was to follow with a store of provisions, to be deposited near the Ice Cape, on the north of Nova Zembla, in case the expedition should be compelled to turn back.

Of the outfit and plan of the Swedish expedition we gave an account in NATURE for August 29. It left Tromsö on the 31st of July, and when last heard of was off the north-west point of Spitzbergen.

We are also favoured with a letter from Dr. Petermann, dated Gotha, October 11, from which we learn that the land on the east of Spitzbergen, which for the last 355 years has had a varying position on the map, has this year for the first time been reached by Captain Altmann of Hammerfest, and again on August 16 last by Captain Nils Johnsen of Tromsö, in his little sailing yacht the *Lydeana*, who landed and explored it. Captain Johnsen saw the island first when in N. lat. 78° 18′ 46, and E. long. 30°; in the maps of 1617 it was marked as Wiche Land, between 78⅓° and 75¼° N. lat. On the 17th of August he anchored near to the north point in 79° 8′ N. lat. and 30° 15′ E. long., for the purpose of landing and exploring the place. What Captain Altmann, looking from a distance, took to be three islands, Johnsen found in reality one, the high hills being connected by low lying land, with several outlying islets. On no part of the land has he found extensive snow-fields, and saw only one small glacier on the south-east coast, while, on the contrary, there are many large streams entirely free from ice. The greatest length of the land Captain Johnsen has found to be 44 geographical miles. Large quantities of driftwood extended here and there to about 100 feet from the coast, and rose to the height of at least 20 feet. The island abounds in the usual Polar fauna, the plentifulness of seals, especially *Phoca Groenlandica*, being noted by Johnsen. The reindeer on the island are spoken of as the largest and fattest which anyone on board the *Lydeana* had ever seen. The rocks seem to be principally of the quartz and argillaceous kind, and some fossils have been sent to Sweden and to Zurich. Captain Johnsen explored the east, south-east, and north-east coasts, and so far as his observations went, ice is to be found only on the north coast.

The fact of greatest significance in this latest news from these quarters is that for many months in the year the sea around Spitzbergen is almost entirely free from ice; a position long and sagaciously maintained by Dr. Petermann.

"Of interest," says the *Academy*, "in connection with this subject is an account of the finding of the relics of Barents' expedition of 1597 to Novaia Zemlia, by Captain Carlsen in 1871, prepared by M. de Jonge, and newly published under the auspices of the Dutch government at the Hague. The pamphlet contains the journal kept by Carlsen, and a minute description of the relics, accompanied by a photograph of these in a group, and charts comparing the Novaia Zemlia of Barents with the island as mapped from our present knowledge of it."

RESEARCHES IN GREENLAND *

WHEN I wrote to you last from Copenhagen, I anticipated that my season would be very short; and my anticipations were correct. The season, however, in Greenland has been long and brilliant. In the middle of May floe ice disappeared in Umenak Fiord, which was fully six weeks earlier than usual; and in April, in Godhavn men went about in summer attire. When I arrived (on July 6) the land was covered with flowers, the butterflies were beginning to appear, and almost all snow had vanished from the sea-level up to 2,000 ft. Since then, with the exception of a bad week in the Waigat, I have enjoyed the most exquisite weather that it is possible to imagine. In this arctic region it has only frozen on two nights, and during the daytime the thermometer has ranged from 50° to 70°. Until recently we have also had a high barometer; and, upon the whole, very little wind.

I have been upon Hare Island for three days, and have also been to Umenak, but the chief part of my time has been spent in the Waigat, where you would be surprised, perhaps, to find that a great deal remains to be done. I have found a great valley leading into the interior of Disco, and have gone up it a hard day's march. I have ascended one of the highest of the peaks on the Noursoak side of the Waigat, and looked down upon the great valley which occupies almost the whole of its interior. The lakes, as given upon Rink's map from reports of Eskimo, do not exist, but there is one very large lake which has a glacier or glaciers coming into it at perhaps 2,000 ft. above the sea. This valley is the most important one hitherto discovered in North Greenland. The river flowing down it has the character of a river, and not of a torrent; and, after descending through many windings a course of at least 100 miles, it pours into the sea a volume of water equal to that of the Rhone at the Lake of Geneva. At half a mile from the shore I found the water fresh.

In Umenak Fiord I ascended a mountain of about 7,000 ft. with five Greenlanders, and took my theodolite to the top. As you know the weight of the instrument, you will be partly able to appreciate this performance. The ascent, first over swamp, then over basalt *débris* which reposed insecurely upon solid basalt, and finally, at the top, up columnar basalt, was a sweet thing of its kind. The picture of your humble servant being lowered by a rope, dangling like a bundle from a crane, will, perhaps, to some people, be more interesting than the results obtained by the theodolite. These, however, were not unimportant. My peak, an isolated one, commanded a view of almost the whole of the Umenak district (which contains the highest mountains of Greenland proper), and a magnificent view of the "inland-ice." I found the general elevation of the mountains exceeded by about 2,000 ft. the height previously assigned to them. Of the altitude of the "inland ice" I shall write on a subsequent occasion.

A large part of my time in the Waigat was occupied by the measurement of a base line. This was the most important piece of work that I undertook, and it was successfully executed. I find the Waigat to have in some places scarcely half the width which our maps give it. I find its mountains to be about double the altitude that they have been supposed to be; and Hare Island I find to be twice the length represented upon the Admiralty Chart; Hare Island has some points of particular interest. I got from it a rather large collection of fossil plants, and went to its top (1,800 ft.). From the summit, at midnight, I distinctly recognised the mountain called Sanderson's Hope, near Upernavik, which was distant from me 140 miles!

I have made an excellent journey, full of interest. My collections are at least as valuable as those of 1867, though, as far as I know, they do not contain anything of the importance of the *Magnolia*. I have, however, even larger collections of fossil plants than before, and from localities which I did not visit in 1867. My stone implements are very numerous, and of good quality, and the natural history specimens are not few in number. Altogether I am very well content.

EDWARD WHYMPER

Written on board the brig Hvalfisken *as it proceeded out of the harbour of Godhavn, Sept.* 10, 1872.

* Copy of a letter addressed to Mr. R. H. Scott, F.R.S., and kindly forwarded by him to us.—ED.

THE HELVETIC SOCIETY OF NATURAL SCIENCES

THE 55th Session of this Society was held at the ancient city of Fribourg on the 19th, 20th, and 21st of August last, and of it we have again to tell of an overwhelmingly hospitable reception by "our hosts of Fribourg;" a well-attended opening address by the President, Dr. Thurler; sectional *séances*, at which

many valuable papers were read, followed by fruitful discussions; a final general meeting to listen to something that would interest all, and then the dispersion. This Society appears to be satisfactorily accomplishing its professed aim of increasing the interests of the people generally in scientific studies, of establishing intimate and familiar relations between men of science engaged upon the same subject, and of fostering a harmonious spirit of labour all over the country. We give an abstract of the report contained in the *Bibliothèque Universelle.*

Prof. Volpicelli gave a paper on Atmospheric Electricity and the best method of studying it. Having made experiments, in calm weather, according to the methods both of Franklin and of Peltier (in the former of which a fixed uninsulated rod is used, connected with an electrometer by a wire, while in the latter a moveable metallic point with similar connection is sent up into the atmosphere), he found the results always contradictory as regards the quantity, and sometimes also as regards the quality, of electricity indicated.

On all the days in which the air was not much agitated, the time and circumstances being the same, the moving rod gave a greater quantity of electricity than the fixed; and the former often showed positive electricity, while the latter showed negative.

It has been shown that the earth is a body negatively electrified. It follows that any conducting substance is electrified positively when it rises in the atmosphere, and becomes negative, on the other hand, as it descends. The indications of the metallic rod shot into the air are therefore modified by the influence of the earth, and do not give a means of determining the electricity of the surrounding atmosphere. Franklin's fixed rod, on the other hand, is free from these disturbing influences.

That a conductor gives positive electricity as it rises in the atmosphere, and negative as it descends, may be proved by experiment. Suppose, *e.g.*, the fixed rod gives negative electricity; if a flame be applied to the point of it, the apparatus will indicate positive electricity. The flame produces an upward current of air, which, by its motion, and under the influence of the earth, gives a neutralising positive electricity, so that the point of the fixed rod becomes positively charged. (It is necessary that the flame should have a high calorific power.)

If the flame be now brought down to the ground, one or other of three effects will occur:—if the flame is not very strong, negative electricity will be indicated; if somewhat hotter, there will be no electricity at all; if very intense, the electricity will be positive. These effects are readily explained as the resultants of two opposing actions, the production of positive electricity by the ascending current of air, and the production of negative through the influence of the earth on the descending flame. The general inference Prof. Volpicelli draws is the preferability of Franklin's method to the other.

M. Müller, professor at Fribourg, gave an account of experiments on the lower Glacier of the Grindelwald, with reference to the optical properties of glacial ice. His experiments partly confirm the results obtained by MM. Grad and Dupré, that thin lamellæ of ice cut horizontally at the base of the glacier, give, in Norremberg's apparatus, systems of coloured rings with a dark cross. This property, moreover, appears only at certain separate parts of the lamella, and the system of rings is always more or less incomplete, which is sufficiently explained by the irregular structure of the ice of glaciers, in which, necessarily, there are only distant traces of the mode of original formation. Vertical sections gave no coloured rings.

M. Louis Dufour described some important researches on the Diffusion of Gases across diaphragms and the variations of temperature accompanying it. He studied the cases (among others) of hydrogen and air, of air and carbonic acid.

He distinguishes the diffusion at constant pressure, and the diffusion with change of pressure. The porous vessel containing the gas with slower diffusion contains also a very sensitive thermometer, and is enclosed in another vessel, in which the other gas circulates. A glass tube, passing through the stopper of the porous vessel, can be put in communication either with external air (pressure constant) or with a manometer. The whole is enclosed in an envelope of cotton. The thermometer is observed with a cathetometer.

1. Diffusion at constant pressure.—First of all, taking as example hydrogen and air, equilibrium of temperature is established between the air outside of the porous vessel and that inside; then hydrogen is made to circulate, and it is seen that the thermometer in the interior falls. A large number of experiments showed that there is always a rise of temperature on the side of the entering gas, and a fall of temperature on the side of the escaping gas. M. Dufour believes this change of temperature does not take place throughout the gaseous mass, but only at the surface of the diaphragm. He conceives that at the part where the gas enters there is condensation and compression, causing development of heat. In the opposite case there is expansion of the gas, and hence absorption of heat.

2. Diffusion with change of pressure.—In this case the phenomenon is complicated by variations in the temperature according to the pressure. When the diffusing gas enters the porous vessel, the thermometer indicates first a slight rise of temperature resulting from rapid increase of pressure; it then falls, and to a much greater extent ($\frac{1}{10}$ of a degree *e.g.*) commences again to rise gradually, falls a little again, in consequence of the escape of the other gas and the rarefaction produced; then continually rises. The effects are represented by a curve.

M. Dufour also studied the case of diffusion between dry air and moist air. He observed there was always diffusion between two quantities of air having different degrees of humidity; and, contrary to what one might expect from Graham's law (the vapour of water being lighter than air), the diffusion takes place from the dry to the humid. The laws of variation of temperature in this case conform to what M. Dufour observed in the case of two gases. The diffusion is readily indicated by a water manometer, and M. Dufour thinks the principle might be applied in hygrometry. It is evident that the general principle must have numerous applications in the organic world. M. Reichert described a thermo-regulator, in which the mercury of a thermometer which was placed in a heated liquid interrupted, on rising to a certain point, the passage of the heat-producing gas.

M. Mousson described a method for measuring the dispersion in the different parts of the spectrum furnished by a prism or any spectroscope whatever. The dispersion varies, it is known, in the different portions of the spectrum obtained with a prism, it is believed much less rapidly in the red, much more rapidly in the violet. The law according to which it varies changes according to the different prisms and different substances used. M. Mousson proposes a new simple process by means of which the law can be directly determined for each spectroscope. It consists in observing with the spectroscope the spectrum given by a network (*réseau*) of diffraction, of which the lines ought to be perpendicular if the edges of the prism are horizontal. There is thus obtained a curved spectrum, which is the graphic representation of the law sought.

Other papers in the section were by M. de la Rive on the rotation of the electric discharge in rarified gases under the influence of a magnet, and particularly upon the mechanical action which this discharge could exercise in its rotating movement. M. E. Hagenbach expounded the principal results of his beautiful researches upon Fluorescence:

and M. Volpicelli concluded the work of the section by a communication on Electrostatic Induction.

Geology is the branch of Natural History which is most cultivated in Switzerland. Notwithstanding its small extent, that country has the most varied field for observation in the mountain-chains of the Jura and the Alps; there are few important questions whose solution cannot be found in these mountains; and many Swiss names are found among those who have done most to advance that science. During the last year geological studies have received a great impulse in Switzerland by the subsidies which the Confederation vote for that purpose; each year the State grants a sum in aid of the researches of a certain number of geologists, and for the study of a new part of the territory. The works which result are published under the care of a special commissioner of the Society of Natural Science. As might be expected then, the Geological Section was very numerously attended, and the papers read on the subject were many and valuable. We learn from M. A. Fauzes' general lecture that the Society have taken similar steps for the study and preservation of Swiss boulders to those taken by the Royal Society of Scotland, whose report we gave in a recent number.

M. V. Gross brought under the notice of the members a series of objects belonging to the lacustrine dwellings of the Lake of Bienne, worthy of the attention even of those who have seen the richest collections of this kind. There was the bit of a bridle almost complete belonging to the station of Mörigen, which belongs to the age of bronze; at the present time only one similar fragment is known. Incrustations of iron upon a bronze knife tend to confirm what has already been conjectured, that at the first appearance of iron it was regarded as a most precious metal. The station of Lüschersz, of the stone age, has been discovered by M. Gross, and has furnished axes of nephrite and jade of a size not hitherto met with in lacustrine dwellings. It is known that these rocks are not found in Europe; and it is a question whether these lake-dwellers obtained them by commercial intercourse with Asia, or whether these rare articles were preserved as heirlooms in families from the period of their emigration from their ancient Asiatic home.

M. Ch. Vogt communicated to the section the results of his microscopic study of rocks. One of the questions which he wished to resolve is whether the microscope can enable us to know whether or not a rock has ever been in an igneous state. M. Vogelsang has discovered that the volcanic rocks present what has been called the "fluidal structure," a structure resulting from the disposition of minute crystals disseminated throughout the vitreous mass, and surrounding the larger crystals which have been previously formed in the lava. This fluidal structure is found in the porphyries, and proves their igneous origin. But on examining the siliceous deposits of the Geyser, M. Vogt found this same structure, and thus it does not belong exclusively to the igneous rocks, but also to those of aqueous origin, provided that they have been in a viscous state. In his study of volcanic rocks, M. Vogt has discovered that the trachytes, the basalts, and the lavas, present common characteristics.

M. Lebert brought under the notice of the section a magnificent series of specimens of amber, and expounded the results of his researches on that substance. The fluorescence of petroleum may be taken as a type of the same phenomenon in amber. For naturalists the most interesting of M. Lebert's specimens are fragments of the conifers which produced the amber, a piece enclosing a movable air-bubble in a drop of water, and a great number of other pieces enclosing insects in a perfect state of preservation.

M. François Forel exhibited a photograph of the fossil man of Mentone, which represents him in the position in which he was found. It would appear that this man was not buried under a landslip, but that he must have been interred by those who survived him. It is argued that, because it is very unusual to inter the dead in a dwelling for the living, we may conclude that this individual belonged to a nomad horde of the age of the reindeer, who did not inhabit the cavern, but passed it from time to time, and who buried this man in the place where he died. We may mention here that in the Zoological section Dr. Vonga read a paper on the same subject, he having been present at the exhumation of the body. He described the caves, and pointed out their probable mode of formation. The body lay upon its left side in the position of sleep. It showed a circular crack at the base of the skull, the thorax being broken at one place; the remainder is in perfect preservation. The cranium is very fine, all the teeth being preserved; the lower jaw is long, but the angle between the horizontal and the ascending branches is a right angle. Dr. Vonga attributed the remarkable preservation of the body to the properties of the pulverised earth which covered it.

Several members presented to the section their studies of various parts of the Alps, and M. E. Favre read a paper on a section of the Caucasus. In the centre of the latter chain a granitic formation is found. On the two sides palæozoic schists are presented, analogous to those of Grätz, and connected by veins of crystalline schist. They are less developed on the north side than on the other. Upon the northern slope the Secondary and Tertiary formations are in a very normal position, and have but little inclination; upon the other slope, on the contrary, there are many zones of eruptive rocks, and the Secondary formations are less disturbed. M. Favre also spoke to the section on the lower limit of eternal snow and the glacial phenomena which he has observed in this chain.

In the section of Zoology Prof. C. Vogt presented the results of his researches upon the *Phyllopodes*, especially the Branchiopods and the *Artemia*.

M. Vogt confirmed the observation of M. Joly, that among the *Artemiæ* collected at Cette during the months of July and August, no males were found, and that the females reproduced by parthenogenesis. This fact is so much the more singular that large numbers of males are found in other salt marshes inhabited by the same or analogous species.

M. Auguste Forel presented to the section some curious and interesting results of his researches into the nature and habits of ants. Different communities of ants, even when they are of the same species, are enemies to each other. A single community of ants may possess many nests, which are connected with each other by galleries and tunnels. A community of ants may be either simple or mixed; it is simple when it belongs to a single species, mixed when it belongs to two or more species living on good terms among themselves. There are in each community, at one time at least, workers, some males and females. If we consider the mixed communities, we can distinguish, amongst others, slave-ants, obtained by the workers of one species pillaging the ant-hills of another species, and carrying off the cocoons. These, when once hatched, become the auxiliary workers and friends of their captors, doubtless believing that they are of the same origin. The mixed community contains the three sexes of the species who plundered, but only the workers of the species pillaged.

The only paper apparently of importance in the Botanical Section was by Dr. Müller, of Geneva, on a new species of *Loranthus* from the Philippine Islands, which, from the position of the flowers, presents some very extraordinary but not yet well-established peculiarities.

Other papers of value were read in the various sections, and, considering that the meeting lasted only three days, the amount of work gone through appears extraordinary; but then no mention is made of any excursions.