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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE COMMERCIAL DEVELOPMENT OF SPITSBERGEN.

By R. N. RUDMOSE BROWN, D.Sc.

(With Illustrations.)

THE commercial development of Spitsbergen began shortly after its discovery in 1596, and was in fact the sole motive for its exploration for two centuries. The whale-fishing in the bays, and later in the open seas, and the walrus-hunting were for long the only valuable activities pursued there. About the middle of the eighteenth century seems to have begun the exploitation of Spitsbergen for the skins of seals, reindeer, and foxes. White whales also began to be an object of the chase. The chase was at first the work of summer visits, but before long the hunters took to wintering in order to obtain the valuable winter coats of bears, foxes, and reindeer. This hunting continues to-day, but probably culminated about five years ago. Small wintering-parties of two, three, or four were then scattered all round the shores of Spitsbergen, but particularly on the west side and up Ice Fjord. There is scarcely a favoured site on the west coast where either an existing hut or the ruins of one is not to be found, while numerous graves tell of the heavy toll of scurvy.

In the early days of this occupation fur-bearing game was plentiful, but as the price of furs rose the number of hunters increased, with serious results to the fauna of Spitsbergen. Polar bears, blue and Arctic foxes were principally sought for, and were originally caught by means of traps; then as the animals became more wary and their numbers decreased other less legitimate means were resorted to. The employment of poisoned bait was very common a few years ago, and wrought havoc among the wild life of Spitsbergen. No doubt its use added to the hunters' take of skins, but scores of foxes and bears who

had partaken of the poisoned meat must have crept away to holes and corners to die, and their lives have been uselessly sacrificed. Birds also became infected with the poison, and probably even the vegetarian reindeer did not escape. The writer has found in numerous places in Spitsbergen dead white foxes in their winter coats, and gulls also, the victims of the dastardly devices of these hunters. These hunters, who nowadays are all Norwegians, have been steadily decreasing in numbers in recent winters, for large tracts of country are almost depleted of their game.

It is said that the hunters themselves are now averse to the use of poison, and that the Norwegian Government has put difficulties in their

Hunter's Winter Hut.

way of obtaining it, but its employment probably continues. In any case, the harm is done now, and hunting, at least on the western side of Spitsbergen, will soon be a thing of the past. This summer we marched for three days through one of the wildest parts of Spitsbergen, ideal reindeer country the whole way, and saw not a single reindeer nor even the tracks of a recent one. Nor did we hear, much less see, a single fox in places where they swarmed less than ten years ago. In Prince Charles Foreland it is the same. Three years ago the expedition in the *Conqueror* saw none on that island, where Dr. W. S. Bruce recorded their great abundance two years before. As regards the reindeer, Norwegian hunters, heavy as is their guilt, are not alone to blame. Numbers of so-called sportsmen have been in the habit of visiting Spitsbergen in July and August to shoot reindeer, slaughtering as many as they can contrive to hit, and leaving them as they fall. In one valley we saw at

least ten carcasses from which neither skin nor horns had been removed, obviously the work of unsportsmanlike butchers and not of profit-seeking hunters. It is only because the reindeer have become shyer and scarcer that this practice is ceasing.

Legitimate hunting is permissible, but these practices must be put a stop to, and that speedily, or Spitsbergen will be a lifeless desert before long.

Bird-life is still abundant, probably because it neither pays nor amuses any one to molest it. Considerable profits are obtained from the eider duck, whose down is annually collected in many places and fetches a good price. The geese are as numerous as ever, but the extremely tame ptarmigan have greatly diminished. Other birds appear to hold their own.

On the east and north coasts there are still reindeer, bears, and foxes in abundance, but fortunately they are difficult of access. The hunters avoid the east coast, since ice has often prevented the relief of wintering-parties on that coast in the following summer. More than one party has had to escape by crossing Spitsbergen to the west coast, which entailed the abandonment of all or most of the skins. If it were not for the likelihood of this eventuality hunting would be profitable enough on the east coast. Last winter a party of some four hunters who erected their hut near the South Cape took ninety-three bears besides other game. A few years ago six men are said to have taken on Wyches Land about £2800 worth of skins, which, on the failure of relief to reach them, they were forced to abandon in the second year in order to travel by boat and foot over ice and land to Advent Bay.

In some of the valleys opening to the north coast reindeer are still frequent, but in Advent Dale, Sassendal, and adjacent valleys, the best reindeer land in Spitsbergen, they are seldom seen nowadays.

No doubt as game becomes increasingly scarce there will be a corresponding diminution in the number of hunters, and so possibly reindeer and foxes will thus escape extermination, but nevertheless a close season is sorely needed, and it should be for five years at least.

The walrus has long been extinct on the west coast, but still persists on the east, and about Wyches Land and Hope Island. The white whale is fished in Ice Fjord principally, but hunters complain that during the last two years there has been too much ice about in summer to allow of its pursuit.

Bear Island has experienced the same fortunes as Spitsbergen, but being so small has been almost cleared of game. The last winterers on it, a year or two ago, made but small profit from their stay.

Whaling still persists in Spitsbergen, and recent years witnessed a revival of it. By the middle of the seventeenth century the bay whale-fishing was practically over, and all that remained was the open sea whale-fishing. During the nineteenth century this was chiefly concerned with the right whale, but it had nothing to do with Spitsbergen. For the last few years, however, finner whale-fishing has revived. Steam whalers have worked off the coasts, and towed the whales into shore stations for boiling down. Schoonhaven (Recherche Bay) in Bell Sound

was the site of the shore station for a year or two, but it is unsuitable for the purpose, since it is liable to be blocked with ice drifted round the South Cape. Consequently it was replaced by Green Harbour, where a large whaling-station has been established for a few years. Last year over one hundred whales—finners chiefly—were dealt with at this station, but this year only twenty-five had been caught up to the end of August. So bad had been the season that old, discarded carcasses lying about the beach had been dug up and utilised in the factory for oil and bone manure. No doubt the bad weather experienced this summer had something to do with the lessened catch, but a growing scarcity of whales is the chief cause, and will probably entail the abandonment of the station this autumn. On the opposite side of Green Harbour is a floating “cook-ship,” the headquarters of the second and only other whaling company in Spitsbergen. It also had experienced a bad season.

It seems probable, then, that whaling in Spitsbergen waters will cease once again this year.

While hunting on land and sea is thus waning in Spitsbergen, a new era in the exploitation of the country is opening. The development of the mineral resources bids fair to outdo in importance all other forms of activity.

Not only is there a considerable variety of geological formations in the comparatively small area of Spitsbergen, but the numerous long fjords give a great area of accessibility. Moreover, the greater part of Spitsbergen, including Barents, Edge, and Hope Islands, as well as Bear Island, is an eroded table-land, so that the majority of the strata are nearly horizontal, which facilitates the working of any minerals that occur. Along the western side most of these beds are steeply upturned by a long fault against the Silurian rocks of the Hecla Hook series, which form almost the whole of the west coast and of Prince Charles Foreland.

So long ago as 1872 mining operations were begun in Spitsbergen, but it is only within the last ten years or thereabouts that much has been done. Every summer now finds new prospectors in the field, and there are few parts of the west coast and its fjords that have not been visited and examined, and probably none of any value that have not been laid claim to.

In a country which is a *Terra nullius* there are few formalities between the discovery of mineral deposits and the appropriation of the land. A notice-board stating the claim and defining its area is all that is required, and all that it is possible to do. The shores of Ice Fjord in places are studded with such boards at no great intervals—some old, others new; some in relation to rights still maintained, others to abandoned claims. But simple as it is to make a claim to land, security of tenure is quite another matter. There is nothing to prevent a new-comer “jumping” a claim: this has occurred in more than one case, and is likely to be done with increasing frequency as the more desirable territory becomes taken up. In the present state of Spitsbergen custom and unwritten law are alone of any service in establishing territorial

rights, and there is no power to compel rival companies and prospectors to obey these canons. It is, however, generally recognised that provided a man claims a reasonable area, his claim is respected if he does any work on it within two years' time, or erects buildings. Otherwise a claim is recognised as lapsing, and the territory as being free to whoever may desire it. This is not an altogether unsatisfactory basis, but it leaves considerable scope in interpretation, and even in its most restricted sense is not always respected. In various parts of Spitsbergen there are instances of flagrant violation of custom as regards the right to territory, and nowhere is this more outrageous than the recent annexation by a Norwegian company of territory claimed and worked by a British company in Advent Bay.

Coal is the principal mineral worked in Spitsbergen. Its existence has been known for a considerable time. In 1610 Jonas Poole, a Hull walrus-hunter, discovered in King's Bay "Sea-coales, which burnt very well." The geological exploration of Ice Fjord and the west coast dates from some thirty years ago, but no doubt long before that the coal in Advent Bay had been discovered. For many years whalers were in the habit of digging small quantities in King's Bay and Bell Sound to replenish their supplies. Some stranded hunters obtained coal in Advent Bay in the winter of 1895-96. Twenty years ago Cremer made a study of the coal beds in Advent Bay and King's Bay, while in 1898 Dr. W. S. Bruce brought back samples of the Advent Bay coal which on analysis proved to be extremely good. Sir Martin Conway records that in 1899 a Norwegian skipper brought away from Spitsbergen a cargo of coal. In 1905 the Arctic Coal Company of Boston, Mass., U.S.A., was formed by Messrs. Ayer and Longyear, and bought from Norwegians existing claims of some two years' standing on the southern side of Advent Bay. Here is a three-foot seam of Tertiary coal, free from "dirt," and equal in use to the best Welsh steam coal.¹ This seam dips gently to the southwest, is brought up by a fault in Coal Bay, and outcrops again along the eastern side of Green Harbour, where numerous claims have been established and there is considerable clashing of acquisitions. In Advent Bay the Arctic Coal Company are working the seam, at a height of about 400 feet, by a level adit. From the pit mouth the coal is taken down to the head of the bay by a wire ropeway, which terminates on a wooden jetty where steamers are loaded, either direct from the ropeway or by a short tramway from a store heap near the beach. Export of coal began some three or four years ago, and this year is said to have amounted to over 40,000 tons. The company's own wooden steamer *W. D. Munroe* and several chartered iron vessels are engaged in carrying this coal to Norwegian ports. The *W. D. Munroe* manages to get into Advent Bay every year before the end of June, and makes her last south-

¹ The following analysis of Spitsbergen coal by Mr. W. H. Patterson appears in the *Chemical News*, cv. p. 277 (1912). Presumably it refers to the Tertiary coal, mined by the Americans, though that is not stated: Moisture, 1.99; Carbon, 79.79; Sulphur, 0.76; Oxygen, 8.4; Ash, 2.52; Hydrogen, 5.45; Nitrogen, 1.08. It is described as a "very pure coal" "with relatively little moisture and a high calorific value." No sign of either pyrites or calcium carbonate was found.

ward trip during the first half of October. But though the export has all to take place during the three summer months work continues throughout the winter. On the northern side of Longyear Valley is the mining settlement of about twenty large wooden houses along either side of a "street," along which is a tramway track to the jetty about a third of a mile away, by which stores are easily brought to the settlement. As many as 300 men are employed here in summer, and perhaps 100 or more in winter. These miners are at present chiefly Norwegian, with British foremen and American engineers in charge. The "camp" has an air of bustle and prosperity in strange contrast to the silence of the unexplored fastnesses near at hand. Considering the short season during

Arctic Coal Co.'s jetty and SS. *Munroe*, Advent Bay.

which building work can be carried on, it is wonderful what progress has been made. Much growth and improvement are noticeable within the last three years. To ensure an absence of scurvy, fresh meat is plentifully used throughout the year. Cargoes are brought from Norway and stored, but there are in addition 100 live pigs, that seem to prosper splendidly, and a few cows. Poultry do not appear to do well, but several horses are always kept at the "camp."

In addition to the export of coal in bulk many vessels call at the mine for bunker coal. Whalers from Green Harbour, tourist boats, a few yachts, and an exploring vessel or two—some or other of these, together with a coal boat and perhaps a hunting-sloop, are generally to be seen lying in Advent Bay, and give an animated appearance to this centre of civilisation in over 78° N.

During summer frequent communication is kept up with Tromsø by

the coal boats, but during winter the settlement is cut off, though occasional visits are received from wandering hunters or other mining camps. This winter, however, an installation of wireless telegraphy will be in operation linking Longyear City with the powerful station which the Norwegian Government erected last year in Green Harbour. The Green Harbour station is in connection with Ingö in the north of Norway.

The Arctic Coal Company claims a considerable area of land from the Sassendal to Green Harbour, and in the latter place are starting an adit into the same seam as in Advent Bay. In Longyear Valley a second adit is being started this year. This company has the most developed mining

Longyear Valley City, Arctic Coal Co.'s Settlement, Advent Bay.

interests in Spitsbergen. Across Advent Bay, on its north-eastern side, is the territory of a British company, the Sheffield Coal Company.

This company, which started operations in 1903, has run a slightly dipping adit at a height of about 150 feet into a seam of Jurassic coal. This side of Advent Bay is built of Jurassic rocks with outliers of Tertiaries capping the highest hills. The British company have never mined the coal which occurs in the Tertiary rocks, and their Jurassic coal is not of the same quality nor so pure as that mined by the Americans, yet it is of a fair quality. The disadvantage which the British company labour under is the exposed nature of the anchorage off Advent City, and the consequent difficulty of loading coal at the pier. The anchorage is untenable during westerly and south-westerly winds; in fact, it is well sheltered only from easterly winds. Operations ceased here over four years ago, but previously to that a good deal was done. The settlement consists of over a dozen exceedingly well-built log houses with a con-

siderable amount of mining and electric light plant and a tramway down the hillside from the coal mine to the end of the jetty. The company also owns several huts in Advent Dale, where attempts were made to mine iron ore.

The present state of Advent City is an illustration of the lawlessness and insecurity of property which obtain to-day in Spitsbergen. Little more than the frameworks of the houses remain standing; windows and doors have been smashed, and stores wantonly destroyed.

Sheffield Coal Co.'s mine and tramway, Advent Bay.

Everything portable and of value has been carried away; what is left has been wrecked. This disgraceful treatment is what every other temporarily abandoned mining settlement may suffer if Spitsbergen remains neutral territory. But an even more flagrant act of aggression has been committed at Advent City this summer. A Norwegian company has erected boards intimating that they have "annexed" this British territory, settlement and all. Here, at least, is an action in which the culprits have not remained anonymous. To regard such conduct in the most lenient light, however, it shows the dangers which mining companies have to contend with in their attempts to develop territory.

Another British mining company has large deposits of coal, presumably Tertiary, in Lowe Sound, where important developments have been taking place since 1906. Attempts have also been made by a Swedish company to work this coal in Braganza Bay, but access to that bay is always difficult on account of ice and probably this will hinder the undertaking. In Klaas Billen Bay, at the small bay on the west called Miners' Bay, a mine has been started this year in what would appear to be coal of carboniferous age. Provided the coal proves good enough there is no reason why this mine should not be successful. Lastly should be remembered the numerous experimental openings one sees in the Tertiary seam of coal along the eastern side of Green Harbour. The confusion of claims here has already been mentioned, but two companies have actually started work and already got out a few tons. As yet, however, the work has been done on a small scale, but the proximity of this harbour to the sea and its excellent anchorage should make it a most favoured place for a coal mine.

A word may be added here regarding Bear Island which enjoys the same immunity from political control as Spitsbergen. Carboniferous coal-bearing strata occur there, and though they have been prospected and claimed no mining is being done at present. Export would be the great difficulty since there is a want of sheltered anchorage. North Harbour would have to be used, but this could only be done if it were protected by a breakwater. In some years, moreover, drift ice would be a menace to shipping in the early summer.

Coal-mining may be the most important of the present-day occupations in Spitsbergen, but it is by no means the only one. It was in 1872 that a Swedish company began to mine concretions in the shales of Triassic age near Cape Thordsen, Ice Fjord, in search for phosphates. They built a large house and workshops and a quarter of a mile of tramway to the sea. The enterprise was not a paying one, however, and was abandoned the same year. This house has had a varied history since, but is still standing. The winter after its abandonment seventeen walrus-hunters, whose sloops had been caught in the ice in the north of Spitsbergen near Red Beach, made for this house to winter in knowing of the store of provisions left there. Lack of exercise and a superabundance of preserved food was fatal to them all, and next year seventeen bodies were found in and about the house and now lie buried in an adjoining grave. In 1882-83 the Swedish Meteorological Expedition wintered in this same house. Three years ago the writer camped near by with Messrs. Miller and Hannay. The house was not then in good repair, the mossy foundations were giving way, but worse was the damage done by Norwegian hunters.

King's Bay is the scene of much activity nowadays. Not only is there some tentative coal-mining, but a British company is employing a number of men in quarrying valuable marble. This is said to be of fine quality and of various colours, and the quarries promise to become a centre of great activity in a year or two. There is an ideal harbour in the immediate vicinity, perhaps the best in all Spitsbergen. Lastly it must be noted that in Prince Charles Foreland and Sassen Bay and Temple Bay are large areas claimed by a Scottish company. Two

small houses were erected on the Foreland claims in 1907 and 1909 respectively. Altogether some 7000 square miles of Spitsbergen are claimed in British interests.

Every year sees further economic developments in Spitsbergen, and as the useful areas on the west become staked out the north and east will be visited and exploited despite the difficulties of access, particularly to the east, in many years. The exploitation of Spitsbergen so far—if we omit the whaling and hunting—has been in the hands of Britons, Americans, Swedes, and Norwegians, but Russians and Germans are already looking anxiously for claims. A large Russian expedition was in the field this year, but does not seem to have acquired any territorial rights. Land, however, has been taken in Cross Bay in German interests.

While the lack of political ownership in Spitsbergen leaves mining free from taxation and kindred troubles, these considerations are more than outbalanced by the insecurity of tenure and the absence of any form of law except usage and might. It is a state of affairs that will not continue much longer. Norway and Russia each show most conclusively what their ambitions are, and Sweden is not behindhand. The Norwegian Government, as was mentioned above, has erected in Green Harbour a powerful wireless installation which communicates with the north of Norway. A staff of six men is maintained here all the year round, but except as a convenience for the mining-camps and for the amusement of a few summer tourists the station is of little use. Certainly its earnings can never justify the cost of its erection, nor even pay for its upkeep. The same Government maintains a so-called mail service at infrequent intervals during the summer months. The mails are carried from Tromsø to Green Harbour by a subsidised motor fishing-boat of twenty tons—the *Dion*—which makes the journey in any time from four days to a week. There is no delivery beyond Green Harbour, and the Americans, who in virtue of the numbers in their settlement might benefit most by this service, do not make use of it, but carry their own mails with greater regularity and frequency to and from Tromsø. At the Norwegian wireless station is a Norwegian post-office at which letters are accepted at Norwegian postal rates and with Norwegian postage stamps.

Finally, it should be noted that Spitsbergen is not as far from Europe as is usually supposed by those unacquainted with the facts. Mercator's projection is largely responsible for this apparent great distance. Nor is it as inaccessible as its inclusion in the polar regions might suggest. Ice Fjord, the centre of the most important coal-mining activity, is only some 1200 miles from the Orkneys and less than 500 miles from Tromsø. The warm Atlantic drift keeps the west coast clear of solid pack, while one or two icebreakers could easily keep open the western harbours in the winter and ensure navigation all the year round.

There may be difficulties in the way of exploiting the mineral resources of Spitsbergen, but they are minor ones as far as climatic questions are concerned. The mines are easily worked during winter with the help of electric light, and the continuous summer daylight

allows out-of-door work to be pushed on rapidly at that season. Labour and provisions have, of course, to be imported, but most mining districts have to contend with these difficulties. On the other side must be put the extreme healthiness of the climate and its invigorating nature. The one great hindrance to Spitsbergen being drawn into the sphere of modern commerce is the want of ownership by a strong power which can make and enforce the necessary laws.

Nor should it be forgotten that Spitsbergen has a great strategical value from a naval point of view. Its splendid harbours, unlimited supply of coal, and proximity, with an open route, to western Europe, make it a land that should not be overlooked. In point of fact, more than one power is showing considerable interest in Spitsbergen to-day.

These notes on the present state of Spitsbergen are based on two personal visits, in 1909 and in 1912, during which practically all the centres of mining were inspected. In addition I have drawn freely on Dr. W. S. Bruce's unrivalled knowledge of Spitsbergen. The view of Longyear Valley City has been kindly supplied by him.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

THE Dundee Meeting of the British Association opened on Wednesday, September 4, with the delivery of the Inaugural Address by Professor E. A. Schäfer. A sensational announcement made at this meeting by the Lord Provost was that Dr. J. K. Caird, of Dundee, had presented the sum of £10,000 to the funds of the Association, a gift unfettered by any conditions whatsoever.

On the following day the sectional meetings began. Geography, together with Anthropology, found a home in the Young Men's Christian Association Rooms, Constitution Road, within a few minutes' walk of the Reception Room in the Albert Institute, but a considerable distance from University College, where a number of the other sections were placed.

The proceedings in Section E were opened by the delivery of the Presidential Address by Colonel Sir Charles M. Watson, this address being printed in full in our last issue (p. 505). This was followed by a paper on the "International Map of the World" by Colonel C. F. Close, which in the unavoidable absence of Colonel Close was read by Captain Henrici. It gave rise to a very interesting discussion, especially in view of the criticisms of the published sheets contained in the Presidential Address. Specimens of these sheets were on view, and an examination of them showed both the difficulties which present themselves, and the methods adopted to obviate these so far as possible. In regard to the detailed criticisms made by the president, it was pointed out that the resolutions of the Committee allowed a certain latitude in the colouring and contouring of the maps, and that the differences noted between the colouring of the published sheets had been found necessary owing to the differences of relief in the countries