Letters to the Editor.

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The Continuous Spectrum of Mercury.

IN recent papers I have discussed the continuous spectrum of mercury and its association with the resonance line λ 2537. Prof. R. W. Wood showed in 1909 that the green visual fluorescence of mercury vapour with continuous spectrum was destroyed by a red heat. I have recently studied the effect of heat on a stream of mercury vapour, showing the continuous spectrum as it distilled away from the electric discharge in which it originated. The visual glow disappeared, as might be anticipated from Wood's result. I thought it very probable that this was to be explained by the dissociation of mercury molecules which give rise to the (apparently) continuous spectrum. It was of interest to see whether the resonance line due to the atom would survive.

Photographs of the ultra-violet spectrum taken with these ideas in view gave a very surprising result. The resonance line *did* survive, but with it was the strong part of the continuous spectrum in the region λ 3300, little if at all affected by the heat. This surviving part of the continuous spectrum is separated by an intervening minimum from the visual region which *is* extinguished by the heat.

There is much more to do. I limit myself for the moment to announcing the above, which has been thoroughly confirmed.

RAYLEIGH.

Terling Place, Chelmsford,
November 14.

The Golgi Origin of Fatty Yolk in the Light of Parat's Work.

DURING the last few years evidence has been steadily accumulating that the Golgi rings or crescents of certain eggs give rise to fatty yolk. As this conclusion has been challenged by certain authors (for example, Harvey, *Quart. Journ. Micr. Sci.*, 1925), it seems to me desirable to set forth briefly the evidence in favour of the above view in the light of Parat's work, which lends strong support to it.

To the best of my knowledge, Hirschler (*Zeit. f. Wiss. mikr. u. tech.*, 1915) was the first worker to describe, in the eggs of ascidians, a swelling of the Golgi elements and their fusion with the swollen mitochondria to give rise to compound yolk bodies. This conclusion has been recently supported by Parat and Bhattacharya (*Comptes rendus*, 1926), who have studied the eggs of Ciona by means of Vital dyes. The greater bulk of evidence in support of the Golgi origin of fatty yolk, however, has been furnished by Gatenby and his pupils, and more recently by myself. In the egg of Saccocirrus (Gatenby, *Quart. Journ. Micr. Sci.*, 1922) the juxta-nuclear Golgi apparatus spreads out and proliferates with the growth of the egg, and probably gives rise to granules which are fatty in nature. A similar process has been described by me (*Proc. Camb. Phil. Soc.*, Biol. Sci., 1924) in the eggs of Lithobius, in which the granules that arise from the proliferation of the Golgi apparatus grow to a considerable size and form fatty yolk which comes up in the centrifuged eggs exactly like the fatty yolk of Saccocirrus. In Helix (Brambell, *Brit. Jour. Exp. Biol.*, 1924) some of the Golgi elements are directly metamorphosed into fatty yolk which occupies the upper pole in centrifuged eggs. In Patella, Ludford (*Jour. Roy. Micr. Soc.*, 1921) and Gatenby and Woodger (*Jour. Roy. Micr. Soc.*, 1920) give a very circumstantial and convincing account of the origin of fatty yolk from the Golgi elements which has more recently been confirmed by Brambell (*Brit. Jour. Exp. Biol.*, 1924), who shows that the fatty yolk occupies the upper pole in centrifuged eggs as is the case in Saccocirrus, Lithobius, and Helix.

During 1924 and 1925 Parat and his collaborators (*Comptes rendus des Séances de l'Académie des Sciences* and *Comptes rendus des Séances de la Société de Biologie*) have published a large number of small papers giving the results of their study of the Golgi apparatus in the genital and somatic cells of both invertebrates and vertebrates. This is not the place for a full discussion of Parat's view. According to Parat, the Golgi elements exist in the form of vacuoles in all vertebrate and invertebrate cells. This he has proved by the use of the Vital stain, neutral red, the crystals of which precipitate in the vacuoles while the mitochondria remain quite colourless. These latter, however, can be stained by the application of Janus green. Vacuole-like or ring-like Golgi elements are of course very common even in fixed preparations of all the cells of invertebrates and the genital cells of vertebrates. The important contribution, however, that Parat has made is that even the network-like Golgi apparatus of the somatic cells of vertebrates really consists of vacuoles. The reticular appearance of the Golgi apparatus is, according to Parat, an artefact produced by the precipitation of metallic silver or osmium in the interior, or at the periphery, or between these vacuoles.

As the somatic cells arise by differentiation from the germ cells, and as undoubtedly the Golgi elements of a particular cell are roughly distributed to the two daughter cells during mitosis, it has been so far difficult to explain how the Golgi crescents or rings of the germ cells could give rise to a network found in the somatic cells of vertebrates. As to the contents of the vacuoles, Parat insists that they are not lipoidal, because osmic acid is the test for fats and not for lipoids. The content is mostly a liquid and its reaction is acidic; hence the affinity of vacuoles for the basic neutral red. The absence of coagulum leads us to think that we have to deal in the majority of cases with the solution of crystalloids. But it is a fact that certain colloids not miscible with protoplasm can accumulate in the vacuoles, like aleurone grains in the vegetable cells. Final judgment on the chemical nature of the Golgi apparatus, however, can be delivered only when we are able to analyse it chemically, as has been done in the case of nucleo-proteins, but the view that the Golgi apparatus really consists of vacuoles in all animal cells lends strong support to the view of Guilliermond, Mangenot, Bensley, and others, that the plant cell vacuole is the homologue of the animal Golgi apparatus.

The above view of Parat also lends very strong support to the opinion that fatty yolk may arise from the Golgi elements. In spiders (Nath, unpublished), in Scolopendra (Nath and Hussain, unpublished), and in the firefly Luciola (Nath and Metha, unpublished), the juxta-nuclear Golgi apparatus consists, in Mann-Kopsch preparations, of rings which may also be appropriately described as vacuoles with a sharp chromophilic rim and a central chromophobic area. With the growth of the eggs, the Golgi rings proliferate and swell up and give rise to fatty yolk spheres by the