Letters to the Editor.

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The Nature and Function of Golgi Bodies.

IN view of Prof. Charles Walker's letter in NATURE of Jan. 21 on the nature and function of Golgi bodies, perhaps I may be allowed to summarise, briefly, the reasons why most cytologists have come to regard the Golgi apparatus as a definite cytoplasmic structure:

(1) The Golgi apparatus can be seen in certain living cells, for example, spermatocytes of Helix (Platner, Murray).

(2) A positive picture of the apparatus can be obtained by the silver and osmic methods (Cajal and Kopsch, and their numerous modifications); also a negative picture results when good cytoplasmic fixatives are employed. Anyone can prove this by trying the osmic and silver methods with cells of the epididymis, or pancreas of the mouse, and comparing the results with material fixed in osmic acid, and counterstained with a plasma stain. In suitable osmic preparations the mitochondria can also be counterstained, and then appear the same as in the living cell, so the argument that cell structure has been distorted by the technique is untenable. It has been shown by Karpova that the Golgi bodies in the spermatocyte of Helix can be stained with Sudan III. after the bichromate treatment of Ciaccio, and Weiner has been able to demonstrate the apparatus by the same method in epithelial cells of the intestine.

(3) The Golgi apparatus has a characteristic form in different types of cells; for example, in most neurones it is a network, while in fibroblasts it forms a compact cluster around the sphere.

(4) It has been shown by a large number of workers (see the reviews of Bowen, *Anat. Rec.*, vol. 32, 1926, and Jacobs, *Ergeb. d. Biol.*, vol. 2, 1927) that there is a definite correlation between the form of the Golgi apparatus and the functional activity of the cell. Thus the form of the apparatus varies during secretory activity in gland cells. In neurones it is altered as the result of injury (Cajal, Penfield); while phosphorus poisoning induces well-marked changes in cells of the pancreas (Cowdry). During gametogenesis, also, it undergoes characteristic changes (Gatenby, Bowen, Brambell).

(5) The secretion granules of gland cells arise in relationship with the Golgi apparatus. Nassonov and Makarov have shown that acid dyes such as trypan blue when injected subcutaneously collect in liver and kidney cells in that part of the cytoplasm where the Golgi apparatus is situated. The droplets of dye accumulate, therefore, in the region of the Golgi apparatus, so the apparatus cannot be a mere condensation of lipoids around droplets as Walker has suggested.

Prof. Walker's argument is based upon a fallacy, that things which look alike are necessarily the same. Every elementary student of physiology knows that models can be set up to imitate amœboid movement, cell division, and growth (artificial osmotic membrane experiments), while cell-like structures with nuclei can be imitated with gelatine solutions. Does this disprove the reality of these vital phenomena? Since Prof. Walker has produced artificial structures, which he says look like Golgi bodies, this no more disproves the existence of the Golgi apparatus in living cells than the production of artificial cells with nuclei disproves the reality of cell structure. Prof. Walker's work seems rather to confirm the view held by most cytologists that the Golgi apparatus is of a lipoidal nature.

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The Spectrum of the Corona.

A CORRESPONDENCE, which may be important, has been found between the 'unknown' spectral lines of the solar corona and the spectrum of argon. It has been found possible to connect about two-thirds of the coronal lines given by Campbell and Moore with the argon lines and terms in Meissner's recent investigation.

There are 18 lines directly identified. The lines in the argon spectrum immediately before and after the selected one are, in each case, well removed from the selected line, compared to the discrepancy between the coronal and the argon wave-numbers. In any case this latter discrepancy is within the accuracy to which the coronal lines are known.

Space does not permit of giving the complete tables, but a few typical examples will be quoted:

The average disagreement is 2 wave numbers; the maximum is 5 (allowed only in the cases where the determination of the wave-length is correspondingly uncertain) and there are half-a-dozen lines where the agreement is accurate within one wave-number. On the other hand, the average distance to the nearest line in the argon spectrum is 30 wave-numbers. For example, the coronal line of wave-number 27443 has, corresponding to it, an argon line, 27441. The argon lines closest by, and to either side, are 27391 and 27507. The selected argon line has the designation $1s_4 - 4p_8$. Consider the two coronal lines of wave-numbers 19533 and 17860. It was recognised that the difference in the wave-numbers was the same as the interval between the $2p_8$ and the $2p_3$ terms in argon, and the argon wave-numbers given by $2p_8 - 6s_1'''$, and by $2p_3 - 6s_1'''$ are these two coronal wave-numbers to within 1 wave-number.

The lines directly identified include most of the strong lines of the corona. Ten other coronal lines are found to be expressible as combinations of Meissner's term values. Thus a line of wave-number 24468 may be compared with the wave-number 24470 given by the combination $1S_3 - 4d'_4$. A coronal line at wave-number 18852 is given by $2p_4 - 9s_4 = 18852{\cdot}58$ and by $2p_5 - 7s_1'' = 18852{\cdot}17$. This line, $\lambda 5302{\cdot}9$, is the brightest line in the coronal spectrum; and the fact that its wave-number is given quite accurately by two different combinations of terms (that is, by two different possible changes in the state of the radiating centre), may be connected with this fact.

Because of the presence of Ca II in extremely high levels of the chromosphere, it was thought that the coronal lines might be attributed to this substance or to Ca III as suggested by Pannekoek. However, a comparison with J. A. Anderson's tables of the calcium spectra gave no very suggestive agreement.

The implication that argon exists in the sun is not borne out by other solar observations; but it is to be remembered that a given substance may be abundantly present in the sun, and yet because the external conditions do not bear a certain definite relation to its ionisation potential—as required by the Saha theory—the spectrum may not appear at all. It is not beyond possibility that conditions of temperature