

The Circulation of the Atmosphere over the Equator.

ABSENCE from home has prevented my seeing Mr. Foulger's letter on this subject till to-day.

The observations on the upper winds over the doldrums, which I have described in NATURE, were taken in about 5° N. latitude and 28° W. longitude, and the whole section of the trades and doldrums lay in a line drawn from St. Vincent to Rio Janeiro.

When I stated that "low clouds from south-east flew over the north-east trade up to 15° N.," I meant to say that while the surface-wind from the doldrum to 15° N. was the north-east trade, the low or middle layers of cloud moved from south-east, all along the line of the section above noted.

Unfortunately I am unable at present to give a general scheme of the circulation of the atmosphere, though I have worked at the subject for years; and my recent observations in the Andes, from Peru to Cape Horn, throw much new light on the question.

What we do know is that the surface trades either die out at the doldrums, or unite into one moderate east current; that the low and middle currents over the doldrums are very variable, but that the wind at these low and middle levels—say 2000–20,000 feet—come usually from the south-east over the north-east trade, and from the north-east over the south-east trade; and that the highest currents—over 20,000 feet—move from east over the doldrums, from south-west over the north-east trade, and from north-west over the south-east trade. We also know that the high-level south-west and north-west winds near the equator gradually descend to the earth's surface about 30° N. and 30° S. respectively.

What we do not know is the relation of the south-east low and middle current over the north-east trade to the south-east trade on the other side of the equator, nor have we yet discovered what becomes of this middle current in the northern hemisphere. In like manner the origin and ultimate destination of the middle north-east current over the south-east trade is equally a matter for future research.

Of course, all meteorology turns round the general circulation of the air through the heating of the equatorial regions, but what I maintain is that the simple scheme which assumes nothing but an upward current over the doldrums and a return current towards each Pole is not confirmed by observation. The reality is more complex, for the centre of the high doldrum current is from the east, but diverges at the edges from south-west and north-west.

The discovery of the true nature of the general circulation of the atmosphere from the equator to the Pole—apart from any theoretical considerations—is a matter of so much importance for the future of meteorology, that I hope all future travellers across the equator will note carefully the direction of the clouds in low latitudes. I know this is somewhat difficult on board ship for want of a steady point of reference; but those whose zeal prompts them to look out between 5 and 6 in the morning, and from 6 to 7 in the evening, will usually find the moon, or some bright star, by means of which the direction of the cloud-motion can be accurately determined. Above all things, the relative, and if possible the actual, level must be carefully noted; and the observations should not be recorded as we so often see—wind north-east, clouds south-west—without any indication as to whether the south-west current is at a low, middle, or high level.

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21 Chapel Street, London, July 22.

Changed Environment.

It is generally known that the English sparrows were introduced into the United States on the supposition that they were insect feeders, and would protect our trees from the canker-worm. For the first time in my remembrance, I have seen one attack a caterpillar this summer. Their usual food appears to be the seeds found in horse-manure on the streets. They are now universally conceded to be an unmitigated nuisance, not doing their assigned work, and preventing others from doing it. They usurp the place of the more charming native birds, the blue-bird, the wren, and the Baltimore oriole, once common in our cities. Still, we have to confess that the sparrows are interesting little creatures, aggressive and pugnacious.

I was lately told of a circumstance, which I can myself now confirm. An "American robin" was seen watching a beetle, known here as the "June bug," that had just emerged from the ground. He tossed him about with his bill, and was closely

watched by a sparrow who had alighted about a foot away. Seeing the latter, the robin at once attacked him, when the sparrow made a dive between his legs, seized the beetle and flew away. A robin rarely hunts for earth-worms, of which robins are especially fond, without being followed by one or more sparrows. These often get the worm for which the larger but less agile bird has laboured.

Another matter suggests itself to me. Mr. Wallace in his new and delightful book on "Darwinism," which reawakens one's old enthusiasm, says that many plants live "not where they must, but where they can." The natural habitat does not always appear to be the best. Thus, *Lobelia cardinalis*, so common in our Rhode Island woods, is always found on the brink of running streams, or where these have been, or near water. It is in such sense aquatic. But, removed to a garden, it will grow vigorously and multiply astonishingly exposed to full sunlight and in ordinary loam. Indeed, the plants prefer to escape from the beds into the gravelly paths. They will overrun a garden.

Aster Nova-Engliæ is not one of our most abundant asters, but in a garden it will crowd out all else. The seedlings spring up even in the dry soil loved by *Plantago major*. *Viola pedata*, which grows naturally in sand, will flourish and increase in size by cultivation, becoming as handsome as a pansy. *Corydalis glauca* grows in nature on hot exposed rocks and cliffs; it will grow larger and better, and set seed abundantly, in rich loam.

I could multiply instances of such changed environment where the result was beneficial. W. WHITMAN BAILEY.

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July 2.

Lamarck versus Weismann.

I SHOULD like to call the attention of those interested in organic evolution to a remarkable passage in Mr. Wallace's recent volume on "Darwinism." This work is throughout an argument in defence of Darwinian principles, in their original unmodified form as stated in the "Origin of Species," in opposition to all recent criticism or development of those principles. And yet on p. 129 the author publishes the following passage:—"Now the eyes of these fish (Pleuronectidæ) are curiously distorted in order that both eyes may be on the upper side, where alone they would be of any use. It was objected by Mr. Mivart that a sudden transformation of the eye from one side to the other was inconceivable, while if the transit were gradual, the first step could be of no use since this would not remove the eye from the lower side. But, as Mr. Darwin shows by reference to the researches of Malm and others, the young of these fish are quite symmetrical, and during their growth exhibit to us the whole process of change. This begins by the fish (owing to the increasing depth of the body) being unable to maintain the vertical position, so that it falls on one side. It then twists the lower eye as much as possible towards the upper side; and the whole bony structure of the head being at this time soft and flexible, the constant repetition of this effort causes the eye gradually to move round the head till it comes to the upper side. Now if we suppose this process, which in the young is completed in a few days or weeks, to have been spread over thousands of generations during the development of these fish, those usually surviving whose eyes retained more and more of the position into which the young fish tried to twist them, the change becomes intelligible."

A Lamarckian could accept the above passage almost without altering a word. The words I have italicized describe with absolute precision the muscular effort of the fish as the active cause, both of the individual and the ancestral metamorphosis. And yet, in chap. xiv., Mr. Wallace expresses his acceptance of Weismann's dogma of the non-inheritance of acquired characters with the words, "We cannot therefore accept any arguments against the agency of natural selection which are based upon the opposite and equally unproved theory that acquired characters are inherited; and as this applies to the whole school of what may be termed Neo-Lamarckians, their speculations cease to have any weight."

J. T. CUNNINGHAM.

July 19.

Bored Stones in Boulder Clays.

STONES bored by *Pholas* and *Saxicava* are by no means rare in the shelly "Basement clay" of East Yorkshire, and I have occasionally found examples in which the shells remained in the