and chemical processes were in use as early as the 1850s as a means of obtaining artificial light (Rosenblum 1984: 248, Greenough 1989: 137). Nares makes reference to Mitchell attempting to photograph the Guy Fawkes celebrations "...by aid of long lights...", but this early attempt at photography with the use of artificial light in the Arctic was unsuccessful (Her Majesty's Stationary Office 1877: 48).

Correct exposure, of both the negative and positive image, would provide a print with a tonal range ideally from a solid black through to a solid white. The ability of the emulsions to register a range of tones was caused by a combination of the chemicals response to certain light wavelengths and also the ability of the emulsion to register a broad range of light intensities. One of the most common examples of this in pictures of this period is the lack or almost total absence of detail in the sky. To circumvent this it was common practice for photographers to

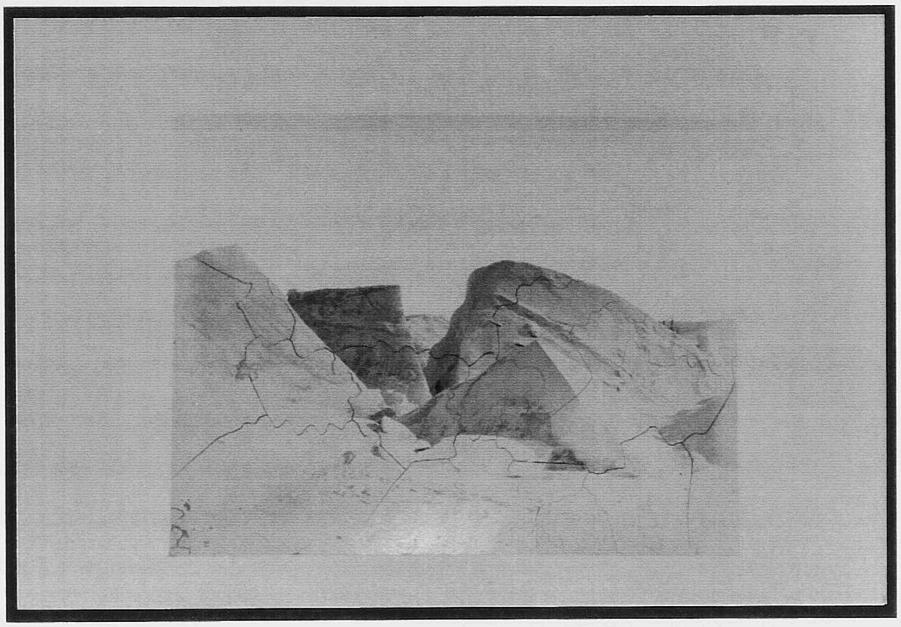


Figure 3.2
Albumen print from a negative with a cracked emulsion
(BS: 84)

add sky, and cloud scenes, sometimes a different exposure of the same view or even a completely different view, to an image when printing. During the period covered, some photographers delegated the printing of the images to specialists, enabling them to continue working in the field.

Photographic processes 1851 to 1881

In the context of this thesis the emulsion used for Arctic expedition photography was predominantly made through the wet collodion process. This and other processes are now discussed. After its launch in 1851, Fredrick Scott Archer's wet plate process quickly challenged and then replaced the earlier photographic processes such as the daguerreotype and the calotype. Archer's process was so successful that it remained as the preferred method of photographers until the emergence of a commercially available dry gelatin plate process in c1878 (Harker 1982, Edwards 1992). Owing to the dominance of the wet plate process in Arctic photography not all photographic processes available in the period are covered. It is difficult to ascertain exact dates of the use of the various processes, as improvements were made by individual practitioners and took time to become established and commercially available. The exception to this was when a particular process was patented, such as was the case with the daguerreotype and calotype processes. The overlapping nature of this technical evolution is shown in Figure 3.3.

a. Positive processes

The daguerreotype 1839 to c1860

The first commercial photographic process, the daguerreotype, was invented by Frenchman Louis Daguerre, and was made public in 1839. The paper-based calotype, developed in 1839 and made public in 1841 by Englishman William Henry Fox Talbot, further paved the way for the modern and more portable photographic processes. The daguerreotype was a "direct positive" photographic process, which unlike the calotype, produced a unique image and was not able to be reproduced using the original image (Harker 1982, Edwards 1992).

The greatest handicap of the daguerreotype was the limited nature of the records it was able to produce. The process provided a remarkably sharp and detailed image, but in addition to the

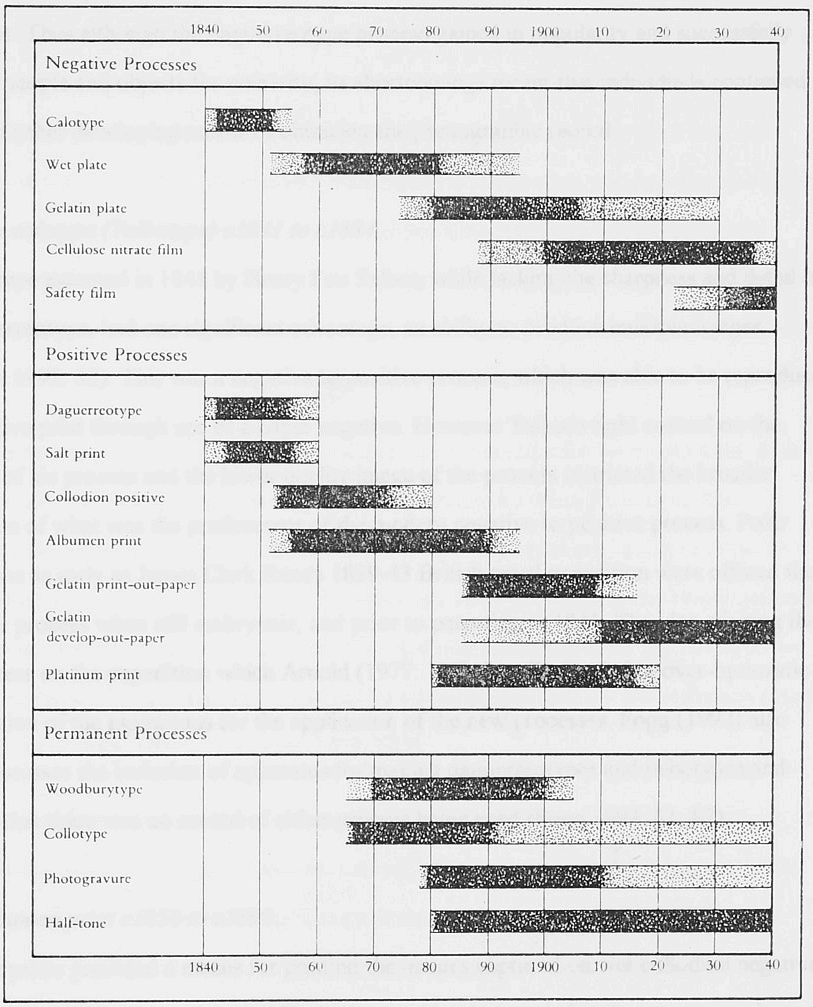


Figure 3.3
Photographic processes 1840-1940
(Edwards 1992: 266)

shortcoming of producing only one image, long exposure times of five seconds to two minutes further restricted its application. Portraits taken by Beard for the Franklin expedition are examples of the rigid posture required to ensure the subject was not blurred through movement. Thus although the daguerreotype process gained in popularity and successfully recorded people and objects for posterity, its shortcomings meant that individuals continued to work on further developing means of obtaining the photographic record.

The calotype (Talbotype) c1841 to c1884

The calotype patented in 1841 by Henry Fox Talbot, while lacking the sharpness and detail of the daguerreotype, had one significant advantage, an ability to produce multiple images (Edwards 1992: 30). This was a negative to positive process, which was able to be reproduced as a positive print through use of a paper negative. However Talbot's tight control on the licensing of his process and the lower quality image of the process restricted the broader application of what was the predecessor of the modern negative to positive process. Polar expeditions as early as James Clark Ross's 1839-43 British naval expedition were offered the use of the process when still embryonic, and prior to patenting in 1841. The idea of using the new process on the expedition which Arnold (1977: 118) described as being over-optimistic is an indication of the aspirations for the application of the new processes. Fogg (1992) also briefly discusses the inclusion of apparatus for making daguerreotypes and talbotypes and suggests that there was no record of either process being used (Fogg 1992: 81, 82).

Albumen print c1850 to c1890

Albumen prints provided a means for printing the images captured on wet collodion negatives. Paper was coated with an emulsion of beaten egg white that carried sodium or ammonium (Harker 1982: 19). The thin, coated paper could be sensitised by immersion in a bath of silver halides. Once sensitised it was required to be exposed to the negative image through direct contact with the glass plate, while being exposed to light. Prints from this process "...have a low gloss, soft sepia tones and yellow highlights..." (Edwards 1992: 265).

b. Negative processes

Wet collodion plate 1851 to c1880

The name of this process describes the state in which the photographic negative must be kept in order for the process to be successful. Prior to exposure of the glass plate, each plate had to be prepared by the photographer. This involved polishing the glass, ensuring there were no impurities on the surface that could create unevenness of the coating, and scouring the edges of the plate, in order to aid the retention of the emulsion. Once the plate was prepared, the collodion solution was poured in an even coating over it. Loss of sensitivity of the wet emulsion as a result of crystallisation of the silver nitrate or decomposition of the silver iodine in the emulsion, restricted the time a glass plate was sensitive to exposure.

Devising a means of overcoming these limitations was a challenge for many interested in the chemical aspects of photography, and a potential hindrance for those desiring to free themselves from the immediate vicinity of darkroom facilities and from having to preserve a plate in a wet state prior to exposure. Two articles originally published in the French journal *La Lumière* and reprinted in the *Journal of the Photographic Society* in 1853 put forward two separate methods of "operating at a distance" by extending the time the wet collodion negative remained wet (Girod 1853: 113, Gaudin 1853: 125).

While the wet plate was restrictive it provided the most practical means of obtaining a photographic record in the field. It was the wet collodion process that proved successful in remote regions of the world, including in the extremes of tropical and polar regions.

Gelatin dry plate c1873 to 1930

Pre sensitised plates, still made of glass, freed the photographer from having to prepare negatives "on site". Light sensitive silver halide was suspended in a gelatin emulsion, which once exposed remained sensitive for a considerable time, "...providing they had been properly packed and stored..." (Edwards 1992: 265). The early versions of this medium "...lacked the sharpness..." of the wet plate, but this was soon remedied.

c. Permanent processes

Inability to reproduce images, such as with the daguerreotype process, limited the application and popularisation of photography. When photographic images were limited to small numbers, their impact on viewers was restricted. Photographic images provided a new form of pictorial record enabling circulation to a wider audience and hence a greater potential impact. Yet achieving this needed a means of mass reproduction through permanent photographic processes.

Perhaps the most prominent photomechanical processes up to 1881 were the collotype (not to be confused with the Talbot's paper negative calotype process) and woodburytypes. At the end of this period the development of the half-tone print and the photogravure process greatly enhanced the technology of photomechanical reproduction. The full impact of photomechanical reproduction did not occur until the late 1870s (Edwards 1992). These processes became the basis for modern photomechanical reproduction methods but were not widely used until after 1880 and only the woodburytype will be discussed here.

Woodburytypes c1868 to 1900

The Woodburytype was an early means of photomechanical reproduction. Walter Bently Woodbury (1834-1885) patented his process in 1866 and 1867 (Wakeman 1973: 106). This method of reproduction, while having to be manually pasted into a publication, gave "...well defined and separation of tones..." and provided "...remarkable image clarity..." (Harker 1982). The process involved the use of an image on a gelatine emulsion being transferred, via a steel plate, to a lead mould. This mould was used in conjunction with pigmented gelatine, usually dark blues or dark browns, and paper to economically produce up to 1,000 impressions (Wakeman 1973: 109). Six photographs reproduced by the Woodbury Permanent Printing Company (established by Woodbury in about 1870) were inserted into George Nares's account of the British Arctic Expedition of 1875-76 (Nares 1878). This process eliminated the need for an artistic translation of the photographic image onto other media thereby increasing the potential for accurate photographic reproduction.

Physical considerations

From the studio to the field.

Within the confines of the studio, photographers were able to establish ideal conditions for photography. Specially designed studios, for example that of Antonie Claudet on the roof of the Royal Adelaide Gallery, London, were fitted with large windows or skylights to maximise available natural light (Gernsheim 1982: 128, Pritchard 1986: 11). Getting photography out of the relatively controlled confines of the studio environment and into the variable natural world began to occur when photographic processes became able to cope with the "...unpredictable brightness range and other factors..." (Haworth-Booth 1984: 22). This did not occur to any great extent until the advent of the wet plate process in 1851.

Bulk and weight of equipment were on occasions two of the foremost planning concerns of expeditions. This was particularly true depending on the choice of the primary and additional means of transport used. Early photographers were encumbered in their activities with two groups of equipment; the camera and the darkroom. While they were separable, the camera and the darkroom were, in the early period of field photography, inextricably linked. The wet plate process required the photographer to be within a close distance of his darkroom. If the time between the exposure of the wet plate and its development was too long, the emulsion dried out. Once dry the emulsion lost sensitivity and became "impervious to processing solutions" (Fabian 1983).

Field photography, transportability of cameras and darkroom equipment.

Darkrooms were provided in railway carriages, steam boats and aboard some expedition vessels. Two polar expedition ships to provided specially adapted spaces for darkrooms were *Challenger* in 1872-76 (Spry 1876: 4) and *Panther* in 1869 (Bradford 1885: 81). Photographers able to utilise existing road networks were quick to adapt horse-drawn vans, as did Roger Fenton while photographing the Crimean War in 1855.

When photographers who were using the wet plate process were unable to have access to appropriate darkroom facilities, their activities ceased, as they were not able to prepare the

glass plate with the light sensitive emulsion. In order to overcome the restriction of having to be close to darkroom facilities, photographers who wished to venture farther developed various portable means of providing a darkroom working space.

One example of solving the problem was the "Portable dark tent" that Bourne found impractical in the Indian heat (Bourne 1866: 474) but that was a practical solution for many. Figure 3.4 shows one version developed by Henry Brown who described it as consisting "…of a flat board …, folding by hinges in the middle, to the under part of which a strong tripod stand is attached …"(Brown 1853:119). This device was also able to be used as a large camera. At the time Brown and other members of the Photographic Society presented their contributions to making photography more portable, the medium was in a process of almost continual evolution and development. Without each effort to make photography more portable, it would have remained tied to the darkroom far longer. This in turn could have slowed the introduction of the medium to the more inaccessible regions of the world, including the Arctic.

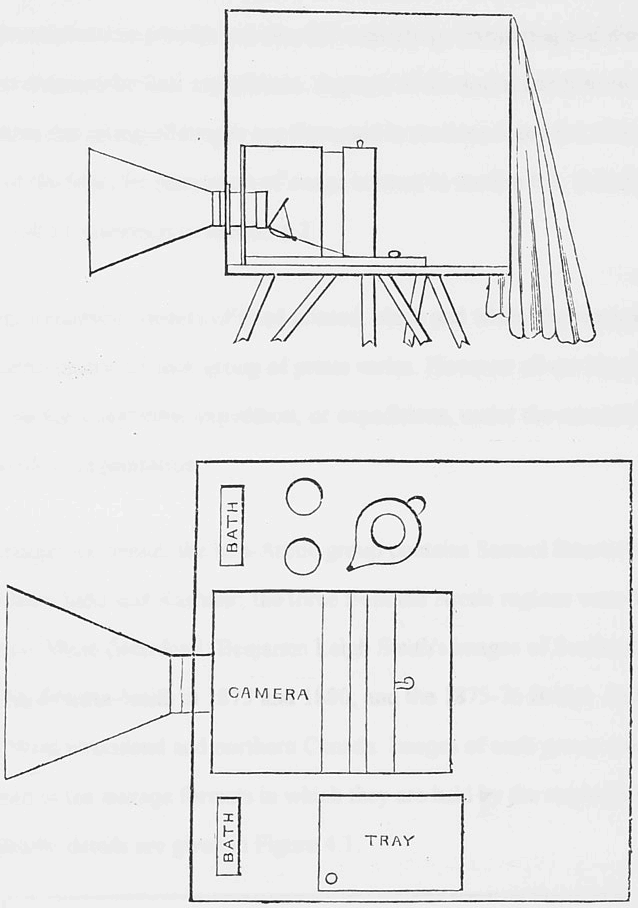


Figure 3.4
Brown's portable dark tent
(*Journal of the photographic society of London* 1854: 119)

4. Image examination, analysis and interpretation

Having established some of the technical constraints that influenced the use of photography in the early period of its application on expeditions, it is now appropriate to outline how aspects of the contribution of photography to the investigation of the Arctic are to be assessed. The aim of this examination and analysis is to provide a means for evaluating, comparing and discussing the photographic record obtained by four expeditions. Aspects of the social and historical context of each expedition and group of images are discussed in sections 5 and 6.1. The image analysis will form part of the basis for discussion of image content in section 6.3. Selected findings of the analysis will be presented in section 6.3.

All images in each group examined consists of hand printed, black and white photographic prints. The method of presentation of each group of prints varies. However all are identifiable as having been created during a particular expedition, or expeditions, under the command or control of the same person or organisation.

Of the four groups of images examined, the non-Arctic group contains Samuel Bourne's 1863-66 images of northern India and Kashmir; the three from the Arctic regions were William Bradford's 1869 images of West Greenland; Benjamin Leigh Smith's images of Svalbard (Spitsbergen) and Zemlya Frantsa-Iosifa in 1873 and 1880; and the 1875-76 British Arctic Expedition's images of West Greenland and northern Canada. Images of each group were listed and analysed as presented in the storage formats in which they are held by the respective holding institutions. Specific details are given in Figure 4.1.

	Image group archive details		
Image group	**Dates**	**Institution**	**Catalogue details**
S Bourne	1864, 1866	Victoria and Albert Museum	x844 a to e x813
W Bradford	1869	Scott Polar Research Institute	(*38):91(08) [1869 Bradford]
B Leigh Smith	1873, 1880	The Royal Geographical Society	E99/014898-014937 and PR/043357-043396
G Nares	1875-76	Scott Polar Research Institute	P60/61/1 to 107

Figure 4.1
Image group archive details

4.1. Explanation of methodologies used

The image created at a particular time can reveal to the viewer information from several sources. The title, photographer (if known) and location (if known) can provide key information for identification of the image. Without these, the value of the images may be considerably reduced (Bate and others 1986). While an image title can provide information on the image subject and context, it also has the potential to be misleading. Reading of titles in isolation from the image may lead to presuppositions that may not be wholly representative of image content.

Specialised systems of categorising information have been developed to meet specialised needs for particular groups of material, such as images. Classification of images through the use of a numerical division based on a decimal system, such as the Universal Decimal Classification system, is one of these. This system, as outlined by Green (1984), focuses on the "...classification and rapid retrieval..." of photographic images "...in any form and in any subject area..." (Green 1984: xiv).

Those who deal with images have devised a means of cataloguing and describing material by using a combination of numerical division and descriptive words. (Elford and Shields 1987). Figure 4.2 gives a comparison between Green's decimal and Elford and Shields "key fields" classification systems. Henceforth the term "key words" will be used to describe words selected for use in image analysis. The key words used in this analysis and their scope are listed in Figure 4.3, are derived from the listing developed by Elford and Shields (1987) with minor modifications to the original listing, that I have added, to accommodate the specialised nature of the images being examined in this study. These have been marked with an asterisk (*).

Comparison of decimal and key word categories			
Decimal categories by Green			Key word categories by Elford and Shields
671	Geology	Geology - including glaciology	For images of geological nature or features, including glaciology, field and laboratory work, equipment diagrams and graphs.
681	Biology	Biological survey	For biological survey field and laboratory work, equipment, diagrams, and graphs.
682	Botany	Vegetation	For any photographs of natural and cultivated vegetation.
691	Anthropology	Anthropology	For all aspects of traditional cultures, whether of people or artefacts.

Figure 4.2
Example of key word and decimal categories

The use of key words in categorising an image can provide a means of overcoming the shortfalls from using a title only category, and can also provide a means for indicating image content. The content of the image, while not always revealed by the components of title, photographer and location, can also add to the value of the image for the viewer or researcher. Image content can provide an insight as to the subject preferences of the photographer, or of those who are directing the photographer. Image content analysis through selection of key words can also provide researchers with information that is additional to the title or to the more obvious aspects of image content.

Analysis of image content by using key words can provide a practical means of discussing images in the context of written works, where it is not always practical to give long descriptions of images being treated, or to provide illustrations of all images under review. Another advantage of a key word system is that it provides a more objective and standardised method while still describing image content. Allocation of key words can aid access to the images, and can provide additional information to the researcher. This minimises the "...highly subjective element in the selection of words used to describe pictures...", as discussed by Belfer (1986). The subjective nature of words in describing images is also evident in the use of titles. However, through the use of a key word method, it is the words that become the means of creating the index to aid access to the images.

Figure 4.3
Key word listing and scope note

Key word listing and scope note for individual image analysis. Note * donates a modified or new key word, not used by Elford and Shields (1987).		
Number	**Key word**	**Key word scope**
1	Animals - Arachnology	For images of spiders, centipedes, millipedes, mites, scorpions, etc., field and laboratory work, equipment diagrams and graphs
2	Animals - Carcinology	For images of crustacea such as crabs, crayfish, prawns, etc., field and laboratory work, equipment diagrams and graphs
3	Animals - Entomology	For images of flies, bees, beetles, insects with six legs, etc., field and laboratory work, equipment diagrams and graphs
4	Animals - Herpetology	For images of frogs, snakes, lizards, skinks, etc., field and laboratory work, equipment diagrams and graphs
5	Animals - Ichthyology	For images of fish, field and laboratory work, equipment diagrams and graphs
6	Animals - Malacology	For images of shellfish, snails, etc., field and laboratory work, equipment diagrams and graphs
7	Animals - Mammalogy	For images of mammals such as seals, walrus, whales, etc., including sledge dogs, field and laboratory work, equipment diagrams and graphs
8	Animals -Marine invertebrates	For images of marine invertebrates such as starfish, corals etc., field and laboratory work, equipment diagrams and graphs
9	Animals - Ornithology	For images of field birds, and laboratory work, equipment diagrams and graphs
10	Anthropology	For all aspects of traditional cultures, whether of people or artefacts.
11	Biological survey	For biological survey field and laboratory work, equipment, diagrams, and graphs.
12	Buildings	For any building exteriors, whether commercial, domestic, public or religious buildings. Includes tents.
13	Communications	For all methods of communications other than written or printed documents.
14	Clothing	For all details of men's, women's and children's clothing, including hats, shoes, underwear and uniforms.
15	Documents / records	For all images of printed or handwritten documents, including cards, certificates, envelopes, invitations, licences, maps, passports, plans, postcards, tickets, title deeds and wills.

(continued overleaf)

Figure 4.3
Key word listing and scope note

Key word listing and scope note for individual image analysis. Note * donates a modified or new key word, not used by Elford and Shields (1987).		
Number	**Key word**	**Key word scope**
16	Domestic equipment	For all domestic implements and fittings such as clocks, cooking utensils, crockery, cutlery, brushware, lamps, glassware, ceramics, etc., except furniture.
17	Events / celebrations	For all important events, such as parades and marches, centenary and sesqui-centenary celebrations, elections and political events.
18	Expedition members	For any image of groups or individual staff members or associates affiliated with the expedition.
19	Exploration processes	For images showing specific aspects of the exploration processes; including sledging, navigation, pitching camp.
20	Flags, emblems and banners	For coats of arms, crests, emblems, flags and banners used for any purposes.
21	Geology - Including glaciology	For images of geological nature or features, including glaciology, field and laboratory work, equipment diagrams and graphs.
22	[Geology / minerals] Not used	This key word category was found to be too specific for the image groups and similar to category 21.
23	Landforms	For views of specific land features such as granite outcrops, riverbeds, caves etc.
24	Landscapes	For general landscapes as a component of the image, including aerial views.
25	Machinery	For all powered and manual machinery including, cranes, engines, hoists and pumps. Excluding auxiliary steamers.
26	Maritime, Civilian	For all civilian maritime industries and activities
27	Maritime, Merchant	For all merchant maritime industries and activities
28	Maritime, Naval	For all naval maritime industries and activities
29	Military	For all service personnel, equipment and military parades.
30	Music	For any aspect of music including performers and singers
31	Occupations	For any example of people actively engaged in their field of employment
32	People - (Unidentified people)	Men, women and children, including babies, couples, families, groups, crowds etc. identifiable in the image

(continued overleaf)

Figure 4.3
Key word listing and scope note

Key word listing and scope note for individual image analysis. Note * donates a modified or new key word, not used by Elford and Shields (1987).		
Number	**Key word**	**Key word scope**
33	Personal effects	For items such as jewellery, hairdressing aids and cosmetics.
34	Photography	For any aspect of photography including cameras and films, projectors and photographers engaged in their work.
35	Recreational	For recreational activities or objects such as camping, games, picnics and children's toys.
36	Rural life	For any aspects of rural life including primary industry whether pastoral or agricultural.
37	Scientific apparatus *	For specialised equipment used specifically for scientific or surveying activities; including tripods, telescopes etc.
38	Sports	For any aspect of sport
39	Tools / materials	For any object which is used to enable some form of work or procedure to be carried out (used mainly for objects used in employment but may include items for other activities).
40	Townscapes	For general and close up views of towns, cities of any size.
41	Transport, manual*	For non mechanised and manual forms of transport; rowing boats, including animal assisted transport such as dog sledges. This does not include sailing ships.
42	Transport, mechanised *	For mechanised transport excluding auxiliary steam ships which are covered under categories 26, 27 and 28.
43	Vegetation	For any photographs of natural and cultivated vegetation.
44	Waterscapes	For views incorporating oceans, lakes, rivers, creeks, and shore scenes.
45	Ice / snow cover	For views incorporating ice or snow, including specific land and sea ice formations.
46	Meteorological, climatic conditions	For cloud formations and other meteorological phenomena.
47	Civil engineering	For structures constructed by manual or mechanical means, such as bridges, dams, water supplies, roads, harbours, jetties and wharves, including construction of buildings, etc.
48	Furniture / interiors	For any building interiors or items of furniture inside or outside.
49	Religion	For any aspect of religion including art, buildings, missions, documents, processions, ceremonies, graves, clothing and objects.

4.2. Examination of images

It is important to outline briefly the sequence of processes that were undertaken while examining each group of images.

The sequence of a series of images, either as taken by the photographer or as accessioned by a holding institution, can provide contextual information additional to the title or content. Both can aid the researcher in gleaning further information as to the methods of the photographer, presenter or collector. Coupled with other information, such as the historical context of the creation of the images, a more comprehensive and exhaustive study would lend itself to further analysis of this kind. However for the purposes of this thesis, determining the sequence of the creation of the images or other contextual information of this type is not included. For this reason no attempt has been made to order the images chronologically within each group.

Pro formas were devised for the image group analysis and individual image description. Completed pro formas from the data analysis and data collection are in Appendix 1 and 2 respectively.

Data collected from the four groups of material comprises two groups of information:

1. Image group description.

   This component of the image analysis relates to aspects of the whole image group from each expedition. It is intended to use this information to aid the interpretation of the context in which the images were taken.

   Components of the image group description have been derived in the first instance from the information as provided by the holding institution. Where this is lacking an attempt has been made to obtain information from other sources, such as contemporary accounts, catalogues or information recorded on the photograph or print.

The pro forma for the image group description is shown in Figure 4.4.

1.1 Expedition.	**1.2** Location/s.	**1.3** Date/s .....
1. 4 Images mechanical.....	**1.5** Images manual.....	
1.6 Photographer/s name.	**1.7** Photographer status **P** (professional)	**1.8** Photographer status **A** (amateur)
1.9 Reproduction method: a / b / c / d / e / f	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

Figure 4.4
Image group description pro forma.

2. Individual image description

The components listed below, with accompanying definitions, form the separate fields for the record of each image.

Image type.

Image type refers to the predominant content of an image's subject matter. An image recorded as a waterscape might possibly also include aspects of landscape, which would have been recorded in the key word listing. Conversely an image that was predominantly a landscape, with components of water in the image, could also have waterscape added in the key word listing. In essence, the image type category did not exclude the use of similar descriptive terms within the key word analysis. For the purposes of this analysis, the following categories have been adapted to denote image type.

a. Landscape

b. Waterscape

c. Portrait (a formal or informal photograph of an individual or individuals.)

d. Closeup (a photograph taken showing detail of a feature that filled the majority of the frame.

e. Interior (A photograph taken inside a structure or building.)

Image quality

(classed as poor, fair of good, see Figure 4.5 to 4.7.)

Image quality was assessed according to image clarity or sharpness of image. Print quality where it interfered with the viewing of the image, for example badly faded, was recorded as a component of image quality.

Image content.

Using the key word listing at least one, and up to 10 key words per image were allocated to an image, with the object of indicating the image content. For example Figure 4.8a would be given two key words (ice / snow and geology). Figure 4.8b could contain a considerably higher number of key words (for example ice / snow; geology; clothing; expedition members; maritime, naval; military; occupations; tools and materials; civil engineering; exploration process).

4.3. Analysis and interpretation of images

Once all groups of images had been viewed, accessed, and recorded the following steps were taken:

The raw data was first totalled and then converted into percentages in order to aid comparison between the four image groups. The number of observations and the percentage of these observations in the image group are given in Appendix 1 and 2. The percentages form the basis for generating tables and graphs used in comparisons and discussions in section 6.3. For the purposes of explanation within this section, examples of the results are included, however no attempt will be made to interpret these examples.

Interpretation of image group description

1. Image group details provide contextual information of the creation of the images, date, location, photographer (if known) and expedition leader.

2. Image quality, poor, fair, good, refers to the quality of the prints that were examined. It should be noted that to some degree the quality of the print will have been affected by the processing and storage and care of the image group. While deterioration of the image after printing can indicate poor processing, this was not the primary criterion for assessment of

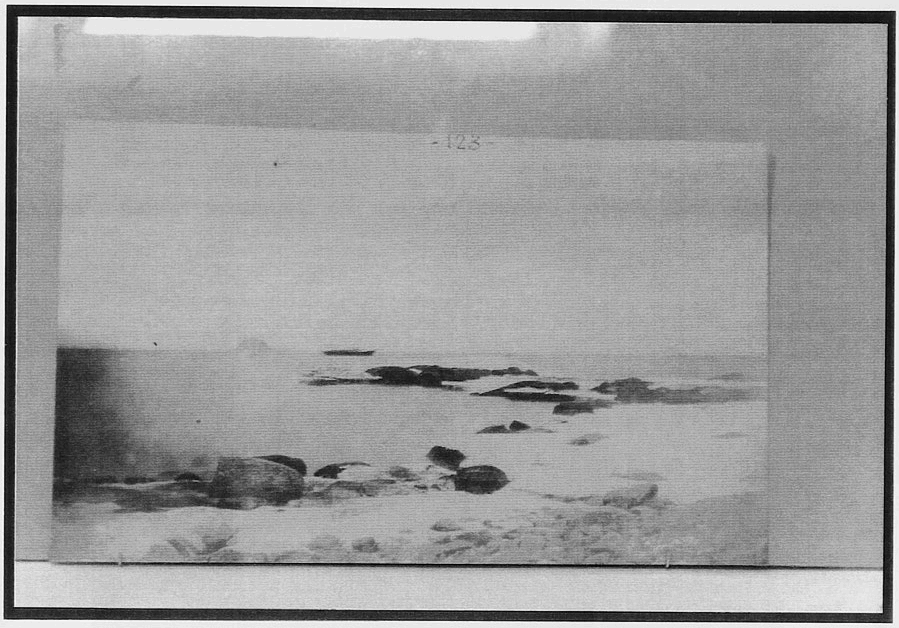


Figure 4.5
Image quality example, poor
Untitled
(BLS 1880)

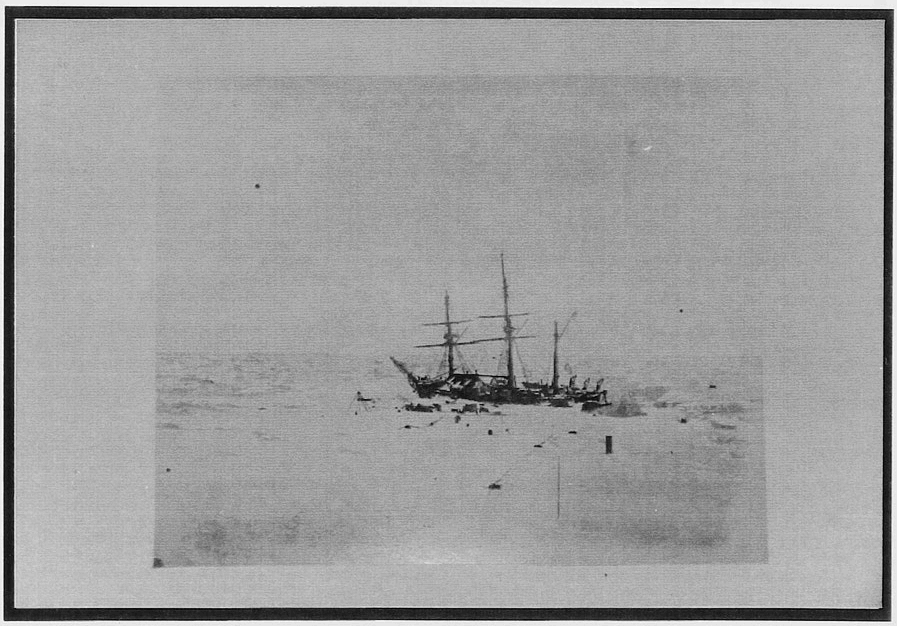


Figure 4.6
Image quality example, fair
Winter quarters of the *Alert*. Old ice scratched by contact with the sea bottom, then turned over by pressure
(BS: 90)

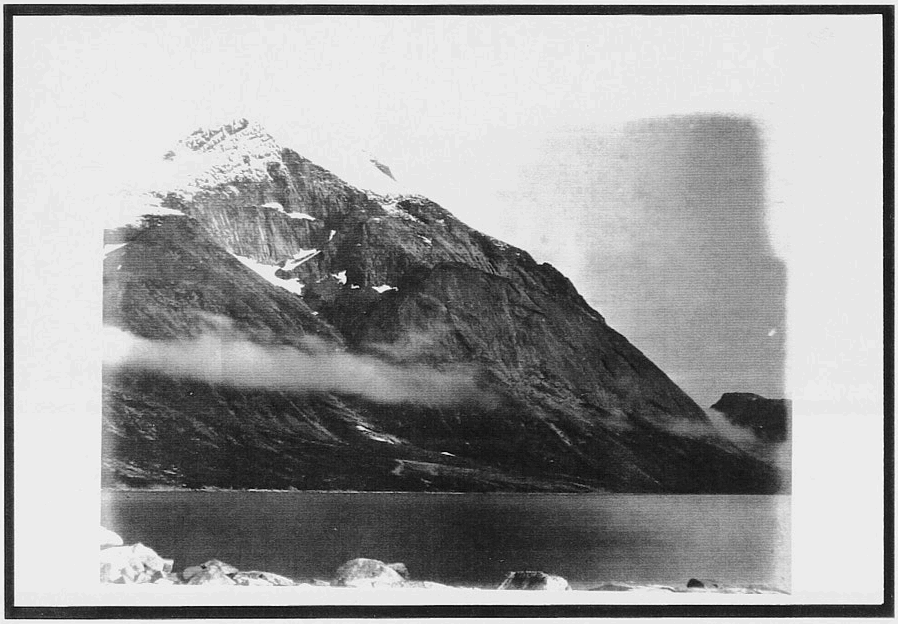


Figure 4.7
Image quality example, good
Kunak mountain in Davis Straits, with the glacier on its summit
(Bradford 1873: 40)

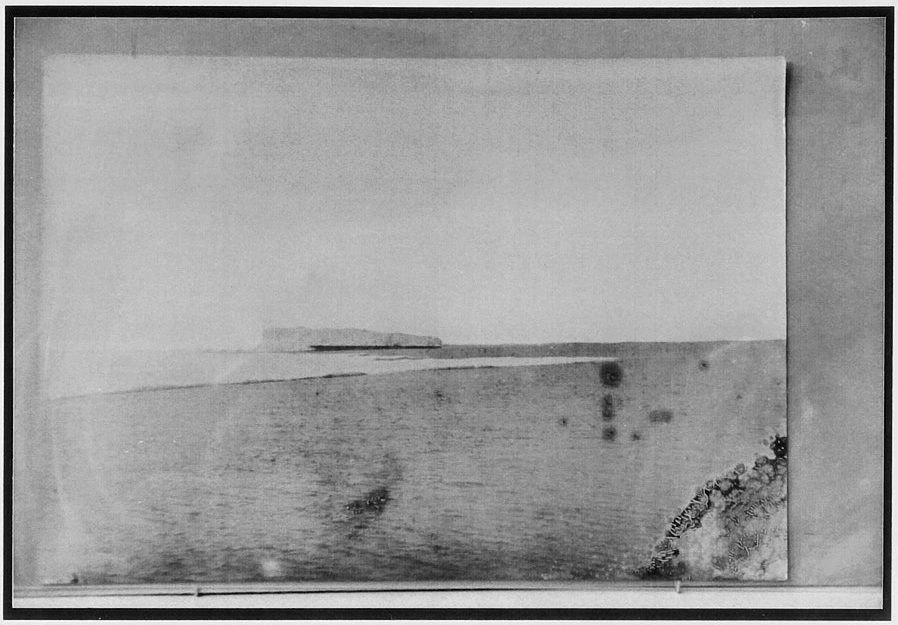


Figure 4.8a
Key word example: ice, snow; geology
Iceberg, Franz Josef Land
(Smith 1880)

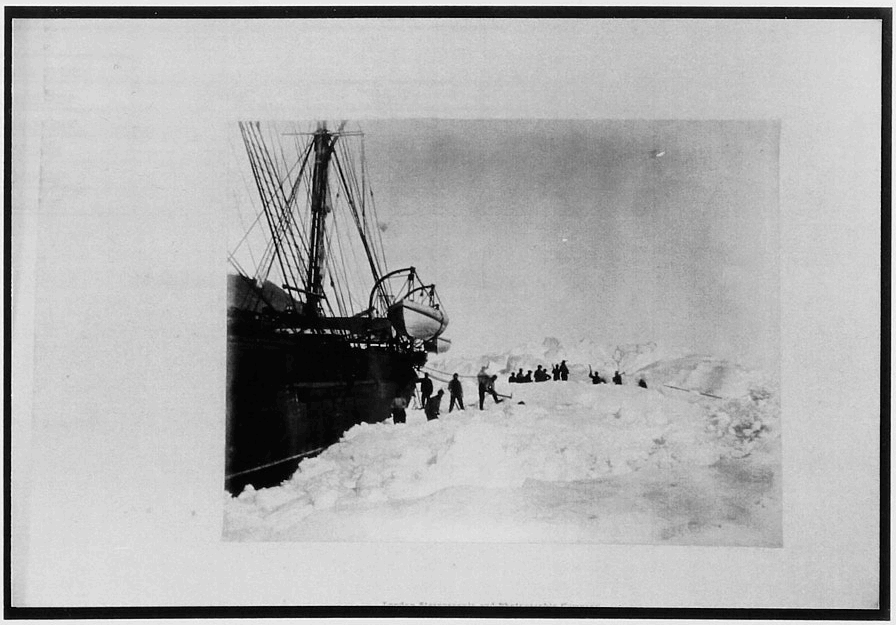


Figure 4.8b
Key word example: ice, snow; geology; clothing; expedition members; maritime, naval; military; occupations; tools / materials; civil engineering; exploration process
Winter quarters of the *Alert*. Clearing a passage for the ship thorough floe-berg, the pack having moved off during a breeze from the S.W., July 1876
(BS: 103)

image quality. The primary criteria for accessing image quality were clarity, detail and exposure of the image.

3. Image type, landscape, waterscape, portrait, closeup and interior, were used to indicate the type or style of photograph. This information can add a greater depth to the interpretation of the key word analysis and also can indicate some aspects of the photographers preferences of photograph type.

Examples of the results of this aspect of the analysis are shown in Figure 4.9 and 4.10.

	Image group description and image details - percentage			
	S Bourne	**W Bradford**	**B Leigh Smith**	**G Nares**
Image details				
Location	Kashmir, India	West Greenland	Svalbard, Zemlya Frantsa-Iosifa	West Greenland, Ellesmere Island
Date/s	1864, 1866	1869	1873 & 1880	1875-76
Photographer	Bourne	Dunmore and Critcherson	Smith? 1873 Grant 1880	Mitchell and White
Photographer status	Professional	Professional	Professional	Amateur
Image quantity	94	141	96	108
Image quality				
Poor	0	5.67	16.7	13.9
Fair	2.1	31.20	35.4	63.0
Good	97.9	63.12	47.9	23.1
Image type				
Landscape	83.0	26.95	33.33	53.7
Waterscape	2.1	50.35	59.4	28.7
Portrait	4.3	20.56	6.3	13.0
Closeup	3.2	2.12	1.0	4.6
Interior	7.4	0	0	0

Figure 4.9
Image group description and details - As a percentage of group

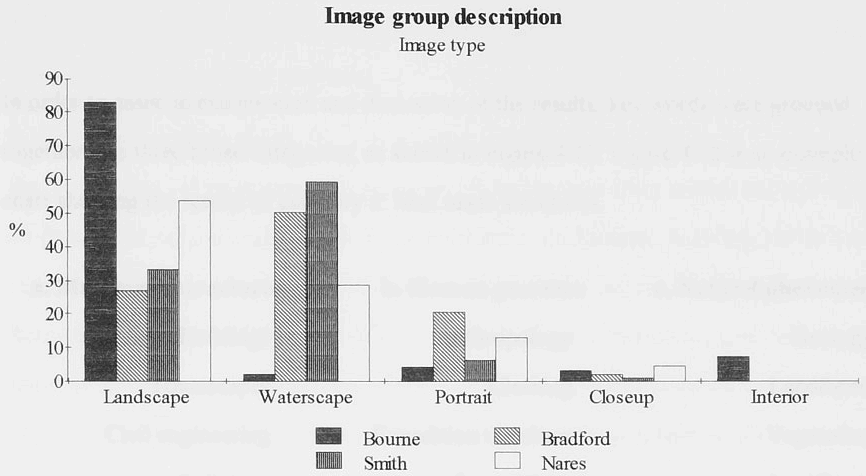


Figure 4.10
Image type

Interpretation of individual image description

Key word frequencies for an image group were calculated as a percentage of the number of images in the group. For example there were a total of 108 images examined from the Nares expedition. The key word "Expedition members" was associated with 30 of the 108 images, giving a percentage of 27.7. Only after all key word frequencies are converted to a percentages can comparisons can be made.

The potential usefulness or merit of any image will be largely decided by the particular requirements of the viewer and the intended use of the image. Images from expeditions of the period under consideration have been used in a variety of ways, including publication in contemporary newspapers, as illustrations for travel accounts and in scientific reports. For example the image of the iceshelf, while only having two key words allocated may show particular ice features of interest to the glaciologist. The second image of an iceshelf, which includes the expedition ship, while having more key words attached, may be of little interest to the glaciologist on account of the icesheet lacking any unique features that are relevant to his interest.

In order to assist in examination and discussion of the results, key words were grouped together into three broad categories, as shown in Figure 4.11. Figure 4.12 is an example of the chart showing the results of category a: Man made structures.

a. Man made structures	b. Human presence	c. Natural phenomena
Buildings	Anthropology	Geology
Townscapes	Clothing	Landforms
Civil engineering	Expedition members	Vegetation
Religious	Occupations	Ice / Snow
	People	

Figure 4.11
Key word groupings

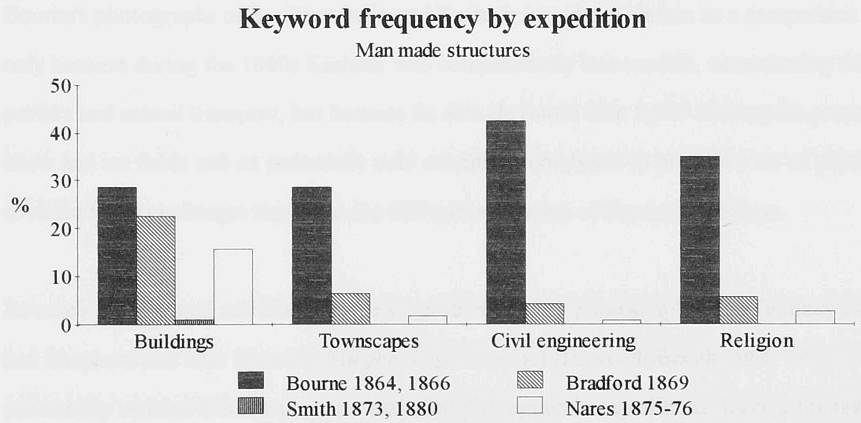


Figure 4.12
Key word frequency; man made structures

5. Expedition photography and the grand tour; the photographic record from outside the polar regions.

Samuel Bourne heads north; "...a somewhat perilous undertaking..."

The images that will be examined as examples of photography from outside the polar regions are those from Bourne's expeditions to northern India and Kashmir, including his ten month expedition to Kashmir in 1864, and one to the source of the Ganges on 1866 (Bourne 1866, Haworth-Booth 1984). This group of 94 images, the work of Samuel Bourne, will provide a means of comparing selected aspects of the relative achievements of the Arctic photographs discussed in section 6. Samuel Bourne was one of an increasing number of photographers, who made a living from travelling to and photographing sites to be turned into prints for consumption for those in Europe and Victorian Britain. The inventor of the "...imperial picturesque...", Samuel Bourne's professional photographic activities in India spanned 11 years (1863-74) and his career encompassed amateur and professional activities in England and India (Haworth-Booth: 104).

Bourne's photographs of northern India and Kashmir have been chosen as a comparison not only because during the 1860s Kashmir was comparatively inaccessible, necessitating the use of porters and animal transport, but because its altitude (more than 5,000 metres) the presence of snow and ice fields and its potentially cold conditions combined to provide a set of physical and environmental challenges similar to the difficulties in some of the Arctic regions.

Bourne's professional activities included a partnership in a photographic firm (initially Bourne and Shepherd and later Howard, Shepherd and Bourne) (Haworth-Booth 1984: 105). The partnership enabled Bourne to go on extended photographic expeditions, leaving the tasks of printing, presenting and marketing the images to his partners who remained in the studio. In contrast to the maritime based expeditions to the Arctic that are discussed in section 6, Bourne's photographic expeditions between 1863-66 were land based. Lacking the convenience of having a ship to transport and accommodate his equipment, Bourne was forced for much of the time to employ local labour as porters to carry his equipment. His equipment for the 1864 expedition to northern India and Kashmir included 20 porter loads of photographic equipment

alone, including a stock of 650 glass plates to be used for negatives. The complete inventory of equipment including provisions, bedding, tents and personal effects required 42 porters, described by Bourne (1866: 474) as "...quite a little army in themselves...".

For the purposes of establishing Bourne's approach to his photographic expeditions his 1864 expedition will be outlined using Bourne's account. Written while still in India, and published in *The British Journal of Photography*, Bourne's *Narrative of a photographic trip to Kashmir (Cashmere) and adjacent districts* (Bourne 1866, 1867) combines narrative of his expedition and discussion of his photographic aspirations and endeavours.

Beginning at Lahore on 17 March 1864, Bourne headed first to Kangra and then to Byjnath, a journey that provided very little of photographic interest. During a stay of almost six weeks in Dhurmsala, Bourne was frustrated in his attempts to photograph the "...great snowy range..." above the valley of Kangra. One day it finally remained clear enough, and he was able to obtain 10 negatives (Bourne 1866: 498). Reliance on the native porters and the poor or absent roads proved frustrating on more than one occasion, but by the second week in June he was headed on a "...direct march..." to Kashmir. During the march Bourne "...intended to stop only at such places as presented something very striking or picturesque..." (Bourne 1866: 525). While Bourne took many landscape photographs, see Figure 5.1, he also documented architectural features encountered enroute, see Figure 5.2.

During Bourne's journey photography and geography worked in harmony. His expedition along a route "...little travelled by Europeans..." was aided through the use of a "...little route map, minus rivers and mountains...", which had been compiled as part of the Great Trigonometrical Survey of India (Bourne 1866: 525). Delays and frustration caused by poor roads or absent bridges and river crossings were turned into photographic opportunities, such as at a river crossing between Chumba to Kashmir, when he photographed the use of inflated buffalo skins to aid the crossing (Bourne 1866: 559).

While rivers at times proved to be obstructions for Bourne and his party they also provided a primary means of transport for a period of four months which ending at Beramba. From here

Figure 5.1
Valley and snowy peaks seen from the Hamta Pass, Spiti side. Bourne 1863-66
(Haworth-Booth 1984: 112)

Figure 5.2
Vishnu Pud and other temples near the Burning Gat. Bourne 1863-66
(Haworth-Booth 1984: 108)

nine uninspiring marches between Kashmir and Muree gave rise to only two photographs (Bourne 1867: 64). By this time Bourne's photographic supplies were nearly exhausted, and he looked forward to the completion of the expedition, which he finished at Lucknow in the tenth month of "...hard and solitary travel..." at 6pm on 24 December 1864 (Bourne 1867: 64).

Analysis of Bourne's photographs selected for this study, has shown that a professional photographer in remote regions, operating under challenging climatic conditions, was able to achieve a high quality result. The frequency of good quality images in the group of Bourne's photographs used in this analysis is much higher compared to the frequency of good quality images in the respective Arctic image groups as discussed in section 6.3 below. Bourne was one of many professional photographers, who were documenting the natural world. Bourne and other photographers marketing their images to people who while unable to travel to the location captured by the photographer, would have been willing to buy, and visually possess such exotic location as Italy, Greece, and Egypt.

Professional photographers and non polar expeditions

While photographers such as Bourne operated as independent agents, locating views worthy of photographing and having saleable potential, others operated within a more formal organisation, for example privately organised expeditions or expeditions conducted through government agencies. The instigation of official photographic projects added to the production of photographs of Europe, and these in turn added to the awareness of sites of interest. One such photographic project, which came under the French Commission des Monuments Historiques, was the 1851 "Missions Héliographique". The five photographers contracted for the project set out to "...photograph ancient structures throughout the country..." (Greenough 1989: 18). Ancient structures of France formed part of the grand tour of Europe, but these were not the only source of photographic inspiration for the professional landscape photographer in the second half of the nineteenth century.

America also developed a strong tradition of landscape photography in which the photographers "...prospected for worthy motives..." some of which came to symbolise the

settlement and development of America (Naef 1975: 13). Another series of expeditions were the American Geographical Surveys, which in the second half of the nineteenth century provided a means for photographers such as Timothy O'Sullivan, Carleton Watkins, and William Henry Jackson to photograph new views of the expanding American frontier (Naef 1975, Klett 1984). The Arctic regions, north of America and Canada also came under the focus of private and official expeditions, and provided a means for the photographic recording of the world to be extended into the white and little known expanses of the polar sea. Two of the three expeditions to the Arctic examined in section 6 were to this region of the Arctic, and form part of the case study of Arctic expedition photography which follows.

6. Arctic expedition photography: vintage prints of the Arctic, a case study

6.1. The photographic record; a social and historical context of the Bradford, Smith and Nares expeditions

Prior to discussion, analysis, and comparison of the three groups of photographs the aims and objectives, of each expedition will be established. Figure 6.1.1 lists the stated "official" aims and the inferred aims, which have been gleaned from contemporary reports, where available, that relate to each expedition.

Aims and objectives	Bradford 1869	Smith 1873, 1880	Nares 1875-76
Stated / official	Artistic purposes	Exploration of Svalbard and Zemlya Frantsa-Iosifa	Exploration Attainment of north pole Scientific
Inferred	Scientific, Recreation	Scientific, Recreation	Re-establishment of British Arctic superiority

Figure 6.1.1.
Expedition aims, Bradford, Smith and Nares

Figure 6.1.2 shows the approximate extent and location of the photographic activities of the Bradford, Smith and Nares expeditions to the Arctic.

William Bradford; Arctic artist and expeditioner

William Bradford was an active artist in his home town of New York, USA, where he had a studio on Tenth Street and where he specialised in oil paintings of marine views. He would have been aware of the debates that discussed the validity of photography as a means of artistic expression, which had engaged traditional artists and users of photography since its invention.

Some artists of the day perceived photography as a threat to their livelihoods as the new medium provided an alternative means of visually recording subjects that had been, until photography, exclusively the domain of the artist. The new technology made available a means of recording images that did not require manual skills of drafting and painting; this opened the way for individuals untrained in the arts to participate in recording the world around them. While photography was seen as a threat by some artists, others, like Bradford, made use of the medium to aid his art work (Wilmerding 1971).

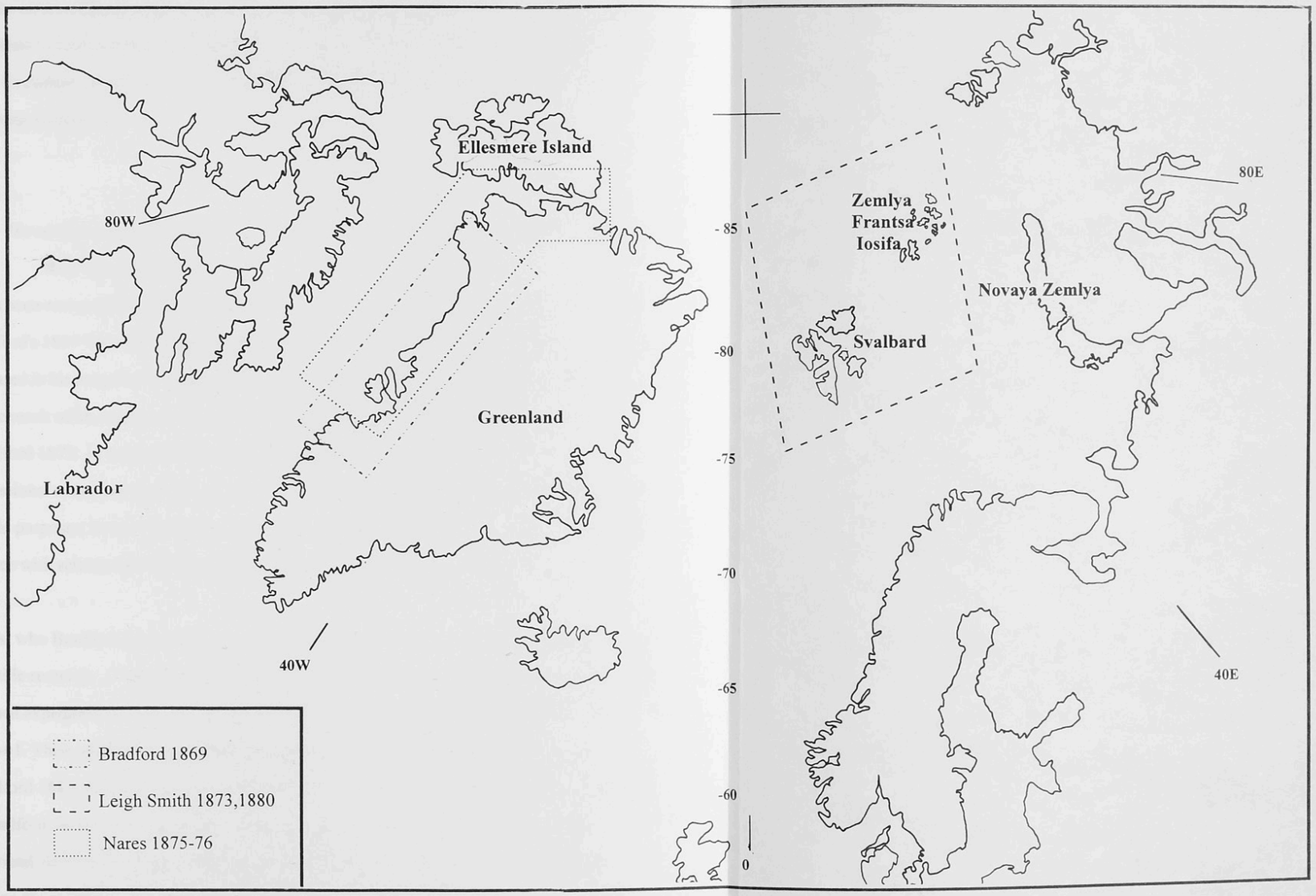


Figure 6.1.2
Map of the Western Arctic, showing approximate location and extent of the photographic activities of the Bradford, Smith and Nares expeditions

During at least two of his voyages for artistic purposes William Bradford achieved an apparently harmonious and complementary use of traditional manual artistic recording methods and the more technical and mechanical photographic recording processes. Art and science had combined to form a productive relationship on the 1864 Labrador cruise and again on the 1869 West Greenland cruise. It is the cruise to West Greenland which will form the basis for the following discussion.

The northern voyage of 1869 - Bradford, Critcherson, Dunmore and Hayes cruise the West Greenland coast.

It has been recognised by Cooke and Holland (1978), Smith (1986) and Johnson (1990) that Bradford's 1869 West Greenland expedition set out to serve art. A much quoted statement that appeared in his magnificent volume *The Arctic regions* (Bradford 1873), that the book was "...the result of an expedition to the Arctic regions, made solely for the purposes of art..." (Bradford 1873: 1) suggested that this was indeed the case. But while Bradford, as a professional artist, was primarily concerned with documenting the polar regions for his own artistic purposes, he also maintained an interest in science during the 1869 cruise. Bradford's alliance with science saw him accommodating the veteran Arctic explorer Dr I. I. Hayes.

Hayes, who Bradford said was his "...guest and associate both for pleasant companionship and scientific research..." was already familiar with West Greenland having participated in the 2nd Grinnell expedition of 1853-55, and led the United States North Polar Expedition there in 1860-61. Their relationship according to Bradford was both "...profitable and pleasant..." (Bradford 1885: 80), and Hayes's first hand knowledge of the region must have been of value to Bradford. In fact, a contemporary news article of the voyage claims that Bradford's "...Friend Dr J J. [sic] Hayes consented to command the expedition..." (*The Illustrated London News* 1871: 614), which was in contrast to Bradford's perception of the relationship.

As a professional artist Bradford stood to benefit from his endeavours in visually capturing the "...awful grandeur..." of the polar regions and the "...solitudes immense, ...unbroken, awful" (Bradford 1885: 79). Photographs obtained on Bradford's 1869 expedition made several

contributions to the understanding of this region of the Arctic. Bradford used photographs as a resource for his own paintings, which were later exhibited and sold. His work on the Arctic regions at times attracted commissions. One such commission was from the British royal family (*The Illustrated London News* 1872: 403). Lectures by Bradford in London in the 1870s were illustrated by the photographs, and Hayes's account of the cruise *The land of desolation* (Hayes 1871) used some photographs. Hayes's interest in glaciology occupied much of his time. While Bradford and his photographers were documenting the landscape, Hayes was observing the formation of Greenland glaciers, and icebergs, which according to Hayes had previously received scant attention (Hayes 1871).

John Dunmore and George Critcherson, the photographers on this cruise, had worked with Bradford in 1864. In 1869 they made a substantial contribution through the use of their photographs in the account of the voyage mentioned above. *The Arctic regions illustrated with photographs taken on an art expedition to Greenland* was produced in a limited edition of 350 and published in London in 1873. It contained 141 albumen photographs representing Eskimos, snowfields, icebergs, and seascapes (Smith 1986). Bradford was not the only professional artist to benefit from the visual successes of the expedition. The flagging fortunes of James Black's photographic studio were boosted as a result of the photographs from Dunmore and Critcherson, which were individually tipped into the lavish publication (Johnson 1990).

Benjamin Leigh Smith: Arctic yachtsman and expeditioner

Benjamin Leigh Smith, like William Bradford, organised a series of private expeditions to the Arctic. Described by Jones (1975: 24) as a "…many sided man…", Smith financed and organised five cruises to the Arctic between 1871 and 1881 (Credland 1980).

There is no account published of any of Smith's voyages, as Smith had a tendency to "…modesty and reticence…" (Jones 1975: 24). Smith's aversion to public life is well summed up by Shirley (1964) who stated that "…he could never be induced to speak in public or to write about any of his expeditions…". When invited to the Royal Geographical Society, to present his account, of the 1880 cruise, he feigned illness, which Markham described as "…a temporary indisposition…" (Markham 1881: 146).

Smith's expeditions, which followed a fashion of private yachting voyages to the Arctic started by Lord Dufferin in 1856 (Jones 1975: 24), had a primary aim of "...accurate surveying of the Arctic islands, recording sea temperatures and collecting geological and other natural history specimens..." (Credland 1980: 128). Smith focused his attentions on Svalbard, Novaya Zemlya and Zemlya Frantsa-Iosifa.

Arctic yachting and science; Smith's 1873 and 1880 cruises

In comparison to the achievements of the 1880 cruise, Smith's 1873 cruise in *Diana* achieved significantly less. *Diana* was to be assisted by *Samson,* acting as tender, particularly to carry additional coal. The two ships were separated, but finally rejoined on 1 July. After the resupply *Diana* headed northwest, but heavy pack prevented further progress. After being beset at Cape Plater, *Diana* began to head back to Hull where she arrived on 5 October (Credland 1980: 131). The heavy sea ice prevented success in "...achieving any geographical result..." zoological collections considered by Markham as valuable (Markham 1873: 93) and oceanographic work, particularly water temperature measurements, which added to the understanding of the layering of the Arctic Ocean (Credland 1980: 131), went some way to offsetting the lack of any geographical result.

The custom built steamer *Eira* set off from Peterhead on 22 May 1880 (Jones 1975: 24) and headed for the east coast of Greenland. Heavy sea ice prevented *Eira* from getting to the coast, and the expedition headed northeast. By 14 July Svalbard was sighted and in early August, after cruising down the west coast, course was set for Zemlya Frantsa-Iosifa, the subsequent passage to Zemlya Frantsa-Iosifa, proved the feasibility of a navigable route between Svalbard and Zemlya Frantsa-Iosifa. This and the identification of a potential harbour (Eira Harbour) for over wintering (Markham 1881: 129) were two achievements of the expedition (Jones 1975: 25).

Despite having appointed Grant, there appears to be very little photographic material produced from Smith's expeditions. The two groups of photographs used in this study consist of mounted

prints, and an album. Correspondence between Grant and Smith in 1880 indicates that there were some difficulties in producing material from the 1880 cruise. Ten of Grant's photographs, possibly the only ones published at the time, accompanied an article in *The Illustrated London News* titled "Mr Leigh Smith's Arctic Discoveries" (*The Illustrated London News* 1880, 4 Dec: 541). Writing to Smith in November 1880 Grant stated that "…I can only say how much I regret that my part of the work was not more satisfactory…".(Grant 1880). Grant does not elaborate what these difficulties were, but coupled with Smith's reticence for public life may partly explain the scarcity of material.

The British Arctic Expedition 1875-1876; George Strong Nares

Equipped, funded and staffed by the Royal Navy, the British Arctic Expedition of 1875-76, was sent out partly in an attempt to restore Britain's eminence in the Arctic. A total of 120 officers and men (Nares 1877: 106) departed England, in the ships *Alert* and *Discovery* with the aims of exploring the regions of northern Ellesmere Island and North Greenland, reaching the North Pole and carrying out a limited scientific program. In contrast to the lack of published material from Smith's private expeditions, there is no shortage of material giving details of this expedition.

Sir Henry Rawlinson, the President of the Royal Geographical Society, had reason to be pleased at the meeting of the society in November 1874. The council of his society, along with "…the Council of the Royal Society, the British Association, and other eminent scientific bodies…" (Disraeli 1875: 39) had successfully lobbied for renewed Arctic exploration "…under the conduct of Government…" (Disraeli 1875: 39). For those in position of influence in the societies of the day and the Navy, the proposed expedition was seen as the opportunity for the re-emergence of Britain as a significant power in Arctic exploration. British geographers were aware that their "…Arctic traditions… had been …supplanted… by …enterprising men of other countries…" (Richards 1875: 209).

Eminent Arctic veterans described "…as the elite of the Arctic Naval officers…" (Rawlinson 1875: 207), including Sir Leopold McClintock and Sherard Osborn, formed part of the

organising committee. Contemporary accounts of the preparations were optimistic, and high hopes were held for geographical success.

Two ships, *Alert* and *Discovery* were fitted out "…with every appliance which experience and ingenuity can suggest…" (Brown 1875: 154), a sentiment echoed by Richards, who felt that the expedition would be equipped "…as only this country has ever equipped such expeditions…" (Richards 1875: 214). Examination of the equipment inventories for the expedition reveal no mention of the photographic apparatus, despite the claims of comprehensive fitting out that included "…instruments and appliances for all branches of science…" (Richards 1875: 215). It is known that there were two sets of photographic apparatus were used by Thomas Mitchell, Assistant Paymaster of *Discovery*, and George White, Engineer of *Alert*. Mention of photographic apparatus is included in the lists of sledging equipment and provisions, prepared by officers in command of some of the sledging journeys and are recorded in the official report (Her Majesty's Stationary Office 1877).

After departing Portsmouth on 29 May 1875, the expedition sailed to and along the West Greenland coast, leaving Upernavik for Smith Sound on 22 July 1875 (Nares 1876: 1) and by early August the two ships were secured in ice docks in Dobbin Bay on the west coast of Ellesmere Island. On nearby Washington Island a depot of 3,600 rations was made, as part of the strategy to aid retreat if so required (Nares 1876: 17). Following the east coast of Ellesmere Island the two ships made their was though heavy pack ice and located an anchorage for *Discovery* on 26 August. This "…well sheltered…" (Stephenson 1877: 106) fiord was "…suitable in every way for winter quarters…" (Nares 1876: 24). Nares and *Alert* continued to head north along Kennedy Channel, through Robeson Channel and finally secured winter quarters, which they called Floeberg Beach, on 1 September 1875. The respective winter quarters became the base for scientific and geographical investigations and during the autumn sledging parties explored the surrounds of the respective winter quarters, and some depots were laid in preparation for the following spring sledging program (Nares 1877).

The spring sledging programs, to West Greenland, north Ellesmere Island, and the attempt for the North Pole were duly carried out, but illness, scurvy and unfavourable conditions severely

restricted these activities and success. By June 1876 the crew *Alert* was badly afflicted restricted by scurvy, with only "…nine sailors fit for work…", and Nares retreated to rendezvous with *Discovery*. The two ships were within 20 miles of each other on 4 August, but heavy sea ice prevented their meeting. Nares dispatched to *Discovery* a party bearing "…orders for her to prepare for sea…" (Nares 1876: 77), and the two ships departed Smith Sound on 9 September 1876 (Cooke and Holland 1978).

Many of the achievements of the British Arctic Expedition were overshadowed by the inquiry into the outbreak of scurvy and other aspects of the perceived failure of the expedition (Hattersley-Smith 1976). The transcripts of this provide a wealth of information, even some scant mention of photographic activities during the expedition. The photographic record obtained by Mitchell and White resulted in the printing of 108 images. These document some aspects of this expedition, which is the only one among those studied that over wintered in the Arctic. The photographic record was used as the basis of mounted prints, in albums of boxed sets, and six photographs were used in the expeditions account by Nares (1878).

6.2. Image group analysis; presentation styles

Bound and published works.

Large format bound volumes which incorporated photographs were an accepted method of presenting photographic material in the second half of the nineteenth century. These lavish publications were produced in limited numbers because of the high cost of production. This included individually printed photographs being mounted or "tipped in" to the volume, enabling the use of high quality photographic images. Less expensive and higher volume works, such as Nares's account of the British Arctic Expedition were restricted by the printing technologies as to the level that photography was incorporated into the volume.

Albums and boxed sets

Bound volumes were only one means of presenting photographic prints. Albums or boxed sets of prints were also used, particularly if there was only a small number. Albums, like the one in Figure 6.2.3, were a limited means of distributing and viewing photography, similar to a book in as much they were only able to viewed by one or two people at a time and that the images were often permanently fixed to the album pages. But while books may have only been able to be viewed by one or two people, they were able to be mass produced making the images, if included, available to a wider audience. Boxed sets may have been preferred by individuals or institutions who wished to frame the individually mounted prints, enabling more images to viewed at any one time.

William Bradford 1869

American artist William Bradford published photographs and his expedition account *The Arctic regions* (Bradford 1873) in bound format combining text and images as an integral component in a lavish volume. This form of presentation and publication makes it the most discreet group of photographic material in this study. This book, shown in Figure 6.2.1, measured 63 x 52cm and followed an established method of combining text with individually printed photographs tipped into the publication as seen in Figure 6.2.2. The photographs by John Dunmore and George Critcherson, were used in an integral way in the publication following established presentation styles of the period.

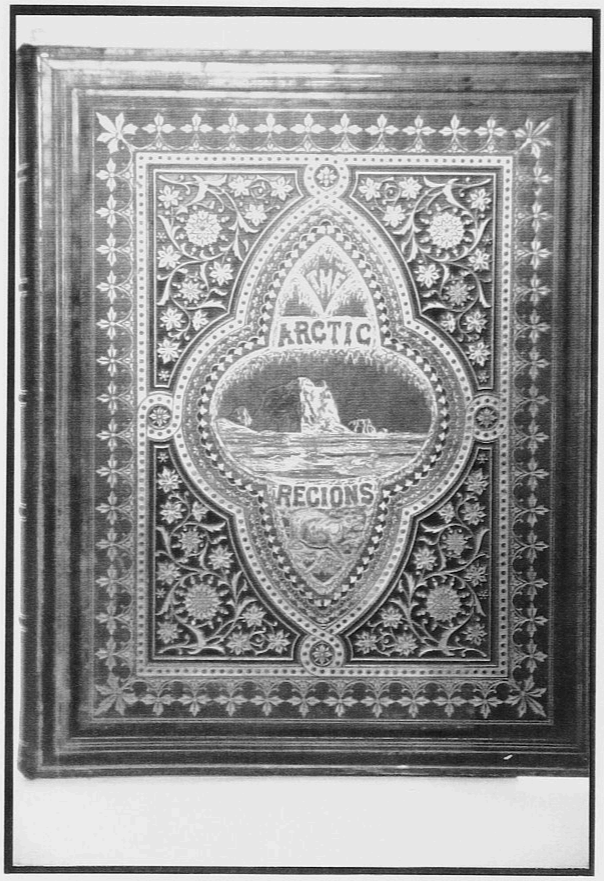
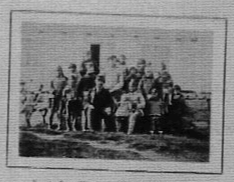


Figure 6.2.1
Presentation style; bound volume 1873, *The Arctic regions* (Bradford 1873)



No. 17. Peter Motzfeldt and Family at Kraksimiut.

CHAPTER V.

Visit Kraksimiut.—The "Panther" aground.—Leave Kraksimiut to visit the Glacier.—Arrive at the Sermitsialik Glacier.—Its appearance.—Observations instituted and Photographed.—Dr. Hayes and Captain Barnett cross the Glacier.—Discharge of Icebergs from the Glacier.—Narrow Escape of some of the party from Icebergs.—Screaming Feats attributed to Mosquitos.

ALTOGETHER Motzfeldt's chosen abiding place, Kraksimiut, was not much to boast of, being situated on a small rocky islet. Peter's house was the only thing that bore the least semblance to civilization, but here he manages to enjoy life. Scattered among the rocks were several Esquimaux huts, containing, all told, a population of perhaps one hundred and fifty persons, who were under Peter's charge, and no petty prince could be prouder than he.

Owing to some misunderstanding on the part of our captain, the "Panther" did not anchor at the place intended, and when the tide went down her stern grounded on a rock, and we were detained several hours longer than we anticipated. Although the vessel was brought three feet by the head before the tide rose again, no damage ensued.

This delay was not altogether time lost, as the photographers took their instruments round to the outer part of the island and obtained some excellent views of the countless icebergs that were drifting out to sea, and I secured some fine studies for future paintings. It also gave the inhabitants, who were more wonder-stricken than the people at Julianshaab, an opportunity of gratifying their curiosity. No steamer had ever visited this out-of-the-way place before, and the "Panther" was a mystery: then again, what was her mission? They saw that she was neither a trader nor a whaler. What, therefore, could the appearance of this strange craft mean? I doubt very much if their minds are even now perfectly satisfied upon the subject.

The tide came in at last, and the "Panther" was relieved from her unpleasant position, and we were able to get away from Kraksimiut at three o'clock, p.m., Tuesday, July 20th, bound for Sermitsialik. We had on board several of Motzfeldt's family, and were accompanied by some fifty other natives in their own boats.

After following a tortuous course among the islands for eight or ten miles, not unattended with danger, the fiord leading to the glacier was entered. This fiord was from two to four miles in width, and bordered with lofty rugged hills, which in many places were wholly inaccessible to human footsteps and even difficult for the sure-footed rein-deer. Although it was now midsummer many of the gorges and ravines were filled with inspected drifts of the past winter; while incipient glaciers were creeping many of the ridges. Strangely in contrast were the kee-ta and cascades from the melting snows tore seen pouring down on either hand.

While steaming up towards the glacier, a strong current was met. It was also noticed that the water changed in colour from dark green to a milky white. The latter circumstance gave rise to many conjectures, but the

Figure 6.2.2
Text and "tipped in" photograph in *The Arctic regions*
(Bradford 1873: 27)

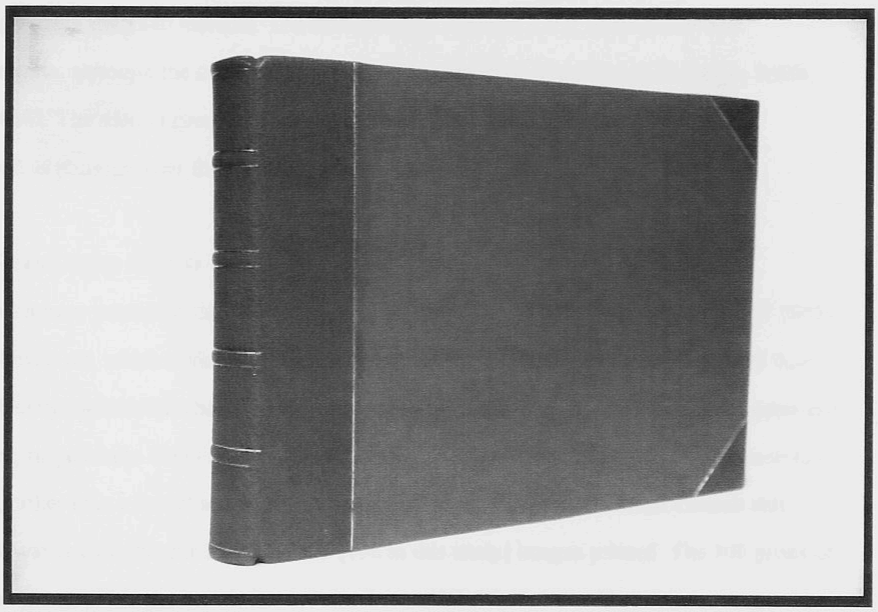


Figure 6.2.3
Presentation style; bound album, similar to those popular in the second half of the nineteenth century

Benjamin Leigh Smith 1873, 1880

The photographs examined from the expeditions of Smith in 1873 and 1880, presented in both album format and individually mounted prints, are the most disparate group in this analysis. It is possible that the individually mounted prints from the 1873 expedition were originally prepared as part of a boxed set, but it has not been possible to ascertain this. Album format was used for the images from the 1880 material. The first group of material is not attributed to any photographer, although the credits on the images' mounts read "Photograph B. Leigh. Smith 1871-1880". The second group of material is the work of William Grant, whom Smith appointed as photographer for his 1880 cruise.

George Nares 1875 to 1876

The British navy presented the photographic prints from the British Arctic Expedition of 1875-76 in a boxed set, which is shown in figures 6.2.4 and 6.2.5. These images are known to have been taken by Thomas Mitchell of the *Discovery* and George White of the *Alert*, Paymaster and Engineer, respectively. Bell (1972) suggested from his examination of groups of images in two albums, rather than a boxed set, of Nares prints held in the Public Archives of Canada that Mitchell was responsible for 31 of the 107 [108 in this study] images printed. The 108 prints of the same group of images held at Scott Polar Research Institute have 12 prints showing Mitchell's actual signature. It is possible that trimming of the prints may have removed inscriptions that were on the negative. Accurate identification of the number and specific images taken by each photographer is a possible task for later research and could assist in evaluating the relative merits of the work of each photographer.

Figure 6.2.4
Presentation style; boxed set 1876
(BS)

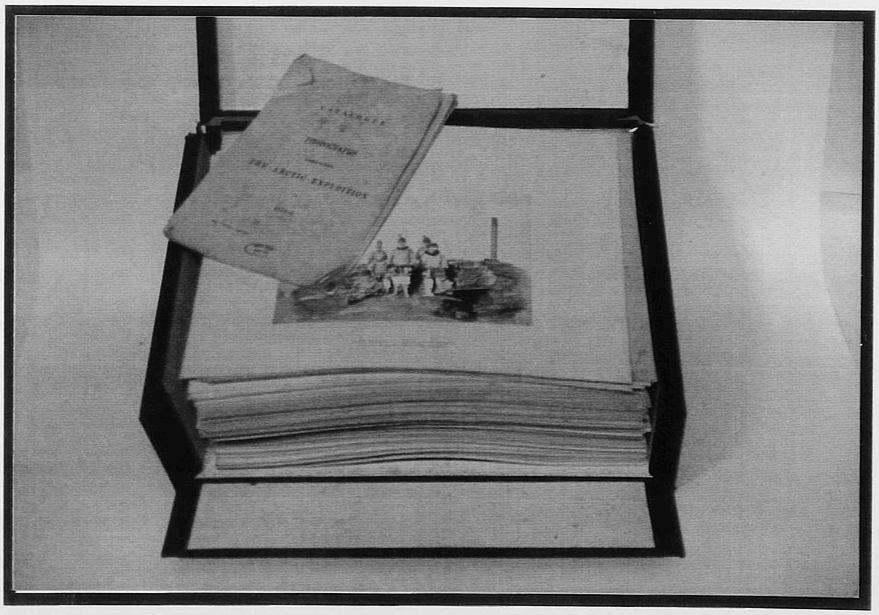


Figure 6.2.5
Presentation style; contents and catalogue of the British Arctic Expedition boxed set

6.3. The photographic record; evaluation of image group analysis

Image quality

Quality of the images obtained on the respective expeditions greatly affects their worth as a visual record. Technical considerations of the chosen medium, such as those discussed in section 3, need to be taken into account by the photographer as he is working in the Arctic. Failure to do so will reduce the chances of producing a high quality image, which would be more useful as a record or as a basis for reproduction. Image quality can indicate aspects of the photographer's familiarity with the photographic process. Figure 6.3.1 shows image quality of the three Arctic expeditions, as a percentage of each image group. The criteria for assessment of image quality, as described in section 4, were image clarity or sharpness and print quality, for example badly faded.

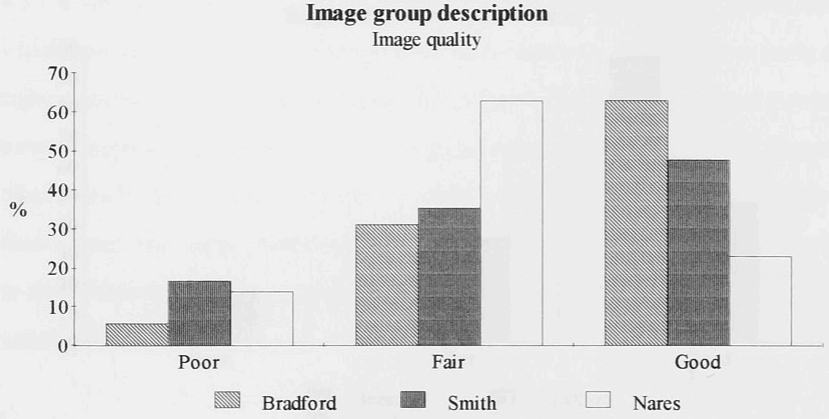


Figure 6.3.1.
Image quality; Arctic image groups

Comparison of image quality from the three groups shows the Nares expedition as having the lowest occurrence of good quality images. Given that the two officers given the task of being photographers were not professionally trained in the art of photography, it is not surprising that there was a predominance of fair quality images. The limited training the two officers received prior to departing England (Abney 1876: 8).would only go a small fraction of the way to ensuring good results in a demanding and climatically unfamiliar environment. Had the Royal Navy been more committed to the application of photography on the Nares expedition a photographer familiar with the Arctic, such as John Dunmore, could have been appointed. As

photographer on *Discovery,* Thomas Mitchell would have been limited by his familiarity with the medium, and lack of space for preparing and processing his photographs forced him to use his cabin (Abney 1876: 9). In contrast to the cramped conditions on the *Discovery* the *Challenger* expedition of 1872 to 1876 had been equipped with photographic apparatus, and space was allocated in the ships laboratory for a darkroom.

William Bradford, who was primarily interested in the visual record ensured, a high priority, that his contracted professional photographers had sufficient room on board *Panther* (Bradford 1885: 81). As an artist Bradford was perhaps more aware of the importance of good photographic records, as they were used as a basis for some of his Arctic paintings. This is reflected in the Bradford image group having the highest number of good quality images.

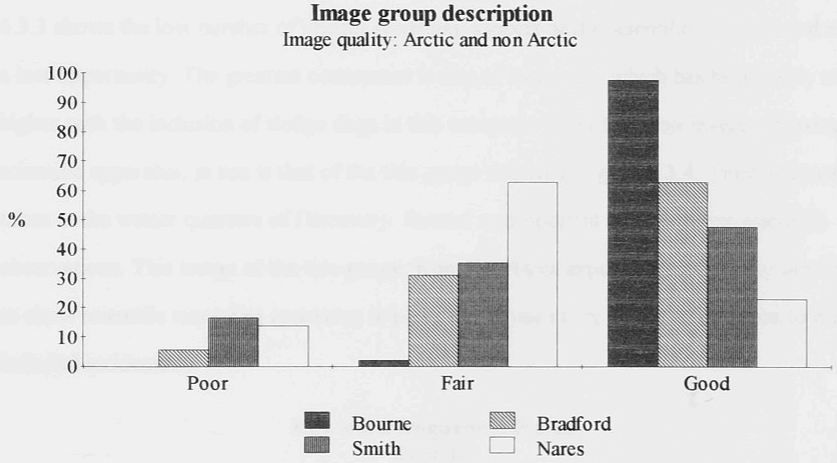


Figure 6.3.2.
Image quality; Arctic and non Arctic image groups

Operating under considerable constraints in the north of India, Samuel Bourne produced a record of considerably higher quality. The group of Bourne's images, while most probably selected from a larger group of negatives, reflects a higher level of proficiency with all aspects of photography. Comparison of the Arctic and non Arctic images as shown in Figure 6.3.2 highlights the significant difference in the quality of the images obtained. What is apparent from this comparison is that it was possible to obtain high quality photographs in the Arctic. To obtain consistently high quality results needed more than just the desire to equip an expedition with photographic apparatus. Space, resources, and appointment of an experienced

photographer, familiar with the technical complexities of the medium, would greatly enhance the chances of obtaining an effective photographic record.

Key word frequency

Image quality is only one aspect that has a bearing on the application of the photographic record. The subject matter in a particular photograph, as shown through the individual key word analysis, has a large bearing on its potential applications. Comparison of each expeditions stated aims with aspects of key word frequency provides a means of evaluating to what extent the photographic record was used to record official or unofficial activities.

The Nares expedition declared scientific investigation as one of its prime aims, so that significant examination is that of specific key words that relate to scientific activities. Figure 6.3.3 shows the low number of images recording aspects of the scientific program and suggests a lost opportunity. The greatest occurrence is that of mammals, which has been partly made higher with the inclusion of sledge dogs in this category. One of the few images showing scientific apparatus, in use is that of the tide gauge shown in Figure 6.3.4. Tidal measurements, taken at the winter quarters of *Discovery*, formed a component of the routine scientific observations. This image of the tide gauge, from the Nares expedition, is the only one intended to show scientific recording apparatus in place and in use in the Arctic as opposed to it being included incidentally.

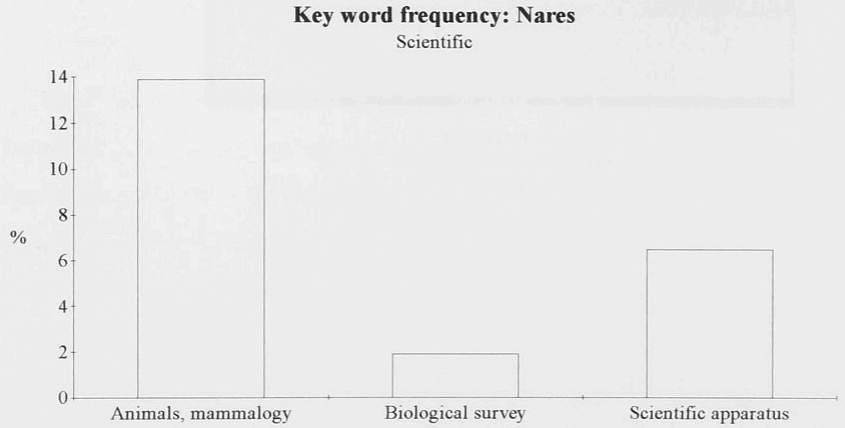


Figure 6.3.3.
Scientifically related key words: Nares 1875 to 1876

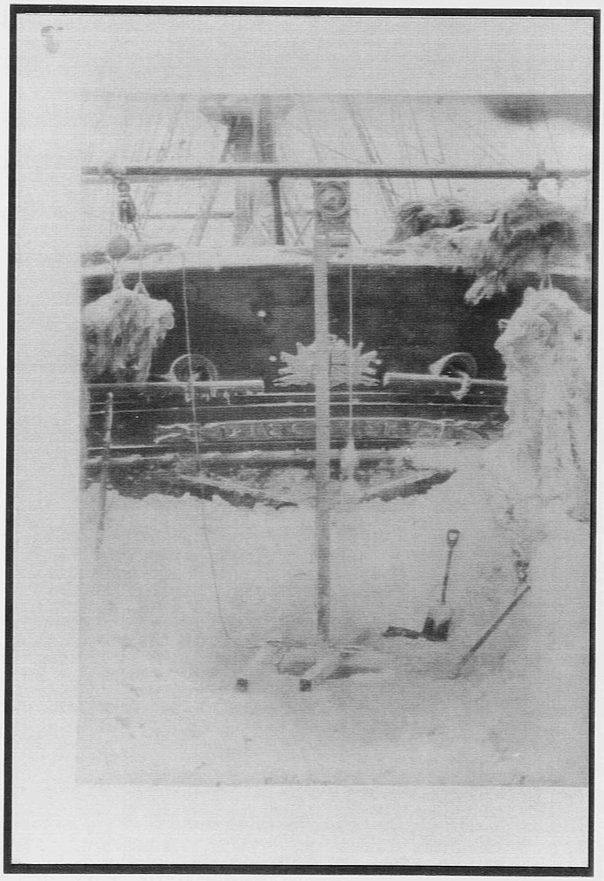


Figure 6.3.4
The *Discovery*'s tide gauge
(BS: 60)

Application of photography to aid recording the physical environment of the Arctic, as shown in Figure 6.3.5, was more prevalent. Photography lent itself to recording the landscape, and, if carried out methodically, provided an accurate means of furnishing topographers with detailed delineation of the new landscape. The use of photography to aid the understanding of the physical geography of the Arctic landscape close to the winter quarters of *Alert* is shown in Figures 6.3.6a and 6.3.6b. These two photographs show a deliberate attempt to maximise the accuracy of the photographic recording process. Taken from the same vantage point the photographer, probably George White, attempted to record variation of snow cover in the valley inland from the *Alert*.

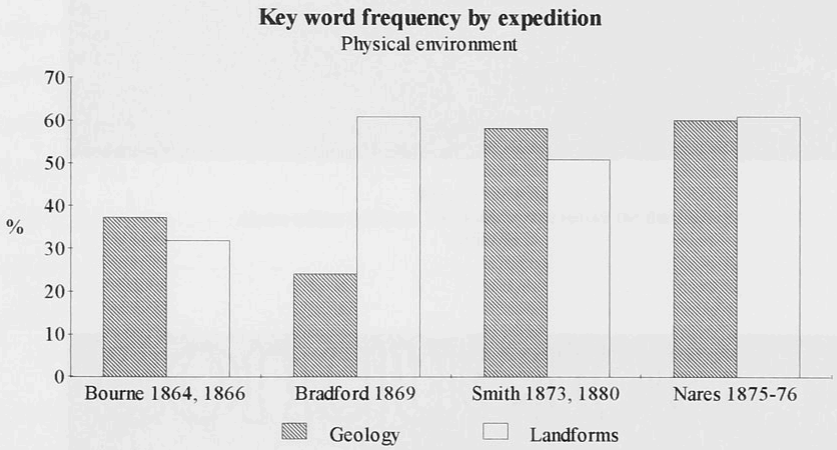


Figure 6.3.5.
Topographically related key words

Arctic expedition photography and the illustrated lecture

Scientific interest was not totally absent in Bradford's expedition. Hayes showed a particular interest in the formation and movement of glaciers. While Bradford was primarily interested in his artistic pursuits, his images were used to illustrate at least two lecture series. One, *The Esquimax and the ice of Greenland*, was presented at the Royal Institution, London on 16 June 1871. The lecture was "...illustrated by about seventy photographs..." and Bradford explained how he "...had been impelled to study nature in some of her most vast and strong aspects..." (*The Illustrated London News* 1871: 614). A second lecture series was given by Professor John Tyndall (1820-1893), "...famed for the charm and animation of his language..."

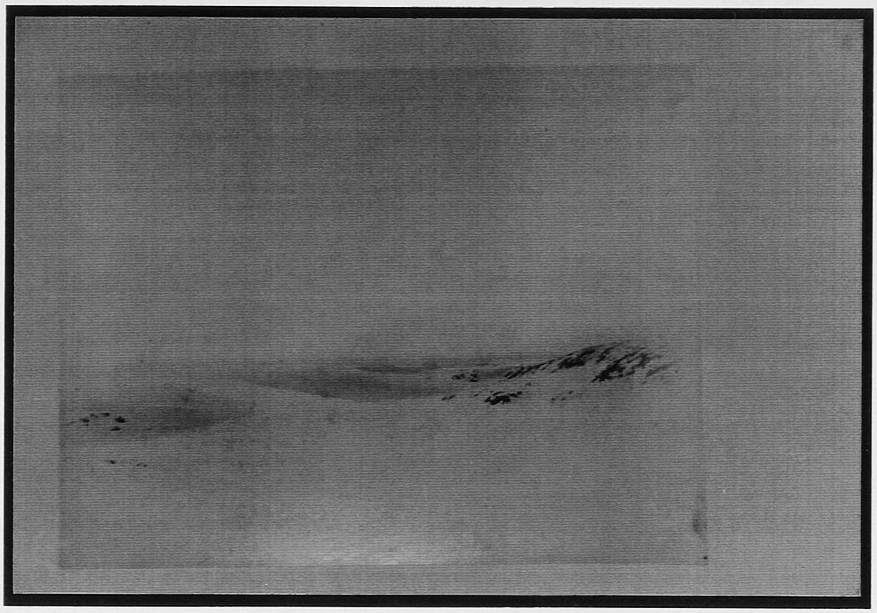


Figure 6.3.6a
Alert's winter quarters. The north ravine before the thaw set in
(BS: 97)

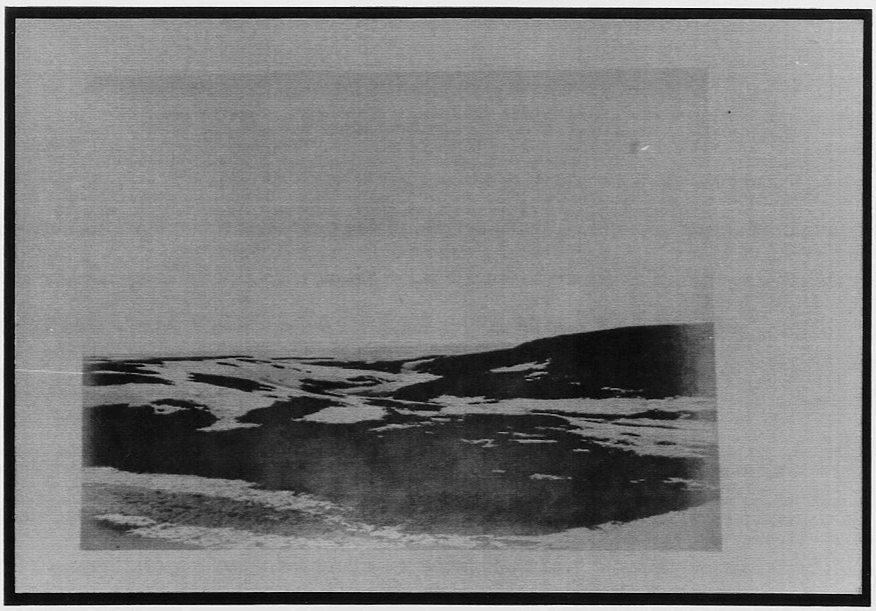


Figure 6.3.6b
The winter quarters of the *Alert*. The north ravine after the thaw set in
(BS: 98)

and having a "…singular skill in devising and conducting beautiful illustrations…" (Lee 1899: 435). Bradford's expedition images of Arctic ice bergs were projected at Tyndall's lecture by use of a lantern slide projector (*The Illustrated London News* 1872: 34). These images took the scope of Tyndall's lecture out of the mountains linking the smaller glacial fields of Switzerland and Europe with the ice age to the greater expanses of the Arctic.

Arctic expedition photography and the illustration

Image quality and key word frequency have given a means of evaluating how effective photography was in recording the activities of expeditions. How these respective photographic records were used will now be examined. Restrictions caused by methods of mass reproduction ensured that during this period photographs remained limited in their direct application in publications. The exception to this was the hand printed and tipped in images, such as those prepared for Bradford's account (1873), although this means of production was still limited to hundreds rather than thousands of editions. To what extent illustrations were based on photograph, and to what degree the photograph was acknowledged as a source of illustration, varied greatly. Several examples of how photography contributed to publications related to the Arctic expeditions are now examined.

The more fanciful visual depictions of Arctic scenes such as Bradford's "Sealers crushed by icebergs" (Figure 6.3.7), were to be increasingly challenged by photography. Realistic and truthful representations of the Arctic, while available in the photographic form, were not exempt from manipulation prior to publication. Four pairs of images from the Nares expedition will be examined to illustrate four different aspects of the use of photographic records from this expedition. The four aspects of utilisation are: a source of inspiration for imaginative illustration; a source of direct illustration with manipulation, without acknowledgment; a source of direct illustration without acknowledgment and source of direct illustration with acknowledgment. Figures 6.3.8a to 6.3.11b show these variations in the application of the official photographic record from the Nares expedition. Figure 6.3.8a could well have been inspired by images, such as those in Figure 6.3.8b, which could have provided the contextual reference of the event and inspiration for this rather imaginative and unrealistic illustration.

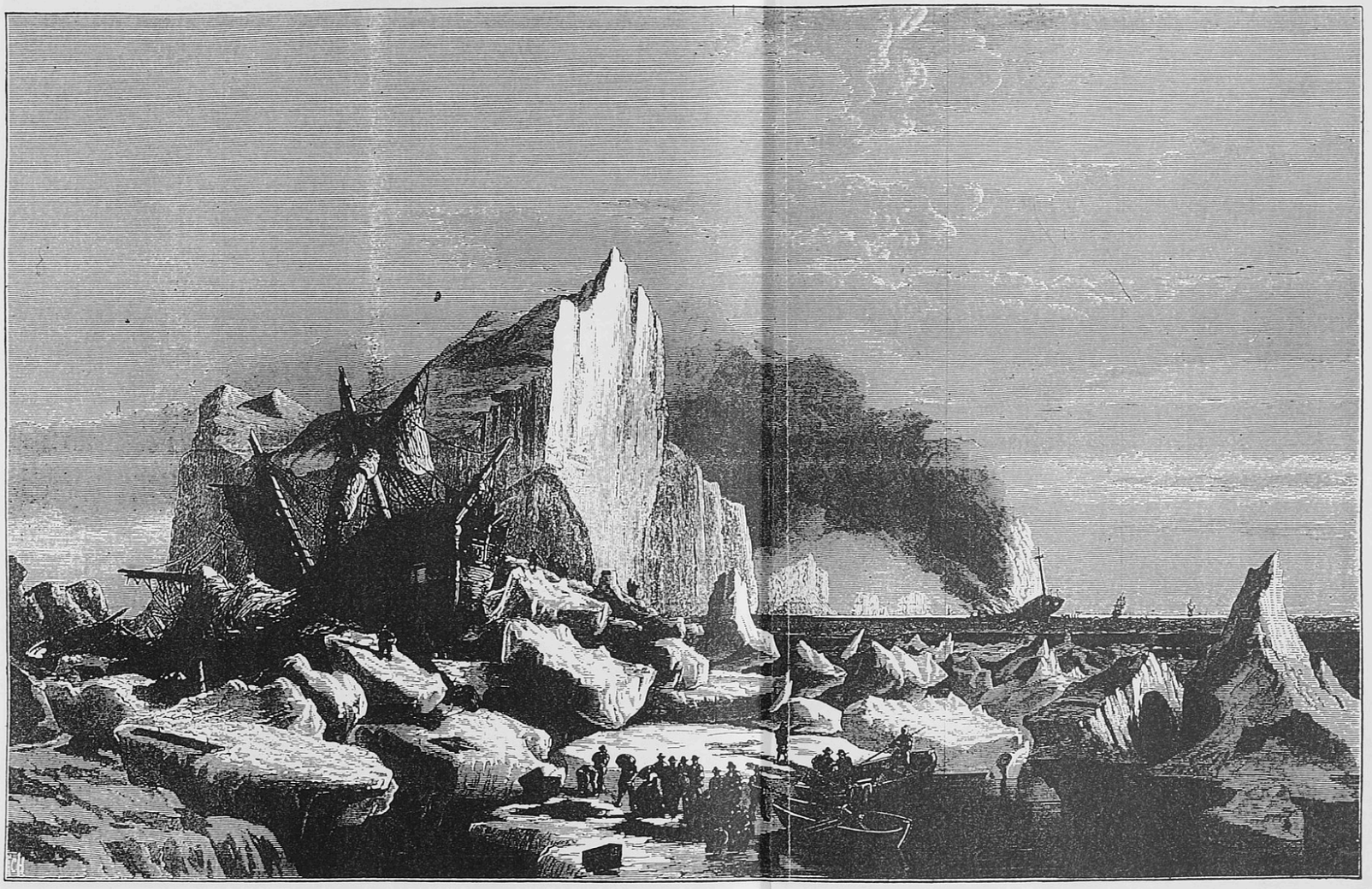


Figure 6.3.7
Sealers crushed by icebergs, from a picture by W Bradford
(*The Illustrated London News* 1872, 26 Oct: 404)

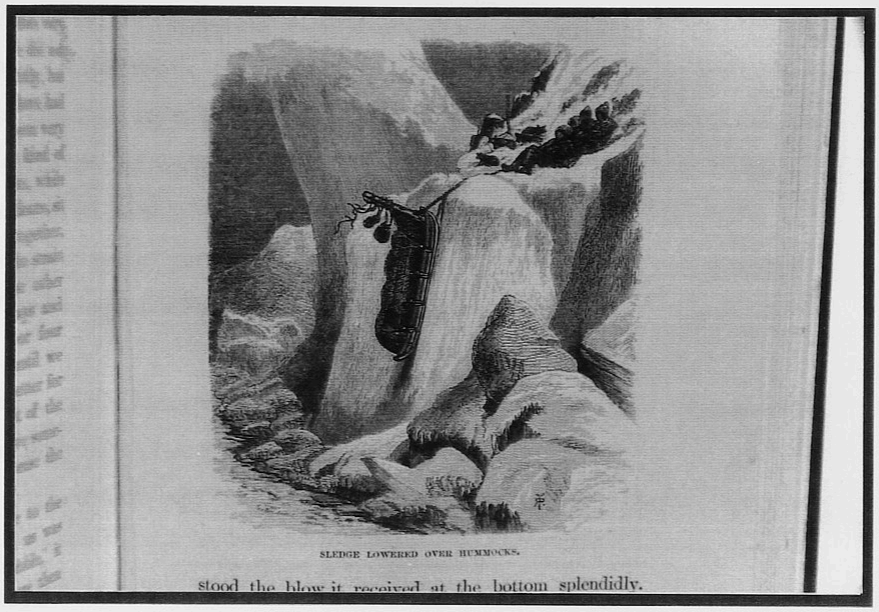


Figure 6.3.8a
Sledge lowered over hummocks
(Nares 1878, Vol 1: 287)

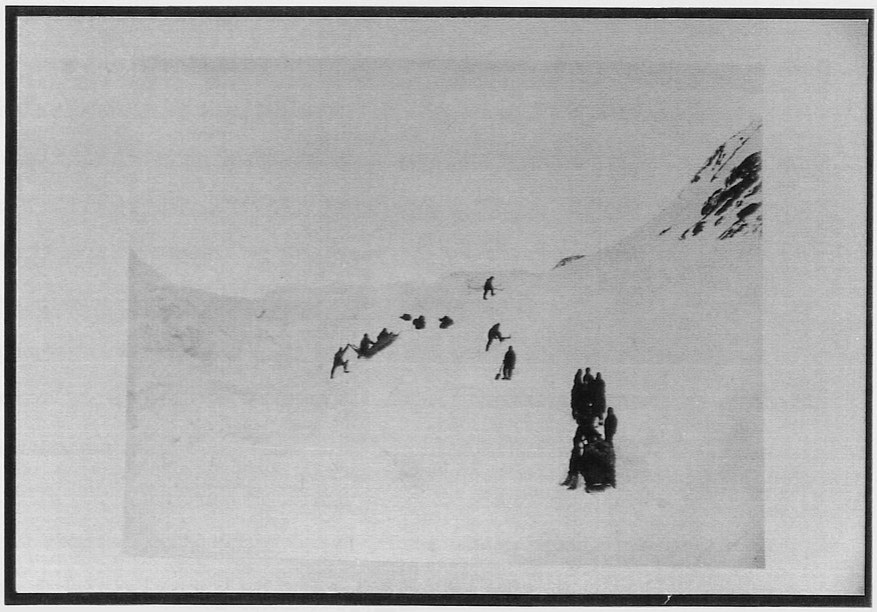


Figure 6.3.8b
Sledge party rounding Cape Rawson
(BS: 86)

Figure 6.3.9a titled *Group of Arctic highlanders*, published in Nares (1878: 42) has not been acknowledged as having been copied from the photograph shown in Figure 6.3.9b. Comparison of the two images shows that the photograph is most certainly the source of the illustration. The illustration lacks any reference to European presence in the original photograph and depicts the indigenous people in a European style pose. Manipulation, or editing (prior to publication) of the photographic record while being transferred to the engravers plate or woodblock is absent in Figure 6.3.10a. However this is no acknowledgment as it being a direct copy of the photograph in Figure 6.3.10b.

Interpretation, lack of acknowledgment of a photograph as a source or gross manipulation are all absent in Figure 6.3.11a. While the original image, Figure 6.3.11b, has a cracked emulsion, making it unsuitable for mass production, it has provided the basis for an accurate illustration.

It is apparent from these four examples that the publisher of the Nares expedition account was inconsistent in acknowledging the use of photographs as a source of either imaginative or accurate depictions of the subject in the photograph.

The faceless Arctic photographer defined

Portrait photography, which had been the mainstay of the studio bound daguerreotype process, established a new and more accessible method of seeing people. Prior to the use of photography in the Arctic, the human element of expedition activities was only recorded by artists such as Edward Moss of the *Alert*. Moss's vivid and heroic depiction of sledging, see Figure 6.3.12, provided readers with a more romantic interpretation of the gruelling and definitely unromantic task of man hauling. Prior to setting out from the *Alert* the members of the sledging parties were photographed, Figure 6.3.13, and are recorded in anything but romantic style, standing stiffly in the daunting landscape, reminding the viewer of the immensity of the land they were in.

Difficulty in obtaining photographs of people on ice, caused by high contrast between the bright ice and the darker faces, contributed to poorly defined images of people, which often lacked detail of facial features. These limitations did not, however, prevent photographers from

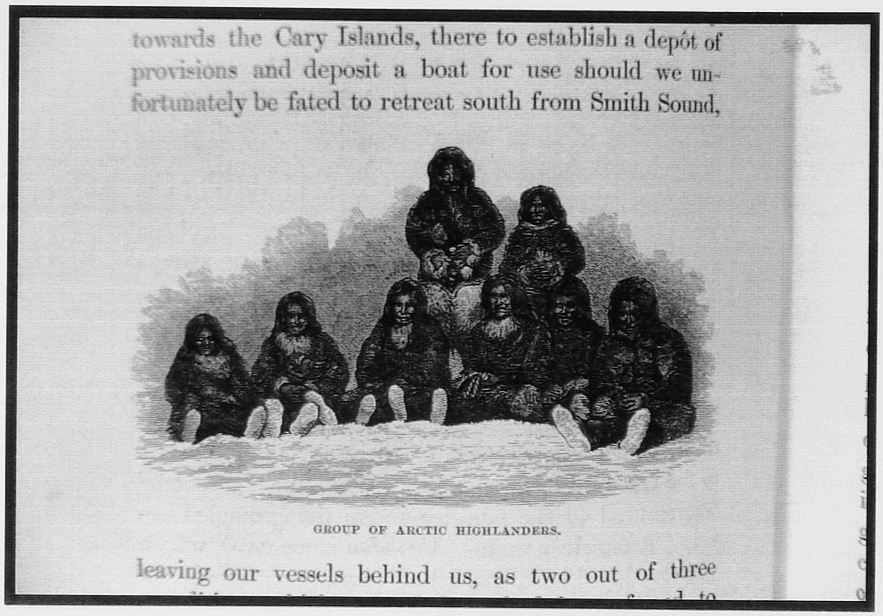
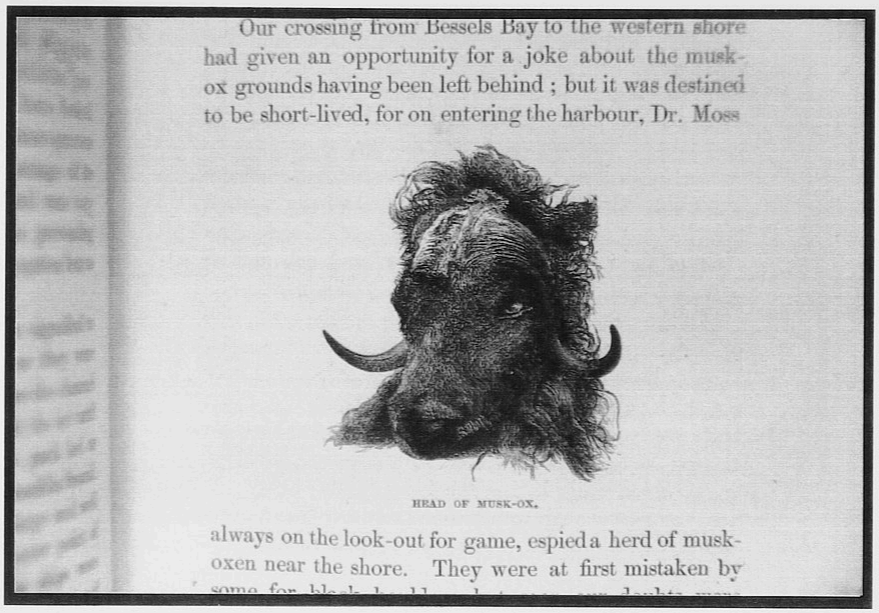


Figure 6.3.9a
Group of Arctic highlanders
(Nares 1878, Vol 1: 42)

Figure 6.3.9b
At Cape York. Group of Arctic highlanders and seamen of the expedition
(BS: 11)



Our crossing from Bessels Bay to the western shore had given an opportunity for a joke about the musk-ox grounds having been left behind ; but it was destined to be short-lived, for on entering the harbour, Dr. Moss

HEAD OF MUSK-OX.

always on the look-out for game, espied a herd of musk-oxen near the shore. They were at first mistaken by

Figure 6.3.10a
Head of musk-ox
(Nares 1878, Vol 1: 113)

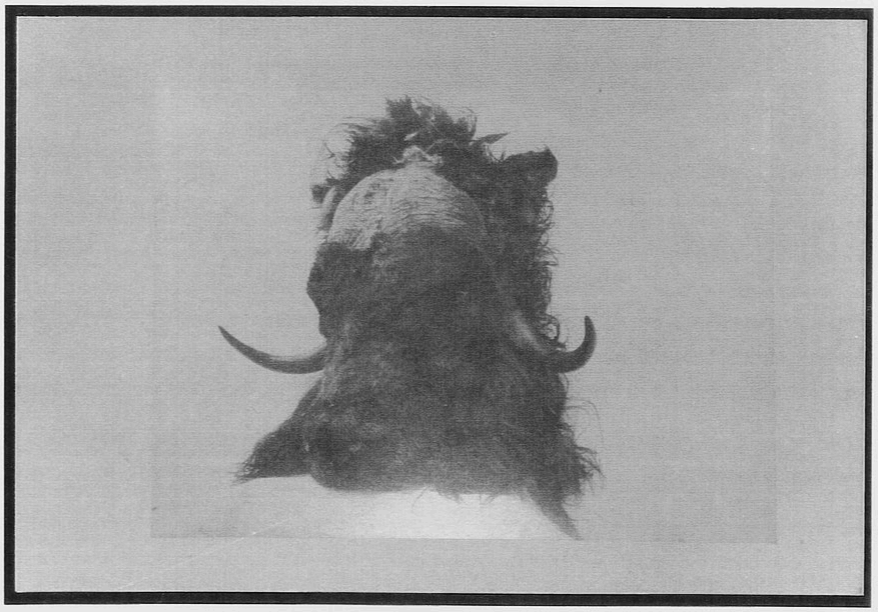


Figure 6.3.10b
The head of a musk-ox
(BS: 100)

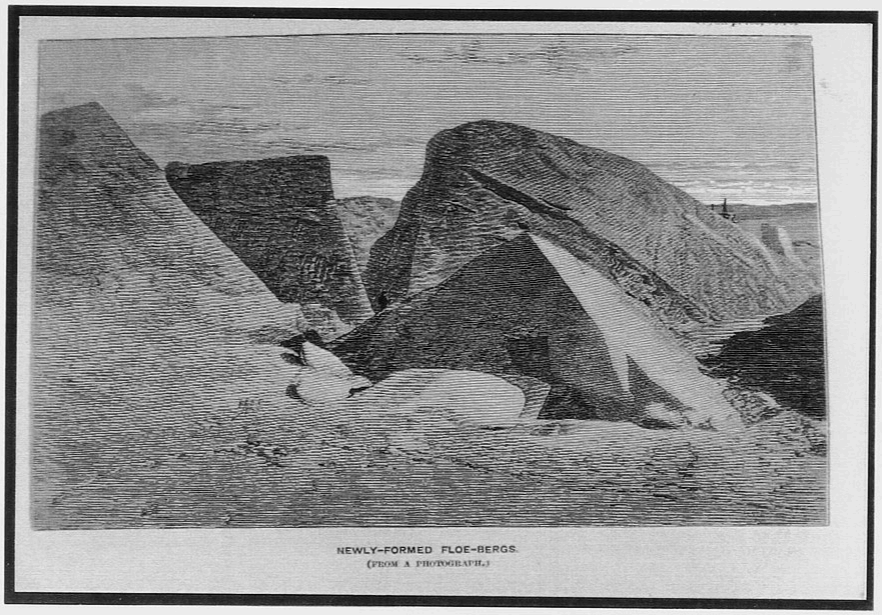


Figure 6.3.11a
Newly formed floe-bergs (From a photograph)
(Nares 1878, Vol 1: 133)

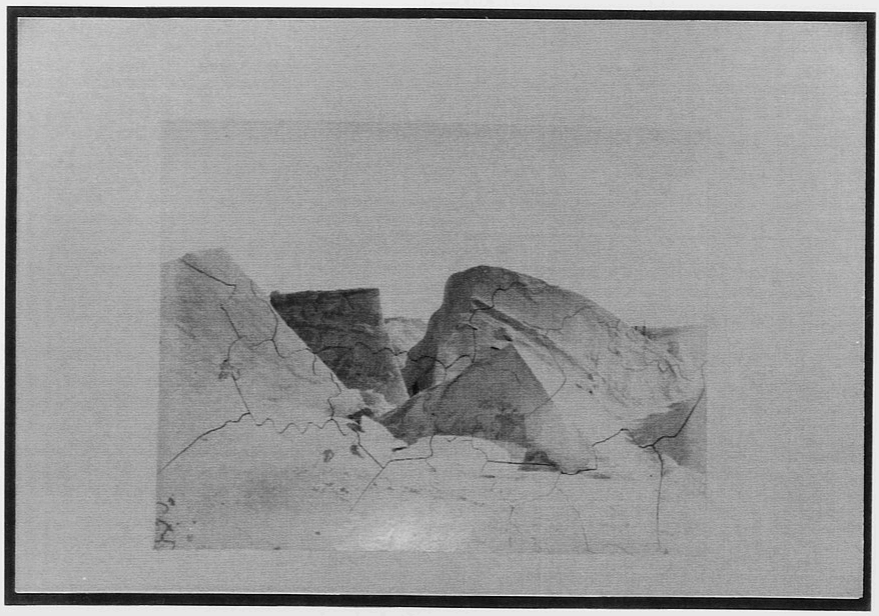


Figure 6.3.11b
Newly formed floe-bergs, showing the old line of flotation, May 1876
(BS: 84)

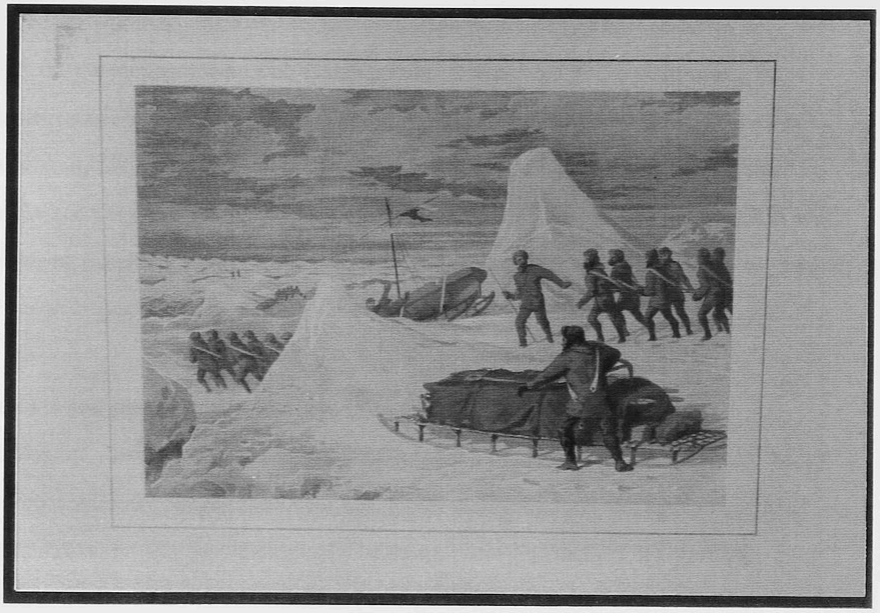


Figure 6.3.12
On the northern march, April 8 1876
(Moss 1878: 60)

Figure 6.3.13
The north Greenland party on their departure for H.M.S. *Alert*. April 1876
(BS: 63)

attempting to have shipmates pose for the camera, such as in Figures 6.3.14 and 6.3.15, which are near the ship, and most probably the darkroom. Figures in bulky clothes standing expectantly for the photographer, such as in Figures 6.3.16 and 6.3.17, brought some familiarity and sense of scale to a record of living and working in such inhospitable conditions and otherwise unfamiliar landscape. Human endeavour in the Arctic was truthfully depicted by photography and became a greater part of the visual record with the increasing application of photography on expeditions. The Arctic hero had become more accessible to the viewing public through the photographic medium, which had become a familiar means of portraiture.

Arctic art and photography; the processes revealed

While photography had begun to depict some of the expedition processes and activities, many were not recorded in the images examined. The notion of documentary photography, with its more methodical approach, would eventually became an accepted method of recording expeditions and other events, but it would not emerge until the first half of the twentieth century. The process of visual documentation, as part of the expedition's activities, was recorded, almost accidentally, in only two of the photographs examined. William Bradford is shown, with his back to the camera, sketching in Figure 6.3.18, a detail of "Looking down the Karsut Fiord". Even more indirectly, a photographer on the Nares expedition, including his camera and tripod, is registered as a shadow cast against the section of a floe berg (see Figure 6.3.19), preoccupied with his attempts to record the strata of the snow, fresh water ice and sea ice. This is the only photograph in all the images examined that records any reference to the process of photography in the Arctic.

Figure 6.3.14
The people who did not leave the ship in the early spring sledging season.
A discarded face protector on snow bank
(BS: 65)

Figure 6.3.15
Untitled [Group portrait on sea ice]
(BLS 1880)

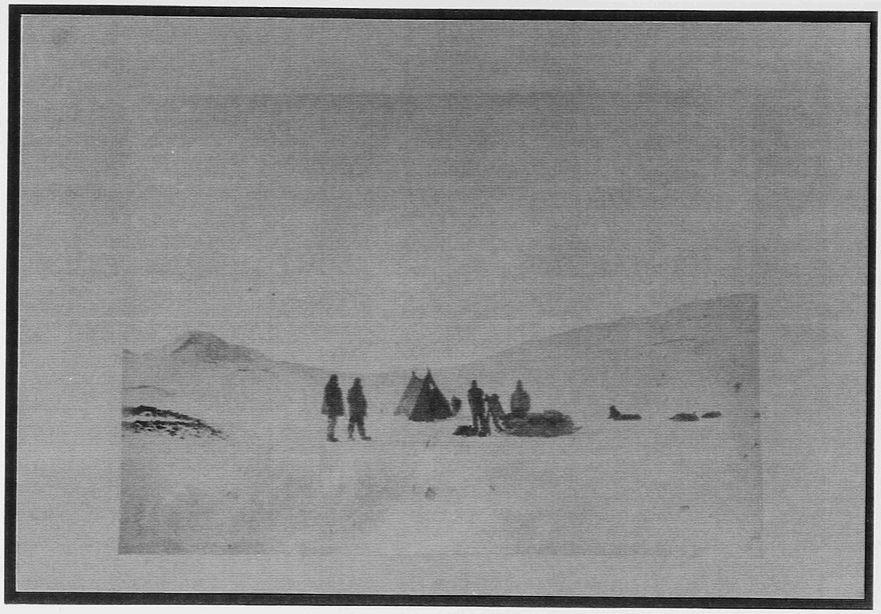


Figure 6.3.16
Camp in the Westward Ho! Valley United States Range, looking to the westward
(BS: 106)

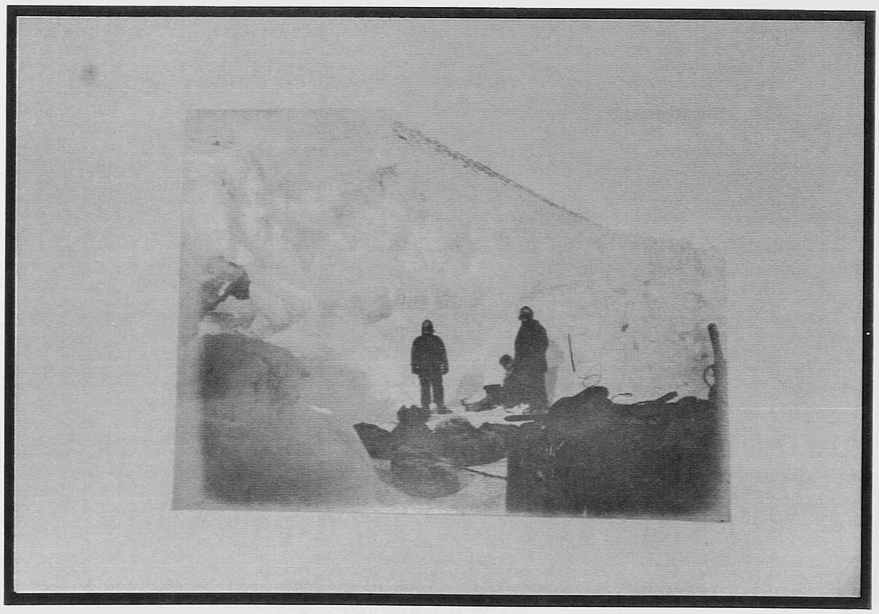


Figure 6.3.17
Sledge journey between the *Discovery* and the *Alert*. The party lunching under the ice wall at the southern cape of Wrangle Bay, April 1876
(BS: 75)

Figure 6.3.18
Detail of the photograph "Looking down Karsut Fiord" showing Bradford sketching on the shore
(Bradford 1873: 50)

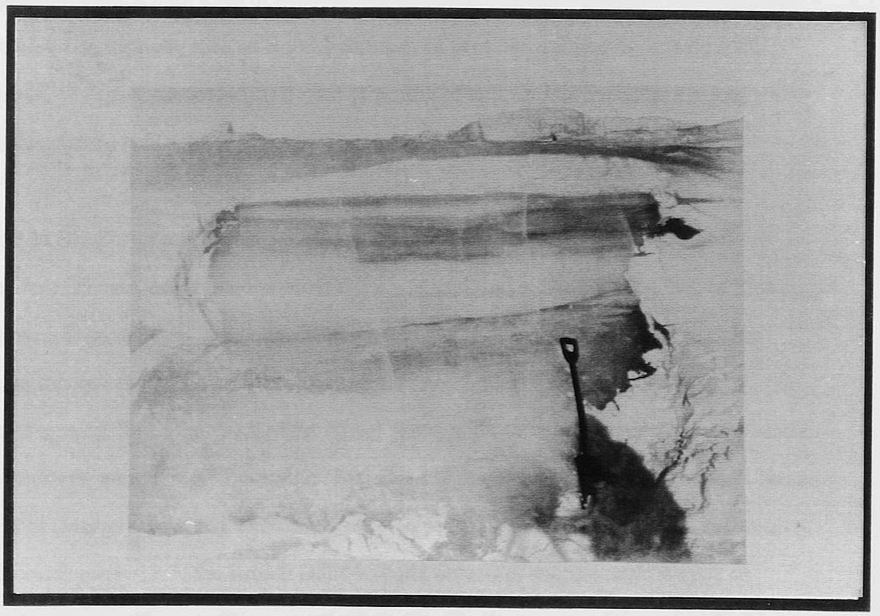


Figure 6.3.19
Section of a floe-berg showing the snow and fresh water ice overlying the salt water ice
(BS: 88)

7. Summary

Photography in the Arctic between 1851 and 1881 was not fully utilised in comparison to other expedition photography occurring outside the polar regions. Remoteness of the Arctic did not prevent opportunities for aspiring photographers, like William Grant, to get into the field.

Despite limitations of the medium caused by technological advances not keeping pace with the new applications, it was possible to obtain well-exposed, and clear images in remote regions. Samuel Bourne's work in India and Kashmir is one such example, and has shown what was achievable in similar remote conditions.

The image group analysis created by this study has generated a unique record of four expeditions that used and applied photography with varying degrees of success. In addition, this record has enabled comparison of several aspects of the use of photography in the period. The images from William Bradford's West Greenland expedition show that through the use of the wet plate process, a high level of success was achievable as early as 1869. This suggests that with adequate support, such as the appointment of professional photographers John Dunmore and George Critcherson, and with provision of appropriate facilities, a good quality photographic record was achievable in the Arctic.

In contrast to Bradford's use of professional photographers, the British Arctic Expedition appointed two officers, not trained photographers, to undertake photographic duties. The resulting record, as analysed in this thesis, partly reflects their lack of familiarity with the medium, as can be seen with the lower frequency of good quality images, compared to Bradford's material. It is apparent that the Royal Navy, and others involved in the organisation of this expedition, were not committed to obtaining a high quality photographic record. Despite the efforts of George White and Thomas Mitchell in obtaining photographs in the extremes of the Arctic cold, see Fig 7.1, the British failed to build on earlier success with the use of photography on scientific expeditions, particularly the *Challenger* expedition of 1872-76.

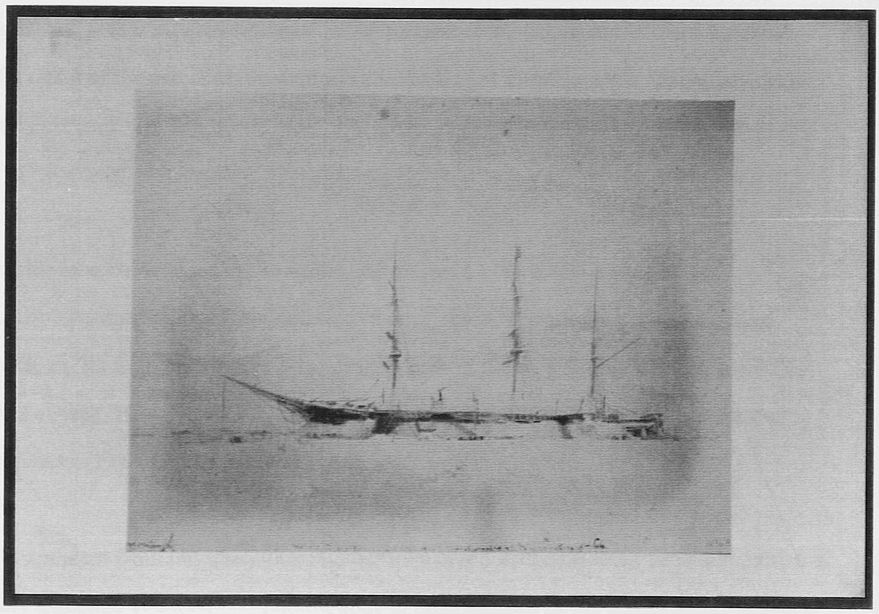


Figure 7.1
Winter quarters HMS *Discovery*, photographed at the temperature of minus 64°, March 1876
(BS: 57)

The reasons why there appears to be an absence from Arctic expeditions of the higher quality and quantity of work, such as that produced by Samuel Bourne in Kashmir, can only be partly attributed to those who took the photographs. In the Arctic images examined, three professional photographers contributed to the records of their respective expeditions, and the resulting higher quality is partly reflected in the analysis of image quality. Perhaps the most successful result of the use of photography in the Arctic and its subsequent application during the period examined was Bradford's work *The Arctic regions* (Bradford 1873). However this appears to have been an exception.

Photographic records obtained in the Arctic and viewed by the public extended the photographic documentation of the globe into a new region. The promise of an objective record obtained through the photographic process altered the way this remote and unfamiliar region was viewed. However photography did not immediately replace established methods of artistic representation on polar expeditions.

While it is apparent from this study that photography in the Arctic between 1851 and 1881 was not as fully exploited as expedition photography in other regions of the world, it shows that if the desire existed it was technically and physically possible to obtain a photographic record that was applicable for commercial and scientific processes.

These first thirty years of photography in the Arctic proved it had a role on expeditions in the polar regions, a role that would be strengthened, as a result of failures and successes, some of which have been discussed in this thesis. Photography was set to become increasingly integrated in expeditions to the Arctic in the closing twenty years of the nineteenth century.

Appendix 1. Data analysis; percentages and totals

1.1. Image group description; image quality and image type

a. Bourne

Bourne 1864, 1866 Percentage of quality		
Poor	0	0.0%
Fair	2	2.1%
Good	92	97.9%

Bourne 1864, 1866 Percentage of type		
Landscape	78	83.0%
Waterscape	2	2.1%
Portrait	4	4.3%
Closeup	3	3.2%
Interior	7	7.4%

b. Bradford

Bradford 1869 Percentage of quality		
Poor	8	5.7%
Fair	44	31.2%
Good	89	63.1%

Bradford 1869 Percentage of type		
Landscape	38	27.0%
Waterscape	71	50.4%
Portrait	29	20.6%
Closeup	3	2.1%
Interior	0	0.0%

c. Smith

Smith 1873, 1880 Percentage of quality		
Poor	16	16.7%
Fair	34	35.4%
Good	46	47.9%

Smith 1873, 1880 Percentage of type		
Landscape	32	33.3%
Waterscape	57	59.4%
Portrait	6	6.3%
Closeup	1	1.0%
Interior	0	0.0%

d. Nares

Nares 1875-76 Percentage of quality		
Poor	15	13.9%
Fair	68	63.0%
Good	25	23.1%

Nares 1875-76 Percentage of type		
Landscape	58	53.7%
Waterscape	31	28.7%
Portrait	14	13.0%
Closeup	5	4.6%
Interior	0	0.0%

1.2. Key word occurrence; frequency and percentage

a. Bourne

Bourne 1864, 1866 Key word occurrence			
Total number of images 94			
1	Animals - Arachnology	0	0.0%
2	Animals - Carcinology	0	0.0%
3	Animals - Entomology	0	0.0%
4	Animals - Herpetology	0	0.0%
5	Animals - Ichthyology	0	0.0%
6	Animals - Malacology	0	0.0%
7	Animals - Mammalogy	2	2.1%
8	Animals -Marine invertebrates	0	0.0%
9	Animals - Ornithology	0	0.0%
10	Anthropology	51	54.3%
11	Biological survey	0	0.0%
12	Buildings	52	55.3%
13	Communications	1	1.1%
14	Clothing	27	28.7%
15	Documents / records	0	0.0%
16	Domestic equipment	2	2.1%
17	Events / celebrations	2	2.1%
18	Expedition members	0	0.0%
19	Exploration processes	0	0.0%
20	Flags, emblems and banners	4	4.3%
21	Geology - Including glaciology	29	30.9%
22	[Geology / minerals] Not used	Not Used	
23	Landforms	36	38.3%
24	Landscapes	59	62.8%
25	Machinery	0	0.0%
26	Maritime, Civilian	2	2.1%
27	Maritime, Merchant	4	4.3%
28	Maritime, Naval	0	0.0%
29	Military	5	5.3%
30	Music	3	3.2%
31	Occupations	13	13.8%
32	People - (Unidentified people)	54	57.4%
33	Personal effects	4	4.3%
34	Photography	0	0.0%
35	Recreational	4	4.3%
36	Rural life	7	7.4%
37	Scientific apparatus * (Inc surveying)	0	0.0%
38	Sports	0	0.0%
39	Tools / materials	10	10.6%
40	Townscapes	27	28.7%
41	Transport, manual*	4	4.3%
42	Transport, mechanised *	3	3.2%
43	Vegetation	73	77.7%
44	Waterscapes	32	34.0%
45	Ice / snow cover	20	21.3%
46	Meteorological, climatic conditions	2	2.1%
47	Civil engineering	39	41.5%
48	Furniture / interiors	17	18.1%
49	Religion	34	36.2%

b. Bradford

Bradford 1869 Key word occurrence			
Total number of images 141			
1	Animals - Arachnology	0	0.0%
2	Animals - Carcinology	0	0.0%
3	Animals - Entomology	0	0.0%
4	Animals - Herpetology	0	0.0%
5	Animals - Ichthyology	0	0.0%
6	Animals - Malacology	0	0.0%
7	Animals - Mammalogy	9	6.4%
8	Animals -Marine invertebrates	0	0.0%
9	Animals - Ornithology	0	0.0%
10	Anthropology	29	20.6%
11	Biological survey	3	2.1%
12	Buildings	32	22.7%
13	Communications	0	0.0%
14	Clothing	32	22.7%
15	Documents / records	0	0.0%
16	Domestic equipment	2	1.4%
17	Events / celebrations	0	0.0%
18	Expedition members	20	14.2%
19	Exploration processes	16	11.3%
20	Flags, emblems and banners	4	2.8%
21	Geology - Including glaciology	85	60.3%
22	[Geology / minerals] Not used	Not Used	
23	Landforms	33	23.4%
24	Landscapes	58	41.1%
25	Machinery	0	0.0%
26	Maritime, Civilian	41	29.1%
27	Maritime, Merchant	1	0.7%
28	Maritime, Naval	0	0.0%
29	Military	0	0.0%
30	Music	0	0.0%
31	Occupations	14	9.9%
32	People - (Unidentified people)	39	27.7%
33	Personal effects	4	2.8%
34	Photography	0	0.0%
35	Recreational	2	1.4%
36	Rural life	0	0.0%
37	Scientific apparatus * (Inc surveying)	0	0.0%
38	Sports	0	0.0%
39	Tools / materials	17	12.1%
40	Townscapes	9	6.4%
41	Transport, manual*	22	15.6%
42	Transport, mechanised *	0	0.0%
43	Vegetation	22	15.6%
44	Waterscapes	108	76.6%
45	Ice / snow cover	100	70.9%
46	Meteorological, climatic conditions	11	7.8%
47	Civil engineering	6	4.3%
48	Furniture / interiors	6	4.3%
49	Religion	8	5.7%

c. Smith

Smith 1873, 1880 Key word occurrence			
Total number of images 96			
1	Animals - Arachnology	0	0.0%
2	Animals - Carcinology	0	0.0%
3	Animals - Entomology	0	0.0%
4	Animals - Herpetology	0	0.0%
5	Animals - Ichthyology	0	0.0%
6	Animals - Malacology	0	0.0%
7	Animals - Mammalogy	6	6.3%
8	Animals -Marine invertebrates	2	2.1%
9	Animals - Ornithology	0	0.0%
10	Anthropology	0	0.0%
11	Biological survey	1	1.0%
12	Buildings	1	1.0%
13	Communications	0	0.0%
14	Clothing	7	7.3%
15	Documents / records	0	0.0%
16	Domestic equipment	1	1.0%
17	Events / celebrations	0	0.0%
18	Expedition members	24	25.0%
19	Exploration processes	13	13.5%
20	Flags, emblems and banners	3	3.1%
21	Geology - Including glaciology	49	51.0%
23	Landforms	56	58.3%
24	Landscapes	37	38.5%
25	Machinery	0	0.0%
26	Maritime, Civilian	33	34.4%
27	Maritime, Merchant	8	8.3%
28	Maritime, Naval	0	0.0%
29	Military	0	0.0%
30	Music	0	0.0%
31	Occupations	22	22.9%
32	People - (Unidentified people)	23	24.0%
33	Personal effects	3	3.1%
34	Photography	0	0.0%
35	Recreational	1	1.0%
36	Rural life	0	0.0%
37	Scientific apparatus * (Inc surveying)	0	0.0%
38	Sports	0	0.0%
39	Tools / materials	19	19.8%
40	Townscapes	1	1.0%
41	Transport, manual*	7	7.3%
42	Transport, mechanised *	6	6.3%
43	Vegetation	2	2.1%
44	Waterscapes	75	78.1%
45	Ice / snow cover	85	88.5%
46	Meteorological, climatic conditions	13	13.5%
47	Civil engineering	0	0.0%
48	Furniture / interiors	0	0.0%
49	Religion	0	0.0%

d. Nares

Nares 1875-76 Key word occurrence			
Total number of images 108			
1	Animals - Arachnology	0	0.0%
2	Animals - Carcinology	0	0.0%
3	Animals - Entomology	0	0.0%
4	Animals - Herpetology	0	0.0%
5	Animals - Ichthyology	0	0.0%
6	Animals - Malacology	0	0.0%
7	Animals - Mammalogy	15	13.9%
8	Animals -Marine invertebrates	0	0.0%
9	Animals - Ornithology	0	0.0%
10	Anthropology	6	5.6%
11	Biological survey	2	1.9%
12	Buildings	16	14.8%
13	Communications	3	2.8%
14	Clothing	22	20.4%
15	Documents / records	0	0.0%
16	Domestic equipment	0	0.0%
17	Events / celebrations	0	0.0%
18	Expedition members	30	27.8%
19	Exploration processes	20	18.5%
20	Flags, emblems and banners	12	11.1%
21	Geology - Including glaciology	65	60.2%
23	Landforms	65	60.2%
24	Landscapes	92	85.2%
25	Machinery	3	2.8%
26	Maritime, Civilian	2	1.9%
27	Maritime, Merchant	0	0.0%
28	Maritime, Naval	51	47.2%
29	Military	26	24.1%
30	Music	1	0.9%
31	Occupations	16	14.8%
32	People	8	7.4%
33	Personal effects	1	0.9%
34	Photography	1	0.9%
35	Recreational	1	0.9%
36	Rural life	0	0.0%
37	Scientific apparatus *	7	6.5%
38	Sports	0	0.0%
39	Tools / materials	39	36.1%
40	Townscapes	1	0.9%
41	Transport, manual*	24	22.2%
42	Transport, mechanised *	0	0.0%
43	Vegetation	9	8.3%
44	Waterscapes	77	71.3%
45	Ice / snow cover	96	88.9%
46	Meteorological, climatic conditions	1	0.9%
47	Civil engineering	2	1.9%
48	Furniture / interiors	0	0.0%
49	Religion	3	2.8%

Appendix 2. Data collection; raw data

2.1. Image group description; raw data

a. Bourne 1864, 1866

(Victoria and Albert Museum)

1.1 Expedition. *S Bourne* *(x844 a to e)*	**1.2** Location/s. *Northern India and Kashmir.*	**1.3** Date/s *1864, 1866.*
1. 4 Images mechanical *70*	**1.5** Images manual.....	
1.6 Photographer/s name. *Samuel Bourne*	**1.7** Photographer status **[P]** (professional)	**1.8** Photographer status A (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

1.1 Expedition. *S .Bourne* *(x813)*	**1.2** Location/s. *Northern India and Kashmir.*	**1.3** Date/s *1864, 1866.*
1. 4 Images mechanical *24*	**1.5** Images manual.....	
1.6 Photographer/s name. *Samuel Bourne.*	**1.7** Photographer status **[P]** (professional)	**1.8** Photographer status A (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

b. Bradford 1869

(Scott Polar Research Institute (*38):91 (08) [1869 Bradford])

1.1 Expedition. *William Bradford*	**1.2** Location/s. *West Greenland*	**1.3** Date/s *1869*
1. 4 Images mechanical *141*	**1.5** Images manual.....	
1.6 Photographer/s name. *John Dunmore and George Critcherson*	**1.7** Photographer status **[P]** (professional)	**1.8** Photographer status A (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

c. Smith 1873, 1880

(The Royal Geographical Society)

1.1 Expedition. *B Leigh Smith PR/043357-043396)*	**1.2** Location/s. *Svalbard / Zemlya Frantsa-Iosifa*	**1.3** Date/s *1873*
1. 4 Images mechanical *39*	**1.5** Images manual.....	
1.6 Photographer/s name. *B Leigh Smith?*	**1.7** Photographer status P (professional)	**1.8** Photographer status **[A]** (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

1.1 Expedition. *B Leigh Smith (E99/014898-014937)*	**1.2** Location/s. *Svalbard / Zemlya Frantsa-Iosifa*	**1.3** Date/s *1880*
1. 4 Images mechanical *57*	**1.5** Images manual.....	
1.6 Photographer/s name. *W.J.A.Grant*	**1.7** Photographer status **[P]** (professional)	**1.8** Photographer status A (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

d. Nares 1875-76

(Scott Polar Research Institute P60/61/1-107)

1.1 Expedition.	**1.2** Location/s.	**1.3** Date/s
Nares (British Arctic Expedition)	*Northern Canada and West Greenland.*	*1875-76*
1. 4 Images mechanical *108*	**1.5** Images manual.....	
1.6 Photographer/s name. *Thomas Mitchell and George White.*	**1.7** Photographer status P (professional)	**1.8** Photographer status **[A]** (amateur)
1.9 Reproduction method: **a.**	**a.** Wet plate	**b.** Dry plate
c. Woodburytype	**d.** Woodblock	**e.** Engraving (Based on a photograph)

2.2. Key word occurrence; raw data

a. Bourne 1864, 1866

(Victoria and Albert Museum x844 a to e and x813)

Bourne 1864, 1866													
Image details				Allocated key word/s									
Accession number	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
52.896	1	G	A	10	32	14	43	21	23	24	45	47	
52.949	2	G	A	43	44	24							
52.950	3	F	A	10	32	24	43	44	47				
53.058	4	G	A	43	47	10	32						
53.069	5	G	A	10	32	24	36	39	43	44	12	31	
53079	6	G	A	21	23	24	43	44	45				
53.081	7	G	A	21	23	24	44	45					
53.111	8	G	A	10	32	14	43	21	23	24	45	39	
53119	9	G	A	21	23	24	12	43	36	44	45		
53.124	10	G	A	21	23	24	44	45					
53.237	11	Not in box											
53.237	12	Dupe of #17											
53.243	13	G	A	10	12	24	32	40	43	44	47	29	14
53.299	14	G	A	14	32	35	40	43	47	12			
53.312	15	G	A	12	29	40	43	44	47				
2.1972	16	G	E	49	48								
3.1972	17	G	A	10	32	40	43	47	49	12			
53.076	18	G	A	21	23	24	45	44					
53.077	19	G	A	21	23	24	45						
53.095	20	G	A	21	23	24	45	44	43	36	10	32	47
53.096	21	G	A	21	23	24	45	44	43	12	46		
53.098	22	G	A	47	32	10	14	21	23	24	43	12	44
53.143	23	G	A	21	23	24	43						
53.144	24	G	A	10	21	23	24	32	44	39			
53.148	25	G	A	21	23	24	45	43					
53.191	26	Not in box											
53.204	27	G	A	12	43	10	32	42					
53.118	28	Not in box											
53.260	29	G	A	47	40	43	49	12					
6.1972	30	F	E	10	49	48							
366.1981	31	G	A	12	10	43	14	24	32	49			
367.1981	32	G	D	12	10	49							
53.191	33	G	A	24	12	40	10	32	43	47			
53.288	34	G	A	49	47	43	12	36	10	31	32	24	
52.910	35	G	A	10	32	43	47	49					

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Bourne 1864, 1866													
Image details				Allocated key word/s									
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52.962	36	G	B	21	23	24	27	42	43	44	10	31	32
53.044	37	G	A	13	24	40	39	43	12	47			
53.061	38	G	A	10	32	12	14	23	24	47	43		
53.073	39	G	A	10	21	23	24	32	43	44			
53.087	40	G	A	10	32	21	23	24	12	36	43	45	47
53.092	41	G	A	12	21	23	24	40	43	49			
53.099	42	G	A	21	23	24	43	46	44				
53.101	43	G	A	21	23	24	10	32	45	14			
53.154	44	G	A	10	24	40	12	32	47	43	41	20	49
53.183	45	G	A	10	23	31	32	12	40	48	16	43	47
53.185	46	G	A	43	47	40	32	10	12	24	14		
53.188	47	G	A	14	10	24	31	32	41				
53.455	48	G	B	23	24	43	44	47					
53.460	49	G	A	12	14	24	32	43	47				
52.875	50	G	A	10	32	47	43	23					
52.876	51	G	A	10	32	43	44	47	40	14			
52.887	52	G	A	21	23	24	43	44	45				
52.895	53	G	A	10	32	21	23	24	43	45	47	39	
52.872	54	G	A	10	32	14	43	47	36				
52.876	55	G	A	21	23	24	43	45					
52.985	56	G	A	10	32	40	41	44	47	12	27	43	
52.996	57	G	A	10	32	23	24	43	44				
53.015	58	G	A	10	32	21	23	24	43	44			
53.016	59	G	A	21	23	24	43	44					
53.026	60	G	A	21	23	24	45	43					
53.105	61	G	A	21	23	24	44	43					
53.107	62	G	A	40	47	12	21	23	24	36	43	45	
53.285	63	G	A	10	32	14	24	26	40	42	44	47	
53.425	64	G	A	10	32	23	24	40	43	44	47	12	
52.979	65	G	C	14	29	31	32	33	39	48			
52.981	66	G	C	14	32	33	35	43	48				
52.982	67	G	C	7	14	12	32	33	35	43	48		
53.010	68	G	A	12	16	10	31	32	43	24	48	39	7
53.051	69	Not in box											
53.052	70	Not in box											
364.1981	71	G	C	17	20	24	12	29	30	14	43	47	
365.1981	72	G	A	17	20	24	12	29	30	14	43	49	
7.1972	73	G	A	10	31	32	12	14	40	47	48		
53.442	74	G	A	12	24	40	43	47	49				
53.145	75	G	A	10	32	21	23	24	43	45	39		
4.1972	76	G	A	10	31	32	40	41	43	47	49	39	12
2366.1990	77	G	A	10	32	12	40	30	49				
2367.1990	78	G	A	10	32	24	40	12	20	45	31	33	27
2368.1990	79	G	E	48	49								
2369.1990	80	G	A	12	49	10	32	14	43	24			

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Bourne 1864, 1866													
Image details				Allocated key word/s									
Accession number	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
2370.1990	81	G	E	10	12	14	31	32	48	49			
2371.1990	82	G	A	10	12	14	32	40	47	49	43		
2372.1990	83	G	D	12	43	49							
2373.1990	84	G	E	48	49								
2374.1990	85	G	A	12	49	48							
2375.1990	86	G	A	10	12	14	40	43	49	23	32		
2376.1990	87	G	A	12	49	47	44	43	24	10	32		
2377.1990	88	G	A	10	12	14	24	40	43	44	47	49	
2378.1990	89	G	A	10	32	31	26	27	43	40	44	49	12
2379.1990	90	G	A	10	12	24	32	40	43	44	47	49	
2380.1990	91	G	A	12	24	35	43	44	48	49			
2381.1990	92	G	A	12	49								
2382.1990	93	G	A	10	12	24	32	43	47	49			
2383.1990	94	G	E	48	49	43							
2384.1990	95	G	A	12	43	49							
2385.1990	96	G	A	12	43	49	24						
2386.1990	97	G	A	12	14	31	32	39	40	47	43	48	
2387.1990	98	G	E	48	49	43							
2388.1990	99	G	D	12	49								
2389.1990	100	G	A	12	24	10	32	14	43	48			

b. Bradford 1869

(Scott Polar Research Institute (*38):91 (08) [1869 Bradford])

* Note: accession numbers have not been allocated to the individual images. Numbers used in this column comprise the illustration number from the list of illustrations and page number/s in *The Arctic Regions* (Bradford 1873). Numbers marked # have been used twice in the list of illustrations. Where images have been inserted between pages the page range is indicated.

Bradford 1869													
Image details				Allocated key word/s									
Accession number*	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
- /Frontispiece	1	F	B	21	24	26	44	45					
-/VII	2	F	B	21	24	44	45	46					
-/VIII	3	F	B	21	26	44	45						
-/IX	4	F	C	14	10	24	32	7					
-/X	5	P	C	10	14	32							
1 / 7	6	F	B	21	44	45							
2 / 8	7	F	B	21	44	45	41	31	32	18			
3 / 9	8	F	A	21	23	24	44	45					
4 / 9	9	F	A	21	23	24	44	45					
5 / 10	10	G	B	21	44	45							
6/11	11	F	B	21	44	45							
7/11	12	F	B	21	24	44	45	18	31	41			
8/12	13	G	B	21	44	45	46						
9/13	14	F	B	21	44	45							
10/13	15	F	B	21	44	45	24	46					
11/14	16	G	A	12	20	21	23	24	40	43	44	14	47
12/15	17	G	C	7	10	12	14	24	32	39			
13/16	18	G	C	10	12	14	32						
13/16	19	G	C	10	14	32							
14/17	20	G	C	10	14	24	32	26	41	44			
15/18	21	G	C	10	12	14	32						
16/18	22	G	C	10	14	32	47	43					
17/19	23	G	C	10	14	26	31	32	41	43	44		
18/20	24	G	C	10	14	32	41	26	24	43	44		
19/21	25	G	A	12	24	40	43	47	49				
20/22	26	G	A	12	23	24	43	49					
21/23	27	G	A	12	24	43	44	49					
22/23	28	G	D	12	43	49							
23/22-23	29	G	A	12	21	23	24	40	43	44	49		
24/22-23	30	G	A	12	24	43	49						
25/24	31	G	C	10	14	26	31	32	39	44	45		
26/26	32	G	C	10	12	14	32	48	33				
27/27	33	G	C	10	12	14	32	33	48	47			
28/28	34	G	C	10	12	14	26	32	41	43	44		
29/28	35	G	B	19	23	24	26	44	45				

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Bradford 1869													
Image details				Allocated key word/s									
Accession number*	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
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31/29	37	F	A	21	23	24	26	44	45				
32/30	38	F	A	21	23	24	44	45	18	32	44	45	
33/31	39	P	A	21	44	45							
34/31	40	F	A	21	44	45							
35/32	41	F	B	21	44	45	18	32	19	26	41	24	
36/32-33	42	G	A	21	44	45	43						
37/32-33	43	G	B	21	44	45							
38/32-33	44	G	D	21	44	45							
39/33	45	F	B	21	44	45	24						
41/34	46	P	A	21	44	45							
40/34-35	47	G	D	21	44	45	43						
41#/34-35	48	G	A	21	44	45							
42/35	49	F	A	18	21	24	32	20					
44/36	50	G	C	10	12	14	16	18	19	20	45	43	35
43/36-37	51	F	A	21	45								
45/37	52	F	A	21	45								
46/37	53	G	A	10	14	20	32	40	12	41			
47/38	54	F	B	26	45	44							
47#/38	55	G	A	21	44	45							
48/39	56	G	B	23	24	44	45	46					
50/40	57	G	A	12	40	23	24	44	45	26			
49/40-41	58	G	A	21	23	24	43	44	45	46			
50#/41	59	F	B	21	44	45							
53/42	60	G	B	19	21	24	26	44	45				
51/42-43	61	G	A	21	23	24	43	44	45	46			
52/42-43	62	G	A	21	23	24	43	44	45	46			
54/43	63	G	B	24	44	45	46						
55/44	64	G	B	21	44	45							
56/45	65	F	B	21	44	45							
57/45	66	P	B	21	44	45	24						
58/46	67	P	B	21	44	45							
59/47	68	G	B	21	44	45	26	19					
59#/47	69	F	B	21	44	45	46						
60/48	70	G	A	21	23	24	44	45					
61/49	71	G	B	21	23	24	44	45	26				
62/50	72	G	A	21	23	24	19	18	41	31	39	45	44
63/50-51	73	G	A	21	23	24	44	45					
64/51	74	G	A	12	21	24	32	40	43				
65/52	75	F	C	10	14	26	31	39	44				
65#/52	76	P	B	21	44	45							
66/53	77	F	B	21	44	45							
67/54	78	G	C	10	14	32							
68/54	79	G	A	12	19	21	23	24	40	41	44	45	
69/55	80	F	B	21	44	45							

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Bradford 1869													
Image details				Allocated key word/s									
Accession number*	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
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71/57	82	G	B	24	44	45							
72/58	83	G	B	21	44	45	24						
73/59	84	G	B	21	44	45							
74/59	85	F	B	21	44	45	26						
75/60	86	G	B	21	44	45	18	32					
76/60	87	G	B	21	44	45							
77/61	88	G	B	21	44	45							
78/62	89	F	B	23	24	44	45						
79/63	90	F	B	26	44	45	19						
80/63	91	F	B	21	44	45	46						
81/64	92	F	B	7	23	24	44	45					
83/64-65	93	G	C	7	11	14	18	21	26	35	39	44	45
82/65	94	F	B	7	23	24	44	45	11				
84/66	95	G	C	7	11	44	45						
85/66	96	G	B	26	44	45	19						
86/67	97	F	B	26	44	45	21						
87/68	98	G	B	26	44	45	19	41					
88/68	99	G	B	26	44	45	21	19					
89/69	100	P	B	26	44	45							
90/70	101	G	B	21	23	24	44	45					
91/70	102	G	B	21	7	32	44	45					
92/70-71	103	G	B	21	23	24	44	45					
92#/70-71	104	G	B	21	23	24	44	45	46				
93/71	105	G	B	21	24	26	41	44	45	39			
94/72	106	G	B	21	44	45							
95/72	107	G	B	21	26	44	45	19	41				
94#/72-73	108	G	B	21	26	18	31	32	41	44	45	19	
98/72-73	109	G	B	21	44	45	18	31	32	39			
98#/72-73	110	G	B	21	44	45	18	32	26	39	41		
96/73	111	G	B	21	44	45	26	18	32				
97/73	112	F	B	21	44	45	26	41	18	31	32		
99/74	113	F	B	44	45	26	18	32	14	19	7	39	
100/74	114	F	B	21	44	45	26	41	18	31	32		
101/74-75	115	G	B	21	44	45							
102/74-75	116	G	B	21	44	45	26	19	14	18	39		
103/74-75	117	G	B	21	44	45	26	19	18	41			
104/75	118	F	B	21	44	45	23	24					
105/76	119	F	B	44	45	23	24	26	41	18	31		
105#/76	120	G	B	21	44	45	18	31	26				
106/77	121	G	C	10	12	14	39	48					
107/78	122	G	C	7	14	39	45	31					
108/79	123	G	C	10	12	14	33	32					
109/80	124	G	C	12	14	32							
110/80	125	P	A	10	12	21	23	24	44	45	47		

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Bradford 1869													
Image details				Allocated key word/s									
Accession number*	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
111/81	126	G	C	10	12	14	48	32					
112/81	127	F	C	10	14	32	39						
113/82	128	G	A	10	23	24	49						
114/82	129	G	A	12	21	23	24	26	40	39	47	44	
116/82-83	130	G	C	10	12	14	32	16	43				
117/82-83	131	G	A	12	21	23	24	26	41	43	44		
115/83	132	F	A	12	40	44	24						
118/83	133	G	C	12	10	14	32	48	33				
119/84	134	G	C	12	10	14	32	39					
120/85	135	G	C	10	14	48							
122/86	136	G	A	12	24	43	44	49					
121/86-87	137	G	A	10	26	41	39	12	43	24			
122#/86-87	138	G	A	21	23	24	44	45					
123/87	139	G	B	21	44	45							
124/89	140	F	B	23	24	26	44	45					
125/89	141	F	B	27	31	32	41	44	45				

c. Smith 1873, 1880

(The Royal Geographical Society)

Smith 1873, 1880													
Image details				Allocated key word/s									
Accession number	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
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043358	2	F	B	26	21	45	24	19	42				
043359	3	G	A	26	45	23	44	19	42				
043360	4	F	B	26	23	45	44	18	19	42			
043361	5	G	B	26	44	45	18	14	20	31	19	42	32
043362	6	F	B	26	19	44	45	24	42	46			
043363	7	P	B	26	19	24	12	45	44				
043364	8	G	B	26	19	18	45	31	44	20	39		
043365	9	F	C	26	19	18	14	31	32	39			
043366	10	F	C	26	19	18	14	7	11	39	45		
043367	11	G	B	7	23	45	44	39	46				
043368	12	G	A	23	21	45	46	44					
043369	13	G	A	23	21	44	45						
043370	14	G	A	23	21	44	45						
043371	15	F	A	23	21	44	45						
043372	16	P	B	23	44	45							
043373	17	F	C	7	45	23	18	35	39	32	14	31	
043374	18	G	B	21	23	44	45						
043375	19	P	B	21	23	44	45						
043376	20	F	B	23	44	45							
043377	21	F	B	44	45	46							
043378	22	P	B	44	45	46	23						
043379	23	G	A	21	23	44	45						
043380	24	F	A	21	23	44	45	26	19				
043381	25	G	B	19	21	23	26	44	45				
043382	26	F	A	21	23	45							
043383	27	G	A	21	23	45							
043384	28	F	B	21	23	45	44	46					
043385	29	F	B	21	23	45	44	46					
043386	30	F	B	21	23	44	45	46	39				
043387	31	P	B	21	23	44	45						
043388	32	G	B	21	23	44	45	39					
043389	33	G	A	21	23	44	45						
043390	34	P	B	23	24	44	45	46					
043391	35	F	B	23	44	45							
043392	36	P	B	23	44	45							
043393	37	G	A	21	23	24	44	45					
043394	38	P	A	21	23	24	44	45					
043395	39	F	B	44	45								
043396	40	Not in box											
014898	41	G	C	14	32	33	18	39	31	26			
014899	42	G	D	14	32	18	31	26	39	45			
014900	43	G	B	18	31	32	26	39	45				
014901	44	F	B	18	31	32	26	39	45	44			
014902	45	G	B	23	24	40	44						

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Smith 1873, 1880													
Image details				Allocated key word/s									
Accession number	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
014903	46	P	B	26	39	41	45						
01490?	47	G	B	21	44	45	23						
014904	48	G	B	18	32	39	16	41	26	45	19	31	
014905	49	G	C	18	7	26	31	32	39	45			
01490?	50	F	A	21	23	24	44	45					
014390?	51	G	A	21	23	24	44	45					
014390?	52	P	B	44	45								
014906	53	G	B	27	44	31	32						
014907	54	G	B	18	31	32	45						
014908	55	F	B	27	44	45							
014909	56	P	B	27	44	45							
014910	57	F	B	26	44	45	39						
01491?	58	P	B	26	18	31	32	45					
014911	59	F	A	21	23	24	44						
014912	60	F	A	21	23	24	44						
014913	61	F	A	21	23	24	44	45					
014914	62	F	A	21	23	24	44						
014915	63	F	A	21	23	24	18	31	32	41	44	45	26
014916	64	G	B	27	44	45	24						
014917	65	G	A	21	23	24	45						
014918	66	G	A	21	23	24	45	44					
014919	67	G	B	26	45	18	32	23					
014920	68	G	B	24	21	45	44	46					
014921	69	G	A	21	23	24	44						
01492?	70	F	B	21	24	44	45						
014922	71	G	A	21	23	24	44	45					
014923	72	G	A	21	23	24	44	45					
014924	73	G	B	27	44	45	31	32	41				
01492?	74	G	A	21	23	24	45						
014925	75	G	B	26	44	45	24						
01492?	76	P	B	21	23	24	44	45					
014926	77	G	B	26	27	32	33	44	45				
01492?	78	F	B	18	26	32	39	44	45				
01497	79	G	B	18	31	32	44	45	7	41	23		
01492?	80	G	A	21	18	31	32	45	14	39			
01492?	81	G	B	21	23	24	26	44	45	46			
014928	82	F	B	21	23	24	44	45					
01492?	83	P	B	27	44	45							
014929	84	F	A	21	23	26	44	45	46	24			
014930	85	F	B	21	23	44	45	24					
014931	86	G	B	18	31	32	26	39	44	45	33		
014932	87	G	A	21	23	24	26	44	45				
014933	88	G	A	21	23	44	45	24					
014934	89	G	A	21	23	45	24						
01493?	90	G	A	21	23	44	45	24					
014935	91	F	B	21	44	45	46	24					
01493?	92	P	A	21	24	44	45	23					
01493?	93	F	B	21	44	45							
014936	94	G	C	7	31	32	39	18	26				
014937	95	G	B	26	24	44	18	31	32	43	8		
014???	96	F	B	26	24	44	18	31	32	43	8		
014???	97	F	B	27	41	44	45						

d. Nares 1875-76

(Scott Polar Research Institute P60/61/1-107)

Nares 1875-76													
Image details				Allocated key word/s									
Accession number	Number	Quality	Type	1	2	3	4	5	6	7	8	9	10
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P60/61/2	2	F	B	12	19	23	24	28	26	41	44	43	45
P60/61/3	3	F	B	19	23	24	28	45	21				
P60/61/4	4	F	C	12	14	24	32	43	10				
P60/61/5	5	F	C	10	12	14	32	43					
P60/61/6	6	F	B	21	23	24	43	44	45				
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107	108	P	D	49									

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