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THE CANADIAN JOURNAL.

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OBSERVATIONS ACCOMPANYING THE EXHIBITION OF A SPECIMEN OF "*SULA BASSANA*," (THE SOLAN GOOSE OR GANNETT), LATELY OBTAINED AT OSHAWA, C.W., AND BELONGING TO THE MUSEUM OF THE UNIVERSITY OF TORONTO.

BY THE REV. WILLIAM HINCKS, F.L.S., ETC.,
PROFESSOR OF NATURAL HISTORY IN UNIVERSITY COLLEGE, TORONTO.

Read before the Canadian Institute, February 8th, 1862.

THE specimen which I have the pleasure of bringing under the notice of the Canadian Institute this evening, may be accounted a curiosity in this part of the country, as the bird rarely leaves the neighbourhood of the sea-coast; and when it does so, can only be regarded as an accidental wanderer. The specimen, which is a female, agrees well with the descriptions and figures of the European Gannett; and having been unable to meet with any definite character of the supposed North American species, *Sula Americana*, I cannot judge whether it is really distinct or whether our individual belongs to it; but considering the tendency manifested by some naturalists to find

or make different species for different regions, I somewhat incline to number this among the imaginary ones.

The habits of the Solan goose, especially at its breeding time, have been so fully described in popular works, that I shall not dwell on the subject; but its systematic position and affinities may be worthy of some consideration, and will give me the opportunity of offering some details illustrative of views of classification, of which a general outline has been already submitted to you.

The genus *Sula* is referred to the family *Pelecanidae*, among the *Natatores* or swimming-birds; and this family is distinguished by the union of the hind toe with the others in a single membrane, great power of wing, generally short legs, the nostrils being slits with a scarcely perceptible aperture, the skin of the throat generally more or less extensible, the tongue small, and the gizzard united with the stomach. The admitted generic forms in the family are *Atagen*, the frigate-birds—(amidst much confusion about names, I have adopted those of Dr. Geo. Gray, as given in the *Genera of Birds*); *Phaeton*, the tropic bird; *Sula*, the gannett; *Graculus*, the cormorant; *Pelecanus*, the pelican; and *Plotus*, the snake-bird. These genera are not rich in species, and the family is a small one, and remarkably deviative in its habits from the mass of *Natatorial* birds; yet such striking peculiarities are observable among the genera, that Dr. G. Gray has placed them in three sub-families, and we may see reason for extending this sub-division. But before we proceed with the analysis of the *Pelecanidae*, I may perhaps be indulged in a few observations on classification generally, and especially on the best treatment of the great class of Birds, designed in illustration and confirmation of a method already submitted to the Institute.

It is well known, that according to the views of McLeay and Swainson, the plan of creation in every different group of organized beings, is sub-division into three leading,—or, since one of them is itself again divided,—into five secondary groups, which are characterized as typical, sub-typical, and aberrant—the latter itself exhibiting three variations. In applying this scheme to the various parts of organised nature, so much knowledge and ingenuity were displayed, and there were so many striking instances in which a satisfactory natural grouping seemed to result, that many were led to believe that the secret of natural classification was detected, and that in order to obtain a perfect system we had only diligently to work out in the

various parts of nature, the circles of three or five groups, with their sub-divisions and their analogies, in which all truths respecting relationship were supposed to be contained.

Individually,—though deeply interested in such inquiries,—I was never led to adopt the quinary or any kindred system. I was often forcibly struck by the apparent truth and beauty of the combinations produced; but I also fancied I met with some manifest errors, some forcing of objects into a place, and some far-fetched analogies. I was, besides, much influenced by general arguments on the subject, which, whatever be their true weight, seem to have prevailed with the great majority of naturalists. And yet, after twelve years of constant attention to the formation, arrangement, and care of museums, during which it has been a special object with me to make the specimens instructive, by placing them in natural groups, I find myself compelled by my experience to the recognition of the very kind of collections of families usually five in number, and conveniently represented as forming a circle, for which Mr. Swainson contended, and I find it impossible to resist being impressed by the remarkable analogies of corresponding groups belonging to different circles. Reflecting much on the nature of these relations, I have gradually formed a theory which seems to me to connect all the facts, and to afford all the explanation of them which we can expect. I conceive that every distinct type of animal structure is capable of being worked out with a larger proportional development of the organs of sense and motion; or, on the other hand, of those of nutrition: and under the former head the development may take the direction of power and ferocity, of greater elevation, and completeness of structure; or that of grace and activity, with general adaptation, where it is at all consistent with the plan of nature, to an aerial or arboreal life. Under the second head, the higher form of peculiarly nutritive development will be known by a well-balanced figure, with a somewhat full habit of body, comparatively quiet and gentle manners, in lower forms approaching sluggishness, and the use chiefly of food which needs not to be obtained by violence or energetic effort. But under this general head there are two other remarkable modifications: one for anomalous—often in some way elongated—forms; and one for the lowest structure consistent with the general type, very often connected with aquatic life. These are to be understood as tendencies of development, and we affirm that they include all the distinct tendencies

that are observable in nature; or, at least, that any others that can be pointed out are only occasional accompaniments of some of these.

One other observation, entirely overlooked, I believe, by Mr. Swainson and his followers, is in my estimation of very high importance for attaining to a good and natural classification. It is that occasionally, perhaps frequently, under one general type of structure we may find not only the five tendencies of development as above explained, but these exhibited in connection with several different well-marked degrees of development. Thus in the highest class, that which peculiarly expresses power and elevation of structure, of the sub-kingdom or branch Vertebrata—the class Mammalia—we have four circles expressing degrees of development, in each of which—excepting the highest, which is occupied by man alone—we find manifestations of all the five tendencies of development in natural groups, which are here called Orders; and in the class Birds, which in the same sub-kingdom expresses the tendency to activity and grace, with prevailing adaptation to aerial or arboreal life, we obtain the clearest idea of the affinities, by placing in the centre the most especially typical groups of small birds forming the great families of the warblers and finches; surrounding these by a circle of five sub-orders of Insessorial birds; and again placing outside of them five more deviative forms exhibiting greater extremes of the tendencies of development already displayed in the inner circles. The great mass of birds forming the two inner circles, constitute the order Insessores, or perching birds, in technical systems; whilst the outer circle embraces Raptores, birds of prey; Scansores, climbing birds; Rasores, poultry and game birds, with which are connected the ostrich tribe, sometimes regarded, very needlessly, as a separate order; Grallatores, stilted or wading birds; and Natatores, swimming birds,—the latter being the lowest group of birds, and analogous with the Cetacea among mammalia.

With due attention to these concentric circles expressing varying degrees of development of the same type, I am disposed to maintain that the several tendencies pointed out will bring before us all really distinct families in every part of the animal kingdom excepting that in the lowest divisions, as might have been anticipated from reasoning, the lower forms can have no place, so that we recognise only three tendencies instead of five; and that in various parts of the general system there will be cases in which, from our ignorance of certain existing forms, or from the incompatibility of a certain tendency of

development with a particular type, breaks will be found interfering with the perfect symmetry of our plan.

What Mr. Swainson intends by naming the groups which make up each circle, *typical*, *sub-typical*, and *aberrant*, is that one of these groups will be found to be especially characterized by those peculiarities of structure or mode of life which belong to the whole circle, so as to display its distinctions in their most striking form, and this one is generally found to be the most numerous in species: another group will approach this both in its relations to the type and in number of species, but will exhibit special features in analogy with some other circle, so as to show the characters of the type differently modified. The remaining groups, with a preponderance of the characters of the type, unite such deviations expressing their own peculiar plan of development, as make them appear like transitional forms leading towards other circles. Mr. Swainson placed what he took to be the typical group first, then the sub-typical, and after these the aberrant; the consequence of which is, that he places analogous forms in different positions in the different circles. I by no means deny that in each circle there is one group whose plan of development is specially adapted to the type, and which thence displays most abundance and variety of species; this, indeed, logically follows from my general theory; but as I always place the representatives of the same tendencies of development in the same position in each circle, it must follow that the typical groups will have various situations in the different circles, according to the characteristic tendency in each, whilst the analogical groups will always be found in the same position, and this I regard as a very important advantage of my plan.

The preceding remarks will be sufficient on the present occasion, as illustrating my idea of a natural system in the animal kingdom, and I have had occasion to enumerate the great divisions of the class Birds, with their mutual relations. It has been stated that the family *Pelecanidae*, with which we are now more immediately concerned, belongs to the order *Natatores* (swimming-birds), which may upon the whole be regarded as containing the lowest forms of bird life. We will first inquire how many really distinct primary families are found in this order, and further, how far their structure and habits correspond to the notion of their representing in this circle, by modifications of its general type, tendencies of development which have been already indicated in the orders themselves, and which, according to our theory,

we might expect to see exhibited throughout the animal kingdom. It is only by the more modern systematists that families and sub-families have been interposed between the order and the genera. Cuvier and Vander Hoeven each admit *four* great families of *Natatores, Palmipedes* or *Anseres*, as the order has been named by different writers. Cuvier gives them as the Divers (*Brachypteres*); the Gulls and their allies including the Petrels (*Longipennes*); our *Pelecanidae*, called by Cuvier *Totipalmati:* and the Ducks and Geese (*Lamellirostres.*)

Vander Hoeven, with a slight difference in the order of the series and in the naming, gives: 1. *Brevipennes* or *Urinatores;* 2. Ducks (*Lamelloso-dentati*); 3. *Steganopodes* (Illiger's name for the *Totipalmati* of Cuvier), the Pelicans; and, 4. *Longipennes*, the Gulls, Terns, and Petrels.

Dr. George Gray, following Vigors, Swainson, and others, separates the Auks and Penguins (his family *Alcidae*) from the Divers, *Colymbidae*. Prince Bonaparte considers the Penguins, *Spheniscidae*, as being also distinct; and he, as well as Gray, separates the *Procellaridae* from the Gulls and Sea Swallows. Thus Prince Bonaparte receives seven, Dr. Gray six, Swainson five, and other great authorities only four principal families of *Natatores*. In my view of the subject, the difference between *Alcidae* and *Colymbidae* is well established; but *Spheniscidae* (the Auks of the southern hemisphere) are to be accounted only as a sub-family; whilst I think both the Petrels and Terns only sub-families of *Laridae*.

It appears to me, in short, that, putting his theory out of view, Mr. Swainson has here exercised a wise discretion, recognizing a manifest distinction of structure and habits, but refusing, where there are very strong points of general resemblance, to make minor differences a pretence for multiplying families. Let us now ask whether we can perceive among the families of *Natatores* or swimming birds, any thing like representation of the several tendencies of development which have been pointed out as occurring in the various divisions of the animal kingdom.

The character of power and of the highest development suited to the type is in the outer circle of birds exhibited by the order of *Raptores*, the birds of prey. We have then to observe whether any of our *Natatorial* families displays characteristics analogous with these birds. We might look especially to strength of wing, rapidity of

flight, taking the prey by a pounce or swoop, and being less decidedly aquatic in habits than the rest of the order—at least with some exception in the family representing the second tendency. We can hardly fail to be led in pursuit of such characters to the *Pelecanidae*, which are remarkable for the length and power of their wings, swim less than any of the other birds organised for aquatic life, and seize their prey either like the *Atagen*, or Frigate bird (the most peculiarly *Raptorial* of the family), by a swoop from the surface of the water, or, like the Gannett and Pelican, by a sudden stroke from above. If we inquire what family of swimming birds deviates least in figure and flight from the most typical birds, forming a link of connection between the *Insessorial* and *Natatorial* orders, and impressing us with the activity and gracefulness of its movements and its union of aerial with aquatic modes of life, we immediately think of *Laridae*—the Gulls, Terns, and Petrels as certainly occupying the second place. It needs no array of evidence to prove that *Anatidae*, including swans, geese, and ducks in all their variety, represent the nutritive tendency, and are analogous with the poultry among the orders of birds. They constitute the largest and most characteristic of the *Natatorial* groups —Mr. Swainson's typical family. The lengthened bill and neck, generally elongated figure, and frequently anomalous feet of the Divers (*Colymbidae*), point out their position as representing the fourth tendency in analogy with wading birds; and finally, the entire unfitness for living out of water or moving much in any other element, with the manifestly low structure as compared with the rest of the order, and with almost all other birds, proves that we are right in assigning the fifth place to *Alcidae*, the Auks and Penguins.

It remains to be considered whether, even in the comparatively small and deviative family of the *Pelicanidae*, an examination of the generic forms will not enable us to mark out sub-families however limited in number of species, again indicating the same tendencies. And here I would name the Frigate birds (*Atageninae*) as displaying the *raptorial* tendency; the *Phaetoninae* or Tropic birds, whose graceful figure, little removed from that of *Insessorial* birds, has caused them to be placed among the Gulls, notwithstanding the beak and the feet showing its connection with the Pelicans, will naturally take the second place.

The bird which has given occasion to these observations, with the larger nearly-related genus *Graculus*, the Cormorant (*Phalacrocorax*

and *Carbo* of different authors), forming the sub-family *Sulinæ*, may occupy the third position; *Plotinæ*, characterized by the long flexible neck, which has obtained for the birds the name of "snake birds," take the fourth place; and the anomalous Pelicans themselves, *Pelecanidæ*, seem fitly to fill the fifth.

What has thus been brought forward in respect to one order and one family is an example of what I conceive to be the proper treatment of every division of the animal kingdom, and I cannot but feel that it presents to our notice at the same time the affinities and analogies of natural objects with a clearness and effect of which we find the want in the methods more commonly employed. It is, of course, only from a number of instances appearing to yield truly natural results, and all plainly displaying the corresponding analogies, that any general conclusion can be drawn in favour of the system, and my confidence in it arises from my belief that I can produce such instances; and from the uniformity with which I have found the general idea in my mind assist me in the solution of difficult questions, and in improving the arrangement of tribes which seemed to me to have been left by others in the most unsatisfactory condition.

SCIENCE IN RUPERT'S LAND.

COMMUNICATED BY DANIEL WILSON, LL.D.

THE present year has witnessed, in the founding of the Institute of Rupert's Land, a remarkably interesting illustration of the changes which are slowly but surely revolutionising this vast continent; and giving evidence of an intellectual dawn which heralds the period when states and empires of the great northwest are to claim their place in the world's commonwealth of nations. The meeting for the formation of the Institute was held on the 12th of February, in the Court-room of Upper Fort Garry, where the Lord Bishop of Rupert's Land, as president of the Institute, delivered the opening address. After alluding to the Universities and other seats of learning in England, and to the influence they had exercised in fostering science,

his Lordship referred to the striking contrast presented to the natives and colonists of the Red River Settlement in their field of labour. But, while, as he remarked, all might feel inclined to acknowledge the Universities and Colleges of Britain, and of Europe at large, as the nurseries of science, where its fitting guardians were to be looked for; and to recognise that its progress was to be anticipated under their fostering care: "Have we," asked the learned prelate, speaking in the name of his Red River auditors, "Have we any field for such pursuits? Does our land, in its present state, offer scope and opportunity for anything of the kind proposed? To this our reply is, others think so. Only the summer before last a party of travellers passed through the Settlement and proceeded northward,—not lured by the prospect of gain; not attracted by any dazzling commercial speculation; yet fired, as was obvious to all who met them, with no less ardent enthusiasm, and eager to overcome every obstacle with this one object at heart. They wished, as you will recollect, to gain a spot from which, as they had calculated, they might obtain the best view of a marvellous phenomenon in the heavens.* Theirs was surely a praiseworthy ambition; and you saw in them, that science has her devoted followers, ready to encounter on her behalf any difficulties. The very same summer, I found on my arrival at Moose, that a traveller had preceded me,† and gone along the shores of the East Main, sent under the auspices of the Smithsonian Institution chiefly as an Oologist or collector of the eggs of wild birds. And we have yet another‡ in our territory on the Mackenzie River, the Youcon, or the shores of the Arctic Sea, who has spent two or three winters in those solitary regions, gathering specimens of the insects of the land for the same scientific body. Besides those, there have been two or three fully organized exploratory expeditions: that of the British Government under Capts. Pallisser and Blakiston, with its Naturalist, Geologist and Astronomer; and that of the Canadian Government under Mr. Dawson and Professor Hind, with its reports carefully drawn up and digested, and the detailed results submitted to the observation of the public. Such is apparently the judgment of others: they survey the land and look into its treasures and find something to reward their labors. Shall we, however, think only of strangers; have we no

* The Astronomical Expedition to take observations of the Solar Eclipse of July 18th, 1860.
† Mr. Dressler.
‡ Mr. R. Kennicott.

spirit of research among ourselves? There is one present,* who n the midst of a laborious life, has often stolen hours from rest, looking with curious eye into the mysteries of nature, scrutinizing the beautiful texture of the insect's wing, or minutely examining the wild flower of the Prairie or the Bay. Another too there is, holding the same rank in the Hon. Company's service, whose best energies have, for many years, been given to the cause ; who has pursued it unintermittingly, whether at Martin's Falls, at Norway House, or as I last saw him, full of the one topic, on the shores of Lake Superior. The name of Mr. Barnston is not unknown in Britain as that of a scientific collector, and his valuable contribution of insects from this country may be seen in the Entomological Department of the British Museum."

Dr. Schultz, in addressing the meeting, sought to indicate the field of scientific labour to be overtaken by the new Institute, and to stimulate its members to a hearty co-operation by further reference to scientific labours already successfully carried out in their midst:— "First," he remarked, "we shall be expected to give accurate scientific information on the Botany, Zoology, Geology, Ethnology, Meteorology, and Physical Geography of this country; to collect and exchange specimens with Societies of a like character, to publish the results of our researches, to give lists of specimens collected, and to correct the maps of this country. Here, we shall be expected to improve the condition of the country by encouraging the Arts and Manufactures, making experiments on the native plants, introducing new plants and seeds; by establishing a Library and Museum, and if assisted, an Observatory; and to answer those expectations, what have we done ; what are we doing; and what can we do? In the '*Fauna Boreali Americani*' I note the following passage by Sir John Richardson: 'Science is indebted to the exertions of the Hudson Bay Company for all that is known of the Ornithology of the American fur countries,' and he goes on to specify the labours and contributions of many officers of that company in this country—Mr. Light, Mr. Islam, Mr. Graham, Mr. Martin, Mr. Hutchins (who made valuable contributions on the habits of the northern birds), Mr. David Douglas, and others. This is what has been done in Ornithology alone; and Zoology, Botany, Meteorology, and Geology are also largely indebted to those and other

* W. Mactavish, Governor of Assiniboia, whose valuable collections of Natural History received the thanks and acknowledgments of the Smithsonian Institution in 1861.

observers. For what we are doing now, we need only say that year after year we find in the Reports of the Smithsonian Institution acknowledgments of valuable contributions from Governor Mactavish; and other Societies and individuals in Britain and Canada are also indebted for specimens to this indefatigable collector. Mr. Donald Gunn, a well known collector and observer; Mr. Bernard Ross, whose name is well known in Britain and Canada: Mr. Ross the well known Historian of the Colony; Mr. Bannatyne, who made valuable collections for Professor Agassiz, and many others may in like manner be referred to. And now, what may we do? First, we have advantages for collecting possessed by no other Society of a like character. The most unscientific among us while travelling could note down the appearance of the country, the character of the soil, the prevailing timber trees, the width, depth, and course of the rivers; could chip off pieces of the rock, pick up fossils, press a plant, or preserve a skin, and thus make valuable contributions to our Institute. As to the industry of those accustomed to collect, I need only direct your attention to the table before us, where you will notice specimens from the neighbourhood of the Rocky Mountains, from the north shore of Lake Superior, from the Missouri River, from the Athabasca, Great Slave Lake, Mackenzie River, and even from the shores of the Icy Sea. Those beautiful birds are from the Ornithological collections of Mr. Bannatyne; the fossils from the Geological collection of the Ven. Archdeacon Hunter, procured by himself during his residence near the Arctic Circle; others from Lake Superior, kindly given by the Lord Bishop; the Entomological specimens are from Governor Mactavish; and the collection of curiosities are samples of the workmanship of the Esquimaux, Chippewyans, Sioux, and other Indian tribes; and I am encouraged when I see those indefatigable collectors here to-day, willing not only to give their valuable collections to the museum, but to become active working members of this Institute, and to give us from time to time the results of their observation and research."

It is impossible to look upon the foundation of such an Institute, without feeling that here, on the remote confines of civilization, we witness the establishment of an outpost of science, from whence we may look for returns of the highest interest and value. It is situated in the very midst of the diverse Indian tribes of the North West, still

in a state of nature; and its President accordingly remarks on this department of investigation:—

"With the Indian tribes and all their ramifications and subdivisions, we shall invite discussion on Ethnology; with the diversified tongues and dialects which these tribes speak, philology and comparative grammar will claim attention; whilst with the vast and varied surface of the continent, and its only partially explored northern boundary, physical geography will naturally prove a subject of absorbing interest to all."

The Institute of Rupert's Land, thus happily inaugurated, includes among its members and correspondents educated men both of the resident clergy, and the officers of the Hudson's Bay Company, stationed at many important points over the vast country ranging from the Pacific to Lake Superior and towards the Arctic Sea. A great and still unexplored field, invites their labours; and there is no department of science which may not be largely benefited by their combined exertions. There is also another class of labourers, to whom science already owes much, and from whose wisely directed co-operation more may be anticipated. "Missionaries," says a recent Christian reviewer, "ought to be the pioneers and promoters of science, hand in hand with the Gospel, throughout the world. In fact they have been so. And we believe it will be found on close inquiry, that the most efficient labourers in the purely spiritual field, have been on the whole, or on the average of numbers, those who also have done most to shed a brilliant lustre upon the missionary character and name in the fields of natural and scientific inquiries and studies."

An interesting illustration of what may be looked for from this class of labourers is furnished by a communication from the Rev. W. W. Kirkby, a missionary of the Church of England, transmitted by Mr. Ross to the New Institute of the North West, from which some extracts will be found to embody observations of considerable value.

The river Youcon is the most westerly of the great rivers emptying into the Arctic Ocean. It rises in the Hudson's Bay Territory, but its principal course is through Russian America, where, after receiving the waters of the Porcupine River, it unites with the Colville, and flows nearly due north in longitude 150° W. into the Arctic Ocean. To a portion of the region drained by this great water system, Mr. Kirkby recently directed his attention, and thus details some of the

incidents of his journey, of a nature most calculated to prove interesting to the general reader:—

"I left home on the 2nd of May, in a canoe paddled by a couple of Indians belonging to my mission. We followed the ice down the noble McKenzie, staying awhile with Indians wherever we met them; and remained three or four days at each of the Forts along the route. On the 11th of June I left the zone in which my life had hitherto been passed, and entered the less genial *arctic* one. Then, however, it was pleasant enough. The immense masses of ice piled on each side of the river sufficiently cooled the atmosphere to make travelling enjoyable. The sun shed upon us the comfort of light nearly the whole twenty-four hours, and as we advanced further northward he did not leave us at all.

"Between Point Separation and Peel's River, we met several parties of Esquimaux, all of whom, from their theivish propensities, gave us a great deal of trouble, and very glad were we to escape out of their hands without loss or injury. They are a fine looking race of people, and from their general habits and appearance, I imagine them to be much more intelligent than the Indians. If proof were wanting, I think we have it in a girl brought from the Coast, little more than three years ago, who now speaks and reads the English language with considerable accuracy. The men are tall, active, and remarkably strong, many of them having a profusion of whiskers and beard. The women are rather short, but comparatively fair, and possess very regular and by no means badly formed features. The females have a very singular practice of periodically cutting the hair from the crown of their husband's head (leaving a bare place precisely like the tonsure of a Roman Catholic priest), and fastening the spoil to their own, they wear it in bunches on each side of their face, and on the top of their head, something in the manner of the Japanese who recently visited the United States. This custom, as may be imagined, by no means improves either their figure or appearance, and as they advance in life, the bundles must become uncomfortably large. A benevolent old lady was most urgent on me to partake of a slice of blubber; but I need hardly say that a sense of taste caused me to decline her hospitality. Both sexes are inveterate smokers. Their pipes, which they manufacture themselves, are made principally of copper. In shape, the bowl is very like a reel used for cotton, and the hole through the centre is as large as the aperture for holding the tobacco. This they

fill, and when lighted, they do not allow a single whiff to escape, but swallow it, withholding respiration until the pipe is finished. The effect of this upon their nervous system is great. They often fall on the ground completely exhausted, and for a few minutes tremble like an aspen leaf. The heavy beards of the men, and the fair complexions of all, astonished my Indians greatly, and in their surprise they called them 'Mannoli Conde,' like the white people. They were all exceedingly well dressed in deer-skin clothing, with the hair outside, which being new, and nicely ornamented with white fur, gave them a clean and very comfortable appearance. Their little Kiyachs were beautifully made, and the men were armed with deadly-looking knives, spears and arrows, all of their own manufacture. The Indians are in great dread of them; and so afraid of my safety were two different parties that I met on my way down, that a man from each of them, who could speak a little Eskimos, volunteered to accompany me, and their freely rendered services proved invaluable to me. Poor fellows, they will never see this; but I cannot refrain from paying them here my tribute of gratitude and thanks.

"At Peel's River I met with a large number of Loucheux Indians, all of whom received me most kindly, and listened attentively. These are a part of the great family who reach to the Youcan and beyond; but from their longer association with the whites, many of the darker traits that belong to their brethren on the Youcan, pertain, if at all, in a much milder form, to them and to the Indians at Lapienes House.

"I left my canoe and Indians, as well as those who had accompanied me, at the Fort; and taking two others who knew the way, I pursued the journey on foot over the Rocky Mountains to Lapienes House. This part of the journey fatigued me exceedingly, not so much from the distance (which was only from 75 to 100 miles,) as from the badness of the walking, intense heat of the sun, and myriads of the most voracious mosquitos that I have encountered in the country. There were several rivers to ford, which from the melting snows and recent rains, were just at their height. Fortunately they were neither very deep nor wide, or my stature and strength would have been serious impediments to my getting over them.

"At Lapienes House I met Mr. Jones, who was my companion from Red River to Fort Simpson. He had come up in charge of the Youcon boat, and kindly granted me a passage. I had fortunately a bundle of Canadian newspapers in my carpet bag, some of them

containing speeches on educational subjects by his venerable grandfather the Bishop of Toronto. Five days of drifting and rowing down the rapid current of the Porcupine River brought us to its confluence with the Youcan, on the banks of which, about three miles above the junction, the Fort is placed. I met with a cordial reception from Mr. Lockhart, who was in charge, as well as from the energetic naturalist, Mr. R. Kennicott, who came into the district with me, and passed the greater part of his first winter at Fort Simpson. He delighted me with the assurance that he had met with a rich field for his labours as a naturalist, and that his efforts had been crowned with much success, especially in the collection of eggs; many rare and some hitherto unknown specimens, both of birds and their eggs, having been obtained by him, so that the cause of science in that department will be greatly benefitted by his labours. Among many others secured by him, I noticed the eggs and parent birds of the American Widgeon, the Black duck, Canvass-back duck, Spirit duck (*Bucephala albeola*); small l- ick-head duck (*Fulix affinis*); the Wax-wing, (*Ampelis garrulus*); Kentucky warbler, the Trumpeter swan, the Duck hawk (*Falco anatum* and two species of juncoes. The majority of those, however, have already been obtained in other parts of the district by the persevering zeal of Mr. Ross, the gentleman in charge at Lapienes; and the wax-wing, which I noted as an exception, I have since learned builds its nests numerously in the vicinity of Bear Lake.

"On my arrival at the Youcan there were about five hundred Indians present, all of whom were astonished, but agreeably surprised, to see a missionary among them. They are naturally a fierce, turbulent, and cruel race; approximating more nearly to the Plain tribes than to the quiet Chippewyans of the McKenzie valley. They commence somewhere about the sixty-fifth degree of north latitude, and stretch westward from the McKenzie to Behring Straits. They were formerly very numerous, but wars both among themselves and with the Esquimaux have sadly diminished them. They are however still a strong and powerful people. They are divided into many petty tribes, each having its own chief, as the Tä-tlit-Kutchin (Peel's River Indians); Tä-küth-Kutchin (Lapiene's House Indians); Kutch-a-Kutchin (Youcan Indians); Touchon-tay-Kutchin (Wooded country Indians), and many others. But the general appearance, dress, customs, and habits of all are pretty much the same, and all go under the general names of Kutchin (the people) and Loucheux (squinters). The former is

their own appellation, while the latter was given to them by the whites. There is, however, another division among them, of a more interesting and important character than that of the tribes just mentioned. Irrespective of tribe, they are divided into three classes, termed respectively Chit-sa, Nate-sa, and Tanges-at-sa—faintly representing the aristocracy, the middle classes, and the poorer orders of civilized nations: the former being the most wealthy, and the latter the poorest. In one respect, however, they greatly differ, it being the rule for a man not to marry in his own, but to take a wife from either of the other classes. A Chit-sa gentleman will marry a Tanges-at-sa peasant without the least feeling of degradation. The offspring in every case belongs to the class of the mother. This arrangement has had a most beneficial effect in allaying the deadly feuds formerly frequent among them. I witnessed a contest this summer, but it was far from being of a disastrous nature. The weapons used were neither the native bow nor imported gun, but the unruly tongue, and even it was used in the least objectionable way. A chief, whose tribe was in disgrace for a murder committed the summer before, met the chief of the tribe to which the victim belonged, and in the presence of all commenced a brilliant oration in favour of the latter and his people, while he feelingly deplored his own and his people's inferiority. At once, in the most gallant way, the offended chief, in a speech equally warm, refused the compliments so freely offered, and returned them all with interest upon his antagonist. This lasted for an hour or two when the offender, by a skilful piece of tactics, confessed himself so thoroughly beaten that he should never be able to open his lips again in the presence of his generous conqueror. Harmony was the inevitable result.

"The dress of all is pretty much the same. It consists of a tunic or shirt reaching to the knees, and very much ornamented with beads and ioqua shells from the Columbia. The trousers and shoes are attached, and ornamented with beads and shells similar to the tunics. The dress of the women is the same as that of the men, with the exception of the tunic being round instead of pointed in front.

"The beads above mentioned constitute the Indian's wealth. They are strung up in lengths in yards and fathoms, and form a regular currency among them. A fathom being the standard, and equivalent to the "made beaver" of the Company. Some tribes, especially the Kutch-a-Kutchin, are essentially traders, and instead of hunting

themselves they purchase their furs from distant tribes, among whom they regularly make excursions. Often the medicine-men and chiefs have more beads than they can carry abroad with them, and when this happens the Company's stores are converted into banking establishments, where the deposits are invested for safe keeping. The women are fewer in number, and live a much shorter time than the men. This mortality among the women arises from their early marriage, the harsh treatment they receive, and the laborious work which they have daily to perform. While the marked inferiority in point of numbers is caused, I fear, by acts of infanticide, which are prevalent among them on the birth of female children. Praiseworthy efforts have been made by the Company's officers to prevent this, but the unhappy mothers have replied that they did it to prevent the child from experiencing the hardships they endure.

"The men reminded me of those of the Plain tribes, with their birds and feathers, nose jewels of ioqua shells, necklaces of copper, and plentiful supply of paint, which was almost the first time I had seen it used in the district. The nose jewels of the ioqua shells gave the expression of the face a singular appearance. The women did not use much paint, but its absence was atoned for by tatooing, which appeared universal among them. This singular custom seems to be one of the most widely diffused practices of savage life; and was not unknown among the ancients, as it, or something like it, seems to be forbidden to the Jews: "Ye shall not print any marks upon you."—Lev. xix. 28.

"Polygamy, which is prevalent in almost all other barbarous nations, is also common among these Youcon Indians, notwithstanding the great desparity in numbers of the sexes; and is often the source of much domestic unhappiness among them. The New Zealander multiplies his wives for show; but the object of the Kutchin is to have a greater number of poor creatures whom he can use as beasts of burden for hauling his wood, carrying his meat, and performing the drudgery of his camp. The Kutchins marry young, but no courtship precedes, nor does any ceremony attend the union. All that is requisite is the sanction of the mother of the girl, and often it is a matter of negotiation between her and the suitor when the girl is in her childhood; this, indeed, constitutes almost the sole prerogative of the sex. Neither the father nor any other of the girl's relatives apparently is allowed to have a voice in the matter.

"The tribes frequenting Peel's River dispose of their dead on stages, the corpse being securely enclosed in a rude coffin made out of a hollowed tree. About the Youcon, the older practice was to have the ashes collected, placed in a bag, and suspended from the top of a painted pole. Nightly wailings follow for a time, when the nearest relative makes a feast, invites his friends, and for a week or so the dead dance is performed, and a funeral dirge sung, after which all grief for the deceased is ended. I witnessed one of these dances while at the Fort; and have been told by others that the dead song is full of wild and plaintive strains, far superior to the music of any other tribes in the country. Altars or rites of religion they had none; and before the traders went there, apparently they had no idea of a God to be worshipped. They have their medicine men, in whose powers they place implicit faith, and whose aid they purchase in seasons of sickness or distress."

Mr. Kirkby describes his labours among these degraded savages as having been attended with many ameliorating results. Mothers, he says, confessed to him their deeds of infanticide, in terms sickening to listen to; evidencing as they did the misery of the wretched mother, driven to the revolting crime from a perverted tenderness for the child; and at the same time he bears testimony to the beneficent influence exercised by the officers of the Hudson's Bay Company in the Mackenzie River and Youcon valleys, in lessening the savage characteristics of the wild tribes by whom these are peopled. He describes the Flora of the region as exceedingly rich and varied; though expressing regret that he does not himself command a sufficient knowledge of Botany to describe it in detail. The Chive, a species of Onion, he speaks of as growing abundantly on the banks of the Porcupine River; and he promises to furnish in future communications a minute account of the geological features and the fauna of the district; as well as some of the legends of the Indian tribes occupying that remote and inhospitable region.

Such is a specimen of some of the first gleanings of science in "Rupert's Land," giving a foretaste of the valuable contributions which may be looked for from a band of intelligent labourers, combined to reap the rich harvest of varied knowledge in that virgin field. The incidental notice of the Esquimaux met with by Mr. Kirkby between Point Separation and Peel's River, though slight, is important, in its confirmation of recent notices by Arctic voyagers. The

Esquimaux, though claiming no share among the historical races of the world, and exercising no influence on the political relations of the Eastern and Western hemispheres, nevertheless occupy a remarkable position as the only people common alike to Asia and America. As the hyperborean type of the human race, they have usually been described as dwarfish and stunted. Dr. Latham especially refers to the physical difference between the Esquimaux and American Indians as constituting, along with the difficulties of their language, a valid basis of reasoning upon the difficult question as to how America was peopled. In defining those physical differences, he remarks: "Stunted as he is in stature, the Esquimaux is essentially a Mongol in physiognomy. His nose is flattened, his cheek-bones project, his eyes are often oblique, aud his skin is more yellow and brown than red or copper-coloured." But Mr. Kirkby describes the Esquimaux whom he came in contact with as tall, active, remarkably strong, with heavy beards and a profusion of whiskers; while their complexions were so fair that his Indian guides compared them to Europeans. The features, especially of the women, are also referred to as regular and well-formed; while the privations to which they are exposed appear to have quickened their natural intelligence, so as to place them in that respect greatly in advance of the Red Indians bordering on the Arctic Circle. With opportunities so favourable for carrying on minute observations on the tribes of the North Western regions, noting their languages, and witnessing their native arts and customs, we may anticipate many valuable contributions to this department of science, when such labours are systematised, and guided in the most important directions of inquiry, by the combined exertions of those who are now happily organising a Scientific Institute for the North West.

REVIEWS.

Sketches of the Natural History of Ceylon; with Narratives and Anecdotes illustrative of the Habits and Instincts of the Mammalia, Birds, Reptiles, Fishes, Insects, &c.; including a Monograph on the Elephant, and a description of the modes of capturing and taming it. With engravings from original drawings.

By Sir Jas. Emerson Tennent, K.C.S., LL.D., &c., author of "Ceylon: an Account of the Island—Physical, Historical, and Topographical," &c.. London: Longman, Green, Longman, and Roberts. 1862.

Sir Jas. E. Tennent has here, as he informs us in his preface, given us a separate and much enlarged edition of the portion of his work on Ceylon which relates to Zoology. The additions chiefly belong to the narratives and anecdotes to which he could not well devote the necessary space in his larger work. The book in its present form is not only highly creditable to the knowledge and zeal of its author, and a very useful contribution to the department of geographical zoology, but a most entertaining and instructive companion to the lover of Nature, and admirably calculated to encourage a taste for natural history studies in the young of both sexes. It is a choice volume for the family and school library, and other collections which are expected to unite entertainment with instruction. We have taken it up now with the intention of making a few interesting extracts which will justify our recommendations, and make our readers desirous of seeing the work itself. We begin with a passage relating to one of the bats, which, from its numbers and curious habits, occupies a conspicuous place in the Ceylon fauna:

"But of all the bats, the most conspicuous from its size and numbers, and the most interesting from its habits, is the rousette of Ceylon; the 'flying fox,' as it is called by Europeans, from the similarity to that animal in its head and ears, its bright eyes, and intelligent little face. In its aspect it has nothing of the disagreeable and repulsive look so common amongst the ordinary vespertilionidæ; it likewise differs from them in the want of the nose-leaf, as well as of the tail. In the absence of the latter, its flight is directed by means of a membrane attached to the inner side of each of the hind legs, and kept distended at the lower extremity by a projecting bone, just as a fore-and-aft sail is distended by a 'gaff.'

"In size the body measures from ten to twelve inches in length, but the arms are prolonged, and especially the metacarpal bones and phalanges of the four fingers over which the leathery wings are distended, till the alar expanse measures between four and five feet. Whilst the function of these metamorphosed limbs in sustaining flight entitles them to the designation of 'wings,' they are endowed with another faculty, the existence of which essentially distinguishes them from the feathery wings of a bird, and vindicates the appropriateness of the term *Cheiro-ptera*, or 'winged hands,' by which the bats are designated. Over the entire surface of the thin membrane of which they are formed, sentient nerves of the utmost delicacy are distributed, by means of which the

animal is enabled during the darkness to direct its motions with security, avoiding objects against contact with which at such times its eyes and other senses would be insufficient to protect it. Spallanzani ascertained the perfection of this faculty by a series of cruel experiments, by which he demonstrated that bats, even after their eyes had been destroyed, and their external organs of smell and hearing obliterated, were still enabled to direct their flight with unhesitating confidence, avoiding even threads suspended to intercept them. But after ascertaining the fact, Spallanzani was slow to arrive at its origin; and ascribed the surprising power to the existence of some sixth supplementary sense, the enjoyment of which was withheld from other animals, Cuvier, however, dissipated the obscurity by showing the seat of this extraordinary endowment to be in the wings, the superficies of which retains the exquisite sensitiveness to touch that is inherent in the palms of the human hand and the extremeties of the fingers, as well as in the feet of some of the mammalia. The face and head of the *Pteropus* are covered with brownish-grey hairs, the neck and chest are dark ferruginous grey, and the rest of the body brown, inclining to black.

"These active and energetic creatures, though chiefly frugivorous, are to some extent insectivorous also, as attested by their teeth, as well as by their habits. They feed, amongst other things, on the guava, the plantain, the rose-apple, and the fruit of the various fig-trees. Flying foxes are abundant in all the maritime districts, especially at the season when the *pulum-imbul*, one of the silk-cotton trees, is putting forth its flower buds, of which they are singularly fond. By day they suspend themselves from the highest branches, hanging by the claws of the hind legs, with the head turned upwards, and pressing the chin against the breast. At sunset taking wing, they hover, with a murmuring sound occasioned by the beating of their broad membranous wings, around the fruit trees on which they feed till morning, when they resume their pensile attitude as before.

"A favourite resort of these bats is to the lofty india-rubber trees, which on one side overhang the Botanic Gardens of Paradenia, in the vicinity of Kandy. Thither, for some years past, they have congregated, chiefly in the autumn, taking their departure when the figs of the *ficus elastica* are consumed. Here they hang in such prodigious numbers, that frequently large branches give way beneath their accumulated weight. Every forenoon, generally between the hours of 9 and 11 A.M., they take to wing, apparently for exercise, and possibly to sun their wings and fur, and dry them after the dews of the early morning. On these occasions their numbers are quite surprising, flying in clouds as thick as bees or midges. After these recreations they hurry back to their favourite trees, chattering and screaming like monkeys, and always wrangling and contending angrily for the most shady and comfortable places in which to hang for the rest of the day protected from the sun. The branches they resort to soon become almost divested of leaves, these being stripped off by the action of the bats, attaching and detaching themselves by means of their hooked feet. At sunset, they fly off to their feeding-grounds, probably at a considerable distance, as it requires a large area to furnish sufficient food for such multitudes.

"In all its movements and attitudes, the action of the *Pteropus* is highly interesting. If placed upon the ground, it is almost helpless, none of its limbs

being calculated for progressive motion; it drags itself along by means of the hook attached to each of its extended thumbs, pushing at the same time with those of its hind feet. Its natural position is exclusively pensile; it moves laterally from branch to branch with great ease, by using each foot alternately, and climbs, when necessary, by means of its claws.

"When at rest, or asleep, the disposition of the limbs is most curious. At such times it suspends itself by one foot only, bringing the other close to its side, and thus it is enabled to wrap itself in the ample folds of its wings, which envelop it like a mantle, leaving only its upturned head uncovered. Its fur is thus protected from damp and rain, and to some extent its body is sheltered from the sun."

Our next extract relates to the leopard, illustrating, by an anecdote communicated by Major Skinner, the dread with which this animal is said to regard man:

"The following morning, anxious to gain a height for my observations in time to avail myself of the clear atmosphere of sunrise, I started off by myself through the jungle; leaving orders for my men, with my surveying instruments, to follow my track by the notches which I cut in the bark of the trees. On leaving the plain, I availed myself of a fine wide game track which lay in my direction, and had gone, perhaps, half a mile from the camp, when I was startled by a slight rustling in the nilloo to my right, and in another instant, by the spring of a magnificent leopard, which, in a bound of full eight feet in height over the lower brushwood, lighted at my feet within eighteen inches of the spot whereon I stood, and lay in a crouching position, his fiery gleaming eyes fixed on me.

"The predicament was not a pleasant one. I had no weapon of defence, and with one spring or blow of his paw the beast could have annihilated me. To move I knew would only encourage his attack. It occurred to me at the moment that I had heard of the power of man's eye over wild animals, and accordingly I fixed my gaze as intently as the agitation of such a moment enabled me, on his eyes: we stared at each other for some seconds, when, to my inexpressible joy, the beast turned and bounded down the straight open path before me. This scene occurred just at that period of the morning when the grazing animals retired from the open patena to the cool shade of the forest: doubtless, the leopard had taken my approach for that of a deer, or some such animal. And if his spring had been at a quadruped instead of a biped, his distance was so well measured, that it must have landed him on the neck of a deer, an elk, or a buffalo; as it was, one pace more would have done for me. A bear would not have let his victim off so easily."

The highly interesting account of the elephant, and the method employed in Ceylon for his capture, is too long for our purpose; but the following passage, describing the approach to the scene of a great corral witnessed by the author, gives some idea of the glorious richness of Nature in that beautiful island:

"Kornegalle, or Kurunai-galle, was one of the ancient capitals of the island, and the residence of its kings from A.D. 1319 to 1347. The dwelling-house of the principal civil officer in charge of the district now occupies the site of the former palace, and the ground is strewn with fragments of columns and carved stones, the remnants of the royal buildings. The modern town consists of the bungalows of the European officials, each surrounded with its own garden; two or three streets inhabited by Dutch descendants and by Moors; and a native bazaar, with the ordinary array of rice and curry stuff, and cooking chattees of brass or burnt clay.

"The charm of the village is the unusual beauty of its position. It rests within the shade of an enormous rock of gneiss upwards of 600 feet in height, nearly denuded of verdure, and so rounded and worn by time that it has acquired the form of a couchant elephant, from which it derives its name of Aetagalla, the Rock of the Tusker. But Aetagalla is only the last eminence in a range of similarly-formed rocky mountains, which here terminate abruptly; and which, from the fantastic shapes into which their gigantic outlines have been wrought by the action of the atmosphere, are called by the names of the Tortoise Rock, the Eel Rock, and the Rock of the Tusked Elephant. So impressed are the Singhalese by the aspect of these stupendous masses, that in ancient grants lands are conveyed in perpetuity, or 'so long as the sun and the moon, so long as Aetagalla and Andagalla shall endure.'

"Kornegalle is the resort of Buddhists from the remotest parts of the island, who come to visit an ancient temple on the summit of the great rock, to which access is had from the valley below by means of steep paths and steps hewn out of the solid stone. Here the chief object of veneration is a copy of the sacred footstep hollowed in the granite, similar to that which confers sanctity on Adam's Peak, the towering apex of which, about forty miles distant, the pilgrims can discern from Aetagalla.

"At times the heat at Kornegalle is intense, in consequence of the perpetual glow diffused from these granite cliffs. The warmth they acquire during the blaze of noon becomes almost intolerable towards evening, and the sultry night is too short to permit them to cool between the setting and the rising of the sun. The district is also liable to occasional droughts, when the watercourses fail and the tanks are dried up. One of these calamities occurred about the period of my visit, and such were the sufferings of the wild animals that numbers of crocodiles and bears made their way into the town to drink at the wells. The soil is prolific in the extreme; rice, cotton, and dry grain are cultivated largely in the valley. Every cottage is surrounded by gardens of cocoa-nuts, arecas, jak-fruit, and coffee; the slopes, under tillage, are covered with luxuriant vegetation, and as far as the eye can reach on every side, there are dense forests intersected by streams, in the shade of which the deer and the elephant abound.

"In 1847, arrangements were made for one of the great elephant hunts for the supply of the Civil Engineer's Department, and the spot fixed on by Mr. Morris, the government officer who conducted the corral, was on the banks of the Kimbul river, about fifteen miles from Kornegalle. The country over which we rode to the scene of the approaching capture showed traces of the recent

drought, the fields lay to a great extent untilled, owing to the want of water, and the tanks, almost reduced to dryness, were covered with the leaves of the rose-coloured lotus.

"Our cavalcade was as oriental as the scenery through which it moved; the Governor and the officers of his staff and household formed a long cortegé, escorted by the native attendants, horse-keepers, and foot-runners. The ladies were borne in palankins, and the younger individuals of the party carried in chairs raised on poles, and covered with cool green awnings made of the fresh leaves of the talipat palm.

"After traversing the cultivated lands, the path led across open glades of park-like verdure and beauty, and at last entered the great forest, under the shade of ancient trees wreathed to their crowns with climbing plants, and festooned by natural garlands of convolvulus and orchids. Here silence reigned, disturbed only by the murmuring hum of glittering insects, or the shrill clamour of the plum-headed parroquet and the flute-like calls of the golden oriole.

"We crossed the broad sandy beds of two rivers over-arched by tall trees, the most conspicuous of which is the Kombook, from the calcined bark of which the natives extract a species of lime to be used with their betel. And from the branches hung suspended over the water the gigantic pods of the huge puswael bean, the sheath of which measures six feet long by five or six inches broad.

"On ascending the steep bank of the second stream, we found ourselves in front of the residences which had been extemporised for our party in the intermediate vicinity of the corral. These cool and enjoyable structures were formed of branches and thatched with palm leaves and fragrant lemon grass; and in addition to a dining-room and suites of bedrooms fitted with tent furniture, they included kitchens, stables, and store-rooms, all run up by the natives in the course of a few days."

We now pass to the birds, and are irresistably attracted by the account of *Corvus splendens*, the common Ceylon crow, which reminds us of the tricks of the European magpie, but exceeds that bird greatly in sagacity and in familiarity with man:—

"*Crows.*—Of all the Ceylon birds of this order the most familiar and notorious are the small glossy crows, whose shining black plumage shot with blue has suggested the title of *Corvus splendens*. They frequent the towns in companies, and domesticate themselves in the close vicinity of every house; and it may possibly serve to account for the familiarity and audacity which they exhibit in their intercourse with men, that the Dutch during their sovereignty in Ceylon, enforced severe penalties against any one killing a crow, under the belief that they were instrumental in extending the growth of cinnamon by feeding on the fruit, and thus disseminating the undigested seed.

"So accustomed are the natives to their presence and exploits, that, like the Greeks and Romans, they have made the movements of crows the basis of their auguries; and there is no end to the vicissitudes of good and evil fortune which may not be predicted from the direction of their flight, the hoarse or mellow

notes of their croaking, the variety of trees on which they rest, and the numbers in which they are seen to assemble.

"All day long these birds are engaged in watching either the offal of the offices, or the preparation for meals in the dining-room: and as doors and windows are necessarily opened to relieve the heat, nothing is more common than the passage of a crow across the room, lifting on the wing some ill-guarded morsel from the dinner-table. No article, however unpromising its quality, provided only it be portable, can with safety be left unguarded in any apartment accessible to them. The contents of ladies' work-boxes, kid gloves, and pocket handkerchiefs vanish instantly if exposed near a window or open door. They open paper parcels to ascertain the contents; they will undo the knot on a napkin if it encloses anything eatable, and I have known a crow to extract the peg which fastened the lid of a basket in order to plunder the provender within.

"On one occasion a nurse seated in a garden adjoining a regimental mess-room, was terrified by seeing a bloody clasp-knife drop from the air at her feet; but the mystery was explained on learning that a crow, which had been watching the cook chopping mince-meat, had seized the moment when his head was turned to carry off the knife.

"One of these ingenious marauders, after vainly attitudinising in front of a chained watch-dog, that was lazily gnawing a bone, and after fruitlessly endeavouring to divert his attention by dancing before him, with head awry and eye askance, at length flew away for a moment, and returned bringing a companion which perched itself on a branch a few yards in the rear. The crow's grimaces were now actively renewed, but with no better success, till its confederate, poising itself on its wings, descended with the utmost velocity, striking the dog upon the spine with all the force of its strong beak. The *ruse* was successful; the dog started with surprise and pain, but not quickly enough to seize his assailant, whilst the bone he had been gnawing was snatched away by the first crow the instant his head was turned. Two well-authenticated instances of the recurrence of this device came within my knowledge at Colombo, and attest the sagacity and powers of communication and combination possessed by these astute and courageous birds.

"On the approach of evening the crows near Colombo assemble in noisy groups along the margin of the fresh-water lake which surrounds the fort on the eastern side; and here for an hour or two they enjoy the luxuries of throwing the water over their shining backs, and arranging their plumage decorously, after which they disperse, each taking the direction of his accustomed quarters for the night."

We must add a sketch of a breeding place of water-fowl on a solitary spot amidst the remains of a vast ruined tank, the work of the early kings of Ceylon:—

"In a lonely spot, towards the very centre of the tank, we came unexpectedly upon an extraordinary scene. A sheet of still water, two or three hundred

yards broad, and about half a mile long, was surrounded by a line of tall forest-trees, whose branches stretched above its margin. The sun had not yet risen, when we perceived some white objects in large numbers on the tops of the trees; and as we came nearer, we discovered that a vast colony of pelicans had formed their settlement and breeding-place in this solitary retreat. They literally covered the trees in hundreds; and their heavy nests, like those of the swan, constructed of large sticks, forming great platforms, were sustained by the horizontal branches. Each nest contained three eggs, rather larger than those of a goose; and the male bird stood placidly beside the female as she sat upon them.

"Nor was this all; along with the pelicans prodigious numbers of other water-birds had selected this for their dwelling-place, and covered the trees in thousands, standing on the topmost branches; tall flamingoes, herons, egrets, storks, ibises, and other waders. We had disturbed them thus early, before their habitual hour for betaking themselves to their fishing-fields. By degrees, as the light increased, we saw them beginning to move upon the trees; they looked around them on every side, stretched their awkward legs behind them, extended their broad wings, gradually rose in groups, and slowly soared away in the direction of the sea-shore."

We must give our readers a specimen of what is said of Ceylon reptiles; but in the abundance of curious and entertaining matter, we are at a loss how to choose.—What follows relates to the night lizards or geckoes:—

"The most familiar and attractive of the lizard class are the *Geckoes*, that frequent the sitting-rooms, and being furnished with pads to each toe, they are enabled to ascend perpendicular walls and adhere to glass and ceilings. Being nocturnal in their habits, the pupil of the eye, instead of being circular as in the diurnal species, is linear and vertical like that of the cat. As soon as evening arrives, the geckoes are to be seen in every house in keen and crafty pursuit of their prey; emerging from the chinks and recesses where they conceal themselves during the day, to search for insects that then retire to settle for the night. In a boudoir where the ladies of my family spent their evenings, one of these familiar and amusing little creatures had its hiding-place behind a gilt picture frame. Punctually as the candles were lighted, it made its appearance on the wall to be fed with its accustomed crumbs; and if neglected, it reiterated a sharp, quick call of *chic, chic, chic*, till attended to. It was of a delicate grey colour, tinged with pink; and having by accident fallen on a work-table, it fled, leaving part of its tail behind it, which, however, it re-produced within less than a month. This faculty of reproduction is doubtless designed to enable the creature to escape from its assailants: the detaching of the limb is evidently its own act; and it is observable, that when reproduced, the tail generally exhibits some variation from the previous form, the diverging spines being absent, the new portion covered with small square uniform scales placed in a cross series, and the scuta below being seldom so distinct as in the original

member. In an officer's quarters in the fort of Colombo, a geckoe had been taught to come daily to the dinner-table, and always made its appearance along with the dessert. The family were absent for some months, during which the house underwent extensive repairs, the roof having been raised, the walls stuccoed, and the ceilings whitened. It was naturally surmised that so long a suspension of its accustomed habits would have led to the disappearance of the little lizard; but on the return of its old friends, it made its entrance as usual at their first dinner the instant the cloth was removed."

We add a passage respecting the Hydrophidae or sea-snakes, an extraordinary race of reptiles, belonging only to the Indian and Pacific Oceans:—

"The *sea-snakes* of the Indian tropics did not escape the notice of the early Greek mariners who navigated those seas; and amongst the facts collected by them, Ælian has briefly recorded that the Indian Ocean produces 'serpents *with flattened tails*, whose bite, he adds, is to be dreaded less for its venom than the laceration of its teeth. The first statement is accurate, but the latter is incorrect, as there is in an all but unanimous concurrence of opinion that every species of this family of serpents is more or less poisonous. The compression of the tail noticed by Ælian is one of the principal characteristics of these reptiles, as their motion through the water is mainly effected by its aid, coupled with the undulating movement of the rest of the body. Their scales, instead of being imbricated like those of land-snakes, form hexagons; and those on the belly, instead of being scutate and enlarged, are nearly of the same size and form as on other parts of the body.

"Sea-snakes (*Hydrophis*) are found on all the coasts of Ceylon. I have sailed through large shoals of them in the Gulf of Manaar, close to the pearl-banks of Aripo. The fishermen of Calpentyn on the west live in perpetual dread of them, and believe their bite to be fatal. In the course of an attempt which was recently made to place a lighthouse on the great rocks of the south-east coast, known by seamen as the Basses, or *Baxos*, the workmen who first landed found the portion of the surface liable to be covered by the tides, honeycombed, and hollowed into deep holes filled with water, in which were abundance of fishes and some molluscs. Some of these cavities also contained sea-snakes from four to five feet long, which were described as having the head 'hooded like the cobra de capello, and of a light grey colour, slightly speckled. They coiled themselves like serpents on land, and darted at poles thrust in among them. The Singhalese who accompanied the party, said that they not only bit venomously, but crushed the limb of any intruder in their coils.'

"Still, sea-snakes, though well-known to the natives, are not abundant round Ceylon, as compared with their numbers in other places. Their principal habitat is the ocean between the southern shores of China and the northern coast of New Holland; and their western limit appears to be about the longitude of Cape Comorin. It has long since been ascertained that they frequent the seas that separate the islands of the Pacific; but they have never yet been

found in the Atlantic, nor even on the western shores of tropical America. And if, as has been stated, they have been seen on a late occasion in considerable numbers in the Bay of Panama, the fact can only be regarded as one of the rare instances, in which a change in the primary distribution of a race of animals has occurred, either by an active or a passive immigration. Being exclusively inhabitants of the sea, they are liable to be swept along by the influence of currents; but to compensate for this they have been endowed with a wonderful power of swimming. The individuals of all the groups of terrestrial serpents are observed to be possessed of this faculty to a greater or a less degree; and they can swim for a certain distance without having any organs specially modified for the purpose; except, perhaps, the lung, which is a long sac capable of taking in a sufficient quantity of air, to keep the body of the snake above water. Nor do we find any peculiar or specially adapted organs even in the fresh-water-snakes, although they can catch frogs or fishes while swimming. But in the *hydrophids*, which are permanent inhabitants of the ocean, and which in an adult state, approach the beach only occasionally, and for very short times, the tail, which is rounded and tapering in the others, is compressed into a vertical rudder-like organ, similar to, and answering all the purposes of, the caudal fin in a fish. When these snakes are brought on shore or on the deck of a ship, they are helpless, and struggle vainly in awkward attitudes. Their food consists exclusively of such fishes as are found near the surface; a fact which affords ample proof that they do not descend to great depths, although they can dive as well as swim. They are often found in groups during calm weather, sleeping on the sea; but owing to their extreme caution and shyness, attempts to catch them are rarely successful; on the least alarm, they suddenly expel the air from their lungs and descend below the surface; a long stream of rising air-bubbles marking the rapid course which they make below. Their poisonous nature has been questioned; but the presence of a strong perforated tooth and of a venomous gland sufficiently attest their dangerous powers, even if these had not been demonstrated by the effects of their bite. But fortunately for the fishermen, who sometimes find them unexpectedly among the contents of their nets, sea-snakes are unable, like other venomous serpents, to open the jaws widely, and in reality they rarely inflict a wound. Dr. Cantor believes, that they are blinded by the light when removed from their own element; and he adds that they become sluggish and speedily die."

We will positively resist the temptation to extract anything relating to fishes, mollusca, insects, &c., that we may in conclusion give our author's account of the land leeches which to many readers will be as novel and wonderful as anything he relates:—

"Of all the plagues which beset the traveller in the rising grounds of Ceylon, the most detested are the land leeches. They are not frequent in the plains, which are too hot and dry for them; but amongst the rank vegetation in the lower ranges of the hill country, which is kept damp by frequent showers, they are found in tormenting profusion. They are terrestrial, never visiting ponds

or streams. In size they are about an inch in length, and as fine as a common knitting needle; but they are capable of distension till they equal a quill in thickness, and attain a length of nearly two inches. Their structure is so flexible that they can insinuate themselves through the meshes of the finest stocking, not only seizing on the feet and ankles, but ascending to the back and throat and fastening on the tenderest parts of the body. In order to exclude them, the coffee planters, who live amongst these pests, are obliged to envelope their legs in 'leech-gaiters' made of closely woven cloth. The natives smear their bodies with oil, tobacco ashes, or lemon juice; the latter serving not only to stop the flow of blood, but to expedite the healing of the wounds. In moving, the land leeches have the power of planting one extremity on the earth and raising the other perpendicularly to watch for their victim. Such is their vigilance and instinct, that on the approach of a passer-by to a spot which they infest, they may be seen amongst the grass and fallen leaves on the edge of a native path, poised erect, and preparing for their attack on man and horse. On descrying their prey they advance rapidly by semi-circular strides, fixing one end firmly and arching the other forwards, till by successive advances they can lay hold of the traveller's foot, when they disengage themselves from the ground and ascend his dress in search of an aperture to enter. In these encounters the individuals in the rear of a party of travellers in the jungle invariably fare worst, as the leeches, once warned of their approach, congregate with singular celerity. Their size is so insignificant, and the wound they make is so skilfully punctured, that both are generally imperceptible, and the first intimation of their onslaught is the trickling of the blood or a chill feeling of the leech when it begins to hang heavily on the skin from being distended by its repast. Horses are driven wild by them, and stamp the ground in fury to shake them from their fetlocks, to which they hang in bloody tassels. The bare legs of the palankin bearers and coolies are a favourite resort; and, as their hands are too much engaged to be spared to pull them off, the leeches hang like bunches of grapes round their ankles; and I have seen the blood literally flowing over the edge of a European's shoe from their innumerable bites. In healthy constitutions the wounds, if not irritated, generally heal, occasioning no other inconvenience than a slight inflamation and itching; but in those with a bad state of body, the punctures, if rubbed, are liable to degenerate into ulcers, which may lead to the loss of limb or even of life. Both Marshall and Davy mention, that during the march of troops in the mountains, when the Kandyans were in rebellion, in 1818, the soldiers, and especially the Madras sepoys, with the pioneers and coolies, suffered so severely from this cause that numbers perished.

"One circumstance regarding these land leeches is remarkable and unexplained; they are helpless without moisture, and in the hills where they abound at all other times, they entirely disappear during long droughts;—yet re-appear instantaneously on the very first fall of rain; and in spots previously parched, where not one was visible an hour before, a single shower is sufficient to reproduce them in thousands, lurking beneath the decaying leaves, or striding with rapid movements across the gravel. Whence do they re-appear? Do they, too,

take a 'summer sle p,' like the reptiles, molluscs, and tank fishes? or may they, like the *Rotifera*, be dried up and preserved for an indefinate period, resuming their vital activity on the mere recurrence of moisture?"

W H.

The uses of Animals in relation to the Industry of Man: being a course of lectures delivered at the South Kensington Museum by E. Lankester, M.D., F.R.S., Superintendent of the Animal Product and Food Collections. 1 vol. London: Robert Hardwicke.

On Food: being lectures delivered at the South Kensington Museum by E. Lankester, M.D., F.R.S., Superintendent of the Animal Product and Food Collections. 1 vol. London: Robert Hardwicke. 1861.

Dr. Lankester is a naturalist of high reputation, and he has been most usefully employed both in delivering the courses of lectures contained in these volumes so as to bring out the real value and importance of the collections which have been placed under his care, and make them contribute most effectually to public instruction, and also in extending the benefit of his labours far more widely by the publication of these pleasing volumes, characterized by sound knowledge, without any display of science, intelligible and attractive in their style, and eminently fitted for a wide popularity; a mere enumeration of the subjects of the twelve lectures making up the first of these volumes will give a good idea of its interest: silk, wool, leather, bone, soap, waste, sponges and corals, shell-fish, insects, furs, feathers, horns and hair, animal perfumes. Under each of these heads a great variety of entertaining and practically useful information has been collected.

No body can look through the volume without being impressed with the educational importance of natural history and chemistry, and the degree in which the diffusion of real knowledge must contribute to improve the practical arts of life, as well as to render their exercise a more intelligent act, and more interesting to those engaged in it, than it can possibly be as a mere mechanical routine. In this connection we quote the concluding passage of Dr. Lankester's volume:—

"It is only," he says, "by a systematic training in the principles of the natural sciences involved in their occupations that we can expect our working men or their masters to execute their work with all that skill and economy of which their industry is susceptible. By

the present system of working by the rule of thumb, an enormous waste of energy and labour is daily taking place, which, if properly economised according to natural laws, would produce an exuberance of comfort, and even luxury, where now only squalor and suffering present themselves. The knowledge of natural laws is the first great condition of man's existence and advancement. It is in vain for him to cultivate the dead literature of the past if he is negligent of the overflowing life of the present. He lives in the presence of forces which, if he does not master them and make them his servants, will master him, and he will be their slave. Nor is it the culture of art that will save him from the terrible presence of the powers that every where threaten his existence. His palace, however beautiful, must be built in accordance with the laws of gravitation; the material of his most cherished forms of beauty must be constructed in accordance with chemical laws; his actions, however graceful, must be made in accordance with physiological laws, or the whole must perish. It is for us in these times to cherish, as the most precious gifts of Providence, those discoveries of genius in the domain of natural science which distinguish the civilization of our age. In those discoveries we have the key to unlock the great secrets by which our existence is bound up with the laws of the universe. It is just as we study these laws and apply them to the varied purposes of our life, that we shall be able to lead that existence which is the highest dignity of man, and realize those blessings which a knowledge of that which is true can alone confer."

We might make many extracts from this volume, but as it is a readable book which ought to be generally read, we abstain, desiring to send many to the work itself. We allow ourselves, however, to copy one passage, the merriment of which forcibly brings back to our minds pleasant hours passed with the author and the distinguished friend, prematurely, alas! called away from us, to whom he refers; and none knew better than these men how to unite merriment with wisdom and knowledge: —

"Another bivalve sometimes eaten by the inhabitants of our coast is the Razor-fish (*Solen maximus.*) This creature would be interesting enough to us if it were not eaten, on account of its long, slightly-curved and truncated shells, which resemble the blade of a razor. It is not uncommon on our sandy shores, where it lives buried in the sand. It is not difficult to find, as above the spot into which it has

retired it leaves an impression of two holes united, something like a keyhole. It is, however, almost useless to attempt to dig them up, they back away from you so skillfully. After many vain efforts to secure one of these creatures alive, I mentioned my failures to the late Professor Edward Forbes. 'Oh,' he said, with a waggish smile, 'there is nothing easier: all you have to do is to put a little salt over their holes, and they will come out.' I remembered, you know, the story of putting salt on a bird's tail, and although I resolved secretly to try my friend's plan, it was so simple, I had not the courage to tell him that I would. I had, however, no sooner got to the seaside than I quietly stole to the pantry and pocketed some salt, and then went alone, at low tide, to the sandy shore. As soon as I espied a hole, I looked round, for I almost fancied I heard my friend chuckle over my shoulder; however, nobody was there, and down went a pinch of salt over the hole. What I now beheld almost staggered me. Was it the ghost of some razor-fish whose head I had chopped off in digging that now rose before me to arraign me for my malice? or was it a real live razor-fish that now raised its long shell at least half out of the sand? I grasped it, fully expecting it would vanish, but I found I had won my prize. It was a real solid specimen of the species *Solen maximus* that I had in my hand. I soon had a number of others, which were all carried home in triumph. Of course there were more than were required for science, and, at the suggestion of a Scotch friend, the animals not wanted were made into soup. When the soup was brought to table, our Scotch friend vowed it particularly fine, and ate a basin with at least twenty razor-fish in it. One tablespoonful satisfied the ladies, whilst myself and an English friend declared—against our conscience I do verily believe—that we had never eaten any thing more excellent. I counted the number of the creatures I was able to swallow; it amounted to exactly three! After a tumbler of whiskey and water—taken, of course, medicinally—arrangements were made for a dredge in the morning. The Scotchman was up at five, but I and my English friend could not make our appearance. Nightmare and other symptoms of indigestion had fairly upset us for anything so ticklish as a dredging excursion. Now, I do not wish to say anything against razor-fish as an article of diet, but from what I have told you, they would seem to possess an amount of resistance to the ordinary digestive activity of the stomach that would render it highly desirable to ensure, before taking them, such a

digestion as a Highlander, fresh from his mountain wilds, is known to possess."—May we ask, by the way, how it is that our familiar friend *Solen siliqua* appears here under the specific name of *maximus*, a name which we do not even recollect as a synonyme? It is true we have not at hand good references on British conchology, but we cannot help suspecting that our author, writing from memory, used a wrong name. It would be useless for us to protest against the zoological system which our author, in common with, perhaps, the leading European zoologists at the present time, has adopted. It is enough for us to repeat, that we hold firmly to the divisions Articulata and Radiata instead of Annulata and Coelenterata; but we should have expected from Dr. Lankester, according to the system he has employed, that he would have better appreciated the value of the sub-kingdoms than to have spoken, as he has often done, of Vertebrata and Invertebrata in contrast. We had understood it to be agreed upon among philosophical zoologists, that invertebrate animals cannot now be regarded as in any sense a division, and that the distinctions between Mollusca, for example, and either of the other sub-kingdoms, are quite as important as those which separate them from Vertebrata.

Dr. Lankester's other volume occupies ground at least as interesting and important as that of which we have spoken; and he has treated his subject with the same knowledge, care and judgment which are manifested in it. His object is to give useful information by explaining the relations of food in its several kinds to the support of the system, and to the health and enjoyment of human beings. We fear he may have assumed a more general acquaintance with the elements of chemistry than his readers will possess; but he will, no doubt, succeed by the clearness of his explanations in making most readers sufficiently comprehend his meaning. He divides human food into three classes: 1. Alimentary or necessary food; 2. Medicinal or auxiliary food; 3. Accessory food. The latter kind, of which gum and gelatine are examples—not contributing anything to the support of the frame, but being merely a useful accompaniment to things that do. The first class contains three groups: 1. Mineral—as water, salt, and various substances found in the ashes of plants and animals; 2. Carbonaceous or heat-giving, to which belong starch, sugar, fat; 3. Nitrogenous or flesh-forming, consisting of albumen, fibrine, caseine. The second class has likewise three groups—the 4th consisting of stimulants, as alcohol and volatile oils; the 5th of neurotics

—such alkaloids as are found in tea and coffee, and cocoa; 6th. Narcotics, as tobacco and opium. The third class forms a seventh group, and these include all the varieties of human food. It is the object to shew from the constitution of our frame in what way each is required, and then practically by what articles of ordinary food each is supplied. The interest of the subject will be generally appreciated; we can but touch on a few points. Under the head of Nitrogeneous or flesh-forming materials, we meet with the following remarks in connection with the albumen contained in blood:—

"This leads to a question on which I wish to say a few words; and that is, as to whether we are wise economically, and are justified in bleeding animals to death and throwing away all the blood, which is, after all, good food. When you recollect that we take from 5 lbs. to 20 lbs. from a sheep or an ox, and multiply that by the number of sheep and oxen killed in the course of a year, you will find that it amounts to something which is quite frightful to contemplate. Now, I have no hesitation in saying that the blood you take away is just as good as the blood you leave in, and that you would do much better to leave the blood in the animal. There are other ways of killing animals than bleeding them to death. These are unpleasant things to think of; but, after all, we have no hesitation in eating the mutton and beef after it is slain, and we ought to be able to give a reason for our extravagance. We do not take the blood away from hares and rabbits: they are brought to the table and eaten by the most fastidious. So also with birds: pheasants and partridges—we do not bleed them; and I tell you more—if you did, they would not be so pleasant to eat; they would lose some of their gamey flavour. Dr. Carson, of Liverpool, many years ago pointed out the loss incurred in the present mode of killing animals, and suggested a method of killing them by which blood was saved; and Dr. Carson induced a certain number of people of Liverpool to try meat killed in his way, and they declared it so much better, that a butcher was induced to kill his animals in that way, and the result has been that he has surrounded himself with customers. Mr. Carson, son of the late doctor, was kind enough to send me up a quarter of a sheep which had been killed in this way; I invited a few friends to partake of it, and they one and all pronounced it delicious. Economically, this is an important question, and it ought to be a consideration whether we are justified in throwing away so large a quantity of nutritious albumen."

This is immediately followed by remarks on the non-nutritious character of gelatine, which, being opposed to a very general prejudice, and yet conveying a well-established truth, we may extract as a specimen of the useful influence of the book:—

"The quantities of fibrine and albumen in butcher's meat are about the same; but I have now to draw your attention to another constituent, which has

always figured in all our chemical analyses as flesh-forming matter. If we take a quantity of beef or mutton, or even of pork, and boil it for a certain length of time, we obtain from it a substance which thickens the water as it cools, and makes it into what we call a jelly. Now, that substance has been supposed to be the nutritive matter of the meat. It has been extracted and sold separately from the other constituents of the meat as nutritive matter; the impression is that this matter is more nutritive than other kinds of food, and it is given to persons who are weak and dying for want of strength to keep them up; and yet I have an extraordinary statement to make to persons who believe in this, that this is not nutritive matter at all; and, although not to be objected to when mixed with other substances, alone it certainly is not capable of supporting life. This substance is called gelatine. It exists in the nerves and muscles and all kinds of flesh of animals. It forms, in fact, the cell-walls of animals. The cell-walls of plants are composed of cellulose. Both cellulose and gelatine are insoluble in cold water, and the difference between them is, that gelatine is soluble in hot water. Gelatine is obtained from all kinds of animals, and all parts, and from bone, and skin, and membrane. This gelatine is used in the arts for making size and glue, and for fining beer and wine, and various other purposes.

"The sound of the sturgeon and of various other fish is composed almost entirely of this substance, and when prepared and cut into strips it is called isinglass. It is obtained commercially, for dietetical purposes, from a variety of things, from the skins of animals not sent to the curriers, and from bones, and so on; and very good gelatine is procured from the refuse of the tanner's yard. So that the substance which we know in the arts as glue and size, and as food under the name of gelatine or isinglass, is this gelatine which you can get from all parts of animals by boiling. Then, I say, it is not a nutritive substance; it is not a digestible substance, and, therefore, cannot be nutritive. Many years ago, the French, being fond of soups, and the poor living principally on soups, discovered that those persons who lived on soups suffered in their health. This became a question, of so much importance that a commission was appointed to inquire into the properties of gelatine, and the result was that it was reported that gelatine had no nutritive property. The impression on the public mind was, however, so favourable, that it was still used in France; and a second commission was appointed, and the result of its labours confirmed the conclusions of the first commission. In Belgium, also, a public inquiry was instituted, the result was the same conclusion as the two French commissions. You do not find this gelatine in the blood. If it were a nutritive agent, you would find it there. You do not find it in eggs, nor do you find it in milk. Seeing, then, there is no gelatine in these nutritive things, which are naturally prepared to form the parts of the body, we are warranted in concluding that it is not a flesh-forming substance at all. Then it appears that this substance is merely an accessory in our usual food, just what cellulose and gum are in our vegetable food. Hence I have called these substances accessory foods. They are not to be rejected; they do not injure; on the contrary, I believe there is evidence that they do good.

"It is found in feeding horses, that if you give them beans or oats alone they will not do so well as if you mix with these more nutritive foods a quantity of chaff, chopped straw, which is little more than cellulose. It appears to me that man has the same relation to these things, and that he requires some indigestible food. In all our food there is a certain quantity of indigestible matter, and if it does not disagree it acts beneficially. This is one recommendation of brown bread, it contains more cellulose than flour. Those who can eat brown bread habitually have better health than those who cannot, or who persist in eating white bread."

It may be well also to present to our readers the author's judgment with which we entirely agree on the question of the fitness of our using animal food. We cannot, indeed, copy the illustrative woodcuts to which he refers, but they are scarcely necessary to the argument, and any one who desires it may actually refer to the objects themselves, substituting for the tiger's skull an inspection of the mouth of a domestic cat.

"Let me add now a few words on the subject of living only on vegetable food. You know from what I have said that I am an advocate of a mixed diet for man, but I would more particularly draw your attention to a statement that is often made, that it is not necessary to partake of animal food at all. Persons who argue thus, put forth, as a first ground, the immorality of the act, and the impropriety and wickedness of taking away life at all. This is surely an absurd assumption; for the Creator has made a certain number of creatures that could not live upon vegetable food, and they naturally prey upon the lower animals which feed on the grass and the herbs of the field. The lion and tiger exist by prey; and it appears to me that man has a perfect right, without being charged with immorality or impropriety, to take the lives of the lower animals for his food.

Then anatomical arguments are adduced against animal food. It is said that man, in his structure, is better adapted for vegetable than animal food. I must here again join issue, for I believe I can shew you from his structure that man is more adapted for a mixed diet than either vegetable or animal alone. Here is a view of the jaws and teeth of a carnivorous creature. The jaws are so constructed that they will only move up and down like a pair of scissors. This is the head of a tiger. Look also at his sharp-pointed carnivorous teeth, especially the great canine teeth. They are intended for holding and cutting up living food. Now look at the horse. His lower jaw is quite movable from side to side. Instead of pointed teeth, they are flat, and every arrangement is made for grinding, not cutting the food; and this is the character of the mouth of a herbivorous animal.

Now if we take the skull of a man we find he has certain teeth—canine teeth—which, like those of lions and tigers, have the power of cutting; but he has also flat teeth, and the power of moving his lower jaw laterally, and can bring these flat teeth across each other for the purpose of grinding his food; so that

you see he is evidently provided with instruments to enable him to prepare for his digestion both vegetable and animal food. I might prolong this argument by shewing you the complicated structure of the stomach of the sheep and the ox, and comparing this with the stomach of the lion, point to the fact that the human stomach has neither the complicated structure of the one nor the simplicity of the other. There are many other points of structure in which man seems to stand between these two groups of animals—the herbivorous on the one side and the carnivorous on the other—which would seem to indicate his adaptation for taking both kinds of food.

"But whatever may be the arguments of the vegetarians, they do not practically carry out their doctrines, for they partake of considerable quantities of animal food. They take milk and butter, and cheese and eggs. Dr. Carpenter states, in a recent review, that he had taken a vegetarian cookery-book, and calculated the quantity of milk, butter and eggs employed in their food, and found that, if a vegetarian family lived in accordance with the rules of this book, each member would consume half an ounce more animal food a day than he did in his own family,—and he was no vegetarian. So that you see people are deceiving themselves who enforce such a doctrine as this.

"On the other hand, there are some persons who advocate a diet of purely animal food. I had a book sent me the other day, written by a gentleman at Liverpool, who states that he has discovered that the panacea for all human evils is the taking of animal food alone; and he takes the opportunity of stating that he is looking for some young lady of similar principles and practice who will link her fortunes with his own, and establish a family of carnivorians.

"There is no question that man may live on a purely vegetable diet; but the question is as to whether that kind of diet is best for the community. We find in the history of man that those races who have partaken of animal food are the most vigorous, the most moral, and the most intellectual races of mankind. You find that the ancient Jews, although they had certain sanitary regulations with regard to killing and eating animals, partook largely of meat, and were amongst the most vigorous people of their day. We find in modern Europe that those nations who take the most animal food are the strongest; and amongst ourselves, it is just in proportion as we give our labourers animal food, or wages to procure it, that they are stronger and better able to do their work. It is vain for a man to expect to get through intellectual or physical labour without an abundant supply of the material of thought and of physical power, and I have shewn you that animal food is one of the readiest means of affording this supply."

Passing on to what forms the second course of lectures contained in this volume, relating to the second class of articles of food termed medicinal or auxiliary, we have first a very full account of the nature, production and effects of alcohol and the various drinks which contain it; and our teetotal friends will find that our learned author,

whilst fully sensible of the dangers and various abuses attending the use of alcoholic drinks, is not prepared to go with them to the extent of entirely condemning all employment of them; but even regards their very limited consumption as beneficial. He is decided, and somewhat vehement in his condemnation of Homœopathy when it incidentally falls in his way in speaking of the varying effects on the system of different quantities of the same substance:—

"Such, then," he says, "is the connection between food, medicine, and poison, that all our food may be made medicinal and all our medicines become poisons.

"I need not remind you how such a view as this lays the axe at the root of all pretensions to cure disease by remedies that can exert no influence on the system. If you are eating or drinking, and men tell you they are curing your diseases with infinitesimal doses, don't believe them. Your food is exercising a far more powerful effect on your system than their remedies. The only remedies that can be rationally employed as medicines are those which act as food on the system. If they are capable of increasing or decreasing the vital actions of your bodies, then they may or may not do you good, according to the skill with which they are administered; but away with the folly and imposture that would lead you to believe that the natural actions of your bodies are influenced by agents whose existence cannot be detected by the senses. I know nothing more degrading in the intellectual history of the past, with its witchcraft, charms, amulets, royal touches, and holy waters, than the belief of certain portions of the medical profession and the public in the abracadabra of 'similia similibus curantur,' and the efficacy of infinitesimal doses. You must excuse these expressions, I speak strongly because I feel warmly. I am ever ready to make allowance for the opinions and practice of my medical brethren. The rational treatment of disease involves problems of the highest perplexity, in endeavouring to understand which, two minds, equally anxious to reach the truth, may yet arrive at different conclusions. But such conclusions, arrived at by the painful road in which truth ever leads her votaries, are very different from the ready-made hypothesis which is adopted to get rid of the difficulties of inquiry, and which is acted on regardless of the sacrifice of human life, so long as the selfish object for which it was adopted is attained."

Nor is he very gentle in his treatment (and perhaps their case needs some wholesome severity) of certain eccentric reformers who would, in their zeal for simplicity of food, persuade us to abandon all spice and condiments as something pernicious, and deserving the condemnation of those who would regulate their appetites by reason. Speaking of the extensive consumption of ginger in Great Britain, he adds the reflection:—

"What folly and madness, what waste and injury, must come of this consumption of condiments and spices, if certain of our philanthropic wiseacres

are to be believed, who, combining the follies of teetotalism and vegetarianism with the delusions of homœopathy, denounce the addition of these substances to our diet."

The lectures on tea and coffee are very interesting, as affording the rational explanation of the fondness of mankind for these beverages, and shewing that both as warm drinks, and on account of the theine or caffeine contained in them, they are really beneficial—liable, indeed, in overdoses, to be injurious, especially to some constitutions; but, on the whole, having so favourable an influence as to be justly accounted among the real blessings of our state of civilization. Our friends who only take a glass of cold water with their breakfast, think themselves, no doubt, very philosophical in their simplicity. They will find, however, both that the warm drink is of real advantage, and that the action of tea and coffee on the nervous system, generally harmless, and often beneficial, gives them a natural hold on the appetites of humanity. The subject of narcotics occupies the last lecture. Dr. Lankester does not think so badly of the use of tobacco as we do. We think if he had seen as much as we have of American tobacco consumers, he would not have doubted the evidence of the injurious effect of the practice; yet we are not much dissatisfied with what he does say, when declining to commit himself to a statement that the use of tobacco is decidedly injurious to health :—

"If you will not, therefore, give up this habit of smoking, from motives of economy, from a sense of its unseemliness, from its making your breath smell, and your clothes filthy from its polluting your hands and your house, and driving women and men from you who do not smoke, I dare not, as a physiologist or a statist, tell you, that there exists any proof of its injurious influence when used in moderation. I know how difficult it is to define that word moderation; and yet, in my heart I believe that every one of you has an internal monitor that will guide you to the true explanation of it in your own case. The first symptoms of giddiness, of sickness, of palpitation, of weariness, of indolence, of uneasiness, whilst smoking, should induce you to lay it aside. These are the physiological indications of its disagreement, which, if you neglect, you may find increase upon you, and seriously embarrass your health."

We must here close our notice of these attractive volumes, recommending them for general perusal, as eminently fitted to inform, improve and entertain the reader.

W. H.

A History of Infusoria, including the Desmidiaceae and Diatomaceae, British and Foreign. By Andrew Pritchard, Esq., M.R.I., author of the "Microscopic Cabinet," &c. Fourth Edition, enlarged and revised by J. T. Alridge, M.B., B.A., Lond.; W. Archer, Esq.; J. Ralfs, M.R.C.S.L.; W. C. Williamson, Esq., F.R.S.; and the Author. Illustrated by forty plates. London: Whittaker & Co., Ave Maria Lane. 1861.

This work, in its original form, was the first to make the observations and opinions of Ehrenberg familiar to the British scientific public. It was the first, too, to render accessible to inquirers respectable microscopic figures of numerous minute organisms with which many become familiar through the microscope. It was found useful, and the author has felt it to be his interest to keep it before the public. The earlier editions contained what are now accounted great errors, at that time universally prevalent, as well as many deficiencies which it is now not difficult to supply. One subject upon which opinion has greatly changed, is the proper limit between the kingdoms of organised nature. What he had previously on high authority described as animals, Mr. Pritchard now sees good reason to regard as vegetables. This change causes him some embarrassment. It is manifestly desirable that the field of his labours should be about the same as it was formerly, yet this now implies its including low forms both of animal and vegetable life, and yet precludes his undertaking a complete investigation of all the lowest groups belonging to either or both kingdoms. His very title, preserved from former editions, is no longer properly applicable. The idea of including *Desmidiaceae* and *Diatomaceae* in Infusoria, is somewhat startling, as the latter term has always been employed to express minute microscopic animals; whilst it is the authors doctrine, in conformity with the general opinion at present, that the two former families belong to the vegetable kingdom. But in fact the name *Infusoria* is now applied by the best authorities only to the highest division of *Protozoa;* and it is highly convenient that this limitation should be observed. The work then treats of microscopic animals and vegetables,—but among the former it entirely omits Sponges and Polycystina, not to mention smaller groups; and it neither is nor professes to be an account of the lowest vegetable structures generally, but only treats incidentally of some which have been recently supposed to be animal. The work, then,

has not a well-defined field, and is not exactly adapted to students of any one department. Yet we believe, that having produced such a work as was contained in his previous editions, and desiring to carry on his labours in the same direction, our author could not have done better than adopt the plan which he has followed out, as he has secured able assistance in the several departments, and given a great mass of useful and interesting information. We must accept of what he has done as a valuable contribution to science, of great practical use to a large class of investigators, although we feel both the deficiencies and the evils arising from a too great mixture of subjects, and may be disposed to recommend special treatises on the different subjects here brought together, as most likely to promote the progress of knowledge and meet the wants of the students of Nature.

Our author divides his treatise into two parts. 1st. A general history of *Infusoria*, &c., in which their nature, structure, functions, and classification are considered; 2nd. A systematic treatise, in which the families, genera, and species are enumerated and characterized. The first part commences with Ehrenberg's *Bacillariae*, containing *Desmidiaceae*, *Pediastreae* (doubtfully separated from the preceding), and *Diatomaceae*. All these are now very properly treated as vegetables. Perhaps Ehrenberg's name would have been better entirely laid aside, as it was connected with the notion of their animal nature; and as the several orders, if more nearly connected with each other than with some other *Algae*, will form one alliance which should be named according to Lindley's plan. The account of the present state of our knowledge of these orders appears to us to be very satisfactory, and affords great advantages to any one entering upon their study.

The second section is devoted to what are here called *Phytozoa*,—a term intended to express a mixed animal and vegetable nature, under which are included a large part of Ehrenberg's *Anentera*. The group is a very miscellaneous one, and confessedly not natural. We give the author's reasons for adopting it, in his own words: "In the opinion of the majority of modern writers, the *Phytozoa* are in general undistinguishable from unicellular *Algae*, among the different families of which they consequently seek to distribute them; and doubtless the creation of such a group is purely artificial, and cannot be admitted in any attempted philosophical or natural classification of microscopic organisms. However, since so much uncertainty and dispute still prevail on the question of the animal or vegetable nature of very

many, and since our knowledge of the phases of existence of a large number is so imperfect, it is really impossible to establish any satisfactory classification. On this account, and also to bring together for convenience sake, a mass of information respecting several collections of beings enumerated among the *Anenterous Polygastrica* of Ehrenberg, difficult or impossible to arrange under any other heading, we resort to this artificial division, and in so doing have the example of Perty and other writers." The collection of the observations and opinions of the most celebrated and trustworthy microscopists on these minute organisms is certainly of great value, and it is at least a considerable advantage to have doubtful and uncertain forms, most of which must now be considered as transient conditions of some of the lowest vegetables, whilst they are described so as to be recognized, and the materials for their study are brought together, carefully separated from beings whose animal character is generally admitted, and which are to be considered as members of the lowest sub-kingdom or branch of the animal kingdom. When we see the number of Ehrenberg's genera, and even families, which are now found to be only successive transformations of some of the lower *Algae* in the progress of their development, we cannot but acknowledge and rejoice in the bright light thrown upon so obscure a subject, affording the greatest encouragement to persevering labour and patient research.

The third section, *Protozoa*, is equal in extent to the two preceding, and contains a full and careful account of observations and opinions in relation to this great division of minute creatures. They are divided into the sub-sections *Rhizopoda* and *Ciliata*, which last division corresponds to *Infusoria* in the limited sense now given to it by many naturalists. In his general table, the author assigns their place among *Rhizopoda* to *Polycystina*, *Thalassicollida*, and *Spongiada*, of which groups—lest his subject matter should be too much extended—he has omitted any further notice. Respecting them, we will only suggest that whilst all that is known of them points out *Polycystina* as true *Rhizopoda*, the sponges (*Porifera* or *Amorphozoa*) appear to constitute a division of equal rank with *Rhizopoda* and *Ciliata* (Infusoria), whilst there are strong reasons for regarding *Thalassicollida* as only a sub-division of sponges.

In this slight indication of the nature of the contents of an extentensive and elaborate work, we must avoid minute criticism, ecpecially of views which are rather recorded than adopted by the authors. The

great merit of the work is as an abstract and summary of what has been done upon an extensive and most curious subject of inquiry, and in consequence of this merit, no worker with the microscope would willingly remain without it. The perfection of his means for observing minute objects is to little purpose if he cannot assign to them a position, and obtain some insight into what is known or believed of their nature and affinities, and he could scarcely find elsewhere any similar collection of the objects which may occur to his notice.

The fourth section is devoted to *Rotatoria* or *Rotifera*, the wheel animalcules, and contains a full and highly interesting account of their structure, mode of life, and the various plans proposed for their classification. The discussion respecting their affinities is given at some length. We have the arguments of Leydig to prove them to be a section of *Crustacea;* the reply of Vogt, maintaining their connection with *Vermes;* the speculation of Gosse, on their resemblance to insects, which we must regard as very fanciful; and the novel view of Huxley, according to which we are to place them with *Annelida, Echinodermata, Trematoda, Turbellaria,* and *Nematoidea,* as a group of the lower *Annulosa,* under the name of *Annuloida.* Believing that we are justified in maintaining Cuvier's sub-kingdoms of *Articulata* and *Radiata,* notwithstanding the great changes recently proposed, that on the one hand *Coelenterata* is entirely unnatural, and on the other hand the separation of the jointed-limbed from other articulated animals is unjustifiable, we agree both with Leydig and Vogt in considering the *Rotifera* as exhibiting an articulate structure, though of the lowest character, and we would settle the dispute as to whether they belong to *Crustacea* or *Annulata,* by making them a distinct class of the articulate sub-kingdom, which will thus contain: 1. *Arachnida;* 2. *Insecta,* of which *Myriapoda* is to be accounted a sub-class; 3. *Crustacea,* including *Cirrhopoda;* 4. *Annulata,* of which *Entozoa* constitute a sub-class; 5. *Rotifera,* which, as the lowest form of the articulate series, exhibit analogies with the lowest mollusca (*Polyzoa*) and with embryonic states of the higher *Radiata* as well as with *Protozoa.*

Another short section, the fifth, is devoted to the *Tardigrada,* which are, we think, rightly treated as a very low form of *Arachnida.* In all the classes of articulate animals, whilst a common type may, in our opinion, be well recognised, the range of development is very extensive and varied, so that animals of very low organisation appear

in the same class with others representing the highest development consistent with the type. The first comparison of a Mygale or a Scorpion with a Mite or a Tardigrade, would hardly suggest any affinity; but further study brings us acquainted with common characters, and leads us to view them as parts of a series in which amidst the greatest variety of development an uniform type of structure is observable.

The systematic history of the several tribes occupies about half the volume, and is invaluable to the practical microscopist, especially when it is considered that the descriptions of the objects are aided by forty closely filled plates, each containing on an average not less than fifty-five subjects beautifully engraved. Such a collection of minute organisms admirably represented, as many times the cost of this work would not enable us to obtain elsewhere. W. H.

TRANSLATIONS AND SELECTED ARTICLES.

EXPERIMENTS ON THE MIGRATION OF ENTOZOA.

BY MM. A. POUCHET AND VERRIER.

(*Translated from the Comptes Rendus of May*, 1862.)

Many of our readers are acquainted with the modern views respecting the transformations of Entozoa, as taught by Van Beneden, Von Siebold, Küchenmeister, &c. The recent researches of two eminent French naturalists, MM. Pouchet and Verrier, creating some doubts on the subject, we copy a translation from the *Comptes Rendus* for May, 1862, giving an account of their experiments; and as we find that Van Beneden has replied, and these writers have attempted further to justify their views in the same publication, we shall continue the subject as the materials come to hand:—

"In a work published by one of us in 1859, a close comparative examination was made of the doctrines of those observers, who in Germany and Belgium had occupied themselves with the subject of

the metamorphoses of the Entozoa and their peregrination through the living organism. The obvious result of this examination was to excite very weighty doubts in every thoughtful mind. M. Davaine, in his remarkable *Traité des Entozoaires*, also says that the conclusion in his mind, from the agreement in the facts and the divergence in the opinions of the experimenters, was 'that the question still demands sound criticism and fresh researches.'

"One observer states that, on nine different occasions, he has succeeded in producing *Taeniae* in the intestine of the dog, by causing it to swallow some *Caenuri* of the sheep. It will be seen that we have also been as successful as this experimenter, and that, in fact, it is the great amount of this success that has given rise to our doubts—we have occasionally reaped more than we have sown.

"But before giving an account of our experiments, let us recal briefly what are the Entozoa upon which they have been instituted. The first is the *Caenurus cerebralis*, a vesicular, polycephalous worm, common in the sheep, in which its presence causes the disease termed 'staggers.' The second is *Taenia serrata*, a cestoid worm, extremely abundant in the dog.

"According to the experiments above referred to, this is what takes place:—The dogs devour the heads of the diseased sheep, and the *Caenuri* are by this means introduced into their stomachs. Having reached this locality, each of the polycephalous helminths separates itself from the parent cyst, elongates enormously, and becomes a *Taenia*. The entozoon returns to the sheep in this wise:—When the *Taeniae* of the dog have attained their full development, the rings which they throw off are passed with the excrement, fall upon the grass, and are swallowed by the ruminant. Soon afterwards the ova contained in these segments are hatched in the intestines of the sheep, giving birth to microscopic larvae, which perform what may truly be termed a prodigious journey. From their native seat they force a route into the interior of the head, and, in the course of the journey, are obliged to penetrate through the most varied living tissues—the base of the skull even does not stop them. Instinctively they find one of the openings, and tear through the resisting tissue which fills it up. Having thus finally reached the brain of the sheep, they take up their abode in it, and there produce the *Caenurus* by which the host will infallibly be destroyed. This closes the cycle of existence

of the helminth, and the shepherd's dog incurs the grave suspicion of infecting the flock committed to his charge.

"Nevertheless, however great may be the complications attending a migration of this kind from one animal to another, and the subsequent journey through its tissues, if it is shown actually to take place, however mysterious the proceeding may appear, logically we are bound to admit its reality. But it is precisely at this point that we meet with, we will not say insurmountable, but with, at any rate, enormous difficulties. Let us see what these are.

"The *Caenurus cerebralis*, according to V. Siebold, Van Beneden, and other naturalists, would be the larva of *Taenia serrata*. But, on the other hand, this *Tænia serrata*, according to Küchenmeister, Van Beneden, Baillet, and V. Siebold himself, would appear to be the product of *Cysticercus pisiformis*, or of *Cysticerus cellulosae*, and *C. tenuicollis*, according to what V. Siebold further says.

"Here we find ourselves in the utmost embarrassment. It must be allowed, however, that zoologists have exhibited great ingenuity in this matter, if they have not been very exact. Immediately a *Taenia* is met with in any carnivorous animal whatever, the evil is at once imputed to his victim. The cat derives its worms from the rats and mice it devours; the wolf and the dog find theirs in the rabbits and sheep; man is indebted to the pig. But a scrupulous examination of the facts excites some doubts with respect to all this. It may be asked, for instance, how is it that the sheep, which does not eat the flesh of any animal, sometimes has its intestine filled with such a multitude of *Taeniae* as to have it completely obstructed by them? In an epizootic malady, which carried off many sheep in the neighbourhood of Rouen, in 1852, this was the case in almost every instance. If the tapeworms find themselves so well off in the intestine, why should the larva of some of them quit that locality, and be obliged to take a compulsory journey to the brain?

"The importance of this question, as regards agriculture, has not escaped M. Le Roy, Préfet of the Seine-Inférieure; and by him we have been instigated to experiment on a large scale on this grave subject.

"Several causes have evidently contributed to throw a degree of uncertainty on the results of experiments of this kind. In the first place, must be placed the natural frequency of the Entozoa which are employed upon the animals to which we profess to communicate them.

We may notice, also, the circumstance that certain physiologists are accustomed to administer worms at several doses, and at more or less distant intervals—a course which allows of all kinds of interpretations. Lastly, we must not leave out of account the unsuccessful results, which have not always been recorded.

"But, let us not delay with these logical considerations; let us see what experiment teaches, which is alone competent to pronounce a positive judgment.

"We will, once for all, state that we have taken the greatest precaution to induce precision in our experiments. Thus, when we have sought to implant *Caenuri* of the sheep into other animals, we have not been content simply to administer them *en masse*, as has been done by various experimenters. In order to obtain accurate results, we have determined, on every occasion, the number of the heads or *scolices* which have been given, by which means we have been able to decide, with unusual precision, with respect to certain results which, in any other way of proceeding, might have led us to erroneous conclusions. Again, whenever we have made use of these same *scolices*, we have taken pains to assure ourselves that their development was as far advanced as possible, and that they were actually alive.

"Physiologists have grievously erred in not giving comparative tables, showing the length of their experiments, and the size of the Entozoa which they have found. The consequence is, that we sometimes observe inexplicable differences in the length of the Entozoa found on inspection after death.

"In a dog which had been made to swallow some *Caenuri* sixteen days before, we found a certain number of *Taeniae* not more than 2 millimètres long, whilst others were 20. After a similar interval of time, an experimenter even obtained some *Taeniae* which had reached the length of 80 millimetres. In another case, at the end of twenty-three days, we found in one and the same dog, *Taeniae* 4 millimetres long, and others, which had reached the enormous length of 60 centimetres. Is it possible that the *scolices* of the *Caenuri* implanted on the same vesicle, having the same degree of development, and absolutely of the same age, after having been introduced into the intestine, should exhibit, in so short a time, such a prodigious difference of size, from 4 to 60 millimetres? It is inconceivable. If we had followed the usual plan, and administered *Caenuri* at different times, such a result would apparently have afforded an evident demonstration.

But, following the plan we did—one both more rational and more rigorous—it seems calculated only to give rise to doubt.

"If, however, in other experiments, we compare the number of Caenurus-scolices administered with that of the *Taeniae* met with, the same uncertainty under which we labour will also be experienced by all serious thinkers. It is impossible, in this case, to reject the evidence of ciphers.

"In one experiment, we administered to a dog 60 heads of *Caenurus*. Eleven days afterwards, on examining the body, we found 36 *Taeniae* in the intestine. In another, 60 *scolices* were also given, and at the end of eleven days 51 *Taeniae* were discovered. This shows nothing. But in a third experiment, in which a dog was also made to take 60 *Caenurus* heads, when it was killed, sixteen days afterwards, we found 78 *Taeniae* in the intestine—that is to say, 18 more than we had administered This is inexplicable.

"Another experiment afforded results of such a nature as to raise still deeper doubts. We gave 100 *Caenurus* heads to a sucking puppy, which was carefully secluded in our laboratory. When killed, twenty days afterwards, we found in the intestine 237 Tapeworms, varying in size from 4 to 60 centimètres—a result doubly perplexing, because we found 137 *Taenias* more than we had sown, and because, having administered *scolices* from the same vesicle, and in the same stage of development, we found, at the end of no more than twenty days, the inexplicable difference of length of from 4 to 60 centimetres. This appears to us calculated to afford ground for serious objections.

"Other experiments have afforded only absolutely negative results. A full-grown Danish dog swallowed at one time a *Caenurus* having about 100 *scolices* on its surface. Killed at the end of forty-five days, it did not afford a single *Taenia*. Another full-grown dog devoured a *Caenurus* upon which were counted about 100 lively *scolices*. When killed, forty-five days afterwards, it afforded also only a negative result.

"But if we admit that some serious doubts still require to be dissipated with respect to the transmigration of the *Caenurus cerebri* of the sheep to the intestine of the dog, we are infinitely more decided with respect to the peregrination of the ova of the *Taeniae* of the carnivora to the brain of the ruminant.

"Our experiments were made upon two lambs, to each of which we

administered ten segments of *Taenia serrata*, all of which contained a number of perfectly-matured ova, in which might be distinguished the embryo with its hooks. The sheep, which had been carefully selected as in perfect health, never presented the slightest symptom of 'staggers.' Experimenters say that the symptoms of this disease are ordinarily manifested from the fifteenth to the twentieth day; but in order to avoid any precipitancy, we kept our animals for four months. Though still in perfect health, they were then killed, in order to ascertain whether the brain contained any vestige of *Caenurus*; but on the autopsy that organ was found perfectly sound. Consequently, in these cases there had been no transportation of the progeny of the *Taeniae* of the dog to the brain of the sheep.

"Considering, therefore, the doubts which arise when we regard attentively the assertions of experimenters, and those also which arise upon a rational examination of the proofs, and lastly, the results of our experiments, we do not hesitate to assert that the offspring of the *Taenia* of the dog never reaches the brain of the sheep.

"But although we deny thus strongly the transmission of the entozoon of the dog to the brain of the sheep, we should not be astonished —without admitting that this is the normal course—to find that it may be possible that the *Caenuri* of the latter animal were individual *Taenias*, which have undergone an arrest of development, owing to the situation in which they have been born, and which aborted *Taenias*, being placed by the experimenter in a more propitious place, there elongate themselves, and attain a larger size than they present in the brain. This opinion has been already sustained.

"We are continuing our experiments, and shall, without doubt, be able to arrive at a solution of this interesting problem."

ON A HYÆNA-DEN AT WOOKEY-HOLE, NEAR WELLS.

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[The account of the contents of a cave near Wells, in Somersetshire, England, which we extract from the last number of the *Quarterly Journal of the Geological Society*, is not only interesting to the geologist and palaeontologist, but from the discovery of human relics, very highly so to the antiquarian and ethnologist. As all our readers

may not have access to the original, we copy the paper, omitting the minute discription of the organic remains, of which, however, we give the list.]

Of all the ossiferous caverns of this country which have from time to time been explored since 1821, there are none, perhaps, which form so exact a parallel to the Hyæna-den at Kirkdale as that which I bring before your notice this evening.

It is situated at Wookey-Hole, a village on the southern flanks of the Mendips, and about two miles to the north-west of Wells. The ravine in which it was discovered is one of the many which pierce the dolomitic conglomerate, or petrified sea-beach of the Permian (?) age, still underlying its ancient sea-cliffs of Mountain-limestone, and overlying the lower slopes of the Mendips. Open to the south, it runs almost horizontally into the mountain side, until closed abruptly northwards by a perpendicular wall of rock, 200 feet or more in height, ivy-covered, and affording a dwelling-place to innumerable jackdaws. Out of a cave at its base, in which Dr. Buckland discovered pottery and human teeth, flows the River Axe, in a canal cut in the rock. In cutting this passage, that the water might be conveyed to a large paper-mill close by, the mouth of the Hyena-den was intersected some ten years ago; and from that time up to December, 1859, it was undisturbed save by rabbits and badgers; and even they did not penetrate far into the interior, or make deep burrows. Close to the mouth of the cave the workmen (employed in making this canal) found more than 300 Roman coins, among which were those of the usurper Allectus and Commodus. When Mr. Williamson and myself began our exploration in 1859, about 12 feet of the entrance of the cave had been cut away, and large quantities of the earth, stones, and animal remains had been used in the formation of an embankment for the stream which runs past the present entrance of the cave. Of the animal remains, some found their way to the British Museum and the Museum of the Somerset Archæological Society at Taunton; but the greater portion were either thrown away or scattered among the private collections of the neighbourhood. According to the testimony of the workmen, the bones and teeth formed a layer about 12 inches in thickness, which rested immediately on the conglomerate-floor, while they were comparatively scarce in the overlying mass of stones and red earth. The workmen state also that at the time of the discovery of the cave the

hill-side presented no concavity to mark its presence. When we began our exploration, so completely was the cave filled with *débris* up to the very roof, that we were compelled to cut our way into it. Of the stones scattered irregularly through the matrix of red earth, some were angular, others water-worn; all are derived from the decomposition of the dolomitic conglomerate in which the cave is hollowed. Near the entrance, and at a depth of five feet from the roof, were three layers of peroxide of manganese, full of bony splinters; and passing obliquely up towards the southern side of the cave, and over a ledge of rock that rises abruptly from the floor, further inwards they became interblended one with another, and at a distance of 15 feet from the entrance were barely visible. In and between these the animal remains were found in the greatest abundance.

While driving this adit, we found an irregular piece of flint, which had evidently been chipped by human agency, and a water-worn fragment of a belemnite, which probably had been derived from the neighbouring Marlstone-series. Bones and teeth of *Rhinoceros tichorhinus*, *Cervus Bucklandi*, of other species of Deer, Irish Elk, Mammoth, *Hyæna*, *Ursus spelœus*, Wolf, Fox, and Horse, rewarded our labours; and at the mouth of the cave, and cemented together by stalagmite, were frogs' remains. Remains of *Felis spelœa* also were found at the time of the discovery of the cave, and are at present in the Museum of the Somerset Archæological Society. The teeth preponderated greatly over the bones, and the great bulk were those of the Horse. The Hyæna-teeth also were very numerous, and in all stages of growth, from the young unworn to the old tooth worn down to the very gums. Those of the Elephant had belonged to a young animal, and one had not been used at all. The hollow bones were completely smashed and splintered, and scored with tooth-marks, while the solid carpal, tarsal, and sesamoid bones were uninjured, as in the case of the Kirkdale Cave. The organic remains were in all stages of decay, some crumbling to dust at the touch, while others were perfectly preserved and had lost very little of their gelatine.

In 1860 we resumed our excavations; and, in addition to the above remains, found satisfactory evidence of the former presence of Man in the cave. One white flint spear-head, of rude workmanship, one chert arrow-head, a roughly chipped piece of chert, a round flattened

piece of chert, together with various splinters of flint, which had apparently been knocked off in the manufacture of some implement, rewarded our search. Two rudely fashioned bone arrow-heads were also found, which unfortunately have since disappeared; they resembled in shape an equilateral triangle with the angles at the base levelled off. All were found in and around the same spot, between the dark bands of manganese, in contact with some Hyæna-teeth, at a depth of four feet from the roof, and at a distance of 12 feet from the present entrance.

That there might be no mistake about the accuracy of the observations, I examined every shovelful of *débris* as it was thrown out by the workmen; while the exact spot where they were excavating was watched by Mr. Williamson. The white flint spear-head was picked out of the undisturbed matrix by him; the remainder of the implements were found by me in the earth thrown out from the same place. Thus there can be no doubt as to their exact position; and error of observation is rendered very improbable. Two of the specimens are similar in workmanship and general outline, though not in size, with two of the typical forms found at Amiens and Abbeville, which Evans terms respectively spear-heads and sling-stones. The spear-head is of white-flint: in outline, size, and workmanship it resembles a beautiful semi-transparent quartz-rock specimen from the burial-mounds of North America, in the possession of Dr. Acland. The bone arrow-heads resembled most strongly in size and outline a flint arrow-head, also from the burial-mounds of North America, and in the possession of Dr. Acland. The chert arrow-head is dissimilar to any that I have seen. A splinter, which is bounded on one side by a straight cutting edge, appears to me to have been used as a knife, and to have been intentionally chipped into its present form for that purpose.

But what inference can be drawn from these signs of Man's presence in a Hyæna-den filled with unmistakeable remains of a fauna now extinct in Europe? Was the fabricator a contemporary of the British Cave-bear, Rhinoceros, Mammoth, and their congeners? Or did he leave his instruments in the cave at a time posterior to that of the other creatures whose remains are associated with them in the Post-glacial period? If the former be answered in the affirmative, Man, instead of having appeared on the earth some 6000 or 7000 years ago, must have existed at a time anterior to the glacial epoch, and at

a time when the relations between land and water were altogether different,—a period that we cannot sum up in years. But if the latter, the great antiquity of the implements is by no means proved, and they may have belonged to any period anterior to that of the Saxons. The facts of the case, to my mind at least, lead but to one conclusion—that these implements were deposited in the cave during the Preglacial period. The cave at the time of its discovery (assuming the statement of the workmen to be true) was completely blocked up, so that the ravine-side presented no concavity to indicate its presence; there were no traces of disturbance posterior to the filling up of the cave either on the spot where they were found, or as we were driving our adit thither. And, as 12 feet of the former mouth of the cave have been cut away, we must double the distance from the present entrance to the spot itself, which will thus be 24 feet. The motive certainly has yet to be assigned that would induce a savage to excavate a trench 24 feet long with his miserable stone implements, and consequently with great labour; and, having excavated it, again to fill it up to the very roof with the *débris* which he had removed—earth, stones, and animal remains. The absence of charcoal, pottery, and human bones precludes the idea of the cave ever having been a place of sepulture, as was the cave close by, also one on the northern flanks of the Mendips at Barrington-Comb, and a third in Cheddar Cliffs.

But, on the other hand, it may be said that the fact of their being found in and around the same spot is a weighty argument in favour of their introduction in the Post-glacial times. Had they been subjected to violent watery action, they would, like most of the animal remains, have been scattered confusedly through the matrix, and would not have been found as they were left by their former possessor. They would moreover have lost their sharp edges. On this point, indeed, they, as well as a large number of the animal remains, where slender processes and points of bone are left uninjured (as, for instance, the palatine process of the right maxilla of a Wolf), agree in shewing that violent watery action had a very small share in filling the cave.

I should infer that, as the dolomitic conglomerate of the roof and walls gradually yielded to the attacks of the carbonic acid in the air, the *débris* was gradually accumulated at the same time that the Hyænas from time to time brought in the remains of their victims. On this hypothesis the fact of the occurrence of these implements in

the same place, coupled with the absence of all traces of an entrance having been effected posterior to the filling up of the cave, is easily explicable; as also is the fact of the bones and teeth being confusedly scattered, and as yet in no instance water-worn. This gradual process may at times have been varied by floodings, by which a large quantity of earthy sediment, derived from higher levels, may have been introduced, as now in a cave close by, in which sediment similar in every respect to the red earth of the bone-cave is deposited during a rainy season. Had the numerous large stones been put in motion by water in the cave, they would soon have ground down the animal remains to an impalpable dust.

Thus, indeed, the discovery of these inplements in the same spot, so far from proving that they were introduced subsequently to the other remains, adds additional testimony to the method by which the cave was filled,—that it was filled gradually and by causes still in operation, and not by any great cataclysm, by which the contents of numerous bone-caves are supposed to have been introduced. And the only alternative left us is to believe that they were deposited during the time that the *Rhinoceros tichorhinus*, Irish Elk, and Cave-bear inhabited the British Isles, and before the great submergence of land in the Northern Hemisphere.

In April, 1861, we resumed our excavations; and, as we made our way inwards, found that the cave began to narrow, and ultimately to bifurcate; one branch extending vertically upwards, while the other, which is undisturbed, appeared to extend almost horizontally to the right hand. As we reached the middle constricted passage, the teeth became fewer, while the stones were of larger size than any we had hitherto discovered. The great majority of the gnawed antlers of Deer were found at this part, also the posterior half of a cervine skull, the right maxilla of *Canis lupus*, and, what is more remarkable, a stone with one of its surfaces coated with a deposit apparently of stalagmite: this, however, was much lighter than stalagmite, and not so good a conductor of heat; and, on analysis, I found that it consisted of phosphate of lime, with a little carbonate, and a very small portion of peroxide of manganese. Doubtless the surface of the stone, covered with phosphate of lime, formed part of the ancient floor of the cave, and hence was coated with excrement, while he lower part, being imbedded in the earth on the floor, was not so coated. This deposit may, perhaps, explain the absence of round balls of *Al-*

bum græcum, which, assuming that the cave at the time was more damp than that at Kirkdale, would be trodden down on the floor by the hyænas, instead of presenting a rounded form. The stone also itself exhibits tooth-marks, and probably was gnawed by the hyænas, like the necrosed antlers, for amusement. Dogs are very fond of exercising their teeth in this way. This discovery also proves that violent watery action had but small share, if any, in filling the cave; for in that case the soft *Album græcum* would have been removed from the stone.

The section made in cutting this passage presented irregular layers of peroxide of manganese, full of bony splinters, and in general covered by a layer of bones in various stages of decay. These layers disappeared in the upper portion of the passage. There were masses of prismatized stalactites scattered confusedly through the matrix. After excavating the vertical branch as far as we dared (for the large stones in it made the task dangerous), we were compelled to leave off, having penetrated altogether only 34 feet from the cave's mouth. In this vertical branch, the bones, stones, and red earth are cemented together by carbonate of lime,—a circumstance which added materially to the difficuity of the excavation.

A short distance from the entrance the cave gives off a lateral branch to the left, which tends obliquely upwards, and is abruptly closed by stalagmite. This forms a marked contrast to the rest of the cave, being covered with stalactite and stalagmite, and free from *débris;* while the other parts are full of *débris*, and at the same time free from any but the merest traces of carbonate of lime, except in the case of the vertical branch above mentioned, where, however, it does not assume a stalagmitic form.

There are numerous caverns in the vicinity which, in all probability, are connected with the one under notice, and which, to say the very least, are parts of the same great system, and all open upon the same ravine. And even this probably is but a cavern unroofed by the chemical action of the carbonic acid in the air, by which the insoluble carbonate of the stone is changed into the soluble bicarbonate, and conveyed away atom by atom. It probably was the main trunk fed by numerous tributaries, now represented by caverns, all of which are dry, with the exception of that at the head of the ravine, through which the drainage still passes, though not to the same degree as formerly.

On measuring the cave we found that the maximum height of the entrance was 8 feet and the width 36 feet; in the interior the maximum height was 9 feet.

In conclusion, I will only add that, after carefully weighing the facts of the case, on the site of our excavation, I cannot but infer, from the evidence afforded by this cave alone, that Man was a contemporary of the gigantic *Ursus spelæus*, the Hyæna, the Mammoth, and their congeners; and I feel convinced that the cave was filled with its present contents, not by a violent cataclysm, but by the ordinary operations of nature now, as then, in progress; with this difference only, that the remains of Foxes and Badgers are now being entombed in the caverns still open in the district, instead of the extinct preglacial fauna.

List of Mammalian Remains.

HYÆNIDÆ. *Hyæna spelæa*, 4 jaws, 49 teeth, left ilium, 2 metacarpals, portion of right rib, and right maxillary.

CANIDÆ. *Canis vulpes*, 4 humeri, 3 ulnæ, 5 tibiæ, left radius.

Canis Lupus, right maxillæ with P. M. 4 and incisors 2, right humerus.

URSIDÆ. *Ursus spelæus*, 3 molars, 2 canines, left humerus.

SOLIDUNGULA. *Equus*, os calcis, 4 astragali, metacarpal, metatarsal, distal end of tibia, upwards of 70 molars, 7 incisors, one canine.

MULTUNGULA. *Rhinoceros tichorhinus*, 3 proximal ends of ulnæ, astragalus, phalanges, 29 molars.

BOVIDÆ. *Bos primigenius*, 2 ossa calcis (right), astragalus, phalanx, portion of shaft of femur, scapho-cuboid, 2 molars.

CERVIDÆ. Teeth, antlers, and various fragments.

Megaceros Hibernicus, 7 molars, fragment of jaw containing M. 1, 2, 3.

Cervus Bucklandi, 2 antlers (skull?).

C. Guettardi, 2 antlers.

C. Tarandus (?), (skull?), (antler?).

C. Dama (?), fragments of antlers.

PROBOSCIDIA. *Elephas primigenius*, 2 second molars, portion of tusk, innumerable splinters.

SCIENTIFIC AND LITERARY NOTES.

THE SOCIAL SCIENCE ASSOCIATION.

[We find the following reports in a London weekly newspaper, and avail ourselves of them in the absence of more complete information on a subject of great and general interest.]

The Houses of Parliament were turned to a new use on Saturday evening, June, 7th, the Social Science Association having converted them to the purposes

of an evening party. In private life the master of the house is often turned out of his library and other haunts when the mistress gives a ball, and his studious leather armchair made use of by young ladies eating ices in the intervals of dancing. So it was on Saturday at Westminster, and fair young girls in opera cloaks spread themselves all over the sombre green benches of the House of Commons, sitting in the Speaker's chair, or enacting Sergeant-at-Arms for a few brief moments in that functionary's huge *fauteuil*.

We cannot pretend to give even a catalogue of the papers read during the week. Our space admits but of a very brief selection.

In the International Department, Dr. Travers Twiss has delivered what should have been an inaugural address. It was a comprehensive digest of the history of international law.

In the section of jurisprudence, Sir Fitzroy Kelly, who presided, has delivered an address, containing an eloquent comment on the constitution of England, but strongly condemning the confused state into which the common and statute law have been brought, and urging the necessity of codification.

The relations of trade and the means of settling differences between masters and workmen have engaged a large share of the attention of the social economy section; and it is fair to add that the masters do not have it all their own way in the controversy. The workmen find plenty of advocates.

Mr. J. Heywood has read a paper on "College Scholarships," in which he described the character of the examinations by which such appointments are obtained at Oxford and Cambridge.

Public Amusements.—Mr. J. Hyde has read an interesting paper upon the subject of the amusements of the working classes. He stated that places of public amusement derived their support from the craving of the people for the excitement of vivid and novel sensations, that animal excitements obtained the largest support, and that of intellectual amusements the following order was observed:—First, periodical literature, then the drama, then concerts, negro entertainments and burlesque performances, then panoramas and exhibitions, then lectures and libraries, and lastly, discussion and other classes. It was necessary to provide better and higher class amusements to meet the wants of the working classes, or vicious and unscrupulous men would supply the deficiency for them, and it was necessary that those amusements should partake something of the form and character of those at present in vogue. He recommended, therefore, the establishment of small garden allotments in the suburbs of all towns for the labouring classes, and that flower, fruit, and vegetable shows should be encouraged amongst them. He recommended also the establishment of bowling greens, skittle grounds, quoit grounds, and cricket clubs, detached from public-houses, and where neither beer nor strong liquors should be introduced. Men were not to be won to Temperance by tea-drinking and experience-relating meetings, and he believed more was to be done in the cause in the way he had pointed out than by any other means. With regard to the drama, Colley Cibber once said that two theatres were as many as London could find performers for or audiences to support, whereas there were now no less than sixteen, beyond the vast number of public recitations and readings from plays, affording a

mild dose of theatrical representation, which those were willing to attend who would not think of going to see the enactment of stage plays, with the improving adjuncts of scenery and costume. The dramatic form was singularly consistent with our nature, and the only objection was to those plays which had an immoral tendency, or which were vicious and stupid, or often both. The great influence of amusements upon the character of the people, and the dearth of proper amusements, claimed for this question the best consideration of the congress.

The Rev. H. Solly found a strong desire amongst the working classes for elocutionary entertainments, and considered that the indulgence of that desire was beneficial in keeping men from public-houses, and from the pernicious influences of twopenny and fourpenny theatres. The penny concerts introduced in some large towns were also deserving of encouragement; but he regretted the increased number of those houses where music was made only the inducement to drink.

Mr. W. Pare, of Dublin, thought the friends of teetotalism had lost a fine opportunity of extending their principles by their adherence to a negative policy, instead of proposing something positive. The working man must have some amusement, and drunkenness was often resorted to from no inherent vice, but from want of something better to do.

Mr. A. Ryland referred to the success which had attended the establishment of penny lectures and penny classes in connection with working men's institutions in Birmingham, to which all classes went. The experiment of parks had been tried there for the amusement of the people, and with signal success, and they were going to try the experiment of workmen's halls, which he understood to mean gin palaces without the gin.

Mr. Cassel remarked that the Temperance Society had not been neglectful in providing amusements for its followers. In Glasgow they had established Saturday night concerts, which were regularly attended by upwards of three thousand people, principally of the working classes, and it was necessary that these temperance amusements should be extended to counteract the influence of music halls, which were becoming a great and gigantic evil.

The Rev. Dr. Beale bore testimony to the success that had attended the plans adopted for the proper amusement of the people in the agricultural districts, and recommended as the result of his experience that lectures to the labouring classes should combine as far as possible amusement with instruction.

Lord Brougham said nothing could be more important than the subject under discussion, affecting as it did both the health of the body and the health of the mind: and he was glad to hear that the appreciation of its importance was not confined to the towns.

University Degrees for Women.—Miss Frances P. Cobbe, on Tuesday, read a paper on "Female Education, and how it would be affected by University Examinations." After alluding to the special wants of women at this time, and the advantages which an improved education would give them, Miss Cobbe controverted the popular idea that a cultivated woman was likely to be a less good wife and mother than an ignorant one, or that, as Sydney Smith said, "a

woman's love for her children depended on her ignorance of Greek, and she would be likely to desert an infant for a quadratic equation." Two of the noblest instances of woman's home virtue and woman's philanthropic devotion were Mary Somerville and Mary Carpenter, the one the head of all her sex in science, and the other learned enough to have taught Homer and Virgil at eighteen. A classical education did not make a woman masculine. It was as absurd to teach a girl French because a boy learned Latin, as to to make her eat mutton because the boy ate beef. The assimilation of mental and bodily food both suited the natural constitution. A woman's mind is made by the Creator wholly different from that of a man, and in everything else she does, art, learning, or philanthropic labour, these differences come out. She works not like a man, from without, by force of will and legislative power, but from within, by persuading and inspiring. To educate a woman to the utmost is only more and more to educe her womanliness; to make her more, not less, a woman. A sound and solid education is even more needful for her than a man, her natural quickness leading her to shallowness and hastiness of conclusions. University examinations, which have long been admitted to be so useful for men, can hardly prove less so for women. That of London, in particular, offers special facilities for their admission, and we may hope that the late resolution of half the Senate to reject them will ere long be reconsidered. London University will assuredly suffer no derogation from following the course of the schools of Alexandria, where Hypatia held the first chair of philosophy then existing in the world; and in that of the University of Padua, where women taught and learned besides Galileo, Petrarch, and Columbus. In conclusion Miss Cobbe begged both men and women to put aside the prejudices which the obnoxious and ludicrous ideas attached to that popular ogress the strong-minded female, brought upon all subjects connected with the claims of women. In the old times of chivalry, to help a woman in distress was deemed the highest honor for the bravest knight. Assuredly it is not less an honor now to aid the whole sex to rise to a better and nobler life, and to develop more perfectly, because more freely and fully, that form outward which God has also made in His own image —a divine and holy thing. The conclusion of the paper was followed by the heartiest applause.

The President: I may accept, I suppose, that acclamation as a wish that we had the power of conferring degrees—(hear)—and if we had, I should be most happy to propose that Miss Cobbe receive from us the degree of M.A.—(cheers and laughter)—mistress of the art of discussing a subject with sound reason, with infinite grace, and with perfect propriety—(hear). On one point only I should wish to make an observation, and that is to confirm the statement of Miss Cobbe as to the possibility of the union of the most perfect domestic virtues with the highest intellectual cultivation. I cannot venture with so many ladies present, to open a discussion on the subject—(laughter). I should be sorry to baulk any lady—(laughter)—but I hope what has been said has been so full and satisfactory that they will accept it as a perfect statement of their case.

At the meeting on the evening of the same day, Mr. Shaen moved a resolution to the effect that the council should represent to the Senate of the University of

London the desirableness of their undertaking the duty of affording women an opportunity of testing their attainments in the more solid branches of learning. He referred to the case of Miss Garrard, who, through her father applied to the Senate to be examined, and received a reply that under the charter they had no power to comply with her request. He read portions of the charter, and endeavoured to shew that the difficulty was more technical than real, and that the Senate would readily get over it as soon as they were desirous to admit women.

Dr. Hodson seconded the resolution.

Mr. H. Chester said it was necessary for national interests that means should be found without delay for improvement in the education of women, and they must consist in a great degree of a tribunal for testing their requirements and granting certificates or degrees. He, however, could not agree that the best mode of accomplishing the object at the present time would be to force the duty upon the University of London. There could be no doubt whatever that the founders of the University and the Government authorities who issued the charter did not contemplate that degrees should be granted to women; and he could not but think that if the University were at once to grant women the degrees of bachelor of arts, master of arts, and doctor, they would bring on themselves an amount of ridicule which would retard rather than advance the object in view. That object could be obtained in a much more practical way. What they wanted was an university specially designed for women alone, and he thought that this association had resources at hand which would enable it to establish such an institution. He referred to the success which had attended the examination of females in different branches of knowledge by the Society of Arts, and suggested that the association should appoint a special committee to deal with the subject.

Dr. Foster thought that women would prefer having university degrees, equal to those obtained by men, to certificates from the College of Precentors or the Society of Arts.

The resolution, after some more discussion, was withdrawn, and the following carried unanimously:—"That this meeting is of opinion that means ought to be provided for testing and attesting the education of women of the middle and higher classes, and requests the council of the association to take such measures as they may deem expedient for the attainment of this object."

A Ladies' Parliament.—The chief interest on Wednesday was centred in the Social Economy Section, in which, under the presidency of Lord Brougham, a ladies' parliament was held to discuss the question of employment for their sex. The section was crowded during the whole day by a throng of ladies, who filled, not only the area of the court, but the jury-box and the seats for counsel, and gave the chamber very much the appearance of the College of the "Princess" with its rows of "fair girl graduates in their golden hair." The gentlemen (says the *Times*) were in such a miserable minority that they were scarcely visible, and if they were not to be seen they certainly took good care not to make themselves heard. Whether they were too craven to utter their real sentiments, or whether they were converted by the soft voices of the orators,

we cannot say; but, if the old adage holds good, consent must be inferred from silence. Some of the ladies, owing to the amplitude of their skirts, found not a little difficulty in getting into the tribune, and, when there, were at first rather nervous, dropping their voices to a confidential whisper, and searching for scraps of paper which were never to be found. But they soon regained their confidence, and spoke out with a distinctness and animation which might put most young curates, and even some barristers, to the blush. The proceedings commenced with a paper by Miss Emily Davies, on "Medicine as a Profession for Women," which was read by Mr. Russell Gurney. The Secretary communicated a paper by the Rev. J. S. Howson, advocating the official employment of women in works of charity. Miss Bessie R. Parkes next delivered in a clear, firm voice, an interesting address, partly prepared and partly extempore, on "The Balance of Public Opinion on Woman's Work." She expressed an opinion that we are now passing through a stage of civilisation in which women are excluded from many occupations in which they are qualified to excel, while they are confined to others, such as factory work, for which they have no aptitude, and which tend to interfere with the true sphere of woman—the household. Miss Emily Faithfull followed with a paper on some of the drawbacks connected with the present employment of women. She attributed the inaccuracy and want of persistent attention with which women were charged to defective education. Habits of unintermittent industry could not be expected to follow a girlhood of negligence. She suggested the establishment of a tribunal to examine and certify as to the attainments of women, and protested against the idea that marriage should be a mere refuge for the destitute. The system of training which she advocated would, in her opinion, promote matrimony, because it would furnish women with accomplishments which would render them valuable acquisitions in the houses of those prudent bachelors of limited means who were afraid to mate with extravagant and useless "fine ladies." Mrs. Inglis, in discussing the papers which had been read, observed, amidst some applause, that it was a woman's own fault if employment was denied her. The sex were so ridiculously afraid of being deemed "strongminded" or "unladylike" that they shrank from doing true woman-like work. Lord Brougham remarked that the talent of women in debate had been clearly proved, and appealed to some of the gentlemen present to exhibit their powers in the same way; but, whether from timidity or gallantry, the invitation was not responded to. In answer to questions, Miss Faithfull stated that she had more applications for work in her printing establishment than she could meet. Mrs. Jellicoe read a paper suggesting the employment of women as supervisors over their own sex in factories. Miss Barbara Corbett reported the progress of the Dublin Society for the Employment of Educated Women. Since last year two hundred pupils have attended the classes for book-keeping, law-writing, sewing with the machine, cutting out clothing, &c. A lucid and able essay on the legal disabilities of women was contributed by Miss Tabor. A paper read by Miss Florence Hill, shewing that there is a sphere in the colonies for educated women, was read by Mrs. A. Hill; and the report of the Women's Employment Society by Miss E. Faithfull.

Thursday's Sittings.—The Reformatory section was occupied with an animated discussion on the Permissive Bill advocated by the United Kingdom Alliance. In the other sections interesting papers on various subjects were read. In the evening a soirée was given to the members and their foreign guests by the Fishmonger's Company. The wires of the Submarine Telegraph Company were connected with the hall, and messages were despatched from the president, council, and others, to the Burgomaster of Brussels, the Lord Lieutenant of Ireland, and the Lords Provost of Edinburgh and Glasgow, to which replies were received before the guests separated. The following cities and towns were also spoken with:—Paris, Basle, Vienna, Warsaw, Cracow, Brussels, Berlin, Copenhagen, and Hanover.

THE INTERNATIONAL PHILANTHROPIC CONGRESS.

The sittings of the International Philanthropic Congress were commenced on Monday, the 9th of June, at Burlington House, under the presidency of Lord Shaftesbury. In his inaugural address, his lordship stated that the object of the Congress was to deal with subjects of private benevolence not requiring the interposition of legislative enactment. In an able manner he pointed out how much there was to be done in this direction.

On Tuesday, the education of neglected children was treated in an earnest, kindly spirit, by Miss Carpenter, in a paper which she read to the Congress. She drew a graphic picture of the "Young City Arab," reckless of punishment and privation, and precocious in the accomplishments of vice, earning his claim to be comfortably lodged and well fed for four years at the public expense, and then discharged in first-rate condition to pursue with renewed zest and energy his pernicious career. She insisted it was the duty of society to assume the place of a parent towards those children who had either lost or been deserted by their natural guardians. The State ought to supply the authority and a portion of the funds for such action, and leave the rest to private benevolence. Care must, of course, be taken to prevent such institutions as Mettray and Rye House from serving as a premium to undutiful parents, and it was only just that parents should be compelled to contribute towards the education no less than to the maintenance of their offspring. The child had also a right to be preserved from the ill-usage as well as the neglect of its parents. As far as possible a domestic character should be given to the schools for neglected children, and industrial should be combined with elementary education. Miss Carpenter also urged that the State ought to assist the ragged-schools.

On Thursday, the following papers were on the programme for the day:—Miss Carpenter, "On the Education of Neglected Children;" M. de Perrégaux-Montmollin, "Rapport sur la fréquentation des écoles primaires dans le Canton de Neufchatel;" Mr. H. Roberts, F.S.A., "Suitable Literature for the Working Classes;" Mr. W. Spottiswoode, F.R.S., "An Account of the Schools and other arrangements for the Workpeople at Her Majesty's Printing-office, London;" Miss Florence Nightingale, "Army Sanitary Reform under the late Lord Herbert;" Dr. Guy, "On the Rate of Mortality prevailing in the General Hospitals

of London;" M. le Dr. Guggenbuhl, fondateur et directeur de l'asile pour les crétins à l'Abendburg (canton de Berne), "Sur la nécessité d'une Statistique Européenne du Crétinisme et de l'Idiotie;" Mrs. Fison, "Women's Work in Sanitary and Social Reform;" M. le Comte de Larnage, fondateur de l'asile agricole pour les épileptiques à Tain (Drôme), "L'Epilepsie considérée au point de vue social et charitable;" Mr. E. Chadwick, C.B., "Recent Sanitary Improvements in England, and their Results;" M. G. Rollin-Jacquemyns, "De l'institution des prix de propreté à Gand;" Mr. H. R. Roberts, F.S.A., "Improvements in the Dwellings of the Working Classes."

BALBIANI ON TRUE SEXUAL REPRODUCTION IN THE INFUSORIA.

The *Infusoria* have long been known to multiply by spontaneous fission, external germination, and the production, internally, of variously formed bodies, which many observers, somewhat hastily, have described under the name of "embryoes." The phenomena of "encysting," "conjugation," and "alternate generation" (so called), which these animals frequently exhibit, and the relation, real or supposed, between such processes and their various modes of propagation, have, from time to time, afforded subject-matter for not a little controversy.

Now, however, the whole aspect of this subject has been changed, and for the vagueness which, less than four years ago, characterised all attempts to explain the generative functions of the Infusoria, has been substituted that clear and complete survey of their leading phenomena, which science has just received from the pen of M. Balbiani. In his excellent summary, just brought to a conclusion, a concise, yet sufficiently detailed account is given of the structure of the sexual apparatus, male and female, among the principal sub-divisions of the class. The changes which this apparatus undergoes in the course of its development—the evolution of the essential elements to which it gives rise, and many other particulars of interest, are all in their turn described with laudable minuteness and precision. Compelled, at times, to correct the mistakes of others, he in no wise shrinks from avowing the errors into which he himself fell at the commencement of his inquiries; nor does he hesitate to point out the difficulties of interpretation which beset him at each successive stage of their progress. Perhaps future investigators may, in some degree, require a more qualified statement of views which M. Balbiani, in common with most of his readers, now considers beyond the reach of cavil. Yet, even with this restriction, it does not seem too much to say that a single observer has done more to establish on a secure basis a right knowledge of the sexual phenomena of the Infusoria than the collective body of his predecessors in the same field of inquiry.—*From the Quarterly Journal of Microscopical Science.*

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—APRIL, 1862.

Latitude—43 *deg.* 39.4 *min. North. Longitude*—5 *h.* 17 *m.* 33 *s. West. Elevation above Lake Ontario,* 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10 PM	M'E'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P·M.		6 AM.	2 PM.	10 P.M.	Resul't.	M'E'N		
					°	°	°	°	°												°							
1	29.872	29.900	29.892	29.8888	33.1	38.5	31.3	34.23	— 2.00	.174	.173	.152	.164	.92	.74	.86	.83	N N W	W s W	N E	N 50 E	4.5	2.8	4.0	2.54	5.77	...	...
2	.728	.334	.230	.4337	34.5	38.5	40.3	39.27	+ 2.63	.173	.199	.209	.192	.86	.85	.84	.80	E b N	E	s b w	s 62 E	12.2	17.0	11.2	3.71	15.58	0.010	...
3	.610	.727	.860	.7447	40.3	45.4	36.0	40.25	+ 3.23	.209	.169	.144	.179	.84	.55	.68	.72	W S W	W	W N W	N 77 W	17.0	14.2	9.4	8.07	10.24	...	...
4	.870	.836	.684	.7842	32.0	32.7	32.0	32.30	— 5.03	.158	.143	.143	.149	.87	.76	.79	.81	N N E	E b s	E	N 86 E	10.2	14.0	19.0	15.47	15.90	...	0.1
5	.235	.319	.561	.3783	35.3	39.9	33.8	36.40	— 1.32	.170	.164	.158	.168	.83	.66	.81	.79	E	W	W N W	S 87 W	21.0	18.2	4.2	6.45	12.51	0.355	0.1
6	.654	.821	—	—	31.3	34.2	—	—	—	.152	.131	—	—	.86	.66	—	—	W b s	~ W	N w b N	N 69 W	14.5	20.2	3.4	11.85	12.03	...	Inp.
7	.984	.886	.786	.8738	20.1	30.9	26.6	26.17	—12.25	.091	.141	.105	.117	.85	.81	.73	.82	W N W	E	N E	N 72 E	0.5	7.0	6.5	8.44	9.41	...	...
8	.718	.653	.610	.6467	29.5	29.1	30.6	29.90	— 8.82	.121	.126	.138	.132	.74	.78	.80	.79	E b N	E b N	E b N	N 80 E	22.0	17.5	23.6	19.97	19.99	...	...
9	.554	.535	.639	.5765	30.9	35.3	33.8	33.22	— 5.82	.104	.127	.166	.131	.60	.61	.85	.69	E b N	E b N	N E	N 72 E	21.0	19.0	7.0	11.17	11.83	...	...
10	.780	.914	.969	.9007	29.8	42.1	35 0	35.67	— 3.75	.140	.152	.134	.146	.84	.56	.65	.70	N N E	S S W	N W	N 32 E	7 5	3.5	2.5	2.71	5.00	...	...
11	30.092	30.062	30.116	30.0923	32.7	44.6	32.7	37.08	— 2.65	.135	.162	.143	.145	.73	.54	.76	.66	N	S E b S	W N W	N 20 E	7.4	4.5	3.0	1.70	4.79	...	...
12	30.086	30.056	29.922	30.0167	37.1	43.5	37.4	39.78	— 0.40	.174	.117	.135	.128	.78	.41	.60	.53	E N E	E	E b N	N 85 E	7.8	13.5	11.0	10.42	10.43	...	...
13	29.829	29.778	—	—	37.8	41.7	—	—	—	.165	.175	—	—	.72	.45	—	—	E	E b N	N E b E	N 77 E	12.8	11.0	2.2	6.74	6.99	0.020	...
14	29.763	29.778	.821	29 7922	41.7	54 0	43.9	46.37	+ 5.63	.218	.282	.244	.247	.82	.67	.86	.79	E b N	E S E	S E b S	N S8 E	2.0	4.5	1.5	3.84	4.18	...	...
15	.866	.852	.810	.8393	43.5	53.3	47.5	49.25	+ 8 20	.250	.312	.264	.288	.92	.70	.80	.82	N E b E	E N E	E	N 81 E	5.5	9.4	6.0	6.11	6.17	Inp.	...
16	.810	.698	.671	.7210	45.4	61.6	53.3	54.32	+12.83	.263	.393	.344	.338	.86	.71	.84	.79	E N E	S E	E	S 67 E	6.0	3.6	3.0	2.58	3.14	0.005	...
17	.701	.773	.763	.7472	52.7	64.1	53.6	56.85	+15.10	.351	.459	.373	.384	.88	.76	.91	.82	S w b S	W	N w b N	N 89 W	4.6	8.4	3.8	4.27	6.93	0.130	...
18	.697	.503	—	—	46.1	48.2	—	—	—	.282	.328	—	—	.90	.97	—	—	N N E	E b N	W b N	N 74 W	2.0	2.2	22.0	5.25	8.98	0.115	...
19	.742	.754	.807	.7725	39 9	45.7	37.0	41.30	— 1.05	.181	.211	.149	.177	.73	.68	.67	.68	W N W	S W b S	N W b N	N 49 W	6.8	9.8	8.0	4.54	7.82	...	...
20	.810	.801	—	—	35.3	42.8	—	—	—	.164	.134	—	—	.80	.48	—	—	W	S S E	E N E	N 87 E	7.5	12.0	5.0	5.44	7.48	...	...
21	.598	.466	.299	.4310	37.0	37.8	37.4	37.40	— 5.70	.167	.217	.213	.199	.76	.95	.95	.89	E N E	E	E	N 82 E	12 5	20.0	23.5	18.93	18.95	1.555	...
22	.078	.109	.284	.1673	38.5	44.6	36.0	39.83	— 3.53	.225	.274	.162	.217	.96	.93	.76	.87	E	S b W	N w bw	N 64 W	11.0	0.4	27.4	11.68	14 04	0.020	...
23	.427	.586	.734	.5947	39.6	32.0	30.6	31.12	—12.58	.152	.150	.144	.147	.89	.83	.85	.84	W	W N W	W b S	N 68 W	19.6	32.0	8.2	17.30	18.11	...	Inp.
24	.763	.791	.821	.8005	30.2	43.9	33.1	35.92	— 8.03	.112	.163	.108	.128	.67	.56	.56	.59	N N W	S W b S	N	S 55 W	12.8	6.0	12.5	3.97	9.84	...	...
25	.875	.876	.909	.8878	30.2	42.1	29.5	35.00	— 9.40	.128	.082	.120	.111	.76	.30	.74	.58	N N E	S E b E	Calm.	N 85 E	4.2	10.5	0.0	4.42	5.37	...	...
26	.948	.992	.970	.9767	33.4	44.6	38.1	38.87	— 4.83	.126	.154	.126	.138	.66	.51	.55	.56	N N E	E S E	N E b E	S 87 E	4.5	10.2	4.5	3.99	5.40	...	...
27	.978	.868	—	—	38.8	47.9	—	—	—	.195	.250	—	—	.82	.74	—	—	E b N	E N E	E	N 76 E	10.0	10.0	7.5	7.17	8.08	...	...
28	.591	.606	.638	.6140	45.0	54.7	49.3	48.10	+ 2.70	.230	.262	.241	.235	.77	.60	.68	.70	S E b E	S S W	N W	S 81 W	3.6	14.4	7.5	5.35	10.76	0.025	...
29	.744	.746	.795	.7627	39.6	51.1	40.3	43.97	— 1.77	.184	.131	.158	.157	.75	.35	.63	.57	N N W	N w b N	N w bw	N 33 W	7.0	19.0	5.0	9.30	9.54	...	...
30	.781	.710	.630	.7023	37.4	52.2	44.6	45.45	— 0.60	.170	.212	.162	.188	.76	.54	.54	.61	N	E b s	E b N	N 87 E	1.0	6.2	10.0	6.30	7.77	...	...
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
M	29.7286	29.7184	29.7288	29.7258	36.02	44.09	37.77	39.56	— 1.48	.177	.199	.177	.184	.80	.66	.76	.73					9.30	11.37	8.75		9.77	2.235	0.2

Highest Barometer . . . . . 30.117 at 8 a. m. on 12th. } Monthly range=
Lowest Barometer . . . . . 29.076 at 8 a. m. on 22nd. } 1.041 inches.

Self-registering Ther.
- Maximum temperature . . . . 68°0 on p.m. of 17th } Monthly range=
- Minimum temperature . . . . 14°5 on a.m. of 7th } 53°5
- Mean maximum temperature . . 46°34 } Mean daily range=12°91
- Mean minimum temperature . . 33°43 }
- Greatest daily range . . . . . 23°5 from a. m. to p. m. of 30th.
- Least daily range . . . . . 4.2 from a. m. to p. m. of 21st.

Warmest day . . . 17th ...Mean Temperature . . .=56°85 } Difference=30°68
Coldest day . . . . 7th ...Mean Temperature . . .=26°17 }
Maximum Solar Radiation { . . . . . 82°4 on p.m of 17th } Monthly range=
Terrestrial . . . . . 5°0 on a. m. of 7th } 77°.4

Aurora observed on 5 nights, viz.: 1st, 3rd, 10th, 15th, and 29th; Possible to see Aurora on 16 nights; Impossible on 14 nights.
Snowing on 4 days: depth, 0.2 inches; duration of fall, 3.8 hours.
Raining on 10 days; depth, 2.235 inches; duration of fall, 43.7 hours.
Mean of cloudiness=0.65; above the average, 0.07. Most cloudy hour observed, 8 a.m.; mean=0.74; least cloudy hour observed, 10 p.m.; mean=0.53.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
1891.49	737.55	3656.66	2202.73

Resultant direction, N. 50° E.; Resultant Velocity, 2.48 miles per hour.
Mean velocity 9.77 miles per hour.
Maximum velocity 33.4 miles, from 1 to 2 p.m. on the 23rd.
Most windy day 8th—Mean velocity 19.99 miles per hour. } Difference 16.65 miles.
Least windy day 16th—Mean velocity 3.34 miles per hour. }
Most windy hour, 1 to 2 p.m.—Mean velocity, 11.50 miles per hour. } Difference
Least windy hour, 7 to 8 p.m.—Mean velocity, 7.48 miles per hour. } 4.02 miles.

2nd. Thunder, vivid lightning, and slight rain, 6 to 9 p.m. (first thunder storm of season).—4th. Snowing and hailing 8.30 to 10.30 p.m.; wind high and squally.—7th. Solar halo during forenoon; lunar halo from 7 20 p.m.; wild pigeons observed.—9th. Lunar halo between 8 and 9 p.m., imperfect.—11th. Lunar halo from 11 p.m., imperfect.—14th. Lunar halo at midnight, imperfect.—15th. Lunar Corona 10 to 11 p.m.; frogs croaking loudly.—16th. Solar halo during forenoon; sheet lightning and distant thunder 7 30 p.m.; lunar halo at midnight; butterflies observed.—17th. Swallows observed.—18th. Wetting fog 6.50 a.m. to 1 p.m.; violent gale from 7 p.m.—23rd, 24th, 25th, and 26th. Ice on exposed vessels and shallow pools at 6 a.m.—24th. Solar halo at 4 p.m., imperfect.—27th.—Solar halo during afternoon.—28th. Ground fog 6 a.m.—30th. Hoar frost and thin ice at 6 a.m.; solar halo at 8 a.m.

The amount of the Eastern Compound of the Wind for the month of April, 1862, was the greatest recorded in any April during the last fifteen years.

COMPARATIVE TABLE FOR APRIL.

YEAR.	TEMPERATURE. Mean.	Excess above Average. (41°0).	Maximum observed.	Minimum observed.	Range.	RAIN. No. of days.	RAIN. Inches.	SNOW. No. of days.	SNOW. Inches.	WIND. Resultant. Direction.	WIND. Resultant. Velocity.	WIND. Mean Velocity
	°		°	°	°							
1840	42.4	+ 1.4	65.9	25.3	40.6	14	3.420	2	...	...	...	...
1841	39.2	— 1.8	62 9	22.1	40.8	3	1.370	3	...	...	...	0.51lbs
1842	43.1	+ 2.1	89.5	21 6	67.9	8	2.740	2	...	...	...	0.57 "
1843	40.9	— 0.1	70.0	15.1	54.9	7	3.185	3	0.1	...	...	0.46 "
1844	47.5	+ 6.5	74.5	17.2	57.3	10	1.515	1	1 mn.	...	...	0.24 "
1845	42.1	+ 1.1	66.0	14.8	51.2	11	3.290	4	1.5	...	...	1.00 "
1846	44.0	+ 3.0	79.4	24.4	55.0	10	1.300	2	1.3	...	...	0.55 "
1847	39.2	— 1 8	65.6	8 4	57.2	8	2.870	2	4.0	...	...	0.59 "
1848	41.3	+ 0.3	65.4	26.5	38.9	5	1.455	1	0.5	N 77 W	1.46	4.89ms.
1849	39.0	— 2.0	70 9	23.2	47.7	10	2.655	2	1.7	N 43 W	3.14	7.50 "
1850	37.9	— 3.1	63.2	18.2	45.0	7	4 720	2	1.1	N 39 W	1.12	7.64 "
1851	41.3	+ 0.3	59.2	25.8	33.4	11	2.295	3	1.2	N 14 E	2 52	8.07 "
1852	38.2	— 2.8	53.8	19.8	34.0	6	1.990	4	9.4	N 23 E	2.41	6.68 "
1853	41.9	+ 0 9	65.7	27.0	38 7	10	2.625	1	1.0	N 12 W	1.95	5.20 "
1854	41.0	0.0	65.1	22.3	42.8	12	2.685	4	2.7	N 50 E	2.57	6.81 "
1855	42.4	+ 1.4	63.8	12.2	51.6	8	2.030	3	1.6	N 36 W	3.99	7.57 "
1856	42.3	+ 1.3	69.8	15.1	54.7	13	2.780	3	0.1	N 29 E	1.64	6.05 "
1857	35.4	— 5.6	51.9	10.0	41.9	10	1.755	11	12 9	N 60 W	4.15	10.24 "
1858	41.5	+ 0.5	61.5	23.8	37.7	13	1.642	2	0.1	N 14 W	1.64	9.57 "
1859	39.5	— 1.5	62.1	23.9	38.2	9	2.527	8	1.2	N 36 W	2.33	10 79 "
1860	39.5	— 1.5	60.7	19.7	41.0	11	1.282	5	0.3	N 37 W	4.10	10.30 "
1861	42.0	+ 1.0	62.3	26.2	36.1	12	1.619	4	6.9	N 37 E	2.31	8.90 "
1862	39.6	— 1.4	64.1	20.1	44.0	10	2.235	4	0.2	N 50 E	2.48	9.77 "
Results to 1861.	40.98	...	65.87	20.12	45.75	9.5	2.398	3.3	2.51	N 19 W	2.04	7 87
Diff. for 1862	—1.42	...	1.77	0.02	1.75	0.5	0.163	0.7	2.31	...	...	+1.90

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—MAY, 1862.

Latitude—43 *deg.* 39.4 *min. North. Longitude*—5 *h.* 17 *min.* 33 *sec. West. Elevation above Lake Ontario*, 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M	10 P.M	M'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P. M		6 A.M	2 P.M	10 P.M	Result	M'N		
					°	°	°	°																				
1	29.560	29.541	29.464	29.5143	43.5	41.7	40.7	42.27	— 4.15	.231	.218	.250	.235	.82	.82	.93	.87	E N E	E b N	E b N	N 82 E	8.8	19.5	17 8	14.34	14.37	0.278	..
2	.417	.406	.461	.4335	40.3	48.8	45.0	44.37	— 2.35	251	.276	.258	.257	100	.80	.86	.88	E b N	S E b S	S W b W	S 20 W	7.5	6.2	14.5	4.31	6.77	0.135	...
3	.490	.528	.551	.5233	42 5	50.0	45.7	46.43	— 0.62	.244	.201	.265	.239	.89	.55	.87	.76	S S W	W S W	W	S 62 W	5.5	17.0	3.2	6.68	8.03	0.007	...
4	.501	.397	—	—	43.9	51.5	—	—	—	.226	.325	—	—	.79	.85	—	—	N N W	E b S	N	N 45 W	0.5	7.0	6.0	1.3	5.94	...	...
5	.431	.441	.472	.4192	41.0	47.9	46.1	16.45	— 1.28	.210	.230	.234	.230	.81	.69	.75	.73	N N W	S W	NW bN	N 39 W	7.8	6.5	11.5	11.16	12.27	..	...
6	.477	.386	.370	.4105	43.9	61.6	51.1	52.35	+ 4.32	.218	.247	.209	.218	.75	.44	.54	.56	N W	N W b N	W	N 53 W	16.5	22.0	11.2	16.38	17.14	...	...
7	.435	.566	.692	.5770	44.6	51.3	41.7	45.90	— 2.52	.130	.130	.183	.145	.43	.34	.69	.48	N W	N W b N	N N W	N 30 W	11 8	10.6	8.5	10.34	10.43	...	...
8	.770	.719	.690	.7220	38.1	60.1	52.2	51.97	+ 3.18	.179	.343	.214	.237	.	.66	.54	.61	W N W	S b W	W b S	N 80 W	6.8	12.0	2.5	6.22	8.19	...	...
9	.683	.589	.522	.5305	53.3	77.5	61.0	65.48	+16.32	.270	.387	.221	.286	.66	.41	.39	.45	W N W	N W b W	W N W	N 57 W	10.5	18.6	11.8	16.22	16.33	...	...
10	.515	.547	.735	.6265	58.7	69.0	52.0	60.33	+10.83	.296	.295	.266	.271	.59	.40	.65	.52	N W b W	N W b N	N	N 26 W	11.2	23.5	9.5	15.09	15.31	...	...
11	.874	.886	—	—	45.4	54.0	—	—	—	.162	.221	—	—	.52	.52	—	—	N N W	S b W	Calm.	S 47 W	5.5	6 5	0.0	1.64	3.24	...	...
12	.858	.701	.571	.6948	16 1	66.3	59.4	58.03	+ 7.87	.225	.406	.207	.304	.72	.62	.58	.63	Calm.	S b W	W b S	S 38 W	0.0	11.5	1.5	4.85	5.65	Inp	...
13	.528	.590	.654	.5917	59.0	46.1	46.1	50.20	— 0.37	.415	.282	.282	.324	.83	.90	.90	.88	N N E	E b S	N E b N	N 35 E	0 5	3.0	1.5	3.1	3.98	0.160	...
14	.681	.751	.741	.7315	46.8	59.1	46.1	52 43	+ 1.53	.206	.268	.225	.234	.64	.55	.72	.60	N b E	E	E b N	N 69 E	4.5	10 6	3.4	5.37	6.85	...	...
15	.805	.783	.756	.7778	55.1	63.7	50.4	56.20	+ 4.02	.226	.260	.278	.253	.52	.44	.76	.57	N b E	S E b E	N E b N	N 73 E	3.5	4.2	3.2	1.53	2.73	...	...
16	.803	.730	.669	.7313	51.5	68.4	54.4	59.93	+ 8.35	.304	.467	.339	.375	.80	.67	.78	.72	N W	S E b S	N E	S 42 E	0.5	3.0	1.0	0.78	1.17	...	...
17	.673	.581	.496	.5750	54.4	68.1	63.0	60.75	+ 8.77	.330	.459	.394	.391	.78	.67	.82	.73	Calm.	E S E	N E b E	S 62 E	0 0	4 8	0.2	1.73	2.03	...	...
18	.399	.238	—	—	56.9	65.2	—	—	—	.384	.433	—	—	.83	.70	—	—	Calm.	E b S	W b N	S 89 W	0.0	5.5	21.0	6.48	10.21	..	..
19	.428	.499	.567	.5070	42.5	45.6	39.2	41.87	—10.75	.150	.166	.207	.182	.69	.55	.87	.69	W N W	W b N	NW bW	N 68 W	12.5	12.8	2.5	8.33	8.55	..	..
20	.645	.664	.665	.6613	39.9	48.6	41.0	44.03	— 8.93	190	.221	.184	.204	.77	.61	.71	.70	N b W	S E b S	N E b E	S 73 E	1.5	10.6	1.2	4.80	6 55	...	...
21	.582	.395	.430	.4520	45.7	52.6	50.8	49.25	— 4.03	.211	.300	.313	.257	.68	.75	.84	.81	E b N	E N E	S W b S	S 58 E	16 0	11.5	8.5	4.62	12.67	0.855	...
22	.555	.657	.594	.5972	52.6	63.0	51.1	54.37	+ 0.67	.269	.362	.269	.291	.67	.63	.71	.68	W S W	S W	S W	S 69 W	17.0	10.5	6.8	10.97	12.92	...	...
23	.696	.786	.853	.7885	48.6	58 3	43.2	50.45	— 3.52	.211	.151	.190	.181	.61	.31	.68	.52	W N W	N W b W	N N W	N 55 W	27.0	19.5	4.5	13.61	13 83	...	...
24	.903	.836	.805	.8535	40.3	49.7	45.7	46.07	— 8.22	.193	.197	.139	.183	.77	.55	.45	.58	N	S b W	N N W	S 7 E	2.0	6.6	5.5	1.45	4.31	...	...
25	.829	.768	—	—	41.4	53.0	—	—	—	.171	.282	—	—	.64	.58	—	—	N W b N	S b W	S W	S 15 W	0.2	10.0	0.8	4.65	4.96	...	...
26	.654	.593	.413	.5210	44.6	58.7	52.0	52.38	— 2.60	.245	.263	.327	.268	.83	.52	.82	.68	E N E	E S E	Calm.	S 80 E	9.7	6.8	0.0	3.26	3.42	0.015	...
27	.361	.3 0	.430	.3633	55.4	69.9	50.4	58.23	+ 2.93	.317	.423	.238	.327	.72	.58	.65	.67	S b W	N b W	NW bN	N 38 W	2.0	11.6	3.8	6.03	9.58	Inp	...
28	.634	.599	.626	.6032	17.5	60.5	42.8	51.25	— 4.42	.245	.197	.177	.193	.74	.37	.64	.53	N W	N N W	Calm.	N 30 W	0.5	13.	0 0	6.63	6.78	...	...
29	.665	.586	.545	.5875	41.0	62.5	55.1	55.15	— 0.80	.134	.269	.195	.227	.71	.46	.44	.52	Calm.	S b W	N N W	S 58 W	0.0	6.5	2.0	1.39	3.22	...	...
30	.513	.497	.500	.5080	64.0	58.3	54.0	55.08	— 1.17	.242	.312	.222	.238	.57	.63	.52	.54	N N E	E b S	N	E	1.0	3.0	4.2	1.79	2.18	...	...
31	.573	.534	.481	.5212	47.9	65.6	56.2	57.40	+ 0.85	.211	.265	.235	.242	62	.32	.63	.52	N	E N E	N N E	N 56 E	0.5	3.0	2.5	3.01	3.51	...	...
M	29.6014	29.5813	29.5846	29.5895	47.36	54.26	49.41	52.17	+ 0.69	.249	.279	.246	.253	.72	.56	.76	.65	.....	.....	.....	.....	5.88	10.25	5.50	.....	7.87	1.427	.....

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR MAY, 1862.

Highest Barometer..... 29.942 at 8 a. m on 24th } Monthly range =
Lowest Barometer ... . 29.238 at 2 p. m. on 18th } 0.704 inches.

Self-registering Thermom.
- Maximum Temperature ..... 78°5 on p.m. of 9th } Monthly range=
- Minimum Temperature ..... 32°4 on a.m. of 8th } 46°1
- Mean maximum Temperature ..... 61°43 } Mean daily range=
- Mean minimum Temperature ..... 42°01 } 19°43
- Greatest daily range ..... 37°0 from a. m. to o m. of 9th.
- Least daily range ..... 4°8 from a. m. to p. m. of 19th.

Warmest day..... 9th .. Mean temperature..... 65°48 } Difference = 23°61.
Coldest day..... .. 19th... Mean temperature..... 41°87 }
Maximum } Solar..... 90°4 on p. m of 9th } Monthly range =
Radiation. } Terrestrial ..... 21°1 on a. m. of 8th } 69°3

Aurora observed on 5 nights, viz.· 6th, 21st, 23rd, 30th. and 31st.
Possible to see Aurora on 20 nights; impossible on 11 nights.
Snowing on 0 days, depth ... inches; duration of fall, ... hours.
Raining on 8 days,—depth 1.427 inches; duration of fall 23.2 hours.
Mean of cloudiness = 0.45. Below average 0.07.
Most cloudy hour observed, 6 a. m., mean = 0.50; least cloudy hour observed midnight; mean, = 0.36.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
2403.89	1122.33	1182.77	2823.90

Resultant direction N. 52° W.; Resultant velocity 2.80 miles per hour.
Mean velocity ..... 7.87 miles per hour.
Maximum velocity ..... 30.2 miles. from 4 to 5 a. m. on 23rd.
Most windy day ..... 6th ..... Mean velocity, 17 14 miles per hour. } Difference=
Least windy day .....16th ....Mean velocity, 1 17 ditto. } 15.97 miles
Most windy hour ...11 a m. to noon.....Mean velocity, 11.10 ditto. } Difference=
Least windy hour...midn't to 1 a.m.....Mean velocity 5 03 ditto. } 6.10 miles.

2nd. Dense wetting fog 6 to 8 a. m.; sheet lightning in N. E. at 8 and 9 p. m.—4th Hoar frost at 5 p. m.—6th. Lunar halo 11 p.m to midnight —8th. Hoar frost and thin ice at 5 30 a.m.; lunar halo at 10 p.m.—12th. Sheet lightning at 9 and 10 p.m; ground fog at midnight.—16th. Ground fog at 10 p.m.—18th. Sheet lightning at 8 and 9 p.m —20th. Hoar frost at 5.30 a m —21st. Thunderstorm, vivid lightning, and heavy rain 4 to 5.20 p.m ; dense fog 5 20 to 6 p.m.—24th. Sharp hoar frost and thin ice at 5 30 a m.—25th. Hoar frost at 5 a m.; faint solar halo at 6 p.m.—26th. Sheet lightning in S W. and W. at 10 p.m. and midnight.—29th. Hoar frost at 5 a.m.; solar halo at 10 a m.—30th. Solar halo from 6 a.m. to noon.

Dew recorded on 9 mornings during this month.

May, 1862, was very dry, comparatively mild, windy, and clear.

COMPARATIVE TABLE FOR MAY.

YEAR.	TEMPERATURE. Mean.	Diff. above aver'ge (51°43)	Highest observed.	Lowest observed.	Mean range	RAIN. No. of days.	Inches	SNOW. No. of days.	Inches	WIND. Resultant Direction.	V'y.	Mean Force or Velocity.
	°	°	°	°								
1840	53.8	+ 2.4	74.5	30.8	43.7	9	4.150	0	...	...	...	.....
1841	50.5	— 0.9	76.2	26.6	49.6	11	2.350	1	...	...	...	0.35 lbs.
1842	49.1	— 2.3	74.3	30.0	44.3	7	1.275	0	...	...	...	0.53
1843	49.1	— 2.3	79.6	28.9	50.7	5	1.570	0	0.0	...	...	0.52
1844	53.6	+ 2.2	77.7	29.0	48.7	14	5.670	0	0.0	...	...	0.30
1845	49.6	— 1.8	76.6	29.4	47.2	8	2.300	0	0.0	...	...	0.55
1846	55.5	+ 4.1	78.1	34.3	43.8	9	4.375	0	0.0	...	...	0.46
1847	54.4	+ 3.1	72.5	27.8	44.7	12	2.040	0	0.0	...	...	0.29
1848	54.1	+ 2.7	78 5	31.9	46.6	13	2.520	0	0.0	N 40° W	1.31	4.93mls.
1849	48.0	— 3.4	72.5	32.7	39.8	16	5.115	0	0.0	N 51° E	1.97	5.33
1850	47.6	— 3.8	76.3	31.1	45.2	7	0.545	1	Inap	N 64° W	2.05	6.32
1851	51.3	— 0.4	73.2	28.7	44.5	12	2.950	1	0.5	N 32° W	1.59	6.34
1852	51.4	0.0	73.3	34.5	38.8	7	1.125	1	Inap	S 82° W	0.99	4.00
1853	50.9	— 0.5	78.4	38.4	40.0	17	4.420	1	Inap	N 2° W	0.83	5.16
1854	52.2	+ 0.8	69.0	27.6	41.4	11	4.630	0	0.0	E	0.40	5.38
1855	54.1	+ 1.7	74.8	33.9	40.9	6	2.505	2	0.9	N 1° W	2.76	5.93
1856	50.5	— 0.9	80.1	35.5	44.6	14	4.580	1	Inap	N 4° E	3.99	9.81
1857	48.9	— 2.	72.5	27.9	44.6	15	4.145	1	Inap	N 23° W	1.14	8.13
1858	48.9	— 2.5	66.0	35.0	31.0	17	6.367	0	0.0	N 42° E	3.33	9.30
1859	55.2	+ 3.8	76.2	41.5	34.7	11	3.410	0	0.0	N 72° E	1.59	5.70
1860	55.5	+ 4.	73.2	35.6	37.6	16	1.815	0	0.0	N 26° E	2.66	7.17
1861	47.5	— 3.4	72.0	23.1	42.9	12	3.380	1	0.5	N 47° W	3.60	9.17
1862	52.2	+ 0.8	77.8	38.1	39.7	8	1.427	0	0.0	N 52° W	2.80	7.87
Results to 1861.	51.39	...	74.80	31.83	42.97	11.3	3.241	0.5	0.10	N 2° W	1.49	6.62
Diff for 1862	+ 0.78	...	+ 3.00	+6.27	3.27	— 3.3	1.814	— 0.5	— 0.10	.....	.....	+ 1.25

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—APRIL, 1862.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M.D., LL.D.

Latitude—45 deg. 32 min. North. Longitude—73 deg. 36 min. West. Height above the Level of the Sea—118 feet.

Day.	Barom. corrected and reduced to 32°			Temp. of the Air.—F.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Horizontal Movement in Miles in 24 hours.	Mean of Ozone.	Rain in inches.	Snow in inches.	Weather, &c. A Cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.					6 A.M.	2 P.M.	10 P.M.
1	30.149	30.179	30.254	36.2	43.9	34.1	.177	.218	.155	85	76	79	E S E	s s E	s s w	0.30	1.5	...	...	Cirr. Str. 4.	Cu. Str. 10.	Cu.Str. 9.h.&r.
2	290	114	29.927	32.1	51.4	33.1	143	295	168	79	78	89	s s E	s s E	s b w	118.10	3.0	Inap.	...	Fog.	Do. 4.	Clear. [7.10pm
3	29.779	29.894	00[illegible]	40.1	47.2	35.8	203	298	177	82	92	81	w s w	w s w	W	409.90	2.5	0.014	...	Cirr. Str. 10.	Rain.	Rain.
4	30.210	30.158	30 251	22.0	42.2	27.0	084	177	111	71	66	75	W	s b w	s w	233.60	1.0	...	...	Clear.	Clear.	Clear.Z.l't br't
5	109	29.770	29.770	17.1	29.2	27.4	063	142	126	67	88	88	N E b E	s s E	w s w	255.60	2.5	...	3.70	Clear.	Snow.	Cu. Str. 10.
6	29.861	897	30.104	30.1	34.6	26.2	130	126	114	78	65	81	s s w	w b N	W N W	122 70	1.5	...	...	C. C. Str. 8.	Clear.	C. Cum. 4.
7	30.228	30.221	233	11.6	36.4	15.4	051	149	0.5	72	71	64	W s w	w s w	s s E	214.80	0.5	...	...	Clear.	Do.	Clear.
8	196	144	132	5.1	44.3	16.7	041	196	05[illegible]	74	68	75	N E	E	s s w	42.20	0.5	...	...	Do.	Cirr. Cum. 4.	Do.
9	103	009	101	10.4	41.1	24.3	054	190	09	78	74	73	E	N N E	N N E	105.90	1.5	...	...	Clear.	Clear.	Do.
10	145	345	277	14.7	52.4	36.7	042	282	181	62	73	85	N E b E	S E b E	S E	172.00	1.5	...	...	Do.	Do Inp. S. H.	C C. Str. 6.
11	319	400	407	22.5	54.0	31.0	095	303	19	78	74	76	N E b E	S E b E	S E b E	86.50	0.8	...	...	Do.	Do. [9.30	Clear.
12	370	367	344	26.2	56.0	35.2	111	342	177	81	78	85	N E	s w	s b w	118.40	0.5	...	...	Do.	Do.	Do.
13	250	241	227	30.9	56.3	35.6	134	315	177	82	71	85	N E b E	S S E	S S E	0.20	0.5	...	...	Do.	Do.	Do.
14	201	199	241	24.1	57.4	38.9	100	381	188	79	81	87	N E b E	S E	S E b E	2.60	1.0	...	...	Do.	Cu. Str. 4.	C. C. Str. 8.
15	393	524	351	37.2	51.7	39.9	199	296	240	90	79	86	S S E	S E	S E b E	1.10	1.0	Inap.	...	Slight Rain.	C. C. Str. 4.	Clear. Ft.A.B.
16	279	183	11[illegible]	36.5	61.2	44.2	191	442	265	90	83	92	E b S	S E b E	E S E	5 11	1.5	...	...	Clear.	Cirr. 4	Cu. Str. 10.
17	001	048	29.998	48.6	66.4	48.1	303	502	310	89	78	92	E S E	S S W	S b w	56.90	0.5	...	...	C. C. Str. 6.	Do 4.	Cirr. 2. Zod.lt.
18	29.997	29.883	756	40.5	66.1	42.0	219	219	244	88	87	91	W b N	W b N	S W b S	39.80	1.5	0.161	...	Fog.	C. C. Str. 4.	Rain.
19	824	951	30.002	41.1	46.1	39 9	212	258	210	82	81	86	W	W	W	344.50	2.0	...	...	C. Cum. 6.	Cu. Str. 8.	Cu. Str. 10.
20	30.097	30.075	151	38.4	50.0	39.7	186	290	195	81	82	82	W b S	S W	S b w	66.30	0.5	...	...	Clear.	Clear.	Clear.Z.l't br't
21	097	29.924	29.960	34.1	52.9	41.2	162	308	235	84	79	9	E S E	S E	S E	45.20	0.5	...	...	Do.	Cu. Str. 10.	ham.
22	29.608	498	45[illegible]	38.0	49.9	44.6	214	297	282	95	92	9[illegible]	N N E	N E b E	S E	139.20	2.5	0.290	...	Cu. Str. 10.	C. C. Str. 10.	Cu Str. 10.
23	464	620	82[illegible]	40.1	43.1	29.0	210	222	129	86	83	81	W S W	S W	W b N	317.00	1.0	...	...	Do 8.	C. Cirr. 4.	C C. Str. 8.
24	864	937	30.042	26.1	32.3	32.0	111	143	149	81	79	81	N W	W S W	W b N	456.80	0.5	...	...	Do. 4.	Cu. Str. 10.	Clear.
25	30.165	30.130	181	24.7	50.1	33.6	105	290	149	81	80	84	W N W	S S W	S S W	122.90	1.0	...	...	Clear.	Clear.	Do.
26	349	323	364	31.1	57.6	39.0	158	372	195	89	78	82	N E b E	E S E	S E b E	32.90	1.5	...	...	C. Cu. 4.	Do.	Do.
27	391	301	269	32.1	62.7	42.1	149	422	244	84	75	91	N E b E	N E b E	N E b E	16.80	1.0	...	...	Clear.	C. C. Str. 4.	Cu Str. 10.
28	101	050	060	44.6	45.9	43.6	282	276	271	96	92	96	E S E	S S E	E N E	112.90	2.5	Inap.	...	Rain.	Cu. Str. 10.	Rain.
29	070	020	021	40.1	59.2	40.1	225	389	210	91	76	86	E S E	S b E	S W	53.70	2.0	...	...	Cu. Str. 10.	Do. 4.	Clear. Ft.A.B.
30	028	021	112	42.1	65.2	47.0	228	490	305	87	81	96	S	S W b S	S E	75.90	1.0	...	...	C. C. Str. 4.	Clear.	Do.
...	.....	.....	.....	.....	.....	.....	...	...	...	...	...	...	.....	.....	.....	.....	....	...	...	.....	.....	.....

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—MAY, 1862.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., LL.D.

Latitude—45 deg. 32 min. North. Longitude—73 deg. 36 min. West. Height above the Level of the Sea—118 feet.

Day.	Barom. corrected and reduced to 32°			Temp. of the Air.—F.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Horizontal Movement in Miles in 24 hours.	Mean of Ozone. (tenths)	Rain in Inches.	Snow in Inches.	WEATHER, &c. A cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.					6 A.M.	2 P.M.	10 P.M.
1	30.061	30.127	30.091	42.6	50.0	43.7	.237	.362	.248	57	.82	.88	N E b E	N E b E	N E b E	107.60	2.0	0.133	...	C. C. Str. 4.	Rain.	Rain.
2	29.954	29.821	29.818	40.4	49.1	45.3	.225	.322	.300	90	.92	1.00	N E b E	N E b E	N E b E	185.90	5.0	1.576	...	Rain.	Do.	Do.
3	819	820	848	44.2	64.2	52.1	.248	.454	.334	96	.77	.86	S S E	S W	S E	89.90	3.0	In'p.	...	Cu. Str. 10.	C. C. Str. 8.	C. C. Str. 4.
4	795	733	772	46 2	56.8	46.7	.262	.385	.238	84	.84	.88	S W	S W	S S W	147.50	1.0	...	...	C. C. Str. 4.	Cu. Str. 8.	Cu. Str. 2.
5	694	701	783	42.1	58.4	50.2	.244	.246	.309	91	.91	.85	S b W	S W	S S W	125.80	1.0	In'p.	...	Rain.	Do. 4.	C. C. Str. 4.
6	600	313	451	39.7	61.0	46.5	.210	.436	.262	86	80	.84	W	W	N b W	196.00	2.0	...	...	Clear.	C. C. Str. 4.	Clear. Ft. A.B.
7	487	550	672	31.1	40.0	39.1	.155	.235	.195	80	.91	.82	N E b E	N N E	N N W	112.30	4.0	...	2.91	Snow.	Thaw.	Cu. Str. 6.
8	770	774	680	36.1	55.7	51.1	.177	.370	.315	85	.84	.89	N N E	N N E	S b E	102.80	2.0	...	...	Cu. Str. 10.	Cirr. 4.	Clear.
9	601	394	807	46.3	67.1	56.9	.269	.556	.370	88	.84	.84	W S W	S S W	W	241.40	1.5	...	...	Do. 10. dis.th.	C. Cirr. 4.	C. C. Str. 4.
10	434	519	754	49.7	56.2	43.0	.290	.288	.209	82	.65	.75	N N W	S b W	N W	347.40	1.5	...	...	Clear.	Cu. Str. 8.	Clear.
11	885	885	972	34.1	66.4	48.2	.156	.438	.242	80	68	.74	W b N	N b W	S S W	207.70	1.5	...	...	Do.	Clear.	Cu. Str. 4.
12	884	710	712	46.4	73.6	59.8	.262	.351	.403	84	.44	.79	S S W	N N E	S W	165.10	2.0	...	...	Cu. Str. 10.	Hazy.	Hazy.
13	752	744	836	46.4	60.1	47.0	.262	.374	.256	84	.73	81	S W	S b W	S b W	60.50	2.0	In'p.	...	Do. 10.	Clear.	Clear.
14	834	862	876	47.4	60.1	57.0	.232	.262	.378	73	.51	.81	N E	E S E	S S E	53.60	1.5	...	...	Clear.	Do.	Cu. Str. 4.
15	918	850	903	51.1	84.3	64.0	.296	.923	.471	80	.79	.81	S	S	S	71.60	1.0	...	...	Do.	Do.	Do. Met. in S.
16	917	802	800	60.1	87.4	64.8	.462	.928	.458	82	.72	.75	S	S	S b E	107.30	1.0	...	...	Do.	Do.	C. Cum. 4.
17	802	736	648	58.2	88.1	67.4	.423	.915	.556	88	.69	.83	S	S	S b W	50.10	1.0	...	...	Do.	Do.	Clear.
18	593	572	437	60.4	91.0	69.1	.345	1039	.599	78	.75	.85	S b W	S b W	S b W	181.00	1.5	...	...	Do.	Cu. Str. 4.	Cu. Str. 2.
19	414	464	602	47.2	58.3	49.0	.280	.416	.253	88	.85	74	W S W	W S W	W S W	478.10	2.5	In'p.	...	Cu Str. 10. d. t.	Do. 4.	Do. 8.
20	694	856	906	40.1	63.2	48.2	.160	.416	.260	74	.77	78	N W	W b S	W S W	80.72	1.0	...	...	Clear.	Clear.	Clear.
21	30.001	916	740	44.7	60.5	84.2	.202	.338	.362	71	.65	.87	S S E	S E	E	118.90	3.5	0.680	...	C. C. Str. 6.	Rain.	Cu. Str. 10.
22	29.628	782	780	41.1	58.4	52.1	.235	.358	.334	91	.73	.86	S S W	S S W	W S W	376.90	3.0	0.336	...	C. C. Str. 10.	Cu. Str. 10.	Clear.
23	601	748	899	56.1	62.9	47.0	.391	.363	.249	87	.64	.77	W S W	W N W	N b W	130.11	1.5	In'p.	...	Cu. Str. 10	Clear.	Do,
24	980	876	899	38.2	55.9	58.3	.165	.288	.334	72	.65	.82	N W b W	W	S	163.20	1.5	...	...	Clear Frost.	Str. 4.	Do.
25	856	827	816	47.2	65.0	54.0	.197	.427	.315	78	.71	.83	S b W	W b S	W S W	152.00	1.5	...	...	Do.	Cu Cir. 4.	C. C. Str. 4.
26	866	840	747	47.0	67.1	55.3	.256	.425	.328	81	.64	.77	N E b E	S S W	N E b E	162.40	1 5	...	...	C. C. Str. 6.	C. C. Str. 4	Cu. Str. 10.
27	621	582	521	50.0	80.0	60.9	.309	.684	.419	85	.67	.80	E S E	S E b E	E S E	225.60	2.0	In'p.	...	Cu. Str. 10.	C. Cirr. 4.	Do. 10.
28	630	606	617	54.2	64.3	48.8	.362	.383	.229	87	.71	.69	S S E	S W	W S W	298.20	1.0	...	...	C. C. Str. 10.	Cu. Str. 4.	Clear.
29	660	689	714	44.4	67.2	55.3	.215	.425	.321	79	.64	.74	W N W	W b N	W b N	243.30	1.0	...	...	Clear.	Clear.	Do.
30	451	580	751	39.1	70.4	50.2	.180	.419	.309	77	.61	.85	S S E	S S E	S S E	0.30	1.0	...	...	Do.	Do.	Do. Au. Bor.
31	702	667	704	46.0	77.0	57.9	.238	.658	.372	77	.67	.78	E S E	S S W	S S E	0.00	1.5	...	...	Do.	Do.	Do.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER FOR APRIL, 1862.

Barometer	Highest, the 11th day	30.407
	Lowest, the 23rd day	29.464
	Monthly Mean	30.074
	Monthly Range	0.943
Thermometer	Highest, the 17th day	66°.4
	Lowest, the 8th day	5°.1
	Monthly Mean	39.°06
	Monthly Range	61°.3
Greatest intensity of the Sun's Rays		82°.2
Lowest Point of Terrestrial Radiation		—5°.0
Mean of Humidity		.816

Rain fell on 6 days, amounting to 0.395 inches; it was raining 13 hours and 13 minutes.
Snow fell on 1 day, amounting to 3.70 inches; it was snowing 6 hours and 0.5 minutes.
Most prevalent wind, the E. S. E.
Least prevalent wind, the S.
Most windy day, the 24th; mean miles per hour, 19.03.
Least windy day, the 13th; mean miles per hour, 0.00.
Aurora Borealis visible on 2 nights.
Zodiacal light bright and well defined.
The Electrical state of the Atmosphere has indicated very feeble intensity.
Fringilla Melodia, Song Sparrow, (*Rossignol*, Fr.) first heard on 6th day.
Swallows, *Hirundo Rufa*, first seen 20th day.
Wild geese, *Anser Canadensis*, first seen flying north 26th day.
Frogs, *Rana fontinalis*, first heard 29th day.
Thermometer in ground 18 inch deep, 44°.
Errata: For 1861 in Reports for January and February read 1862.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER FOR MAY, 1862.

Barometer	Highest, the 1st day	30.129
	Lowest, the 6th day	29 343
	Monthly Mean	29.738
	Monthly Range	.786
Thermometer	Highest, the 8th day	91°0
	Lowest, the 24th day	29°2
	Monthly Mean	51°61
	Monthly Range	62°8
Greatest intensity of the Sun's rays		93°2
Lowest point of Terrestrial Radiation		24°7
Mean of Humidity		.786
Amount of evaporation		3.61

Rain fell on 11 days, amounting to 2.725 inches; it was raining 34 hours and 45 minutes and was accompanied by thunder on 2 days.
Snow fell on 1 day amounting to 2.91 inches; it was snowing 5 hours and 20 minutes.
Most prevalent wind, S.W.
Least prevalent wind, N. by W.
Most windy day, the 19th day; mean miles per hour, 19.97.
Least windy day, the 31st day; Calm.
Aurora Borealis visible on 2 nights.
The Electrical state of the Atmosphere has indicated moderate intensity.
Temperature of the ground 18 inches deep, 61°0.