the former or not appears to depend on whether Linnæus in his diagnosis of *maculata* intended the description of the middle lobe of its trifid labellum to apply to one or both.

On reading the discussion, I was reminded of some observations—of interest perhaps to the disputants—which I made on this orchid in 1922 during a stay near Heathfield in Sussex. The banks of the railway between Mayfield and Heathfield, and of the high road from Brighton through the latter place to Kent, are profusely empurpled in its season with the spotted orchis. Long habit induces me, whenever in the country, to gather specimens of the flowering plants I meet with, for the pastime of discovering any variation from type, especially of orchids, to record the proportion of cross to non-fertilised flowers. I daily brought to my rooms, therefore, handfuls of this orchid.

While on the majority of the plants, gathered from the *same* communities—all to me obviously *maculata*—the lateral segments of the labellum were normal in being larger than the central one, which, though somewhat less in breadth, did not much, if any, exceed them in length, I was nonplussed—as notes and a rough sketch made in my journal at the time indicate—to find in a considerable number that the central lobe of the florets, differing from the figure in Fitch's illustrations (the only botanical work I had with me), was conspicuously longer, very sharp pointed, and, both actually and in comparison with its fellow side-lobes, much narrower than in the others. I believe (without being absolutely certain on the point) that florets with the more normal labellum and those with a long-pointed mid-labellar lobe occurred together on the same spike. As I was then unaware of the controversy I did not make the precise observations I might have done, thinking that the differences were—as I incline still, even if they occur on separate plants only, to believe—merely varietal. *O. Fuchsii* would, in my amateur opinion, appear to be only a variety (if not an oft-recurring sport) of *O. maculata*.

HENRY O. FORBES.

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Regularities in the Spectrum of Ionised Titanium.

THE spectrum of ionised titanium is very interesting, owing to the fact that a large number of chief lines lie between $\lambda=3000$ and $\lambda=4500$, and hence enhanced lines of titanium form a very characteristic feature of the spectrum of the solar chromosphere and the stars. As regards the chromospheric spectrum, lines of Ti^+ at $\lambda=3685$, 3759, 3761 reach a height of 6000 km., and many other lines reach heights exceeding 1500 km., while resonance lines of titanium ($\lambda=5193{\cdot}12$, 5173·92, 5210·59)—following the classification given by Kiess and Kiess—reach heights of 500 km. only. In this respect the behaviour of titanium is parallel to that of calcium, both as regards the ordinary as well as the enhanced lines, though owing to the larger atomic weight, titanium fails to reach the great height of Ca^+, as given by the H and K lines. Also no lines of Ti^+ dominate the spectrum to the same extent as the H and K lines dominate the spectrum of Ca^+.

Recently King has published a very thorough study of the spectrum of titanium in the furnace, and the arc. This has enabled me to study the regularities in the spectrum of Ti^+. The chief lines can be arranged as quartet groups, and the lowest levels are given by three p-terms with the frequency differences 861 and 509. The structure fits in admirably with the rules given by Lande (*Zeitschrift für Physik*, vol. 15); for, according to the displacement rule of Sommerfeld and Kossell, the spectrum of Ti^+ ought to be similar to that of scandium, which has been shown by Catalán to consist of quartets and doublets. The separation of the p-terms, according to Lande, ought to be as 5 : 3, while 860 : 509 = 5 : 2·96. The separations of the d-terms ought to be as 7 : 5 : 3, while we have found them to be 98·40 : 69·46, 45·86 = 7 : 5 : 3·1. The precise value of the ionisation potential of Ti^+ has not yet been obtained, but it seems to be about 13 volts. The ionisation potential of titanium itself has been shown by Kiess to be about 6·8 volts. This is in accordance with the fact that in the spectrum of stars the behaviour of T^+ and Ca^+ are almost parallel—*vide* W. J. S. Lockyer, Mon. Not. Roy. Ast. Soc., vol. 81, who finds that titanium lines are stronger in F5G stars (ϕ-Cassiopeia) than in A2F stars (α-Cygni).

A full account of the work will be published very soon.

NALINI KANTA SUR.

Allahabad,
September 25.

"Evolution at the Crossways."

I MUST protest that from the notice of my book on "Evolution at the Crossways," in NATURE of October 4, no reader can get a correct impression of what my theory really is.

The reviewer makes me speak of "righteous" or "unrighteous" insects, for example. But I have specially guarded myself (p. 11) that the bio-morality which I posit does *not* involve conscious morality or really ethical praise or blame. I speak (only rarely and in a general way) of "biologically" righteous and "biologically" unrighteous conduct, *i.e.* in respect of the interdependence of life, of mutual relations. More commonly, however, I use instead the terms "cross-feeding" and "in-feeding" species. My thesis is that "Nature abhors perpetual in-feeding"—the analogue of Darwin's aphorism regarding "in-breeding." The difficulties the reviewer has with my theory are more apparent than real. Have his sharks or echinoderms anything to boast of? Have the molluscs, numerous though they be? They reached their highest development in the massive and almost mindless cuttle-fish. Most of these are indeed predatory and carnivorous. What has it led them to?

The critic's "agriculture" argument is beside the point, unless he intends to be more anthropomorphic than I am. Surely species may be retrogressive, though still of some use to man.

H. REINHEIMER.

103 King Charles' Road,
Surbiton, Surrey,
October 9.

MR. REINHEIMER may justly claim that only from his words can a reader get a correct impression of the theory. On page 12, we read: "Everything abnormal and pathological is due to biologically unrighteous, *i.e.* fundamentally predatory behaviour. Although predaceous species may apparently, and for a time, live quite well, yet their temporary success is at the expense of permanent survival." On p. 186, "All predaceous animals are on the road to ugliness." On p. 87, "The wages of biological sin are: deformity, inferiority, disease, degeneration, death."

There are no apparent difficulties with Mr. Reinheimer's theory. Sharks and echinoderms may "boast" of having been biological sinners and "in-feeders" since Silurian times without incurring any of the five penalties of p. 87. The brain of the cuttle-fish is not less developed than that of herbivorous molluscs, The inferiority of eagles and whales is not self-evident. nor the deformity of cats and sea-birds, nor the ugliness of mackerel and king-fishers. G. P. B