

Survey Photography in British Columbia, 1858-1900

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When François Arago presented his report on the daguerreotype process to the Chamber of Deputies in France in 1839 he remarked that he could “allude to some ideas that have been formed on the rapid means of investigation which the topographer may borrow from the science of photography.”¹ Unfortunately, he decided not to expand on this remark. It is clear, though, that photography was applied very early to surveys of all kinds. In Canada, as in the United States, the exploration of the West coincided with the development of photography. For a variety of reasons, British Columbia was the target of many surveys in the last half of the nineteenth century and all of them — boundary, geological, exploratory, topographical and railway — used the camera with success. In fact, the province was the site of one of the most notable developments in survey photography, one which still remains little known. In the surveys operating there we can trace the gradual ascent of the camera from playing a purely supportive and tentative role to one that was essential, a development for which the early photographic surveyors in B.C. were partly responsible. We will examine three of those surveys here: the North American Boundary Commission Survey (1858-1862), the Canadian Pacific Railway Surveys (1871-1879) and the topographical work of the Dominion Lands Survey and the International Boundary Commission (1886-1900).

By 1850 Colonel Aimé Laussedat in France had worked out a system for taking measurements directly from perspective drawings made with the aid of a *camera lucida*. In 1852 he substituted the photographic camera for the *camera lucida*, thus putting in place extremely early a system for accurate topographical surveying using photography and the laws of perspective.² Although this was a notable achievement it was not

¹ L. J. M. Daguerre, *An Historical and Descriptive Account of the Various Processes of the Daguerreotype and the Diorama* (London: McLean, 1839; New York: Kraus Reprint Co., 1969), p. 29.

² Public Archives of Canada (PAC), Records of the Surveyor-General of Canada, RG 88, vol. 185, file 6659, MS “Photographic Surveying,” pp. 2-3.

widely used at the time because the prevailing photographic technology, the collodion wet-plate, was so time-consuming and difficult, and the equipment so heavy and bulky, that it effectively ruled out any widespread application. Nevertheless, interest continued and there were a number of inventions designed to aid the topographer. In 1867 Captain R. H. Stotherd of the Royal Engineers reported on "La Planchette Photographique" of Auguste Chevalier which he had seen at the Paris Exhibition. Acting like a theodolite, the device recorded a circular photograph the centre of which was the position of the trigonometrical station. Using the measurements taken at the station a detailed map could later be plotted from the panoramic view. Stotherd concluded, "If a series of views were taken from prominent points, a system of triangulation might be rapidly carried over any district of country, and on this triangulation the detail could readily be built."³ In spite of the advantages of the camera it was not until the advent of the gelatin dry-plate method in the late 1870s that the method Stotherd supported became attractive. Phototopography was practised on a limited scale in Europe during the remainder of the century.

Meanwhile other surveyors recognized the usefulness of the camera and experimented with it. Perhaps the most disciplined group to adopt photography at this time was the British Army and the Royal Engineers in particular. Among their many tasks the Engineers were regularly called upon to perform surveys. A number of Sappers and Non-Commissioned Officers were trained in photography at the South Kensington Museum in the early 1850s, and a studio was established at their School in Chatham in 1856. The following year it was decided to begin regular instruction in photography for Sappers, after which they were to be sent abroad. The intention was to establish a network of photographic stations around the world which would "send home periodical Photographs of all works in progress, and to photograph . . . all objects, either valuable in a professional point of view, or interesting as illustrative of History, Ethnology, Natural History, Antiquities, &c."⁴ It was owing to this policy that pho-

³ Capt. R. H. Stotherd, "Description of an Application of Photography to Surveying Purposes, called 'La Planchette Photographique,'" Paper VI, *Professional Papers of the Corps of Royal Engineers*, New Series, vol. XVII (1869), pp. 128-30. For other comments on surveying applications see: "Photography Applied to Topography," *The Photographic News*, 20 May 1859, p. 122; "The Photographic Plane Table of M. Auguste Chevalier," *The Photographic News*, 7 February 1862, pp. 63-64; "Surveying by Photography," *The Philadelphia Photographer*, December 1866, pp. 379-80; M. A. Jouart, *Application de la photographie aux levés militaires*, (Paris: J. Dumaine, 1869).

⁴ Quoted in *Fifth Report of the Department of Science and Art*, pp. 87-88.

tographers appeared in British Columbia in 1858 to work on the joint boundary commission marking the 49th Parallel from the Strait of Juan de Fuca to the eastern limit of the Rocky Mountains.

The Oregon Treaty of 1846 had settled the boundary along the 49th Parallel, but no effort had been made to mark it prior to the discoveries of gold on the Fraser and Thompson Rivers and near the boundary. It was quickly realized that an undefined border could lead to jurisdictional disputes and perhaps even conflict. In order to avoid such possibilities the British government moved swiftly to establish with the United States a Joint Boundary Commission in 1857 to mark the boundary. The land portion of the work was assigned to a force of the Royal Engineers under Lieutenant-Colonel John Summerfield Hawkins, while the water portion through the Gulf of Georgia was handled by the British Navy. On the American side both sections were under the direction of Archibald Campbell.

Usually such explorations and surveys included a skilled artist. The British Army trained many of its officers to produce topographical drawings and paintings. Often they would also make drawings of indigenous people and other subjects of interest. Great emphasis was placed on accuracy. Artists were common on many other kinds of exploration, and here too the emphasis was increasingly on accuracy for scientific purposes, for their drawings were usually reproduced in the form of engravings as evidence to support the official reports. It was quickly seen that photography had the potential to fill this role with far greater accuracy than the best drawing and in only a fraction of the time.

In spite of the potential, early attempts met with only limited success, particularly those using the wet collodion process. An anonymous author writing in *The Quarterly Review* in 1864 urged that "for the purposes of science, an explorer and a photographer should be convertible terms." That they were not, he explained, was due "to the extreme cumbrousness of the photographer's inevitable luggage." The wet collodion process required that the photographer carry with him not only a large camera and heavy glass plates but also a complete darkroom and a full array of chemicals because he was forced to coat, expose and develop the glass plate on the spot before the emulsion dried. In addition, any number of problems which could take hours or even days to trace and correct could arise in his sensitizing bath of silver nitrate. "The nitrate bath," said the same author, "is the nightmare of the photographer; a kind of evil deity



PLATE I. *Cutting on the 49th Parallel, on the right bank of the Mooyie River, looking west.* North American Boundary Commission, 1861. Photo: Royal Engineers (c-78979). Much of the photography on the earliest surveys was to show the nature of the work being done and the country through which the survey passed. This photo demonstrates clearly to the leaders at home how the boundary was marked and the densely-wooded terrain that was encountered.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

whose worship he performs with curses, though he cannot forgo it for fear of the evil that may befall him.”⁵

The kind of support offered by the Army, however, could make the physical difficulties less exacting. Both the American and British Commissions wanted to gain scientific information from their work as well as simply marking the boundary, so it is not surprising that they both decided to include photography to record their work, the country and the Indians. Only the British Sappers proved successful, for Campbell made the mistake of supposing that a completely inexperienced member of his party could learn to operate the apparatus in the wilderness with the aid only of a manual. It was quickly given up because of the difficulty of transporting the bulky equipment.

The party of Royal Engineers, consisting of seven officers and civilians and fifty-five men, arrived in Victoria in July 1858. Included in their number was a Sapper trained in photography with equipment valued at £100. Hawkins had been directed by the Foreign Office to mark the boundary from the point where the 49th Parallel met the coast, eastward to the eastern base of the Rocky Mountains. In addition, a naturalist was attached to the Commission, “Her Majesty’s Government being desirous . . . to promote the interests of science. . . .” Although the treaty established the 49th Parallel as the boundary, Hawkins was also asked “to ascertain the natural features of the Country in case the two Governments should ultimately be disposed to . . . settle their Boundary with reference to them. . . .”⁶ Both of these instructions had a bearing on the photographer, for whose presence no specific reasons were given. In an article written in 1860 Captain Henry Schaw, head instructor in photography and chemistry at Chatham, gave a lengthy list of the advantages of photography to the military. “In surveying boundaries of different countries,” he wrote, “photographs of remarkable natural features of the country, which may either occur in the boundary line or be visible from certain points in it, will tend to fix the positions of the line with great certainty.” He also mentioned that the camera was useful for “obtaining portraits of remarkable persons and costumes of foreigners.”⁷ His opin-

⁵ *The Quarterly Review*, October 1864, pp. 491, 499.

⁶ Draft, Foreign Office to Captain Hawkins, 30 March 1858, in Otto J. Klotz (ed.), *Certain Correspondence of the Foreign Office and of the Hudson’s Bay Company copied from Original Documents, London, 1898* (Ottawa: Government Printing Office, 1899).

⁷ Henry Schaw, “Notes on Photography,” *Professional Papers of the Corps of Royal Engineers*, Paper XVIII, New Series, vol. IX (1860), pp. 108-28.

ions undoubtedly reflected prevailing thought; certainly they were expressed by a number of his colleagues.⁸

The photographic equipment was transported to the mainland too late in the season for it to be used. Apart from a photograph of the Royal Engineers' camp at Esquimalt in July, there are no known photographs by the anonymous Sapper. The first difficulty that was encountered was not with the equipment but with the photographer, who deserted in the spring of 1859, probably hoping to make a career for himself in the United States. As a consequence there are no photographs of the survey work in 1859. Immediately after the desertion Hawkins sent for a replacement, and two more Sappers trained at the South Kensington Museum arrived with Lieutenant Samuel Anderson in October. Familiarizing themselves with the equipment during the course of the winter, they made twenty-three views in and around Victoria. Hawkins considered it worth sending four sets back to England but remarked that they were not of any special interest since they had nothing to do with the work of the survey proper. None of these views are known to have survived, a distinct loss because they would have been among the earliest photographs of the young city.

During 1860 the Commission's work was located from Chilliwack Lake to the Pend Oreille River, but they experienced delays in leaving Victoria because of the quirky demands of Hawkins, who was described by one of the American surveyors as "a fussy, cross little body who can't bear to be thwarted," a feeling corroborated by some of the British party as well. Finally leaving at the end of April, the large party went down the coast to the Columbia and ascended the river by steamer as far as Fort Vancouver and then marched to The Dalles hoping to buy transport. The photographers took views at the major settlements as they went. At The Dalles they found that the Americans, who were far in advance of them, had monopolized the majority of the horses and mules, leaving Hawkins with a recurring problem of transport. This made Hawkins acutely aware of the problems caused by the bulkiness of the photographic equipment, which required at least two animals.

Making their way to Fort Colville, the winter quarters, the photographers remained with Hawkins while the rest of the men proceeded to their work. In October Hawkins left with the photographers on an inspection of the work being done by the British locating the boundary and cutting sight lines through the dense forest that was occasionally

⁸ See, for example, John Donnelly, "On Photography and its Application to Military Purposes," *British Journal of Photography*, 15 June 1860, p. 178.

encountered along the line. Fortunately this section of the work was in relatively easy terrain that reminded the travellers of an English park. Early in November they met Archibald Campbell, who requested a meeting, so they all returned to Colville.

In preparation for longer journeys through rougher terrain, the two photographers spent the winter of 1860-61 reducing the equipment they had to carry with them. Obviously they had not been satisfied with its portability. There was an enormous amount of work to do during the second season, and no one expected that they would be able to finish in 1861. The whole of the boundary from Kootenay Lake east to the crest of the Rocky Mountains remained to be marked, in addition to a small portion of the line completed in 1859 which needed correction. All the parties left for the field from Colville in April, but because the way was long and the rivers in flood, they did not reach their first work stations until mid-July. During the second crossing of the Kootenay River one of the mules carrying several "photographic things" drowned and the equipment was lost. Judging by the subsequent results the loss of these items did not hinder the photographers.

Accompanying Captain Haig, the photographers reached the eastern terminus of the boundary about July 20. Here they took a number of views of the completed monuments in the heart of the mountains with the Union Jack snapping in the stiff breeze. At the end of the month Hawkins appeared on an inspection tour, and when he left the photographers went with him. Captain Darrah had not been seen or heard from since parting from the others in July, so when the pack train reached the Kootenay the photographers and Hawkins separated from it and went on horseback in search of Darrah. They found him August 8 and after a brief visit caught up with the pack train as it continued down the Kootenay and Mooyie Rivers and eventually back to Colville. The photographers were busy all the way photographing the boundary markers and the cuttings. In five weeks the photographers had covered 500 miles in the wilderness, a tribute to their resourcefulness in making the equipment more portable.

Hawkins was having some problems with the Lords of the Treasury, who were concerned that cutting vistas through the forest was an expensive and unnecessary undertaking that natural growth would soon render useless. Hawkins had to justify the need for such cutting several times, and the photographs were undoubtedly taken partly to show the nature of the country and why the vistas were made. With the exception of four photographs of the obelisk at Point Roberts taken in October,

this completed the photographers' work even though some portions of the boundary marking continued until December.

The first season's work to be recorded by the camera was something of a disappointment: of the forty-four photographs that appear in the official report only sixteen were taken under field conditions. The remainder, views of Fort Vancouver, the Cascades and The Dalles, were all taken under comparatively leisurely conditions while the Commission was moving slowly or was stationary. The photographs of the field operations are somewhat dull, showing such things as camps, terrain, boundary markers and cuttings. They were, of course, what was required but they betrayed the novice's skill. The photographers were not yet quite sure what to photograph. As a result almost all the objects and places depicted were lacking in detailed information and, therefore, in interest.

According to Henry Schaw, between the two seasons the Sappers photographed a number of the Indians who visited Colville, selecting those who were important or who were representatives from as many of the interior tribes as they met in the camp. Probably the most direct and imposing among these rather crudely composed portraits is that of the Spokane chief Garry, "a very shrewd, clever fellow," according to Charles Wilson, the secretary of the Commission. Self-assurance and distrust are plain in the Indian's gaze. Such photos were apparently an early attempt to provide a library of ethnological types. There is considerable evidence only ten years later of this kind of interest on the surveys of the American West, where not only was there a conscious attempt to obtain a complete documentation of Indian life and types, but there were also frequent requests from Europe for precisely that kind of photograph for scientific research.⁹ The results of the two seasons of photography were mixed. Looking at the work produced by the two Sappers it is obvious that compositionally the photographs of the second season were generally far stronger than those of the first season. As a consequence the amount of information contained in the photographs increased and was easier to read. Their portraits of the Indians were pedestrian and stiff except on those occasions when the Indians themselves conveyed a sense of their own integrity. The Sappers merely tried to reproduce the prevailing studio photograph in the wilderness with subjects that had no concept of how they were to present themselves. As a result their ethnological usefulness is questionable.

⁹ The records of Ferdinand Vandever Hayden's surveys in the American West during the 1870s contain a great deal of correspondence relating to the collecting of photographs of Indians and their culture.

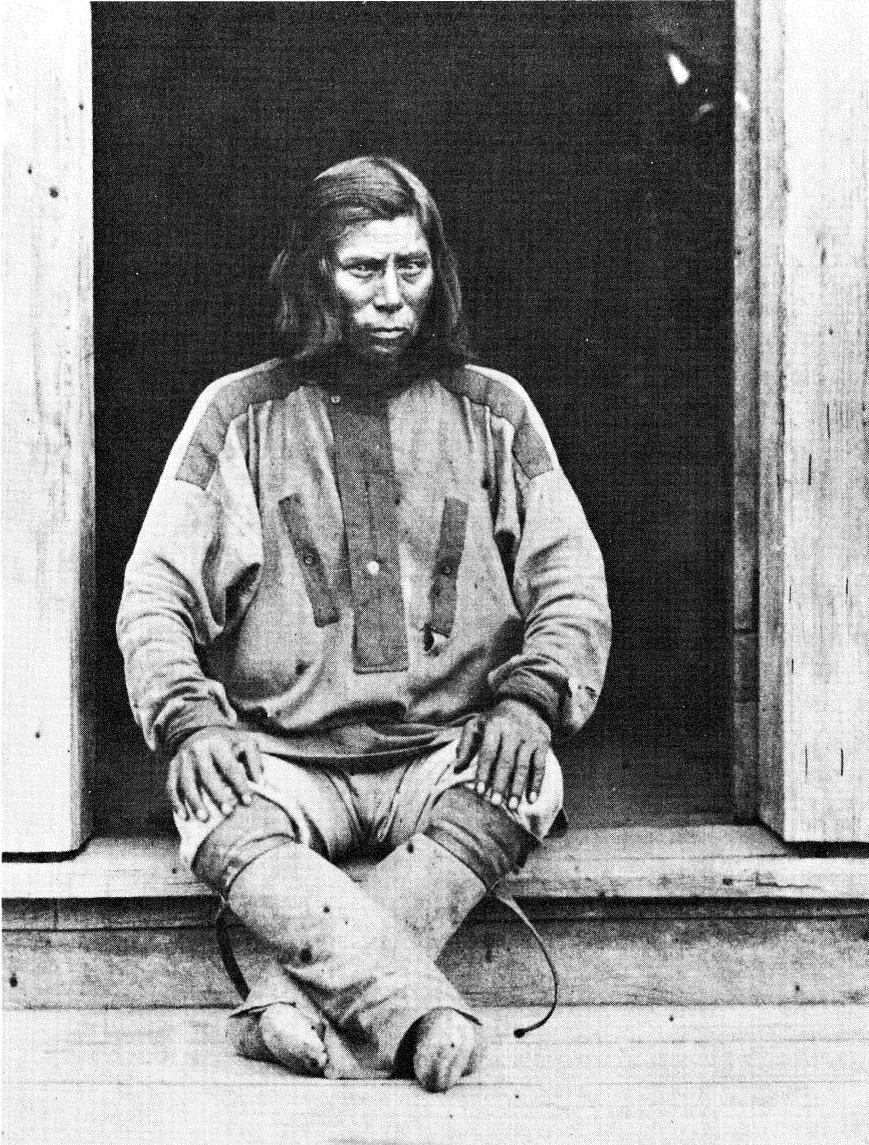


PLATE II. *Garry, a Spokane chief, 1860-61.* Photo: Royal Engineers (C-78966). Captain Schaw had written in 1860 that there were a number of uses for photography on surveys and explorations. One of the specific examples he cited was obtaining portraits of notable natives. Garry was a well-educated and well-known spokesman for his people.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

Hawkins had criticism of the difficulties posed by the photographic equipment. When he sent sets of the eighty-one official photographs to the Secretary of State for Foreign Affairs he remarked :

The apparatus supplied was very cumbersome and it proved inconveniently so in view of the demand upon our means of transport for keeping up supplies in the field . . . on the whole . . . I am inclined to think that a competent artist attached to such an expedition . . . would command greater facilities for the production of numerous and interesting sketches of the scenery &c.¹⁰

If Hawkins had reservations about the practicability of wet-plate photography under the conditions facing the Boundary Commissions, he was nevertheless satisfied with the photographs themselves. "Many of the subjects," he concluded, "are of considerable interest, as bearing upon the operations of and country traversed by the Commission." Apart from their technical success, which was no small accomplishment at this early date, the photographs were noteworthy because they were conceived from the outset as an integral though subordinate part of the work of the Commission for very practical reasons. It is impossible to know how they might have been used because the Commission produced no official report, but that they accomplished all they had been expected to there can be little doubt. In fact the photographs conform to the advantages outlined by Captain Henry Schaw the year they began their work.

There was no attempt during the boundary survey to use the camera for topographical mapping. The work of the Sappers shows the camera being used in a tentative way to replace the drawings that would normally have been produced by an artist. The Army had a clear idea of the kind of information it wanted from photography, as numerous officers testified. That it fulfilled this role is evident from the fact that Hawkins recommended photographers be used a decade later during the marking of the boundary across the Prairies.

Very little survey work took place in North America for the next few years. Canada was preoccupied with its political difficulties, while the United States consumed all its energies in the Civil War. However, following the war there was renewed interest in surveying.¹¹ In 1871

¹⁰ Public Record Office (England), FO 5/811, J. S. Hawkins to the Secretary of State for Foreign Affairs, 13 March 1863.

¹¹ The use of the camera reached a new level in the geological and topographical surveys of the American West which began in the late 1860s and lasted more than a decade. The work of photographers like Timothy O'Sullivan and William

Benjamin Baltzly, a photographer with the Notman studio in Montreal, was hired to accompany an expedition of the Geological Survey of Canada to British Columbia. Working under great difficulties and using the cumbersome wet collodion technology, Baltzly still succeeded in making some highly useful photographs as the expedition worked its way up the North Thompson River, overland to Tête Jaune Cache and back. In his report of the survey, Alfred Selwyn, its leader, repeatedly referred to the photographs as he described the geological formations and commented on the terrain. He stated that he was highly satisfied with Baltzly's work, even though Baltzly later said that he was dissatisfied himself because he felt better work could have been realized if the expedition had been properly organized.¹²

Sandford Fleming, the Chief Engineer of both the Intercolonial and Canadian Pacific Railways, was also well aware of the informational value of photography in both railway construction and railway survey, for during the 1870s he repeatedly used photography. The origin of the proposal to hire Baltzly is still obscure, but Fleming readily agreed to pay half of the expenses of sending the photographer on the survey. During the course of the construction of the Intercolonial Railway he or one of his field engineers hired various photographers to make progress photographs of the more important sections like the Miramichi bridges.

As Chief Engineer of the Canadian Pacific Railway Survey he was importuned and sometimes forced to hire men he did not want. One individual brought to his attention insistently by Sir Charles Tupper was Charles George Horetzky. Horetzky was an intelligent man who had worked for a number of years with the Hudson's Bay Company in northern Ontario, but he was unqualified as an engineer. Fleming therefore felt there was no place for him on the survey. However, discovering that Horetzky was an accomplished amateur photographer and weakening before the persistence of Tupper, Fleming agreed to hire him. "From our want of knowledge of the country, his services could be rendered useful as a photographer," he concluded, and attached him to the party of

Henry Jackson was used for scientific, engineering and publicity purposes with typical American energy. Although much has been written about the art of these photographers, they, like their Canadian counterparts, were hired to supplement and illustrate the work of the scientists and topographers. This use of photography seems to have been an idea that was in the air.

¹² See Andrew Birrell, *Benjamin Baltzly. Photographs & Journal of an Expedition through British Columbia: 1871* (Toronto: Coach House Press, 1978).



PLATE III. *Lake Tochquonyala (Lindquist), 1874.* Photo: Charles Horetzky (C-14766). Much of Charles Horetzky's survey photography stands midway between the early work of groups like the Royal Engineers and that rigorously applied science of the later phototopographic surveys. This photograph bears a striking resemblance to those of the topographical surveyors of the next two decades. It also bears the exact compass bearing of the centre of the photograph.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

Frank Moberly which was to examine two routes between the Forks of the Saskatchewan and the foothills of the Rocky Mountains.¹³

It is unlikely that Fleming was merely excusing himself when he recounted how Horetzky came to be hired, for he was not the only one who found Horetzky's work very useful. Marcus Smith, Fleming's Chief Engineer in British Columbia and later his successor in Ottawa, echoed his superior's sentiments on one occasion. Regarding the possibility of passes through the mountains coming out at Gardner and Dean Canals, he wrote, "Mr. Horetzky's photographs and descriptions will show the character of the country."¹⁴ In 1875, even after a rancorous argument with Horetzky and while still deeply bitter towards him, Smith insisted on having a set of photographs of the Homathko River from its source to its mouth to demonstrate the nature of the valley and the engineering difficulties there. Obviously Fleming, Smith and Horetzky all considered the camera to be a valuable adjunct to the explorations which helped in establishing the topography of the regions examined.

Between 1871 and 1879 Horetzky worked seven seasons with the Survey, four of them in British Columbia, where he produced most of his significant work. After his first season's work, in which he had been entrusted with a lone exploration of the Jasper House Valley, he was promoted to the level of Exploratory Engineer and given long and difficult assignments to explore a variety of passes in the coastal range and interior of British Columbia. He enjoyed these lone explorations and always carried his camera with him, taking it into areas where maps were often unavailable. Clearly he was bringing back the first reliable visual information that could be used to substantiate both his reports and those of others.

There are two major reasons why Horetzky's work is of interest to us here. First, he was one of the first photographers to use the dry-plate exclusively in his explorations. Most professionals found the dry collodion far inferior in quality and reliability, but Horetzky seems not to have had any serious difficulty at all. The advantage lay in the fact that he

¹³ Sandford Fleming, *Letter to the Secretary of State, Canada, in reference to the Report of the Canadian Pacific Railway Royal Commission* (Ottawa: MacLean, Roger & Co., 1882), p. 23.

¹⁴ PAC, Sandford Fleming Papers, MG 29, B1, vol. 47, file 323, Marcus Smith to Sandford Fleming, 25 May 1874, No. 3. Horetzky himself stated, "... I carried with me a small camera and a few dry plates ... this was done in order to supplement our general information, and in my own case as a valuable adjunct to the laying down of the topography of the country." *Report of the Canadian Pacific Railway Royal Commission* (Ottawa: S. Stephenson & Co., 1882), II, p. 1708.

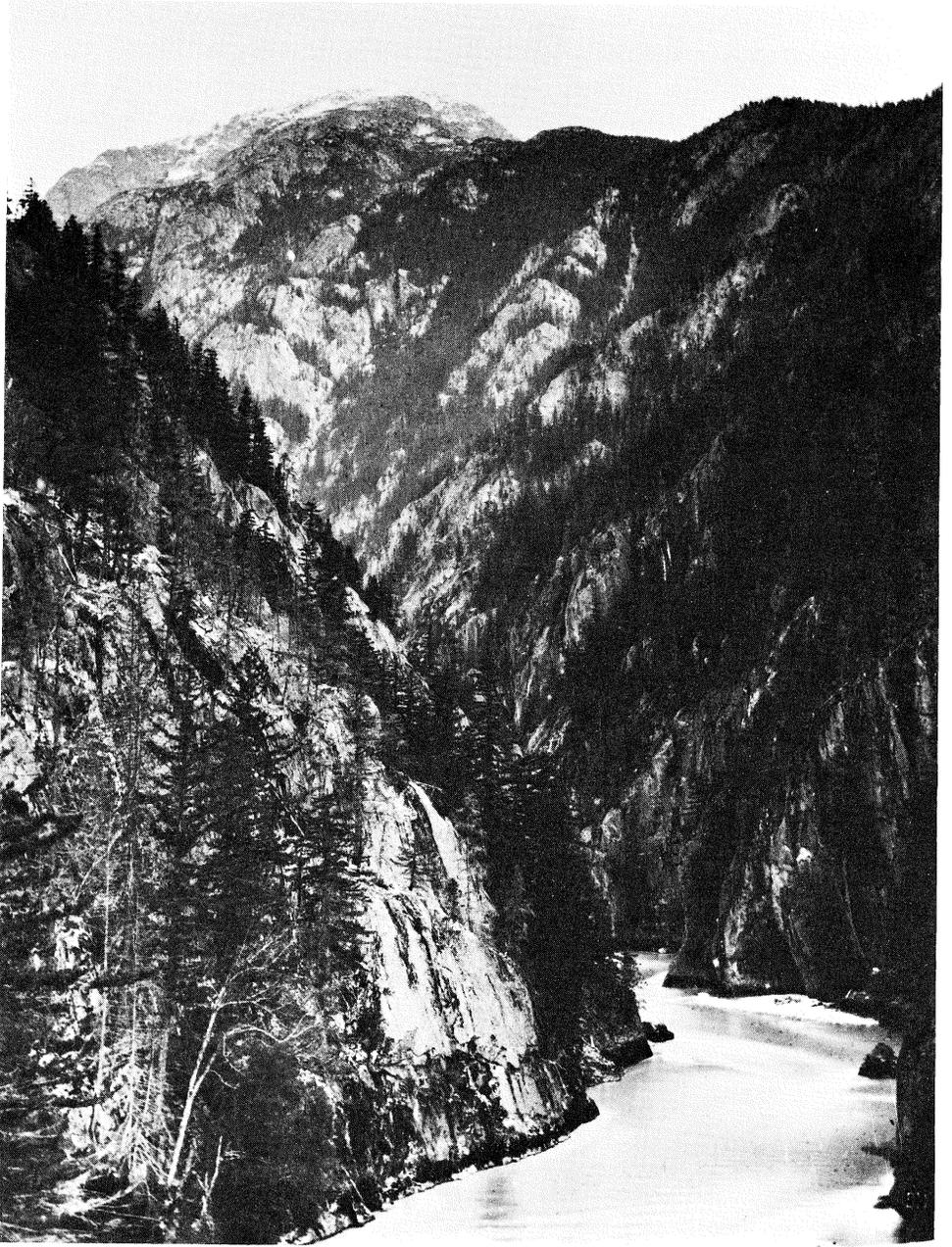


PLATE IV. *Homathko River. Lower end of Grand Canyon, 30½ miles from Waddington looking up from Station 1611. Gamsby's survey of 1875. June 1875. Photo: Charles Horetzky (PA-9165).* The detail referring to the exact location of this photograph in relation to the surveying information that would come from the surveyor, C. H. Gamsby, underscores the fact that the photographs were taken for engineering information only. All the photographs of the Homathko River are identified equally carefully.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

needed to carry only a camera, his plates and a tripod. It is unlikely that he could have worked with the speed he did if he had been burdened with the additional apparatus required by the wet-plate. The Geological Survey had been in touch with Horetzky, and probably because of his experience, Selwyn reversed his decision to avoid photography. He had refused to hire Baltzly the year following their survey in the interior because he had found that, in spite of the quality of the photographer's work, the wet-plate method had slowed down the work and almost doubled the cost. But in 1875 he and several other geologists began to carry collodion dry-plates and cameras with them. Thereafter cameras became part of the field equipment of the geologists.

Secondly, Horetzky's photographs taken in the mountains stand midway between the illustrative photographs of the Royal Engineers and the purely topographic application developed by Edouard Deville the following decade. Fleming had originally hired Horetzky to photograph "objects of interest, illustrative of the physical features of the country through which you will pass. . . ."¹⁵ To a great extent this remained the prime reason for his photography, but the work he did in the mountains, consisting frequently of mountaintop views of the surrounding country, prefigured the more exact work the topographical surveyors would do a decade later. While these views are among the least interesting visually, they are most precise in stating direction, latitude and longitude and even compass bearing so that Fleming and others could locate precisely on a map where the photographs were taken. Though much has been made of the artistic qualities of Horetzky's photographs, the fact remains that they were commissioned and used solely for information.¹⁶

Following in the tracks of the Canadian Pacific Railway came the surveyors of the Dominion Lands Survey, whose job it was to survey the country adjacent to the railway so that it could be settled. By 1886 they had finished the work on the Prairies and had to consider how to survey the mountains of British Columbia. By this time some of the surveyors had already begun to carry cameras with them. One of the first DLS surveyors to photograph in the mountains was Otto Julius Klotz, later to become Dominion Astronomer. During September 1886 he recounted in his diary meeting Edouard Deville, Surveyor-General of Canada, on his

¹⁵ *Ibid.*, vol. 64, Sandford Fleming to Frank Moberly, 12 June 1871.

¹⁶ For a brief discussion of Horetzky as an artist see Dennis Reid, *Our Own Country Canada* (Ottawa: National Gallery of Canada, 1979), pp. 153-59. More detailed information regarding Horetzky's checkered career with the CPR Survey may be found in the author's "Fortunes of a Misfit; Charles Horetzky," *Alberta Historical Review*, Winter 1971.

inspection tour. Deville, he wrote, was taking photographs along the CPR: "Since about a year photography has become a hobby of his, experimenting in all ways and manners the ultimate object being to obtain some cheap method for illustrating our reports. . . ." Klotz, who never failed to inform his diary how advanced his own thinking and action were, had to add, "This is a matter to which I have officially attended some years ago and have illustrated my own reports the past two years . . . at my own expense."¹⁷

Deville, it is true, was thinking along those lines because he felt that illustrations would make the reports more attractive and increase their informational value. However, his proposal in 1887 to the Deputy Minister for a modest photographic department consisting of "a properly qualified professional man" did not meet with approval.¹⁸ Of greater importance to him were the enormous costs involved in carrying the standard rectangular surveys of the Prairies into the mountains — almost twenty times as much, he was later to show. The only alternative, he said, was to undertake a topographical survey, using not conventional methods but photography, replacing measurements on the ground in the field with measurements taken from the photographs and plotted in the office.¹⁹

As we have seen, the principles of this kind of surveying were not new to Deville or the world. However, Deville had learned them first hand while serving in the South Seas with the French navy. Assigned to map the coral reefs and channels among the islands, he soon tired of sitting for hours in a small boat tediously taking soundings. He wanted to explore the shores of the adjacent islands and so he hit upon the idea of making his charts from a mountaintop where all the shoals and channels could be plainly seen. He spent a day sketching and measuring angles and a second day plotting, and produced a map which normally would have taken many days longer. His superiors were astonished and commended him for his astute work.²⁰

Phototopography — or photogrammetry, as it came to be called — worked on similar principles with photographs replacing hand sketches. The surveyors occupied a number of stations whose positions had been carefully determined by triangulation. From each of these mountaintop stations panoramic views were made including several other triangulation

¹⁷ PAC, Otto J. Klotz Papers, MG 30, B13, vol. 1, Diary, 14 September 1886.

¹⁸ PAC, RG 88, vol. 425, Book 17, pp. 385-87, Edouard Deville to A. M. Burgess, 13 March 1887.

¹⁹ PAC, RG 88, vol. 426, Book 25, "Memorandum on Photo Surveys," 29 July 1891.

²⁰ PAC, RG 88, vol. 185, file 6659, "Photographic Surveying."

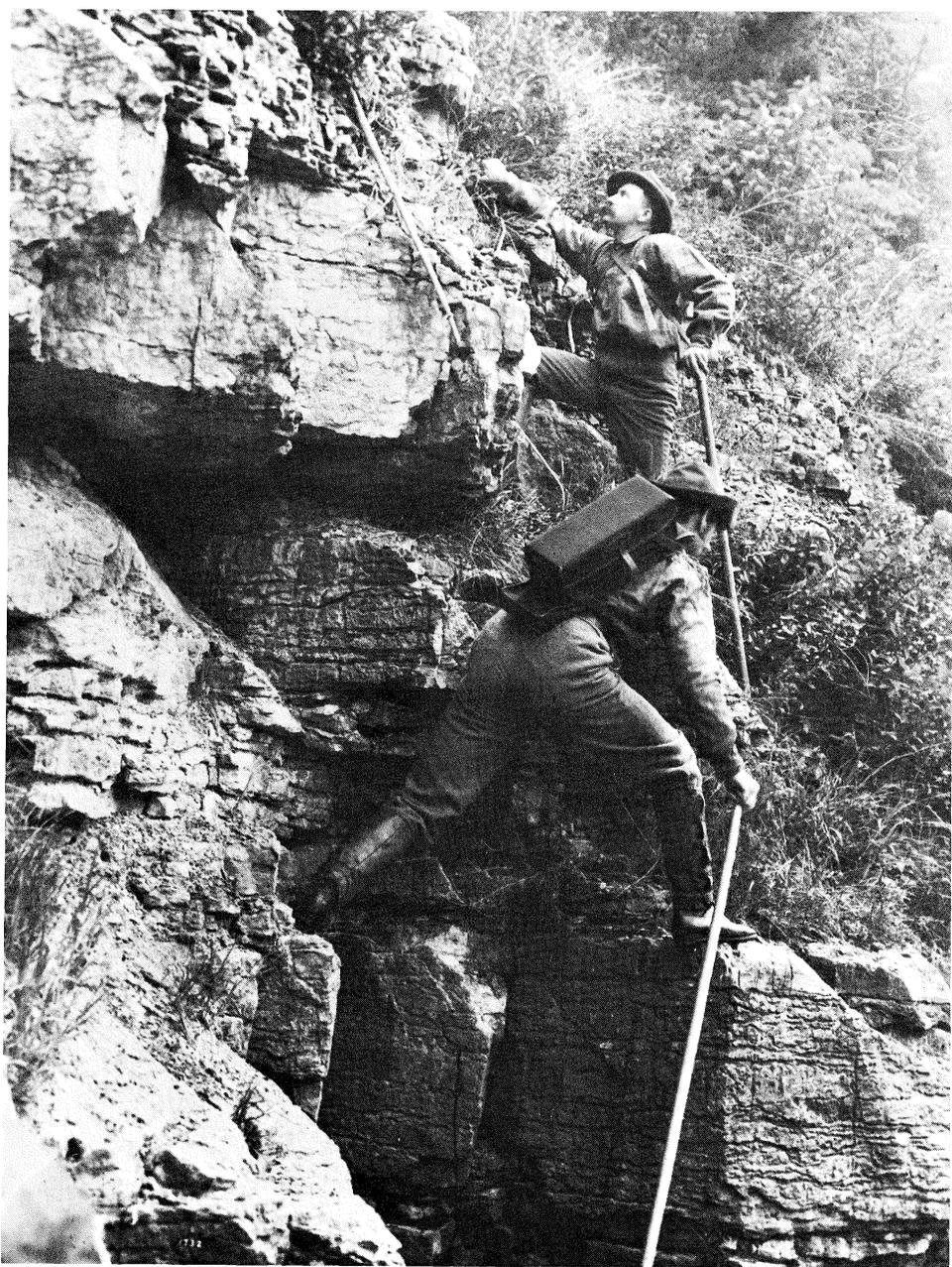


PLATE V. *Topographer and assistant showing the method of carrying phototopographical equipment, 1887.* Photo: Unknown (PA-23141). The two men are carrying the photographic equipment only. Conceived by the Surveyor-General, Edouard Deville, this consisted of a half-plate camera, glass plate negatives and a tripod. Deville's approach revolutionized topographical surveying in the mountains.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

stations in them. After the surveyor returned from the field, prints were made from the negatives and he could plot his map directly from the photographs using an instrument known as a perspectograph. Deville was well aware that he was not creating some new thing but was building on the work of Laussedat and of the European countries that were using the method on a limited scale. It was left to Deville to apply it on a grand scale befitting the nature of the country to be mapped.

The first attempts in the Rocky Mountains in 1887 were truly experimental. Deville obviously tried to reduce the physical burden to the two surveyors, J. J. McArthur and W. S. Drewry, and so equipped them with Eastman "Detective" cameras fitted with drop shutters and using roll film. This avoided heavy glass plates and larger, boxier cameras. They worked using the method described above, but the results were disappointing. The roll film proved unsuitable, Drewry later stated, and smoke and haze frequently caused delays. This is not surprising since roll film had just appeared on the market and was designed for a mass commercial market, not for technical applications. The camera was the forerunner of the famous Kodak Number 1, which was also designed for the amateur who had absolutely no knowledge of photography. Compared to the resolution possible with large glass plate negatives and advanced lenses, these first efforts were bound to be disappointing. They were good enough, however, to demonstrate the feasibility of the approach and its economies.

The following year the two men went out again, this time with professional cameras and glass plates. The results proved satisfactory and approximately 700 square miles of the mountains in the vicinity of Crow's Nest Pass and Banff were mapped.²¹ Coincident with these surveys Deville had one of his men attempt a topographical survey in the standard way, working as rapidly as he could. This provided the control in the experiment. Not only did it take much longer, it was also more expensive. The traditional topographical survey cost \$130 per mile, while the photographic method averaged \$7.50.²²

Deville continued to use McArthur in this capacity until 1892. McArthur covered an average of 500 square miles a year and became one of the world's most experienced phototopographers. In 1893 one of the

²¹ W. S. Drewry, "Report of the Standing Committee on Phototopography as Applied to Topographical Surveying," in *Report of Proceedings of the Association of Dominion Land Surveyors at Its Sixth Annual Meeting* (Montreal: John Lovell, 1889), pp. 43-49.

²² J. A. Flemer, *An Elementary Treatise on Photographic Methods and Instruments* (New York: J. Wiley & Sons, 1906), pp. 29-30.



PLATE VI. *International Boundary Commission. Triangulation Station E, Chilkat River district, 1904* (PA-37740). This photograph by C. H. Bigger shows the surveyor's party on the summit of a mountain establishing the position of the camera station with a theodolite. The exact position was always noted in this way so that accurate maps could then be made from the photographs back in the survey offices.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

Canadian exhibits at the Columbian Exposition in Chicago was a dozen sheets of maps of Rocky Mountain Park based on McArthur's work. The American surveyor J. A. Flemer, admittedly a biased source, called this "one of the most interesting exhibits of the government . . . of Canada."²³

Deville meanwhile had produced a handbook entitled *Photographic Surveying* lithographed in an edition of fifty copies for use in his department. Conceived as a kind of training manual, it elucidated the mathematical theory, described the kind of photographic equipment required and illustrated how to apply the laws of perspective to obtain an accurate map. By 1895 interest in his limited-edition handbook had grown, along with the fame of the Canadian work, and Deville revised the book and had it published by a commercial firm.²⁴ The same year saw the production to exacting tolerances of a camera he himself designed to increase accuracy.²⁵

Throughout the period that Deville had his surveyors working in the mountains, periodic discussions had taken place between the United States, England and Canada regarding the marking of the disputed boundary between Alaska and British Columbia. In 1892 a joint International Boundary Commission was created "with a view to the ascertainment of the facts and data necessary to the permanent delimitation of said boundary line" from latitude $54^{\circ} 40'$ north of its junction with the 141st Meridian. The initial survey was to be a rapid reconnaissance of the territory along the disputed border, from which it was hoped sufficient information could be gathered to resolve the debate over the boundary.

W. F. King, the Canadian Commissioner, elected to use Deville's method of phototopographical surveying. Since McArthur was the only really experienced surveyor in Ottawa he was assigned to train six others, including Otto Klotz, in the Gatineau Hills outside the city. The stage was now set for a remarkable demonstration of the superiority of the camera over the conventional methods used by the Americans. In two seasons, the first cut to only twenty good days because of abysmal weather, the Canadian surveyors managed to cover the entire territory allotted to them. Other surveyors in North America had been somewhat

²³ *Ibid.*

²⁴ Edouard Deville, *Photographic Surveying, Including the Elements of Descriptive Geometry and Perspective* (Ottawa: Government Printing Office, 1889; Ottawa, 1895).

²⁵ For a description of the camera see the author's "Photography the Map-Maker," *Photo Canada*, February 1978, pp. 77-80.



PLATE VII. *Station Moore 139, mouth of the Skagway River.* International Boundary Commission, 1894. Photo: J. J. McArthur (PA-37709). McArthur was the most experienced of Deville's phototopographers. This photograph is typical of the work of all the surveyors on the International Boundary Commission and forms part of a 360° panorama. It is evident that this photography is purely practical and has no existence other than to convey specific surveying information.

COURTESY OF THE PUBLIC ARCHIVES OF CANADA

skeptical of Deville's approach, partly because radically new methods usually meet resistance. However, when the Americans saw the efficiency of the camera on the Alaskan exploration they were quick to adopt it themselves.

McArthur wrote with some pride shortly afterwards:

The superiority of the camera over any other instrument for mountain work was strikingly demonstrated. Our American colleagues were equipped with the plane table, and except on very fine days were unable to accomplish anything. We could secure, in a few minutes with our cameras, more topographical data than could be accomplished in this rough country by any other method in as many weeks.²⁶

Even allowing for hyperbole, it was a great achievement which was attested to by other more disinterested observers.

Deville was widely acknowledged for his creative application of the principles of phototopographical surveying in the mountains of British Columbia. He and his men were accepted as experts and were constantly asked to contribute articles and lectures on their experiences. Deville equally often repeated that he was merely building on the work of others. Yet there is no doubt that he had advanced the application of this camera technique from the realm of interesting curiosity with a limited use to the point where it was proven not just practical, but the only practical way of mapping extensive mountainous regions. He retained his interest in photogrammetry throughout his tenure as Surveyor-General, which lasted well into the twentieth century.²⁷

Thus within the space of forty years the mountains of British Columbia were repeatedly surveyed for a variety of reasons. Each time the camera played a role. Each time photography advanced in importance until it became the primary instrument for surveying. In this, as in many other cases, photography has produced significant advances in knowledge and technology.

²⁶ PAC, RG 15, vol. 723, file 389045, "Memorandum on the photographic surveys of the Canadian section of the International Boundary Commission."

²⁷ Too little is known still of Deville's work to judge whether or not his assessment of his own work was accurate or just his own humility. This is an area that merits greater investigation.