Letters to the Editor.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, nor to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Ozone Absorption during Long Arctic Night.

IN NATURE of April 27, p. 644, Prof. R. W. Wood again raises the hopes of astronomers that it may be possible to obtain an extension of the ultra-violet spectra of the sun or stars by going to a station near the pole at the end of the winter. He assumes—as most people have done—that the ozone in the atmosphere is formed by ultra-violet radiation from the sun, and since it is the absorption by ozone which causes the abrupt extinction of stellar spectra at about 3000 Å., he naturally concludes that this absorption would be least where the upper atmosphere has had least sunlight.

I fear that it is necessary to dash any such hopes of astronomers, and possibly this note may save someone from the discomforts involved in a fruitless expedition to high latitudes in the winter. We have now, by the kindness of a number of helpers, a series of observations extending over many months at twelve stations, ranging in latitude from 70° N. to 45° S. These observations are quite regular and consistent, and show that the lowest ozone values are found in tropical regions at any time of the year, while the highest ozone values are found in high latitudes in spring. In the tropics there is practically no annual variation, but in high latitudes the annual variation is very large (the maximum amount of ozone is about twice the minimum amount), the maximum being in spring and the minimum being in autumn. The autumn values in high latitudes are nearly as low as those in the tropics, so that while in the spring hemisphere the amount of ozone increases rapidly from the tropics to the pole, in the autumn hemisphere the amount of ozone is nearly constant at all latitudes.

These results are, of course, quite inconsistent with the suggestion that the ozone is formed by ultra-violet radiation from the sun. The shortest wave-lengths from the sun will undoubtedly form ozone, but the longer waves which are strongly absorbed by ozone will decompose it. As there is so much more energy in the band of longer wave-length, it is not surprising that the equilibrium amount of ozone, when the atmosphere is subjected to both wave-lengths, should be very small. What forms the ozone is not, at present, certain, but the connexion found between the amount of ozone and magnetic disturbance might suggest some action associated with the aurora, though occurring lower down (the ozone appears to be at a height of about 40 to 50 km., while the minimum height of the visible aurora is about 90 km.). Whatever the action forming ozone, it is clear that the equilibrium amount due to sunlight is always smaller than the amount actually present, so that the sunlight tends to reduce this amount.

If astronomers wish to get spectra extending as far as possible into the ultra-violet, they should go to the tropics, or should choose days in temperate regions during the autumn with anticyclonic conditions and a tropical air current above, as under these conditions the amount of ozone is as low in temperate regions as in the tropics.

G. M. B. DOBSON.

Boars' Hill, Oxford, April 27.

No. 3106, VOL. 123]

Thyroid and Temperature in Cold-blooded Vertebrates.

THE thyroid is well known to be concerned with temperature regulation in homothermic animals. It seems, however, also to have a somewhat analogous function in cold-blooded forms. In an experiment undertaken to investigate the temperature coefficient of metamorphosis, a number of sets of half-grown *Rana temporaria* tadpoles, after all being exposed to the same concentration of filtered thyroid suspension in water for the same length of time, were placed at various temperatures from 3° to 30° C. The thyroid dosage was moderate, sufficient to produce metamorphosis in about a week at room temperature.

As expected, temperature exerted a marked effect on metamorphic rate. Those exposed to temperatures below 5° C., however, provided a surprise. After showing a certain degree of change, they proceeded no further in metamorphosis. Even when removed to room temperature, they continued indefinitely in this half-and-half condition, as shown in the photograph (Fig. 1), taken several weeks after removal.

That permanent intermediate conditions between larva and adult could be obtained in urodeles was

already known from the work of Jensen and others on axolotls. This is, I believe, the first case in Anura. It confirms the view that metamorphosis is not an all-or-nothing reaction. The relation to temperature, however, is what especially concerns us here. The half-and-half state can only be interpreted as follows: (1) the treatment with thyroid *ab extra* causes a marked compensatory reduction in the animal's own thyroid (a fact well known in amphibian experiments); (2) some of the effect of the thyroid dose, which causes rapid metamorphosis at higher temperatures, is here used up in counteracting the effect of low temperature instead of in producing metamorphosis.

FIG. 1.

Something of the same sort can be deduced from other work, such as that of Adler, who found that in untreated tadpoles high temperature caused regression of the thyroid, low temperature hypertrophy, both in growth and functional activity.

The conclusion appears to be justified that in tadpoles the thyroid is acting as a primitive temperature-regulator, or rather as a *temperature-buffer*. The metabolism of tadpoles is lower in the cold than in the hot; but thanks to the thyroid's hypertrophy in the cold and regression in the hot, and to the fact that thyroid secretion increases metabolism, the difference is not so great as it would be without a thyroid. On this view, the temperature coefficient of oxygen consumption and other metabolic activities should be greater in thyroidless than in normal tadpoles. It would be of great interest for anyone who has command of the technique of thyroidectomy in frog embryos to put this deduction to the test.

JULIAN S. HUXLEY.

King's College, London, W.C.2.

Mimicry.

IN NATURE of April 27 there appears an article on mimicry by Dr. Hale Carpenter, of Uganda, in which he pays me the compliment of quoting extensively from an essay of mine on evolution which appeared in the volume "Evolution in the Light of Modern Knowledge". In Dr. Carpenter's article he asserts