

eye-witness, who also stated that the cones produced by the trees in question always proved seedless. The trees, curiously, were all females, and had no opportunity of impregnation. In further reference to the diceous character of this genus of Conifers, I am informed that the Maresfield trees, as indicated, failed to produce fructiferous cones until males were planted within suitable proximity to them. Pertaining, further, to the sexuality of the Araucaria, I believe that a distinguishing character exists in the size of the foliage, that of the cone-bearer being considerably the larger.

Bearing on the sudden fruition of the Inveraray tree, it may be interesting to relate a parallel case, which occurred upwards of twenty years ago, when I was residing in the neighbourhood of Stratford-on-Avon. A fine specimen of that beautiful Spanish silver fir (*Picea Pinsapo*), on one windy day, became prostrate, and exposed, to my surprise, the greater portion of its main roots in a fungous, diseased condition, thus solving the problem why the tree had for the last few years assumed a stunted growth. Fortunately, however, as two or three of the main roots on one side of the tree remained intact, I resolved to raise it to its former position, after having cut away every vestige of diseased or broken roots; which was successfully accomplished by the aid of a stout rope and pulley-block, and a dozen able men. Subsequently the tree did not appear to suffer materially from the trying ordeal it had been subjected to, and my anticipations of its resuscitation were shortly afterwards justified by a healthy renewed growth, and the interesting appearance, in the course of two or three years, of a crop of beautiful cones, specimens of which I exhibited at one of the Royal Horticultural meetings in 1869, and for which a "Special Certificate of Merit" was awarded. Evidently the cause of this abnormal fruition—as in the case of the Inveraray Araucaria—was owing to arrested growth. In conclusion, I may add that I failed to discover the real cause of the decay of the *Picea*'s roots, but attributed it to something unsuitable in the almost impervious damp subsoil, the fungous condition being only consequential.

WILLIAM GARDINER.

Harborne, Birmingham, November 15.

P.S.—Respecting the sexuality of the Araucaria, it would be instructive as well as interesting could any of your correspondents define any comparative specific character possessed by the plants, such, for instance, as the foliage or general habit, when in their earlier life, and whereby they may be distinguished.—W. G.

EARLY this summer the Araucarias of large size around Terregles House, near Dumfries, were in fruit. Many of the shed cones were lying at the base of the plants. Several years ago I saw a fine Araucaria in fruit in the manse garden, Colvend, Kirkcudbrightshire; but learned from the incumbent that the sight was a rare one. About the middle and end of October, this year, we had numerous trees of the mountain ash from which the leaves had fallen, but which stood glittering, laden with red berries. Clouds of fieldfares arrived, at first noisy and shy, perching on the tops of larch-trees. They devoured these berries, and, getting bolder, invaded my garden, and clustered on a mountain ash in such numbers that there could not be less than 200 at one time. At two visits of one hour each, in one day, every berry disappeared from that tree. Now the flocks of fieldfares are no longer visible, and the berries of the hawthorn and other wild fruit do not seem to attract them, while not a berry of the mountain ash could be picked up for many miles.

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### THE GENESIS OF TROPICAL CYCLONES.

ACCORDING to the views of Dr. Hann, as explained in a previous number of this journal, (Nov. 6, p. 15) the storms of the temperate zone originate, not in the convective ascent of warm damp air (an explanation, however, which he appears to admit in the case of tornadoes), but in great vortical movements of the upper air-currents, which commence over the equator as the anti-trades, and set continuously towards the poles, being gradually diverted eastwards in consequence of the earth's rotation. Owing to the spherical form of the earth's surface, these

currents become irregularly congested as they necessarily converge on reaching higher latitudes, and thus give rise to anticyclones, or tracts of excessive accumulation and pressure, and to cyclonic vortices in the intervals. Admitting this view as at least highly probable, the question now to be considered is how far similar conditions hold good in low latitudes. Do the cyclones of the tropical zone originate in like manner, or are they not rather primarily due to the conditions of the lower atmosphere, to the production and condensation of vapour over a calm region, and the creation of an upcast current?

In the first place, it is to be observed that in low latitudes those causes which impede the even flow of the upper currents are at a minimum. Their tendency to congestion must vary as the contraction of the degrees of longitude in successive parallels of latitude; and whereas between latitude  $40^{\circ}$  and  $50^{\circ}$ , for instance, this amounts to 16 per cent. of the length of the degree, and between  $50^{\circ}$  and  $60^{\circ}$  to 22 per cent., between  $5^{\circ}$  and  $15^{\circ}$  it is little more than 3 per cent. Accordingly, the non-periodic oscillations of the barometer, which, in Europe, frequently amount to an inch in the course of a day or two as cyclones and anticyclones successively sweep past, in the latitude of Madras ( $13^{\circ}$  N.) rarely much exceed a tenth of an inch in the whole course of a month. But cyclones originate certainly as low down as latitude  $8^{\circ}$ , and instances have been recorded in  $7^{\circ}$  and even  $6^{\circ}$ .<sup>1</sup>

On the other hand, the supposed alternative cause, viz. the production and condensation of vapour, is at a maximum in low latitudes, and the facts recorded by Eliot, Pedler, and others who have traced out the early history of Bay of Bengal cyclones, go to show that their formation is determined by the inrush of a saturated current from the equatorial sea, and that this inrush is preceded by at least one or two days of disturbed squally weather in the birthplace of the storm. Moreover, the evident relations of these storms to the features of the terrestrial surface, always in the early stages of their existence, and frequently after they have been maturely developed, seem to admit of no other conclusion than that they are, primarily at least, phenomena of the lower atmospheric strata, even though at a later period the vortical movement may be imparted to the greatly elevated anti-trade, and so be carried forward into higher latitudes. And lastly, as Dr. Hann has himself shown, the temperature test, which he rightly appeals to as crucial, and which in his hands has led to the overthrow of the condensation theory of extra-tropical storms, does not fail when applied (as far as the data admit of) to the case of tropical cyclones. On each of these points some further elucidation is necessary.

First, as regards the place of their origin; and in these remarks I shall restrict myself to the storms of the Bay of Bengal and the adjacent Indian continent, which have been more closely studied than those of other tropical seas. A chart given by Mr. Eliot in his recently published "Hand-book of Cyclonic Storms in the Bay of Bengal" shows that they are generated with about equal frequency in all parts of the bay between N. latitudes  $8^{\circ}$  and  $18^{\circ}$ . Between latitude  $18^{\circ}$  and the Bengal coast they are much more frequent, though generally of less intensity. But they are formed very rarely indeed over any part of the Indian peninsula. I can remember but one such case during an experience of many years' daily study of the weather charts. And although they originate somewhat more frequently in Lower Bengal during the height of the monsoon, even these instances are rare in comparison with those of storms generated at the head of the bay during the same season. With but few exceptions, therefore, they are formed only over the sea, and these exceptions are nearly all restricted to the low plain immediately north of the bay. If the original impulse were a vortical movement of the higher atmosphere, it

<sup>1</sup> See the list of storms in Appendix II. to the "Weather and Climates of India."