tion was acted upon; and in the following year (1870) Mr. Smillie invented the vertical camera, and with it introduced the use of a side-light, which produced the same effect as the skylight with the horizontal camera. Mr. Smillie also attached to the side of the apparatus an endless screw, whereby the distance could be readily regulated between the lens and the object to be photographed. In 1871, and again in 1875, a camera of this kind was constructed specially for photographing the marine animals taken by the U. S. fish-commission at Wood's Holl, Mass. Its advantages were readily seen by Professor Agassiz, who asked and obtained Professor Baird's permission to construct for his own work a camera on a similar principle. Not less than six thousand negatives have been taken with the vertical camera by Mr. Smillie. G. BROWN GOODE.

A tailed child.

The *Commercial* of this city for the 17th and 18th inst. gave accounts of a tailed child recently born here. As such cases are of scientific interest, and are very rare, a party of four, including a prominent doctor and the writer, concluded to investigate the case.

We found a female negro-child, eight weeks old, normally formed in all respects, except that slightly to the left of the median line, and about an inch above the lower end of the spinal column, is a fleshy pedunculated protuberance about two and one-half inches long. At the base it measures one and one-quarter inches in circumference. A quarter of an inch from the base it is somewhat larger, and from that it tapers gradually to a small blunt point. It closely resembles a pig's tail in shape, but shows no signs of bone or cartilage. There seems to be a slight mole-like protuberance at the point of attachment. The appendage has grown in length about a quarter of an inch since the birth of the child.

The mother, Lucy Clark, is a quadroon, seventeen years old, and the father, a negro of twenty, — both normally formed.

In Darwin's 'Descent of man,' vol. i. p. 28, he speaks of a similar case, and refers to an article in *Revue des cours scientifiques*, 1867–68, p. 625. A more complete article is that by Dr. Max Bartels, in *Archiv für anthropologie* for 1880. He describes twenty-one cases of persons born with tails, most of them being fleshy protuberances like the one just described. H. W. EATON.

Louisville, Ky., May 24.

Hibernating mammals.

In *Science*, No. 68, Dr. Merriam desires the evidence upon which my statements concerning the hibernation of certain mammals were based to be well sifted; and rightly, if it is true that my observations upset the well-known (?) laws that govern hibernation. Now, these 'laws' may be in force in the Adirondack region, but they are not in Central New Jersey.

I presume Dr. Merriam will admit that the squirrels and Hesperomys occasionally take a nap during the winter; that sleep is not wholly ignored by them. In my original communication (*Science*, No. 65), I stated very clearly that the Hesperomys slept much more during the winter months than at other times; that its hibernation consisted of such additional slumber, *and nothing more*. So far as the moles are concerned, I have never found evidence of activity in winter equal to that characteristic of the summer months; and specimens kept in captivity hibernated, in the strictest sense of that term, although food was kept within reach all of the time. Of course, star-nosed moles may get out of the reach of freshets; but I have never seen evidence of this, and have often dug down to their burrows immediately the freshet subsided, and found the animals where they were when the waters began to rise. Since the appearance of Dr. Merriam's critical remarks, I have thought the matter over, and believe it probable that these moles may close the openings to their burrows so effectually as to shut out the water from the central nest. This, it must be borne in mind, is a supposition only. In conclusion, I would state that I am not given to adducing facts in proof of general statements. Convinced of their essential correctness, I leave them with others to disprove or confirm by their independent observations. In the case of the 'hibernation' of certain mammals, a comparison of my original communication with the conclusions of my critic will show that there is no very marked difference in our impressions as to the habits of the animals named; and, whether 'extraordinary or improbable,' what I have said of the Hesperomys and star-nosed mole is not simply substantially correct, but absolutely so.

CHAS. C. ABBOTT, M.D.

May 25.

THE ROYAL SOCIETY OF CANADA.

THE third session of this society was held at Ottawa, commencing on the 20th of May, and ending on the 23d. Many members and delegates were present; among the latter, Dr. Persifor Frazer of Philadelphia, who represented the American association for the advancement of science, and Dr. C. Hart Merriam of New York, who represented the American ornithological union.

An address of welcome was presented to the new governor-general of the Dominion, the Marquis of Landsdowne, inviting him to become the honorary president of the society, to which his Excellency returned a suitable reply. The president's address was delivered by the Hon. P. J. O. Chauveau, in French, and the vice-president's by Dr. T. Sterry Hunt, in English.

On the 22d of May the members and friends of the society were invited by the Ottawa field-naturalists' club to participate in an excursion to the King's Mountain, near Chelsea, in the Laurentian country to the north of the city, which proved eminently successful.

The following officers were elected for the ensuing year: president, Dr. T. Sterry Hunt; vice-president, Dr. Daniel Wilson; treasurer, Dr. J. A. Grant (re-elected); honorable secretary, Mr. J. G. Bourinot (re-elected).

The two scientific sections of the society are the third (mathematical, physical, and chemical sciences) and the fourth (geological and

biological sciences); and our account covers only the more interesting or important papers in these two sections. A full list will be found in our Notes.

In the physical section, Mr. F. N. Gisborne, the superintendent of the government telegraph-service, described a new system, devised by himself, to obviate the evil effects of electrical induction in underground and aerial conductors. A number of diagrams were presented, illustrating the conditions obtaining in neighboring circuits; and two or more circuits arranged in the ordinary way, and the same arranged according to his method, were compared. The advantages of the latter arrangement were clearly set forth; and proofs of its efficiency were presented in a tabular statement of experiments made with a section of cable about three thousand feet in length, constructed under his direction, and laid underground between two of the departmental buildings in Ottawa. The cable contains twenty indifferently insulated conductors or wires, which are divided into pairs, two conductors being twisted together in each case. Each pair constitutes a metallic circuit, one conductor being used as a 'return,' instead of the earth-plates usually employed. The peculiarity of the invention consists in the twisting of these metallic circuit conductors, as both wires are thus made to occupy an equidistant relationship with respect to any other conductor or pair of conductors in their vicinity. It was explained, that, by this device, a current introduced into a circuit is conducted down one wire, and up the other; and, the position of both wires being the same with respect to neighboring circuits, the inductive effect of the current passing down one wire is neutralized by the inductive effect of the same current passing up the return-wire.

It was also theoretically demonstrated that the twisting of the wires of the metallic circuits lessens the effect of induction of the current upon itself. When the wires of a metallic circuit are laid parallel throughout, the current induced from one wire into the other is in the same direction as the current itself passing in that wire; the effect of the current is therefore prolonged, and retardation experienced in a marked degree: whereas, when the wires are twisted closely (say, two turns to the inch), the wires occupy throughout their length a position approaching right angles with respect to each other; and the induced currents are thereby materially lessened, and retardation rendered less appreciable.

In the discussion which followed the reading of the paper, it transpired, that if a conductor were enclosed and insulated within another conductor (such, for instance, as a gutta-percha covered wire drawn through a metal tube), and both conductors were connected at either end with earth-plates, or other conductors, so as to form two independent closed circuits, the enclosed conductor might be employed to convey electrical currents, without any inductive effect being perceived, in a circuit extending parallel with, or in the neighborhood of, the outside conductor. The explanation of this condition is, that the outside conductor, which in this case cannot be used as a medium for communication, intercepts the induced currents on all sides of the inducing circuit, and in its closed circuit absorbs them.

As in such a system the outside conductors could not be utilized in the formation of circuits for purposes of communication, it is admitted, that, apart from the bulkiness necessarily attending it, the first cost of construction upon that plan renders the system comparatively impractical; whereas, in the system advanced by Mr. Gisborne, the construction is much cheaper, and all the conductors form an integral part of the communicating circuits, so that space is economized to the fullest extent.

A good deal of interest is being manifested in this invention which Mr. Gisborne has just now brought forward, although it has been a subject of investigation with him for some years past, the cable referred to in the paper having been ordered by the Dominion government during the summer of 1882.

Mr. R. Steckel presented a paper on the form of the contracted liquid vein, affecting the present theory of the science of hydraulics, in which the author claims to propound a new theory of the efflux of liquids, and describes experiments by which he has sought to test it.

Dr. T. Sterry Hunt, in his paper on the origin of crystalline rocks, maintained, in opposition to the plutonic and metamorphic hypotheses of the origin of these rocks, a new one, designated the *crenitic* hypothesis (Greek, κρήνη, 'a spring'), according to which they were formed, at an early period of the earth's history, by the agency of circulating subterranean waters rising to the earth's surface as springs. He supposes the previous existence of a chaotic layer, the last-congealed portion of a globe consolidating from the centre; which layer, rendered porous, and permeated by waters, gave up to them the materials of quartz and the felspars, after the manner of zeolites, to be deposited at the surface. The action of non-aluminous silicates, allied to pectolite or the

magnesian salts in sea-water, was the source of serpentine, pyroxene, etc. The gradual removal by solution from below, of vast quantities of material, and the resulting contraction of the primitive stratum, caused the universal corrugations of the upper acidic or gneissic layer. From the undissolved basic residual portion have come such eruptive rocks as melaphyres and basalts, while granitic and trachytic rocks are softened and displaced portions of the acidic or secondary layer. The author has developed at length this hypothesis, which, according to him, affords a satisfactory explanation of many hitherto unsolved problems in geology.

In a paper on the density and the thermal expansion of aqueous solutions of sulphate of copper, Prof. J. G. MacGregor gave an account of extended observations made to determine the density of solutions of different degrees of concentration, and at different temperatures. As a general result of the experiments, it is shown, 1°, that the rate of variation of density with temperature in all cases increases with the temperature and with the degree of concentration; 2°, that at low temperatures (below about 25° C.) the rate of change of density with temperature is for all solutions greater than the same rate for water; 3°, that the difference between these rates diminishes as the temperature increases; and, 4°, that for most solutions (probably for all) these rates are, at sufficiently high temperatures (30°–50°), the same as for water, i.e., the thermal expansion of solutions is the same as that of water at these temperatures. The experiments also substantiate a result formerly obtained by Professor Ewing and the author, that very weak solutions of this salt have a volume smaller than that of the amount of water which they contain.

Prof. E. Haanel gave a continuation of his paper, presented to the society last year, on blowpipe re-actions on plaster-of-paris tablets, in which he described the effect of treating copper with hydrobromic acid, and iron with hydriodic acid, and showed how to distinguish between selenium and mercury. He described also the coatings *per se*, for the above tablets, for selenium, tiemannite, arsenic, silver, alloys of bismuth, lead, and antimony with silver, galena, orpiment, realgar, mercury, tellurium, carbon, cadmium, and gold.

The same author gave a description of apparatus for distinguishing flame-coloring constituents when occurring together in an assay. The apparatus consists of a spectacle-frame, furnished for the left eye with plain colorless glass, and, for the right eye, with four glasses, — red, green, violet, and blue. These glasses revolve on an axis, and can be brought, either separately or in any combination, before the right eye of the operator.

Prof. N. F. Dupuis showed how to develop by simple algebraical methods certain functions ordinarily developed by the aid of the calculus.

Prof. E. J. Chapman described a series of analyses of magnetic and other iron ores from samples obtained by him personally from various parts of Ontario. The geological conditions of the deposits were also briefly given.

In the geological and biological section, Dr. A. R. C. Selwyn gave an account of his observations, in 1883, on the geology of a part of the north shore of Lake Superior, in which he considered he was able to show that the great masses of columnar trap which form the summit of Thunder Cape, Pie Island, and McKay's Mountain, were not part of a 'crowning overflow,' as they have been described to be, and newer than the Keweenawan series, but that they are contemporaneous with the black slaty shales of the Animikie group, which immediately and conformably underlie them.

Professor George Lawson presented a revision of the Canadian Ranunculaceae. The author referred to his monograph of Ranunculaceae, published in 1870, to the extensive collections that had been subsequently made, and to works published upon the North-American flora, — all of which enabled a fuller and more accurate description of Canadian ranunculaceous plants to be given now than was possible when the previous paper was prepared. The greater precision given to recent observation had also enabled the geographical range of these plants to be stated more fully. The striking diversity of modification in the form, number, and arrangement of the several parts of the flower and of the fruit, in the several genera, was pointed out. The number of Canadian species is seventy-eight, and of varieties eighteen.

Dr. T. Sterry Hunt presented a second part of his essay on the Taconic question in geology, in which he endeavored to show in the first place, more fully than has yet been done, the relations of the Taconian or lower Taconic series of stratified rocks to the succeeding Cambrian, or upper Taconic, which some geologists have confounded with the Taconian. In this connection is given a critical discussion of the studies of Perry, Marcou, and others, and the opinions of Dana, as regards the Cambrian of the Appalachian region of North America. In the second place is considered

the probable equivalence of the Taconian to the Itacolumite series of Brazil, and to similar rocks elsewhere in South America and the West-Indian Islands, as well as in Hindostan and southern Europe. All of these comparative studies, it is said, tend to establish the distinctness of the Taconian as a great and widely spread series of crystalline stratified rocks, occupying a horizon between the Cambrian and the Montalban or younger gneiss series of Europe and North America.

Some deposits of titaniferous iron ore in the counties of Haliburton and Hastings, Ontario, were discussed by Prof. E. J. Chapman. After referring to the occurrence of numerous deposits of magnetic iron ore in certain zones or belts of country in the counties of Victoria, Haliburton, Peterborough, and Hastings, he described their conditions of occurrence as those of large, isolated masses or 'stocks,' — forming, in some cases, sheathed stocks, or *stockscheiders* and *skölars*, of German and Swedish miners, — as in the great iron-ore zone of Arendal, in Norway. While these stock-masses of iron ore are, for the greater part, quite free from titanium, one of vast size in the township of Glamorgan, and another equally large mass in Tudor, are shown to contain a considerable amount of titanium. Detailed descriptions of these were given, with analyses of the ore.

Prof. E. J. Chapman also read an essay on mimetism in inorganic nature. Mimetism, as recognized in organic nature, has been regarded, on the one hand, as the direct result of a protecting Providence, and, on the other, as originating in minute approaches towards the imitated object; these becoming intensified in successive generations until the imitation becomes complete, or reaches its extreme limit. In this paper, the writer attempts to show that neither hypothesis may be absolutely correct, but that the peculiarity may be due to some occult law of 'localism' by which associated forms often become impressed with mutual resemblances. In support of this view, he refers to several curious cases in which certain minerals, normally and generally of very dissimilar aspect, become closely mimetic under certain local conditions; as seen in examples of quartz and zircon, pyroxene and apatite, etc., in the phosphate deposits of the Ottawa region.

A monograph of Canadian ferns was offered to the society by Dr. T. J. W. Burgess and Prof. J. Macoun. Professor Macoun stated, that twenty years ago the total number of ferns known to occur in Canada was forty-six, while at the present time it had increased to sixty-three. In illustrating the range of the more interesting species, he particularly noticed the occurrence of Phegopteris calcarea in Anticosti, where he had found it in 1882, and remarked that the same plant had recently been collected by Drs. G. M. Dawson and R. Bell in the country around and to the east of the Lake of the Woods.

Prof. L. W. Bailey, in a paper on geological contacts and ancient erosion in the Province of New Brunswick, summarized the more important and well-established lines of physical contact between the geological formations of New Brunswick as bearing upon the relative age of the latter, and the disturbances to which they have been subjected. Three well-marked breaks, separating groups of widely diverse character were recognized among pre-Cambrian strata, — the supposed equivalents of Laurentian, Huronian, and possibly Montalban horizons; a very marked one at the base of the Cambrian; and others successively between later formations to the base of the trias. The evidence of such breaks was shown to be of various character, including discordance of dip and strike, overlap, igneous extravasations, and intermediate erosion; and the bearing of the facts determined on the physical and geological history of north-eastern America was briefly discussed. The granites, which constitute so marked a feature in the geology of the Acadian provinces, were described as intrusive, and as the cause of the extensive alteration exhibited by the formations which they have invaded. The erosion which accompanied or followed upon the disturbances described was shown to have been enormous.

Mr. G. F. Matthew continued his illustrations of the fauna of the St. John group by presenting a paper on the Conocoryphidae, with notes on the Paradoxidae. The species of Conocoryphe referred to and illustrated are C. Matthewi Hartt (with three varieties), C. elegans Hartt, C. Baileyi Hartt (with two varieties), and a new form which the author describes as C. Walcotti. Critical remarks are also made upon Paradoxides lamellatus Hartt and P. acadicus.

In a description of a supposed new ammonite from the upper cretaceous rocks of Fort St. John, on the Peace River, Mr. J. F. Whiteaves considered it to be an undescribed species of Prionocyclus, closely allied to the type of that genus (Ammonites Woolgari of Sowerby), but with much more closely coiled volutions. It occurs in flattened nodules, in shales which are believed to be the equivalents of the Fort Benton group of the Upper Missouri section.