brighter and closer together where the pillars had formerly stood, and rapidly ascending.

When I first looked, some of them had already reached a height of nearly 4′ (100,000 miles), and while I watched them they rose with a motion almost perceptible to the eye, until in ten minutes (1.5) the uppermost were more than 200,000 miles above the solar surface. This was ascertained by careful measurement; the mean of three closely accordant determinations gave 7′ 49″ as the extreme altitude attained, and I am particular in the statement because, so far as I know, chromospheric matter (red hydrogen in this case) has never before been observed at an altitude exceeding 5′. The velocity of ascent also, 166 miles per second, is considerably greater than anything hitherto recorded.

As the filaments rose they gradually faded away like a dissolving cloud, and at 1.15 only a few filmy wisps, with some brighter streamers low down near the chromosphere, remained to mark the place.

But in the meanwhile the little "thunder head," before alluded to, had grown and developed wonderfully into a mass of rolling and ever-changing flame, to speak according to appearances. First it was crowded down, as it were, along the solar surface; later it rose almost pyramidally 50,000 miles in height; then its summit was drawn out into long filaments and threads which were most curiously rolled backwards and downwards, like the volutes of an Ionic capital: and finally it faded away, and by 2.30 had vanished like the other.

The whole phenomenon suggested most forcibly the idea of an *explosion* under the great prominence, acting mainly upwards, but also in all directions outwards, and then after an interval followed by a corresponding inrush: and it seems far from impossible that the mysterious coronal streamers, if they turn out to be truly solar, as now seems likely, may find their origin and explanation in such events.

The same afternoon a portion of the chromosphere on the opposite (western) limb of the sun was for several hours in a state of unusual brilliancy and excitement, and showed in the spectrum more than 120 bright lines whose position was determined and catalogued—all that I had ever seen before, and some fifteen or twenty besides.

Whether the fine aurora borealis which succeeded in the evening was really the earth's response to this magnificent outburst of the sun is perhaps uncertain, but the coincidence is at least suggestive, and may easily become something more, if, as I somewhat confidently expect to learn, the Greenwich magnetic record indicates a disturbance precisely simultaneous with the solar explosion.

C. A. YOUNG

Dartmouth College, September 1871

THE KEA—PROGRESS OF DEVELOPMENT

A NOTICE of the development of a striking change in the habits of a bird may be considered by naturalists interesting enough to justify a brief record in your journal. The Kea (*Nestor notabilis*) may be seen and heard in certain localities amidst the wild scenery of the Southern Alps in the middle island of New Zealand, for it is not so rare as has been described. This fine bird belongs to one of our indigenous genera, an examination of its structure proves that it shares with the *Kaka* a claim to a position amongst the *Trichoglossinæ* or Brush-tongued Parrots; the under side of its thick tongue near the tip is fringed with papillæ, enabling it to collect the sweets of its favourite blossoms. Through how many years has this species been content to range over shrub-covered heights and rock-bound gullies, gathering its subsistence from the nectar of hardy flowers, from the drupes and berries of the dwarfed shrubs that contend with a rigorous climate, and press upwards almost to the snow line of our Alpine giants? To these food-resources may be added insects found in the crevices of rocks, beneath the bark of trees, and its aliment not wholly vegetarian, yet such as called forth no display of boldness in order to procure a sufficient supply. This peaceful demeanour was observed under the ascendency of Moaic conservatism. The European has been the means of corrupting the simplicity of its ancient habits; the meat-gallows of the back-country squatters attracted the attention of our mountain-parrots in the winter season. To them they became points of interest in their wanderings, and furnished many a hearty meal torn from the dangling carcass as it swung in the frosty air; neither were the drying sheepskins, stretched on the rails of the stockyard, neglected. The Paneka has been destined to supply the enterprising Kea with a dainty only equalled perhaps by that which the epicurean African cuts warm from his bovine victim—our *educated* bird now tears his food from the back of the living sheep. From a local paper one learns that, for the last three years the sheep belonging to a settler "in the Wanaka district, (Otago) appeared afflicted with what was thought to be a new kind of disease; neighbours and shepherds were equally at a loss to account for it, having never seen anything of the kind before. The first appearance of this supposed disease is a patch of raw flesh on the loin of the sheep, about the size of a man's hand; from this matter continually runs down the side, taking the wool completely off the part it touches, and in many cases death is the result. At last a shepherd noticed one of the mountain parrots sticking to a sheep and pecking at a sore, and that the animal seemed unable to get rid of its tormentor. The runholder gave directions to his shepherds to keep watch on the parrots when mustering on the high ground; the result has been that during the present season when mustering high upon the ranges near the snow line, they saw several of the birds surrounding a sheep which was freshly bleeding from a small wound in the loin; on other sheep were noticed places where the Kea had begun to attack them, small pieces of wool having been picked out."

From the recent settlement of the country, it would be quite possible to date each step in the development of the destructiveness of the Kea, the gradual yet rapid change from the mild gentleness of a honey-eater, luxuriating amidst fragrant blossoms when the season was lapped in sunshine, or picking the berried fruits in the more sheltered gullies when winter had sternly crushed and hidden the vegetation of its summer haunts. Led, perhaps, to relish animal food from its partly insectivorous habits, its visits to the out-stations show something like the bold thievery of some of the Corvidae, whilst its attacks on sheep feeding on high ranges exhibit an amount of daring akin to the savage fierceness of a raptorial. Is the position of Nestor in our avifauna an anomalous one? A sucker of honey, devourer of fruit, destroyer of insects, render and tearer of flesh—will the difficulty be met by classing our mountain bird as omnivorous, or is it to be considered as only one other instance in which system puzzles and hampers the field naturalist?

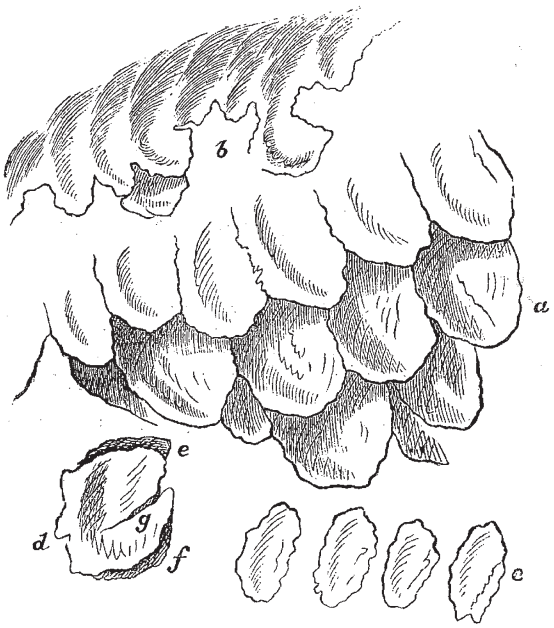
THOS. H. POTTS

ON A NEW FORM OF CLOUD*

THE accompanying figure on p. 490, represents a form of cloud which I have seen but twice in my life;* the first time about the commencement of June 1871, at five o'clock in the evening, at Washington, U.S.; the second at Beloit, Wisconsin, U.S., during the same year, and at the same hour. The state of the atmosphere presented similar meteorological conditions at both times. The appearances coincided with

* See my new classification of clouds with sixteen engravings in the *Rural New Yorker*, January 29, February 26, April 9, May 21, June 4 and 11. It will be reprinted in the Report of the Smithsonian Institution for 1870, with an historical introduction, in print now for the next number of the *Annales Hydrographiques* of Paris.

a north-west storm passing slowly north of the city without bursting, and disappearing in the south-east. Great branched masses of cloud appeared suspended from a sheet of Pallio-Cirrus. Some resembled bunches of grapes (*a*), others stalactites (*b*) in a striking manner, and still others formed round balls (*c*) separated by the azure of the sky. These balls seemed to be formed of snow flakes, and approached the form of Cirro-Cumulus; one might say of masses of snow rolled upon themselves by the effect of electric currents developed during the storm. This was accompanied by thunder and lightning at Washington, and by lightning only at Beloit. *d* represents one of these balls detached, with two sorts of penumbra, darker in *e* and *f*, and a streak at *g*, the rest whitish. Somebody at Beloit told me he had seen this form of cloud two or three times. A slightly brilliant aurora borealis was seen at Beloit the same evening. The night of its appearance at Washington no aurora was visible, but I do not know whether there may not have been one in other parts of



the United States. The same evening and the next day at Beloit the temperature fell several degrees. It is a general belief that the aurora borealis is followed by a decrease of temperature. We know that in higher strata of the air vapour of water floats constantly in the form of frozen needles, especially in the polar regions. It is not impossible that these ice needles may be drifted by the electric current which engenders the aurora borealis* into lower latitudes, and thence towards lower strata of the atmosphere by the winds and storms. Hence the cooling of the air which is said to attend the aurora.

ANDRÉ POËY

EXOGENOUS STRUCTURES AMONGST THE STEMS OF THE COAL MEASURES

THE perusal of Dr. M'Nab's reply to my short article on the existence of an exogenous process of growth amongst the cryptogamic stems of the coal measures, confirms my previous conviction that the discussion of *the details* of my proposition can lead to no beneficial results until the publication of my large store of new facts has been completed. Dr. M'Nab's article convinces me, as indeed is necessarily the case, that he has no conception either of the nature or of the extent of those facts. Were it otherwise, he would see at a glance how far his explanations are from accounting for them. He has given an exposition of a common process of exogenous growth, which is true as far as it goes; but I can assure him that the modifications of that process, so far as we can infer from peculiarities of structure, have been much more varied in past geological ages than he is aware of. He is pleased to affirm two things which require proof: (1) that I have "been led away by the mere superficial resemblance of the parts;" and (2) that I have "never tried to understand the homologies of these stems." To the first of these charges I plead not guilty; to the second I reply that I was *trying* to understand these things when he was a child at school. Whether or not I have succeeded remains to be seen, but as yet he has told me nothing new to me.

In studying the relations of the several parts of a plant, we have to consider three things, of which Dr. M'Nab has mainly dwelt upon one. These are—

1. The relative positions of the tissues.
2. The mode of their development.
3. The functions they have to perform.

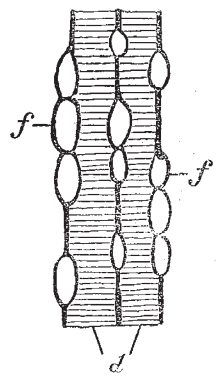


FIG. 1

The first point where I shall differ from Dr. M'Nab is in supposing that a correspondence on the first of these clauses invariably pre-supposes a similar correspondence on the second. I shall have to show on a future occasion that Nature has attained the same end in more ways than one; and that she refuses to be shut up to that dichotomous arrangement pre-supposed by Dr. M'Nab; but for the present I will limit my illustration to the particular mode of growth upon which he rests his case.

If we take a perfect Stigmaria, we find its centre (*a*, Fig. 2, p. 491) to be occupied by an axis of ordinary cellular parenchyma unmixed with any vascular tissue. This is surrounded by a ligneous or vascular cylinder (*b*) which, in its turn, is invested by a thick bark (*c*) consisting of a mixture of parenchyma and prosenchyma arranged in definite positions. The central axis differs in no respect whatever from the cellular piths of ordinary exogenous stems. The woody cylinder consists of vessels which, in the transverse section, are arranged in radiating lines (*d*) running from the pith to the bark; these lines are separated by intervening cellular tracts (*e*), which I, in common with Brongniart and Dr. Hooker, designate medullary rays. The radiating lines of vessels exhibit proofs of distinct interruptions to the process of growth, and afford clear evidence that the cylinder began as a thin ring of vessels surrounding the pith, and which grew, by successive concentric additions of vessels, to its peripheral surface where the cambium layer is found in ordinary exogens. We have here no trace of the limiting tissues of which Dr. M'Nab speaks; the growth has been free and prac-

* See my Memoir on the Development of Electricity during the Aurora Borealis in the "Annuaire de la Société Météorologique de France," 1861, vol. ix. p. 42.