

be carried. When the snow is soft, the dogs are shod with seal-skin shoes.

The Eskimo's powers of endurance are wonderful. During the winter of 1885-86 many of those about me were reduced to mere skeletons through starvation, and, although they were helped as much as possible, several, it is to be feared, died not far from us. Some had eaten the skin covering of their bed, and were only saved by an occasional seal being killed and by the few lemmings they could catch under the snow. In one instance a case of what appeared to be economic hibernating was noted. Some distance from the Observatory a woman and her son were found closely huddled together in a house completely closed and not much larger than themselves. They said they had not had any food for some time, but expected friends in a few days. Leaving what food we had, we returned to the station, and extremely bad weather coming on some days afterwards, we had almost forgotten these people. Two weeks later we were reminded of them by an Eskimo having passed that way who said he had not seen them. Fearing they were dead, we went over with provisions, and much to our surprise found them, though little more than parcels of bones, perfectly well, and they declared they had lain there ever since. These people, with others, were soon stout and hearty when food became more plentiful.

In many of the narrow gravelly passes in the rocky hills, low walls were often noticed that had undoubtedly been built many years ago. These were in a straight line from one hill to another, and were usually nothing more than single stones about a foot high placed close to each other. Many conjectures as to their use were made, and, taking Ugaluk to one of these walls one day, he informed me that many years ago, when large numbers of Eskimo lived here, and wood was extremely scarce, some would bind sharp stones to their feet, and lying upon their backs behind these walls, others would drive the deer, which were then very numerous, and as the deer passed over the walls the hidden hunters would strike with their stone-tipped feet and would often kill many of them in this way. Regarding the scarcity of wood, it may be added that even now many Eskimo have not harpoons because they cannot procure a piece of wood large enough for a handle.

Having often heard of the dislike the Eskimo is believed to have to a white man exploring the graves of their dead, we determined to test this, and purposely went with several Eskimo, passing near where a number were buried. Here I stopped at one grave which had evidently long ago been visited by wolves or dogs, for the covering of stones had been dragged away and the bones were scattered in every direction. To my surprise the Eskimo looked on quite unconcernedly as I turned the skull and bones over with my stick, and, if anything, they seemed rather amused than otherwise. Suddenly I feigned an expression of fear, and while they looked at me made a bound forward, screaming as I fled. In a moment they were after me, screaming apparently in greatest terror. Soon stopping, however, I burst into laughter, and was immediately followed by all excepting the children, who evidently could not see the joke, nor would they return to the grave. During the remainder of my stay here we often examined other graves, but from a warm attachment for the dead, as well as for the living, not a bone was ever removed.

F. F. PAYNE.

Meteorological Office, Toronto, Ont.

Movement of the Higher Atmosphere.

If this question had been discussed previous to August 27, 1883, there would have been but one view expressed, and that would have been unanimous; namely, that the higher atmospheric layers have very little velocity, and if there is any motion it must necessarily be from the west toward the east. As it is universally admitted, even now, that the upper atmosphere has such a motion everywhere except in the equatorial regions, we need to give here some of the proofs that this law holds good for the latter region also.

1. A careful and elaborate theoretical discussion has shown the universality of the law. The merest outline of this discussion is as follows. The sun heats up the equatorial region more than the

circles of latitude on either side, and this causes a bulging, so to speak, of the atmosphere over this region. These air particles will have a tendency to flow off toward the north and south; but a particle going from the equator continually reaches a region that is revolving less rapidly, so that its course will be deflected toward the east. This discussion loses a good deal of its force, however, when we consider how exceedingly tenuous the atmosphere must be at a height of twenty miles. The barometric pressure would be less than one inch, and any motion of air particles in such a space due to their gravity must be exceedingly slow, if they move at all. If we should inquire as to the probable amount of heaping up in the air from the increased heat at the equator, we would see that it must be exceedingly slight. Above the height of seven or eight miles the changes in the temperature would be nothing, as the sun's influence is entirely dissipated there; moreover, the difference in temperature between the equator and a point at 30° north latitude would be so slight that this heaping up would be highly problematical.

2. We find these theoretical computations and views amply borne out by a study of the motion and velocity of the highest clouds. For days at a time no motion at all can be perceived in these clouds at the equator, and whenever it is noted it is always toward the east and very slow. Mr. Abercromby seems to have observed a motion of clouds toward the west, but this must have been seen in clouds at a lower level, which would move westward in the lower trade-wind. The evidence regarding the motion of these highest cirrus clouds comes by special correspondence with physicists at Batavia, Mauritius, the West Indies, and the Philippines, and is conclusive as regards this question.

3. In many cases volcanoes have projected ashes to enormous heights in the atmosphere, both in the West Indies and in Java. Some of these ashes have been carried a comparatively short distance toward the west by the lower trade current, but others have also been borne many hundreds of miles farther eastward by the upper current. A good example of this is given in an eruption of Krakatoa in May, 1883, in which ashes were carried twelve hundred miles to the eastward.

4. One of the best proofs that can possibly be had of the direction and velocity of the higher atmospheric strata would be seen in the cloud left by a meteor in its passage through the sky. In a recent meteor that fell in Iowa, in a perfectly clear sky, there was a most excellent opportunity of studying this question. This meteor left a beautiful whitish cloud, which was carefully watched by at least two observers. One of them saw it perfectly stationary, a little to the east of the zenith, for more than an hour. The other saw it over two hours, and it appeared to gradually diffuse itself in the atmosphere. It is easy to see that any appreciable motion would have made itself plainly manifest in the long time during which this cloud was visible.

We see that both theory and observation give no uncertain sound on this question, and up to Aug. 27, 1883, this may have been regarded one of the best ascertained and established facts of meteorology. On this date there occurred one of the fiercest volcanic outbursts ever known, at Krakatoa in Java. On Aug. 28 and succeeding dates there were seen most beautiful sky colorings at various points on the equator to the westward of Krakatoa, each appearance being at a later date the farther west one went. An enthusiastic astronomer at once suggested that a current of eighty miles per hour had borne the ashes of Krakatoa westward, and that the sky-glow was caused by diffraction and reflection from these mechanically distributed ashes. This seems to have been an unfortunate invasion of an unknown field, and must result in disaster. Every effort has been put forth by astronomer and physicist to force such a current, but with two or three exceptions no meteorologist has accepted this view. We have already seen how untenable it must be. There are other insuperable objections to this hypothesis, but these against the velocity and direction of the current are the most serious.

The Krakatoaists have hailed with delight a certain theoretical computation advanced quite recently by Professor Ferrel, and it will be well to pass upon it at some length. Professor Ferrel first shows conclusively that the tendency of the upper layers must be toward the east, and then, referring to the sky-glow, he tries to

show that there might be a westward motion, by the following reasoning. If the Krakatoa outburst had occurred at a time of year when the temperature was uniform on either side of the equator, say in March and September, then the motion must have been toward the east, but, after March 21 and until June 21, the sun gradually heats up, relatively more and more, portions of the earth to the north of the equator. In consequence of this the bulging of the upper atmosphere does not occur at the equator so much as at circles of latitude farther north. As a result the motion of air particles becomes reversed, that is, toward the equator and not away from it. This would give the particles a tendency to move toward the west,—Q. E. D. This certainly seems like vicious reasoning. In the first place the phenomena of the sky-glow continued until the second week in September, or within ten days of the time when, according to Professor Ferrel, the heat of the sun would have been uniform on either side of the equator, and the motion of the higher strata must have been toward the east if at all. This consideration alone shows how untenable this reasoning is.

In the second place, let us inquire what the utmost effect can possibly be when the sun is at his farthest north. It should be noted that this heating effect is not directly upon the atmosphere, but the sun first heats the earth's surface, and that in turn the air above it, and so on. If we can find the air temperature at the earth at various latitudes we can reason from that as to the probable heating of the air at some height above the earth. It is quite difficult to determine the heat upon a complete circle of the equator, but, if we take the islands of the sea, we may make an approximation to the true value. The following table gives the temperature of the air at various points:—

Place.	Latitude.	Temperature (Fahrenheit).		
		March.	July.	August.
St. Thome,	0° 20' N.	78°	76°	76°
Batavia,	6 S.	79	78	79
Singapore,	1 17 N.	84	82	80
Mean,	Equator.	80	79	78
St. Beneto,	12 37 N.	80	72	72
Cape Verde Islands,	14 54 N.	82	85	86
Jamaica,	18 3 N.	70	75	74
Porto Rico,	18 18 N.	77	82	82
Kanai,	22 15 N.	70	76	77
Canary Islands,	28 4 N.	63	69	70

It will be noticed at once that the high temperature of the Cape Verde Islands is due to the proximity of the African coast. It is also true that the exposure of the thermometer is not uniform at these localities. Making due allowance for all irregularities, however, we still find the most remarkable fact, that the air at the earth's surface in July and August is actually at a higher temperature on the equator than at a latitude of 23° where the sun may be supposed to be the hottest. This shows conclusively that this seeming heaping up of the air, to the north of the equator, owing to an increased heat from the sun's apparent motion northward in July, is entirely mythical; and the only effect that can possibly supervene upon the higher atmosphere must be a motion to the eastward, in all parts of the year, and in the equatorial regions as well as to the northward.

The question will arise, How can these remarkable sky-glow be accounted for? This question does not properly come into this discussion, but a partial answer may be given. The sky-glow were a marked intensification of ordinary sunset phenomena, which it is well known are due to moisture particles. In order that these glows might be seen at their best the following circumstances were necessary. (1) An abundance of moisture particles at great heights. (2) A clear sky. (3) An abundance of electricity in the air, which would cause the moisture particles to be repelled. We know that the occurrence of such an eruption as

that at Krakatoa does set free an enormous amount of electricity. If any one of these were lacking the glow would diminish or disappear. It is known that the glows were of an intermittent character. That the action should have taken place at great velocity from east to west is not at all incredible. Whatever may have been the cause of these glows, we may be absolutely certain that they were not the effect of sun-light upon ashes or products of combustion mechanically distributed by a rapid current from east to west.

H. A. HAZEN.

Washington, D.C., Aug. 8.

BOOK-REVIEWS.

The Ethical Problem. By Dr. PAUL CARUS. Chicago, Open Court Pub. Co. 12°. 50 cents.

THIS pamphlet contains three lectures recently delivered before the Chicago Society for Ethical Culture, together with some preliminary matter on the same theme. Dr. Carus is deeply impressed with the importance of a new basis for ethics, the old traditional foundations having proved insufficient. He maintains, in opposition to many leaders of the ethical societies, that a correct theoretical basis of moral action is indispensable, a view with which we cordially agree; and he tells those societies plainly that, unless they supply such a basis, their movement will come to naught. "How can we," he asks, "have a common aim in the 'elevation of the moral life,' if we are not agreed upon what a moral life is, if our philosophical opinions about good and bad differ?" Accordingly he has prepared these lectures with the apparent purpose of furnishing a basis of ethics, but, we are sorry to say, without success. Indeed, he hardly makes a serious attempt to solve the problem; but contents himself with talking around it and about it, without ever coming to the point. He rejects all the theories of other men, theological, intuitional, utilitarian, and otherwise, and maintains that ethics must be based on "facts"; but what the true basis is he nowhere informs us. Indeed, we have seldom met with a more unsatisfactory treatment of the question at issue, and we cannot see that Dr. Carus has made any real advance from the position of the ethical societies.

AMONG THE PUBLISHERS.

D. C. HEATH & Co., Boston, have in press, to be published about Aug. 15, a new number in the series of Guides for Science Teaching, published under the auspices of the Boston Society of Natural History. The book is entitled "Insecta," and is written by Professor Hyatt, curator of the Natural History Society. It will be extensively illustrated with engravings from drawings made specially for the work.

—Scribner & Welford have the exclusive agency for America of the library edition of Moncure D. Conway's "Life of Hawthorne," published in England in the Great Writers series. This is printed on larger paper, and, in general, is gotten up more sumptuously than the twelvemo edition.

—Frank Vincent, the well-known traveller and author, "in recognition of his distinguished services to the literature of travel," has received from the Emperor of Austria the great gold medal for art, literature, and science. This is the second honor Mr. Vincent has received from Vienna, having, a few years ago, been elected a corresponding member of the Austria Geographical Society.

—Messrs. Longmans, Green & Co. have published a volume of short pieces by the late Richard Jefferies, entitled "Field and Hedgerow." It contains more than twenty essays, mostly on topics suggested by rural scenes and events; but for what purpose such works are written and read we do not know. There is nothing in the book but trifling descriptions of natural objects, written in a disagreeable style, with occasionally some brief remark on moral or artistic themes. We look in vain for any contribution to our knowledge of nature, either in its scientific or its esthetic aspect; while the author's remarks on higher themes are singularly vapid and profitless. It may be that somebody will derive either