a single line of change, and the *differentiation* of a specific type in two or more lines of change. The race of giants is formed—if I may again quote the pre-Darwinian expressions of the Laureate—by successive generations progressively mounting to higher things on the steps supplied by their own “dead selves.” But this ladder-like succession of species in time differs in many respects from a tree-like multiplication of species in space; and the respect in which it differs most has reference to “the difficulty of the swamping effects of intercrossing.” The transmutation of species in a single line of change is self-evidently capable of being effected by natural selection alone, because here free intercrossing among the uneliminated “fittest” is the very means whereby the transmutation is effected. But the tree-like multiplication of species (or Darwin’s “divergence of character”) is no less self-evidently incapable of being effected by natural selection alone; it is not so much as logically possible that any arborescence of species can take place unless natural selection is assisted by some form of isolation at the origin and throughout the development of every branch. The race of giants is evolved by intercrossing being “permitted” between all the uneliminated individuals of each successive generation; but if at the same time a race of pygmies, another race of blacks, another of whites, &c., are to be formed, it is a plain necessity of the case that intercrossing must be *prevented* between all these different races; else natural selection could not so much as begin to differentiate them.

This all-important distinction between what Mr. Gulick has concisely termed “monotypic” and “polytypic” evolution is not observed by “Wallace and others,” who are now said to have “amply dealt” with the “difficulty” in question. For they deal only with the case of monotypic evolution, with reference to which no one has been so foolish as to allege any difficulty; and thus their whole treatment of the subject is irrelevant to the only difficulty which has been alleged, viz. the abstract impossibility of natural selection having ever effected *polytypic* evolution, or *divergence* of character, without the co-operation, in some form or another, of segregate breeding by the prevention of free intercrossing. GEORGE J. ROMANES.

Oxford, April 17.

The Flying to Pieces of a Whirling Ring.

DR. LODGE appears to be still in error in making (p. 534), without qualification, the statement that “the dangerous tension will be set up in a straight portion of any endless band running in the direction of its length with the critical speed $\sqrt{\frac{T}{\rho}}$ by the agency of the curved portions which necessarily exist somewhere.” For the curved portions of such a band might run *inside* smooth guides which would supply the necessary centripetal pressure and relieve the band from all tension. Such an arrangement was in my mind when I wrote (p. 463) that the band *need not* be stretched to its breaking strain. It is true that Dr. Lodge began his original letter (on p. 439) by specifying a ring “not radially sustained,” but he will, I feel sure, allow me to call attention to the fact that without a repetition of this qualification his remark that I have quoted is incorrect: and I think he will see that his supposition that my remarks referred only to a straight bar with free ends, and not to an endless band, is contrary to the expressed terms of my letter. The fact remains that the motion of even an endless band has not necessarily anything to do with the stability of the straight part. Dr. Lodge apparently still wishes us to suppose otherwise.

Devonport, April 12.

A. M. WORTHINGTON.

A Lecture Experiment illustrating the Magnetic Screening of Conducting Media.

A LECHER’S tube (*Wied. Ann.*, xli. p. 850) is put, by means of two cork rings, into another large (4 cm. diam.) glass tube, with a crane on one end. Holding the tube in one hand, and approaching it to a wire in which electrical waves are produced, a continuous lighting in the Lecher’s tube is to be seen. This lighting remains even if the large tube, including the Lecher’s tube, is filled with water. But if the tube is filled with dilute sulphuric acid the light disappears.

When we open the crane and the acid flows out, we perceive the light again, but only in that part of Lecher’s tube which is not surrounded with the acid. The light in the Lecher’s tube penetrates but very little below the level of the acid in the surrounding tube.

J. J. BORGMAN.

St. Petersburg, University, April 14.

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The Intelligence of the Thrush.

IT IS, I think, well to record the following observations of the intelligence of the thrush. The first happened on June 28, 1865. I then saw, from the windows that look out on the little lawn north of my house, a thrush steadily “stepping westward” in front of the hedge that parts the lawn from the public road. The bird seemed to be intentionally making for a gravel path that, after passing almost close to the windows, bends to the north-west, toward the small gate of my front garden. It was bearing something in its bill. On coming to the path it attempted to break this on a stone. It did not succeed. It then tried another stone. This time it succeeded. Thereupon it flew away. On the spot I found a remarkably big stone embedded in the path, and round it were scattered bits of snail shell. The bird had eaten the snail.

The second of the observations I would note, and the more striking of the two, happened on June 5, 1890. I then was viewing the gravel path from the westernmost of the four windows. Just beneath me, standing on the path, was a female thrush. She had succeeded in breaking a snail shell. She had the snail in her bill. But, despite of vigorous efforts, she could not swallow it. Up hopped a male thrush. Standing before the female, he opened his bill. She dropped the snail into his bill. He chewed the snail. He dropped it back into the female’s ready bill. She swallowed it. The pair blithely trotted off, side by side, toward the small gate. I saw them no more.

JOHN HOSKYN-ABRAHALL.

Combe Vicarage, near Woodstock, Oxfordshire,

April 16.

Cocks and Hens.

WHILST I was living at Highfield House in Nottinghamshire in 1879, a duck-wing game bantam injured her leg after she had been sitting for a fortnight, and could no longer remain on the eggs. The cock bird, however, took her place, and not only hatched the brood, but acted in all respects like a hen, brooding the young, setting his feathers up like a brood hen, and using the same peculiar cluck that a hen has for calling her chickens, also sleeping on the nest instead of his usual perch—being, in fact, a mother for the time. Years before (in 1841) one of my Dorking hens was accidentally killed, leaving a brood of chickens some five weeks old; the Dorking cock took to them and brought them up, but in this instance there was no change except the act of brooding. E. J. LOWE.

Shirenewton Hall, Chepstow, April 12.

Cackling of Hens.

IT is often difficult to recall an actual instance of what may be a matter of very common occurrence. Such is to a certain extent the case with the subject to which Prof. Romanes’s query in *NATURE* of April 2 (p. 516) refers.

In a general way it is my impression that the cackling of jungle fowl is not very commonly heard in India, but I feel certain that I have heard it occasionally, and that I once did hear it upon a somewhat considerable scale is impressed very distinctly upon my memory by certain and special circumstances. My tent for a few days in April 1876 was pitched close to a perfectly impenetrable patch of thorny jungle in Orissa. This cover was full of jungle fowl, and I remember hearing the cackling of the hens, which reminded me of the familiar farm-yard sounds of home. It is possible that in this case the safety of their retreat may have had something to do with their not fearing to cackle with unusual vigour. V. BALL.

Science and Art Museum, April 18.

THE PARADOX OF THE SUN-SPOT CYCLE IN METEOROLOGY.

IN 1872 and 1873, three writers, independently of each other and dealing with different branches of meteorological science, revived an old speculation of Sir William Herschel’s, that the sun’s heat probably varies with the