of warfare. Long tells us, in the account of his expedition, that sometimes they would hastily dig a trench, throwing the dirt on the danger side, and thus form a defensive barrier.

Whether the hill-forts are to be attributed to the authors of the circles and squares is doubtful: in fact, the indications appear to lead to the opposite conclusion. Certainly there is no reason for supposing that Fort Ancient, Fortified Hill, and other works of this character in the Miami valleys, were built by this people. The writer is inclined to the belief that they are the work of the Shawnees, but cannot undertake at this time to give his reasons for this opinion.

As the so called "altars" form a link in this historic chain, we may as well remark here that the names "sacrificial mounds" and "altars," implying human sacrifice, have been brought into use without even the shadow of evidence therefor. As Morgan has truly observed, "there is no propriety in the use of either of these terms, or in the conclusions they would force us to adopt. . . . These clay beds were not adapted to the barbarous work." Possibly they may have been places where prisoners were burned, which was the chief sacrifice offered by Indians. The basin-shaped clay beds of the Kanawha and East Tennessee mounds seem to have grown out of them, and their uses were probably similar.

CYRUS THOMAS.

[To be continued.]

THE ROYAL SOCIETY OF CANADA.

THE eighth annual meeting of the Royal Society of Canada is just over; and, from the interest manifest in the four sections into which that society is divided, no better proof of the growth, usefulness, and success of such an organization can be desired.

Of forty-three papers which were presented, either read *in extenso*, in abstract, or by title, no less than twenty of them treated on scientific topics, while the remainder were devoted to historical, political, and literary subjects.

Sections III. and IV. of the Royal Society are specially devoted to the sciences: the former embracing the mathematical, physical, and chemical sciences; the latter, the geological and biological sciences. A list of the papers read in these sections was published in *Science* of June 6.

The character of the papers read in the section of the geological and biological sciences were all of a high order, and interesting discussions took place. Dr. G. M. Dawson, assistant director of the Geological Survey, was president, and for his inaugural delivered an address upon the "Mesozoic and Tertiary History of the Rocky Mountain Region of Canada," in which the geological history of the Cordillera is traced from the triassic period to the close of the tertiary, and special reference is made to the process of development of the surface features of the region, together with the changes in elevation of the land at different periods. Another paper by Dr. Dawson, which can be regarded as a supplement to the foregoing, gave a very succinct sketch of the glacial history of the Rocky Mountain region of Canada, bringing the subject-matter to date. These two papers were followed by another from the pen of Principal Sir William Dawson, on "Fossil Plants from the Similkameen River and other Places in the Southern Interior of British Columbia." The following is an abstract of this paper: —

The deposits affording these plants have been described by Dr. G. H. Dawson in the "Report of Progress of the Geological Survey of Canada for 1877–78" (pp. 130B, 166B). They are of lacustrine origin, and underlie basalt and other volcanic materials. The beds holding well-preserved remains of plants are chiefly those composed of fine laminated clayey or silty material, which in some cases has been hardened by silicious matter which appears to have been derived from springs contemporaneous, or nearly so, with the date of formation of the beds. These deposits have been approximately assigned to the period of the miocene tertiary. They contain a number of species of fossil insects which have been described by Scudder (report above cited, p. 175B), and fossil plants, of which a provisional list was given in the same report (pp. 186B–187B). The present paper relates to additional collections of plants from the Tulameen or North Fork of the Similkameen, Tranquille River, etc., and which, while they extend our knowledge of the flora, tend strongly to confirm the miocene age of the formation, and to connect it with similar deposits farther north in Alaska.

The object of the paper, "Stratigraphical Notes on the Citadel Hill, Quebec" (in French), by L'Abbé Laflamme, was to determine the structure of the beds constituting the cliff at the citadel near the Dufferin Terrace, Quebec, where the "land-slide" occurred in September, 1889, and thereby to ascertain the cause of the disaster. Professor Laflamme pointed to imminent danger even at present, and the probable sliding-away of several feet of strata, which sooner or later must take place. A very interesting and animated discussion followed.

The paper on "Illustrations of the Fauna of the St. John Group, No. V.," by G. F. Matthew, M.A., was a continuation of the paper of last year which described the fossils of the "Basal Series" (beneath the St. John group), and the new ones of Band C of Division 1 of the St. John group. The following points were discussed in this paper: (*a*) a description of the structure of the St. John basin, (*b*) a description of the new series in Division 1 of the St. John group and of newly recovered parts of others, (*c*) a description of the tracks and organisms of Division 2, and (*d*) a description of the fossils of Division 3. Peculiar tracks have been detected, which appear to be those of radiate animals. A good many tracks have been observed in the sandstones and shales of Division 2, which are like those of the Eophyton sandstone in Sweden; but it is thought that this resemblance is due to a similarity of conditions under which the above sandstones and those of Division 2 were deposited, as the *Paradoxides* fauna undoubtedly intervenes.

Mr. E. Gilpin, commissioner of mines for Nova Scotia, in his paper on "The Evidence of a Nova Scotia Carboniferous Conglomerate," referred to the nature, source, and extent of the modern drift of Nova Scotia, and to the shingle beaches formed from it He described the carboniferous conglomerates of Cape Breton as consisting usually of detritus derived from local sources, and in Nova Scotia proper cited the conglomerates of the south side of the Cobequids, and of New Glasgow, as good examples of conglomerates formed from subjacent strata. The auriferous conglomerates of Gays River, Colchester County, were described, and the occurrence in it of bowlders referrible to pre-carboniferous measures lying to the north was noticed. The inference suggested was that the modern drift-transporting agency, carrying to the Atlantic shore bowlders referrible to the Cobequids, was paralleled, at the opening of the carboniferous period, by a similar agency furnishing bowlders found in lower carboniferous conglomerates at Gays River.

The paper on "Southern Invertebrates of the Shores of Acadia," by W. F. Ganong, was submitted to the Royal Society, and read by Professor L. W. Bailey of New Brunswick University. It opened with a sketch of the progress of knowledge of the distribution of marine invertebrate animals on the east coast of North America, from the time of the establishment of Milne-Edwards's "Pennsylvanian Region" in 1838, down to its division into the Syrteusian, Acadian, Virginian, and Carolinian faunæ, as accepted by students to-day. Attention was then called to the well-known occurrence of southern or Virginian forms in the Gulf of St. Lawrence, at Sable Island, and at other points on the coasts of Acadia and Maine; and a table was given showing the twenty-five undoubtedly southern species of mollusca. At least three *Echinodermata* occupy these localities, mingled with the more northern forms. This anomalous condition cannot date far back, since post-pliocene deposits show no trace of it. Indeed, there is evidence to show that changes are still going on; and facts drawn from Indian shell-heaps, from dead beach and dead dredged shells, and from old books, all show that these southern forms had for-

merly a wider range than now, and that they are gradually disappearing. The physiography of the coast of Acadia was then discussed, the distribution of currents considered, and evidence given to show that the land in all this region is steadily sinking. The effect of this depression on the currents of this coast was discussed, and the views of Verrill and Dawson considered. The conclusion was arrived at, that the known facts as to currents, the sinking of the land, etc., explained the phenomena under discussion. The relation of these facts to post-pliocene conditions was referred to, and a sketch given of what remains to be done in this field.

At the closing meeting of the society, the following officers were elected for the ensuing year in the Geological Section: viz., president, Professor W. Saunders, director of the Central Experimental Farms, etc.; vice-president, Professor L'Abbé Laflamme; secretary, Mr. J. F. Whiteaves. For the whole society, Very Rev. Principal George Munro Grant of Queen's University, Kingston, was elected president, and Rev. L'Abbé Laflamme of Laval University, vice-president. The honorary secretary is Dr. J. E. Bourinot.

HEALTH MATTERS.

Sterilizing Water.

IN a paper published in the *Medical Record* of June 14, 1890, Dr. C. G. Currier of New York states that unless extraordinarily resistant, water becomes sterilized if it be at or near the boiling temperature for fifteen minutes. If the same degree of heat be maintained for five minutes, all harmful micro-organisms will have been destroyed. Still less time serves to destroy the disease-producing varieties which are recognized as liable to occur in water. Thus merely raising to the boiling-point a clear water containing the micro-organisms of malarial disorders, typhoid, cholera, diphtheria, or of suppurative processes, and allowing it to gradually cool, insures the destruction of these germs. They are also destroyed by keeping the water for from a quarter of an hour to half an hour at a temperature of 70° C.

Occasionally, however, very resistant but harmless bacteria may get into water. The brief heating renders them safe for drinking-purposes; but, when it is desired to destroy every micro-organism that may be present in a contaminated water, it should be heated for one hour, and allowed to cool slowly. Then it may be used for cleansing wounds or for alkaloidal solutions, which will keep indefinitely if no germs be introduced after the solution has been heated.

Coffee Inebriety.

Dr. Mendel of Berlin has lately published a clinical study of this neurosis, his observations being made upon the women of the working population in and about Essen. He found large numbers of women who consumed over a pound of coffee in a week; and some men drank considerably more, besides beer and wine. The leading symptoms were profound depression of spirits, and frequent headaches, with insomnia. A strong dose of coffee would relieve this for a time, then it would return. The muscles would become weak and trembling, and the hands would tremble when at rest. An increasing aversion to labor and any steady work was noticeable. The heart's action was rapid and irregular, and palpitations and a heavy feeling in the præcordial region were present. Dyspepsia of an extreme nervous type was also present. Acute rosacea was common in these cases. These symptoms constantly grow worse, and are only relieved by large quantities of coffee, generally of the infusion. In some cases the tincture was used. The victims suffer so seriously that they dare not abandon it, for fear of death. Where brandy is taken, only temporary relief follows. The face becomes sallow, and the hands and feet cold; and an expression of dread and agony settles over the countenance, only relieved by using strong doses of coffee. In all these cases, acute inflammations are likely to appear any time. An injury of any part of the body is the starting-point for inflammations of an erysipelatous character. Melancholy and hysteria are present in all cases. Coffee inebriates are more common among the neurasthenics, and are more concealed because the effects of excessive doses of coffee are obscure and largely unknown. Many opium and alcoholic cases have an early history of excessive use of coffee, and are always more degenerate and difficult to treat. A very wide field for future study opens up in this direction.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Dr. Hann's Studies on Cyclones and Anticyclones.

IN your issue for May 30 I have with much interest noticed a letter by "W. M. D.," entitled "Dr. Hann's Studies on Cyclones and Anticyclones." It contains a passage which I am unable to comprehend; and, with your permission, I should like to ask the writer, through your columns, to enlighten me on the subject.

Mr. D. declares himself an advocate of the convectional theory of cyclones, and states, "There is unquestionably an ascending component of motion in cyclonic areas, and a descending component in anticyclones." This is what I do not understand. The question is apparently that of a body of air moving in a certain direction, but in what direction it is moving I don't quite see; and neither do I understand what is meant by a "component of a motion."

To put my question more precisely, I noticed once, in a book called "Weather," by the Hon. Mr. Abercrombie, that the author had observed that the waves on the North Sea differ in shape, when caused by a north-east wind under high pressure, from that when caused by a south-west wind with low barometer; and he considered this a proof that the air in an anticyclone is a descending current, and the air in a cyclone an ascending current, of air.

As an engineer, I am in the habit of always making a diagram on paper whenever I have a mechanical or dynamical problem before me; and it is a safe rule in applied mechanics that whatever cannot be thus represented does not exist. But in this case I came to the result that a supposed descending current of air in an anticyclone, having once reached the surface of the sea, must needs afterwards follow this surface,—that is, blow horizontally, or come to a standstill,—and also that a supposed ascending current must instantly, the moment it starts, come out of contact with the surface of the sea, and henceforward be unable to materially affect the shape of the waves. In other words, a body of air moving over the surface of the sea must necessarily have a horizontal direction; and the only cause I can imagine of the supposed difference in the shape of the waves is the difference in friction between air and water surface when the air-pressure is high or low.

I therefore beg to ask Mr. D. to give me some kind of a graphical representation showing the direction of the motion of the air in cyclones and anticyclones; say, for example, in the North Atlantic anticyclone at horse latitudes: and if he is unable to do so, he will allow me to believe that his statement is far from being unquestionable.

Mr. D. further states, "The convectional theory is merely a local application of a theory that is universally accepted to account for the general circulation of the atmosphere between equator and poles." But is it, after all, necessary to account for such a circulation? Has there ever been found the faintest actual proof to show that such a general circulation really takes place?

As to the other parts of Mr. D.'s letter, he will excuse me for saying that I cannot share his apprehension that Dr. Hann's studies will much alter the views held on cyclones and anticyclones, as the doctor's observations merely deal with temperatures at the earth's surface, which, as is well known, are local, and perfectly independent of the temperatures of the air at some considerable distance from the surface; which latter, however important in this kind of investigations, are unattainable unless by balloon ascents. A body of surface air moving over the ground must necessarily follow the shape of this latter; and consequently the air which is to-day at the summit of the Alps was yesterday