

in Japan. In all these, as well as in the case of the hills near Freiburg mentioned by Dr. Wetterhan, the soil appears to be a porous detritus with a hard substratum. At St. Anton, as at Chamoanix, the hill-side sloped at an angle of about 50°, with a northern aspect, and in both cases and in Japan the phenomenon occurred in the autumn, a season often characterised, especially at high elevations, by cold nights and genial days. Dr. Koch calls it "sunderbar" and "ganz eigenthümlich," and it is plainly not of common occurrence.

Dr. Koch's explanation of the phenomenon is virtually the same as had occurred to me, except that both he and Dr. Wetterhan appear to consider that the water was derived by absorption from a moist atmosphere. In none of the descriptions, however, is there any mention of what was one of the most striking features of the ice which I tried to describe, viz. its division into distinct layers, each layer being of uniform depth; and this, showing as it does that the crystallisation was interrupted, and not continuous, seems to make it more probable that the water was supplied from below. The cylindrical perforations were, no doubt, caused by the presence of pebbles or small lumps of earth too dense to allow the ice-crystals to penetrate them, and too heavy to be pushed up. The layer of dust on the surface was much thinner in my case than in Dr. Koch's, which was no doubt due to accidental difference in the soil.

A friend in the country tells me that on a bright winter's day two or three years ago he picked up a piece of a dead beech-branch which was covered with filamentous ice, such as is described by the Duke of Argyll and others in NATURE (vol. xxi, pp. 274, 302). He brought it home, and, having examined it, left it out in the sun, when the crystals of course soon vanished. Next morning, however, he was surprised to see that they had all reappeared as before. The water from the melting ice had again filled the pores of the wood, and again been extruded in the same crystalline form. Now, if the highest temperature to which they had been exposed during the day had been 32° F., and a fresh supply of water had been afforded from any source to the wood, then neither would the ice have melted nor the water frozen; until the temperature fell again at night, when a fresh formation of crystals would have taken place, which would have pushed up those previously existing, and the result would have been a formation similar to that described in my letter. It seems more probable, therefore, that the moistening took place from below, as I suggested.

Hampstead, December 20, 1884

B. WOODD SMITH

Lightning in the Tropics

My experience confirms the remarks of Dr. Von Danckelman in NATURE (p. 127) respecting the little damage done by lightning in tropical climate.

In the plains of India at the commencement of the monsoon, storms occur in which the lightning runs like snakes all over the sky at the rate of three or four flashes in a second, and the thunder roars without a break for, frequently, one or two hours at a time. During twelve years' residence in India I heard of only two human beings and, I think, three buildings being struck, although in parts of Lower Bengal the population amounts to more than 600 to the square mile. I always attributed the scarcity of accidents to the great depth of the stratum of heated air next the ground keeping the clouds at such a height that most of the flashes pass from cloud to cloud, and very few reach the earth. This idea is supported by the fact that in the Himalayas, at 6000 feet or more above the sea, buildings and trees are frequently struck. I have seen more than a dozen pine-trees which had been injured by lightning on the top of one mountain between 8000 and 9000 feet high. In the British Islands thunderstorms are said to be more dangerous in winter than in summer, and such a fact, if true, can be explained by the very thin stratum of air then intervening between the clouds and earth.

J. J. MEYRICK

London, December 19, 1884

An Unnoticed Factor in Evolution

I AM surprised that the letter of Mr. Catchpool in NATURE (vol. xxxi, p. 4) has remained unnoticed by your correspondents. His hypothesis that mutual sterility may be the cause, not the result, of specific divergence, is, I think, quite in accordance with many observed facts. The buffalo and the ox, the sheep and the goat, have lived for ages side by side without, as far as I

am aware, a hybrid between either of them having been produced. Mule or hinny hybrids between the horse and the ass are obtained easily, but the offspring is rarely fertile, so rare, that the British Consul at Granada told me, when I was there, that he had never known of a case, although in Spain mules exist in thousands. Amongst bovine animals many species produce hybrids which are apparently perfectly fertile; those between the Indian ox and the gawal, species of different genera, *Bos* and *Bibos*, are common, and their fertility is shown by the existence of numerous intermediate hybrids. There is living at the Zoological Gardens at the present time, a hybrid between the Indian ox, the gawal, and the bison, and, by her side, a hybrid between herself and a bison. The offspring of the cross between many species of ducks are perfectly fertile. This I have repeatedly seen in the case of the hybrids between the tufted duck and the pochard. I think there is another unnoticed factor in evolution. The scent of animals plays an important part in their sexual relationships, and "sports" in this respect are as likely to occur as in the organs of the body; thus the peculiar odours of the sheep and the goat may be mutually repulsive.

J. JENNER WEIR

Chirbury, Beckenham, Kent, December 15, 1884

A Large Meteor

A MAGNIFICENT meteor was observed here last night. Its path lay from the west of σ Hydre towards the west of η Monocerotis. Its head could not exactly be said to explode but broke up and extended suddenly considerably along its course, emitting a deep red and bluish white light, the latter of a most extraordinary brightness, for a moment quite sufficient to allow print to be discerned. It disappeared very near 11h. 19m. 6s. M.T. Dublin, and left a bluish white trace behind it, which could still with certainty be perceived seventeen minutes after the meteor had disappeared.

OTTO BOEDDICKER

Birr Castle Observatory, December 23, 1884

THE FORMATION OF THE SOLAR SYSTEM¹

THE aspect of the heavens, the appearance of the planets, do not give us the least idea of the solar system. In order to understand it well, we must in imagination quit our world altogether, and remove ourselves to a distance, so as to embrace in one glance the little system of which so ordinary a star as our sun occupies the centre.

Around the sun there move eight primary planets at very unequal distances. Of these planets six have satellites; that is to say, they in their turn are centres of little systems reproducing the solar system in miniature. Thus the Earth has a satellite, the moon; Mars has two, Jupiter four, Saturn eight, Uranus four, and Neptune, the most distant, has one. A striking thing in this system, that which makes it unique, is that the sun turns on its own axis from right to left, and all the planets without exception revolve around it in the same direction, almost in the same plane, that of the rotation of the sun, and describe orbits very nearly circular.

Would not one say that a vast gyratory movement animates all these bodies, and that the secondary systems of the Earth, Mars, Jupiter, &c., are little whirlpools moving in the primary one? Such was the idea of Descartes. If the solar system does not actually constitute a whirlpool, it was originally formed by a movement of this nature in the nebula which gave it birth.

The sky exhibits here and there a large number of gigantic masses of extremely rarefied matter, like the mists of chaos, without shape, having undergone only that degree of condensation necessary to create a feeble light. We require usually a powerful telescope to distinguish them, and then we can see them by thousands in the heavens; these are *nebulae*.

When you visit an observatory under the escort of an astronomer whom you know, tell him several days beforehand that what you wish is not to gaze at the moon, or the planets and their satellites, or the fixed stars, double

¹ Translation of an article by M. Faye in a recent number of *L'Astronomie*.