farthest point attained by Lieut. Aldrich, of the English Polar Expedition of 1875-76 on the west coast of Grinnell Land coming down from the north. He was not successful, however, though he penetrated as far north as 80 deg. 37 min., which was but a short distance from the goal. Sledge journeys undertaken by other participants in the expedition resulted in the exploration of the west coast of North Devon. In the beginning of August, 1902, when the "Fram" was again free from ice, Sverdrup started immediately upon his homeward way, reaching Stavanger on the 19th of September. The chief result of this expedition was the discovery of large land areas west of Ellesmereland; and since the discovery of Franz Josef Land no such extension of our knowledge of these regions has been signalized.

Lieut. Robert N. Peary, U. S. N., conceived a plan of reaching the North Pole by sledge journeys, accompanied by no one but Esquimaux and his black servant Henson. For this purpose it became necessary to establish, well to the south, a point of departure that could be reached every year by a ship, which should supply fresh provisions and new outfittings, that were to be pushed toward the north and deposited in caches along the coast. The weak point of the scheme lay in the fact that the advance to the farthest points already reached required so much time for so small a sledge crew, that further penetration into the unknown must be undertaken at an advanced season of the year, when the stability of the ice made such a movement questionable. The winter of 1898-99 Peary passed at Etah on the eastern shore of Smith Sound, in order to interest the aborigines in his plan, buy dogs, and perfect other preparations. After his ship, the "Windward," reached him with fresh supplies in the fall of 1899, he was transported to Cape Sabine, which he had fixed upon as the starting point and base of the expedition. Here he passed the winter of 1899-1900. In the spring of 1900 he undertook a sledge journey straight across Ellesmereland, and in the fall of that year established a line of depots toward the north. In the spring of 1901 he made the first energetic move toward the Pole, which led him from Grant Land in the direction of Greenland. He passed the most northern point, 83 deg. 24 min., reached by Lockwood in the Greely expedition of 1882, and fixed, under latitude 83 deg. 39 min., the northern extremity of Greenland. He followed the coast toward the east until it began to bend decidedly to the southeast in the direction of Independence Bay, thus establishing the insular nature of Greenland.

On his return he made a dash for the north and reached 83 deg. 50 min., the highest point thus far attained on the American side of the polar archipelago. During the spring of 1902, Peary even exceeded this. Starting from Cape Hekla, the northernmost point of Grant Land, he proceeded over the ice as far as 84 deg. 17 min., while Capt. Markham in 1876 succeeded only in reaching 83 deg. 20 min. from this side. From the European side, however, Capt. Cagni, of the Italian expedition, starting from Franz Josef Land, attained the advanced position of 86 deg. 34 min.

Peary was obliged to make his dash in April, and, as was the case with Markham, he found the ice in a very unsatisfactory condition; the immense hummocks of compressed drift-ice increased the difficulties of travel for both dogs and men. There were no traces, however, of the unchangeable paleocrystic ice mentioned by Markham, for on the return Peary met with numerous open places and channels which caused serious delays. No land was visible to the north of either Greenland or Grant Land. In spite of the unsuccessful termination of his expedition, Peary is still convinced that the best point of departure is from the American side of the archipelago, and, moreover, that, with an early start from Grant Land, the Pole may be reached by sledge. Though Sverdrup and Peary added to our knowledge of the Polar regions, the third expedition fitted out by Mr. Ziegler, an American, and under the direction of Mr. Baldwin, who started from Franz Josef Land for the Pole, was closed without definite results. Several small islands were discovered; the hut in which Nansen and Johansen lived in 1895-6 was again found; some scientific events were noted; meteorological sketches and photographs of the Northern Lights were made; and yet the finality of the expedition was a fiasco. No earnest attempt to reach the Pole was made. Serious friction between Baldwin and Fridtjof, the sailing master of the expedition, is responsible for the unsuccessful termination.

Among the most important of the Polar expeditions is that led by Baron Toll, a Russian, for the discovery and exploration of the island either existing or supposed to exist to the north of the New Siberian Islands. Having twice before, in 1886 and 1894, visited the northernmost of these islands, Toll left Europe again in 1900 in the steamship "Sarja" upon a similar quest. Upon entering the Sea of Kara, he did not pick up the ship which was bringing him coal, and since both the condition of the ice and the open sea were favorable to his designs, he preferred not to wait for it. Cape Tscheljuskin, the extreme northern point of Asia, and the intended termination of the first summer's journey, was not reached, but the condition of the ice compelled him to put into Colin-Archer haven at the entrance to the Taimyr Straits on September 26, where he passed the winter.

Failing in two attempts to gain the mouth of the Jenissei by crossing the land, Lieut. Kolomeizoff finally reached it by following the coast. During the spring of 1901, the extent of Taimyr Bay was carefully explored upon sleds, and through the discovery of the hut in which Lapten spent the winter of 1840-1, as well as by reaching the most northern station of the Middendorf expedition of 1843, the mouth of the Taimyr River was definitely fixed. The "Sarja" could not proceed till August 25. Cape Tscheljuskin was safely rounded and the course set for the location where, according to Toll's observation in 1886, the distant Polarland, seen as early as 1811 by Sannikow, to the north of Kotelny, ought to be. This point was passed without sighting the supposed land, and a few miles before reaching Cape Emma, the southernmost point on Bennett Island, discovered by the "Jeannette" expedition, the ice became so packed that further progress northward was impossible. On the return voyage the ship cruised again in the vicinity of the supposed Sannikow land, but without sighting it. On September 24, 1901, the "Sarja" froze in at the island of Kotelny in Nerpitscha Bay, where the expedition passed the winter. Whether or not Sannikow and Toll were deceived as to what they saw cannot yet be determined. It is quite possible that they may have miscalculated the distance and that the island may lie farther north in a section not touched even by Nansen's drift in the "Fram" during the long winter night of 1893-4.

Unable to get coal from the Lena River, the "Sarja" became unfit for long journeys; accordingly Toll resolved upon sledge journeys to the north, similar to those undertaken from the "Fram" by Nansen. The geologist Birula began such a journey May 11, intending to explore the largest of the New Siberian Islands. On June 5 Toll followed him, accompanied by the astronomer Seeberg and two Jakuts, but touched only at the northernmost point, Cape Wyssoki, which he left on July 13, crossing the ice for Bennett Island. Toll left Lieut. F. Mattheissen in charge of the "Sarja," but August 21 arrived before any earnest effort could be made to proceed to New Siberia and Bennett Land to bring back the sledge parties. About Kotelny and Faddejew the ice was so thick that these islands could be passed neither to the north nor the south; and since the open season was fast drawing to a close, Mattheissen brought the "Sarja" back to the Lena, where he anchored in the bay of Tiksi September 8. Being too deep of draft to steam up the river, the "Sarja" was abandoned, and the crew, together with the scientific collection and instruments, were transferred to Jakutsk on the small steamer "Lena."

It was expected that Toll and Birula would return to the mainland at the beginning of winter, but Birula returned in 1903, in good health, without having seen Toll. Perhaps the condition of the ice between Bennett Land and New Siberia prevented Toll's return, and it was held that he would attempt it again in the spring of 1903.

CALCIUM CARBIDE AND ITS COMMERCIAL DEVELOPMENT.

The wonderful simplicity of the reaction of water on calcium carbide to produce acetylene gas has doubtless struck almost every student who has had occasion to generate the gas. The important effect which Willson's discovery of electrically producing calcium carbide in commercial quantities will have upon the gas industry of the civilized world, an effect which is due in part at least to this very simplicity of producing the gas, may well be shown by tracing the development of the carbide and acetylene industries in Germany.

There are about eight thousand acetylene installations, of all capacities, in active operation at the present time in that country.

Acetylene is coming into use for driving gas engines; 5.65 cubic feet develop 1 horse-power, for the development of which 21.19 cubic feet of coal-gas are required. The small weight of carbide needed for the production of a given illumination gives acetylene an advantage over other illuminants for colonial and military uses, where the cost of transport forms an important item. The high temperature of 2,700 degrees of the acetylene Bunsen flame renders it valuable for soldering purposes. For miners' and other portable lamps a portable acetylene generator is now largely used. Acetylene is also adopted in factories and other places where colors have to be distinguished and compared by artificial light. Investigations on the Elbe have shown that acetylene is very suitable for lighthouse illumination and for signaling at sea. Carbide containing a high percentage of phosphorus is useful for destroying parasites on vines.

SCIENCE NOTES.

The symbol of the two-headed eagle is considered by some heralds to be merely the result of the heraldic practice of "dimidiation," which crept into English heraldry during the reign of Edward I. Dimidiation was simply a child's way of impaling two coats-of-arms on the same shield by the primitive method of cutting each in half and taking the dexter half of one and the sinister half of the other and placing them back to back, as it were. Strange two-headed beasts naturally resulted, as, for instance, when a lion and an eagle were halved and joined together, and the griffin is supposed to have been evolved from two lions rampant by dimidiation. It robs the two-headed eagle of half its terrors to know that it owes its origin to this sort of child's play. The gryphon and mock turtle that went out to sea with the whiting are far more serious creations.

Dr. Jules Rehns, of Paris, has been carrying out several experiments to ascertain the precise effects of radium burning upon the skin. If the rays of one-sixteen-hundredth part of an ounce of radium bromide are applied no pain is experienced, nor is there any mark left at the time of application, but twenty-four hours later a red mark appears, remains for a fortnight, fades, and leaves behind a scar similar to that of a burn. If the application be continued for ten minutes instead of five, the mark becomes visible in eighteen hours. Ulceration does not occur unless the radium has been applied for at least an hour. If the spot thus caused is treated medically, suppuration may be prevented and the wound cured in six weeks or two months. But if it is not attended to, it gathers, becomes painful, and lasts an indefinite period. Some of these wounds or burns, caused three months ago by one hour's application of radium, still show no signs of healing. Moles can be destroyed by applying the radium for ten minutes.

Glass is known to be blackened under the influence of radium rays, the same phenomenon being observed in the case of quartz. The coloration produced by radium will disappear, not only under the influence of heat, but at ordinary temperatures as well. N. Georgiewski, in a paper recently presented to the Russian Physico-Chemical Society, has investigated by a photometric method the absorption of glasses and of quartz colored by radium rays, as well as its diminution in coloration with time, this diminution being represented by a logarithmic curve. The author describes his experiments made on quartz, mica, gypsum, and other bodies, showing the alteration of the optical properties of these materials, as occurring under the influence of radium rays. Mica, being placed between crossed Nicol prisms, shows an alteration in the chromatic polarization in the portion which formerly was exposed to the action of radium rays, this alteration disappearing as soon as the specimen is heated. Gypsum and fluorspar, while showing the same alterations of the optical properties, are not blackened under the influence of radium rays.

In order to show the diffusion of the emanation from radium bromide, a long tube was used, the internal surface of which was coated with a layer of sidoblende (zinc sulphide). On connecting the apparatus with a test tube containing a solution of radium bromide, a luminescence was found to appear and to be propagated throughout the tube. On repeating Ramsay's experiments, Th. Indricson (see paper read before the Russian Physico-Chem. Society) found the yellow helium line not to coincide with the yellow line of the spectrum given by the emanation, but to lie between the two yellow lines of the emanation. If the coil of pipe communicating with the tube was dipped into liquefied air, a strengthening of the lines corresponding to the helium line was noted in the spectrum of the emanation; while between the two yellow lines above referred to, a third line coinciding with the yellow line of helium would appear. The lines of helium do not exist in the spectrum given by the emanation of a freshly-prepared tube, but appear only afterward. On observing the gases set free on the dissolution of radium bromide, it was observed that the helium lines did not appear as long as the spectrum tube preserved its phosphorescence in the dark. After four days, this phosphorescence would disappear, while the lines of helium were noted in the spectrum.

A pipe line 280 miles long, built for the purpose of conveying oil from the Kern River district to a shipping point on San Francisco Bay, was recently completed and opened for service, when a very unexpected difficulty was encountered. The oil is so heavy that it moved through the pipe at a sluggish rate of speed, which makes this method of transporting the oil impracticable unless some improvement in the process can be devised. The oil was five days traveling the first thirty-seven miles, when it was decided to abandon the work. It has been decided to make the experiment of heating the oil to a point of about 120 degrees, and at the same time the number of pumping stations will be greatly increased.