been added to our up-stream journey that it would become doubtful whether we should be able to afford time for geological work on the Lewes, and reach the coast before the smaller lakes near the mountains were frozen over. I therefore decided to set about the building of another boat, suitable for the ascent of the Lewes, and on the second day after we had begun work Mr. Ogilvie very opportunely appeared. After having completed our boat and obtained Mr. Ogilvie's preliminary report and survey sheets, together with the necessary provisions, we began the ascent of the Lewes, from the head waters of which we crossed the mountains by the Chilkoot Pass, and reached the coast at the head of Lynn Canal on the 20th of September. I am happy to be able to add that the entire expedition was carried out without any serious accident or loss, notwithstanding the difficult nature of the country, and that, though circumstantial reports were heard in the spring, of trouble between the miners and Indians on the Yukon, these proved to be entirely groundless."

Mr. Ogilvie proceeded down the Pelly River, and is now wintering in the vicinity of Belle Isle. It was proposed to make astronomical observations corresponding to those of Mr. Ogilvie near the point of intersection of the Yukon and 141st meridian at two places, — Kamloops and Ottawa. Unfortunately the corresponding observations could not be carried out, and the value of Mr. Ogilvie's astronomical work is therefore problematical. This spring he will start for the mouth of the Mackenzie by way of the Porcupine River and Fort Macpherson, and ascend the Mackenzie to Fort Chipewayan, connecting with his own survey of the Peace and Athabasca Rivers.

THE GEOLOGICAL OBSERVATIONS OF THE YUKON EXPEDITION, 1887.

THE routes to be followed by the expedition were selected with the purpose of obtaining as much information of a geographical, geological, and general character as possible of the great tract of country included in the extreme northern part of British Columbia, and to the north of the 60th parallel (which forms the boundary-line of that province), between the Rocky Mountains proper on the east, and the borders of Alaska on the west. The greater part of this vast region is drained by several large tributaries of the Yukon River, but these interlock to the south with tributaries of the Stikine and with branches of the Liard, a feeder of the Mackenzie.

The results obtained will form the subject of a detailed report of the Geological Survey of Canada, but for the preparation of this some time is yet required; and Mr. Ogilvie of the Dominion Lands Branch, and Mr. McConnell of the Geological Survey, are still in the field for the purpose of continuing surveys and explorations next summer. Meanwhile the following notes, bearing particularly on the principal geological features of scientific importance, may prove of interest.

In 1879 a geological traverse was made by the writer, of the entire width of the Cordillera region, by the line of the Skeena and Peace Rivers (*Report of Progress of the Geological Survey of Canada*, 1879–80); but this had, so far, remained the most northern line of geological examination across the wide mountain-belt of the west coast of the continent. The work of the past summer included a similar traverse of the same belt by the Stikine, Dease, and Liard Rivers, at a minimum distance of two hundred miles north of the last, and extended by the last-named river completely through the Rocky Mountains, to the great valley of the Mackenzie. The latter part of the traverse was, however, undertaken by Mr. McConnell, and his observations are not yet available.

To the north of this cross-section the exploration extended in the Yukon basin to the mouth of the Lewes River, near the 63d parallel. The actual line of travel and survey followed the Liard from its junction with the Dease northward to its sources, crossed the height of land to the Pelly near its head waters, followed that river down to the mouth of the Lewes, ascended the Lewes southward to its head, and finally, traversing the coast mountains by the Chilkoot Pass, reached the head of Lynn Channel.

The entire region thus examined may be described as mountainous in general character, though comprising also wide areas of hilly or rolling country, and many important flat-bottomed river-valleys. It declines as a whole gradually to the north-westward from heights of 2,730 feet at the Stikine-Dease watershed, and 3,150 feet at the height of land between the Liard and Pelly, to 1,550 feet at the confluence of the Lewes and Pelly. The close-set mountains forming the coast ranges on one hand, and on the other the serried peaks at the base of which Frances, Finlayson, and Pelly Lakes lie, and which represent the western tier of the Rocky Mountains, are here the principal mountain axes. A third important intermediate range, which it is proposed to name the Cassiar Range, is, however, cut through by the Dease River immediately to the east of Dease Lake. This appears to be continuous in a north-westward direction to the Pelly, after reaching which it assumes a more westward course, and with decreasing altitude follows parallel to the river, which it eventually crosses, near the mouth of the Lewes, in the form of low ranges of hills. The trend of the subsidiary and less continuous ranges to the west of the Rocky Mountains proper, as well as the prevailing strike of the rocks, partake in a similar general change in direction, wheeling westward in the north in approximate conformity with the outline of the Pacific coast.

The rocks throughout the entire region above outlined present close analogies to those already investigated in the southern portions of British Columbia, thus confirming previous statements with respect to the great general similarity, in a north-westerly and south-easterly direction, of the peculiar geological features of the Cordillera belt. The coast mountains where crossed by the Stikine, and again still farther north in the line of the Chilkoot Pass, consist for the most part of granitoid rocks, which are generally rich in hornblende and triclinic felspars. With these are occasionally included belts of crystalline schists, micaceous or hornblendic, the rocks as a whole resembling those of which details are given in my last report on Vancouver Island (*Annual Report of the Geological Survey*, 1886). It may be said, in fact, that the composition and structure of the coast ranges is practically identical wherever they have been examined, from the Fraser River to the head of Lynn Channel, — a length of nearly nine hundred miles.

To the east of these ranges, the country to and including the Rocky Mountains proper is chiefly characterized by the occurrence and wide distribution of paleozoic rocks, which often closely resemble those provisionally named the Câche Creek Series in southern British Columbia. They include limestones, quartzites, argillites, slates, and schists, with a notable proportion of agglomerates and other materials of volcanic origin, and are all pretty thoroughly altered and hardened and considerably flexed. Near Dease Lake, and again on the Pelly almost on the same line of strike, important beds of serpentine occur, and the associated rocks in these and many other places are preponderantly schistose and slaty, running through a number of varieties, but closely resembling the schistose and slaty rocks of Cariboo, and other gold-bearing districts to the south, and here also yielding gold.

These paleozoic rocks are interrupted by granitic areas, which generally rise in the form of ridges or mountain elevations, and were in some places observed to be flanked by more or less considerable occurrences of crystalline schists, which appear to be more highly altered portions of the paleozoic. The most important of these inland granitic ranges is that previously referred to as the Cassiar Range. Granitic mountains also, however, occur in the range to the east of Frances Lake, and elsewhere.

Fossils are by no means abundant in the paleozoic rocks; but a small collection of graptolites was obtained on the Dease, which has been submitted to Professor Lapworth, and by him pronounced to be of middle ordovician age, six species being recognized. This is, no doubt, the farthest north-western occurrence of a graptolitic fauna so far noted on the continent. Carboniferous fossils, notably *Fusulina* and *Loftusia Columbiana*, were obtained from limestones in the Liard basin, and again on Tahko or Tagish Lake near the head of the Lewes River. It is probable, however, that rocks ranging from the Cambrian to the top of the paleozoic, and possibly also including the triassic (Vancouver or Nicola Series), may be embraced in this great preponderantly paleozoic area.

Strata which are probably of cretaceous age occur on the Stikine in limited basins immediately to the east of the coast mountains; and rocks holding middle or lower cretaceous marine fossils have a considerable development on the Lewes, where they are associated

with plant-bearing beds of the horizon (as determined by Sir W. Dawson) of the Laramie, or so-called miocene of the Mackenzie River and Alaskan coast. A few fossil plants, which are probably of cretaceous age, were also found at one place on the Pelly.

The miocene proper is represented in the upper Liard valley by soft stratified rocks associated with basalts; and basaltic flows of limited extent, and probably of the same age, occur on the Pelly, at the confluence of that river with the Lewes, on the latter river at the Cañon, and again in the Stikine valley east of the coast mountains. There is not, however, in the entire region examined, any wide basaltic plateau.

Some features of special scientific importance occur in connection with the superficial deposits and the evidences of glacial action, but these cannot be more than mentioned in this brief note. It may be stated, however, that true bowlder-clay is frequently seen in the river-sections, and generally passes up into and is covered by important white or gray silty deposits, resembling those of the Nechacco basin in British Columbia, and of the Peace River region to the east of the Rocky Mountains. These later-glacial silts are particularly widespread in the Upper Yukon basin. Terraces are generally conspicuous features in the landscape, and extend even to the higher parts of the district, while water-worn and travelled stones were found to occur at a height of at least 4,300 feet on an isolated mountain near the watershed between the Liard and Pelly Rivers. In the Lewes and Pelly valleys, traces of the movement of heavy glacier-ice in northward or north-westward directions were observed in a number of places, the grooving and furrowing being equally well marked at the water-level and across the summits of hills several hundred feet higher. The facts are such as to lead to the belief that a more or less completely confluent glacier-mass moved in a general north-westerly direction from the mountainous district south of the southern sources of the Yukon, toward the less elevated country which borders the lower river within the limits of Alaska. This observation, taken in connection with the evidence of the former northward movement of glacier-ice in the Arctic regions to the east of the Mackenzie (*Annual Report of the Geological Survey*, 1886, p. 56 R), appears to have very important bearings on theories of general glaciation.

The discovery of small rounded bowlders or pebbles of jade (nephrite) on the upper part of the Lewes River may be mentioned as of interest. Though not actually observed in place, the material is evidently derived from the altered volcanic rocks, probably of paleozoic age, which are abundant in the district. The theory that the jade used by the coast tribes for the manufacture of implements was imported by them from Asia, if still held by any, can scarcely any longer be maintained as tenable.

A second minor point of interest brought to light in connection with the expedition is the existence of a very wide-spread deposit of volcanic ash in the Upper Yukon basin. This generally occurs beneath the soil, but is distinctly newer than the silts or latest glacial deposits. It forms a layer which is seldom more than a few inches in thickness, and is doubtless to be attributed to some single great volcanic eruption of a date long antecedent to our historical knowledge of the north-west part of the continent.

GEORGE M. DAWSON.

SCIENTIFIC NEWS IN WASHINGTON.

National Academy of Sciences; Partial List of Papers; Presentation of Medals. — How to detect Cottonseed-Oil in Lard. — Aboriginal Copper-Workers in the Lake Superior Region; Proofs that they were Modern. — The Siana Indians; Investigations by the Bureau of Ethnology. — International Entomology.

National Academy of Sciences.

THE National Academy of Sciences has been holding its annual meeting in Washington during the past week, but too late to report its proceedings in this number. Among the features of the meeting were the presentation, on Wednesday evening, of the Henry Draper medal to Prof. Edward C. Pickering, director of the Harvard Observatory, for his work upon astronomical photography; the J. Lawrence Smith medal to Prof. H. A. Newton of Yale University, for his work on meteors; and the reading of memorial papers commemorative of Prof. J. C. Watson and Capt. James B. Eads, by Prof. G. C. Comstock of Wisconsin University, and Mr. William Sellers of Philadelphia, respectively.

Among the papers expected were the following: 'The Rotation of the Sun,' by Prof. J. E. Oliver of Cornell University, Ithaca, N.Y.; 'The Foundations of Chemistry,' by Dr. T. Sterry Hunt of Montreal, Canada; 'On an Improved Form of Quadrant Electrometer, with Remarks upon its Use,' by Prof. T. C. Mendenhall, director of the Rose Institute, Terre Haute, Ind.; 'On the Vertebrate Fauna of the Puerco Series,' by Prof. E. D. Cope of Philadelphia; 'Re-enforcement and Inhibition,' by Dr. Henry P. Bowditch of Harvard University; 'On Apparent Elasticity produced in an Apparatus by the Pressure of the Atmosphere, and the Bearing of the Phenomena upon the Hypothesis of Potential Energy,' by A. Graham Bell of Washington; 'The Orbits of Aerolites,' by Prof. H. A. Newton of Yale University.

Detection of Adulteration of Lards.

The recent examinations of lards made at the Agricultural Department have resulted in the discovery of a test by which the presence of cottonseed-oil may be detected instantly by any dealer or housekeeper. The experiment is as follows: As much lard as can be taken up on the point of a case-knife is placed in a teacup. About a quarter of an ounce of sulphuric acid is poured upon it and thoroughly mixed with it. If the lard is pure, it will coagulate, and there will be a little difficulty in the mixing. If it is adulterated with cottonseed-oil and stearine, the mixture will take place immediately and easily. After half a minute, one-fourth of an ounce more of sulphuric acid should be poured upon and mixed with it. The whole process thus far should not occupy more than one minute.

The substance thus obtained is poured into a common test-tube, such as may be bought at any chemist's shop for a few pennies. The acid, somewhat colored, will sink to the bottom, and the fatty substance will remain on top. If the lard thus tested was pure, the color of the latter will be that of a light-colored sponge, changing in a minute or so to a dark-cinnamon color. If it has been adulterated with cottonseed-oil, the color at first will be darker, changing immediately to a dark brown. These differences of color are so marked that no experience is required to detect them.

Cards might be printed upon which the colors produced by the sulphuric-acid re-action for both pure and adulterated lards might be shown; and dealers, by using this test, may prove to their customers in a minute or two that the lard that they are selling is an unadulterated article. The experiment is simple, and the cost of it almost nothing. The novel thing about it is the placing of the mixture in a test-tube in which the acid may become separated from the fatty substance, thus making the test much more decisive and satisfactory. This was first suggested by Dr. Thomas Taylor, who has extended his experiments to a great number of different animal and vegetable oils.

Algonkin Metalsmiths.

Mr. Henry Lee Reynolds read a paper before the Anthropological Society at a late meeting, in which he replied to M. Paul du Chatelier, who has discussed the great antiquity of the ancient mines discovered at Lake Superior, in 'Materiaux pour L'Histoire Primitive et Naturelle de l'Homme.' The idea, he said, that these mines were very ancient, is commonly prevalent. Although Drs. Charles T. Jackson and I. C. Lapham gave quite plausible reasons for thinking them to be the works of the present race of Indians, men like Wilson and Whittlesey subsequently published standard works in which they asserted their belief in a contrary opinion; and these latter theories are now being promulgated by a host of writers like M. du Chatelier.

Mr. Reynolds reviewed the evidence upon which these theories are based, criticised some of it as misleading and some of it as having lost its original importance and prominence in the light of later ethnologic and archæologic research, and expressed the opinion that the mines in question are the work of the ancestors of some of the historic Algonkin tribes, if not of the historic tribes themselves. In proof of this he quoted some pertinent testimony from early chroniclers to show that the copper reported as having been found among the historic tribes could not all have been drift-metal discovered upon the surface. Three sources whence the