

The Golgi body in the Erythrocytes of the Sauropsida.

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With Plate 22.

In recent years the Golgi bodies have been described in so many categories of cells of vertebrates and invertebrates that it has been suggested (3) that it is always present in the animal cell. Cowdry (1), sceptical about this generalization, cites as an exception the non-nucleated red blood-cells. On account of this controversy we examined the erythrocytes of tortoises and birds by the latest methods. This study led one of the authors (D. R. B.) to the discovery of what we believe to be true Golgi bodies in the red blood-cells of the tortoise. More recently the other author (F. W. R. B.) found similar bodies in avian erythrocytes. We have also observed a similar Golgi apparatus in the red blood-cells of the lizard, *Uromastix hardwicki*. We have not at present extended our study to other classes of vertebrates, but in view of the phylogenetic relationships existing between the Sauropsida and the other classes it seems probable that Golgi bodies will be found to occur not only in the nucleated red blood-corpuscles of the fishes and amphibians, but also in the non-nucleated red blood-corpuscles of the mammals, at least in some stages of their development. In the young, nucleated red blood-cells of mammals, the mitochondria are abundant, but these, along

with the nucleus, disappear *pari passu* with the later differentiation of the cell (2). It must be remembered, however, that the fully differentiated mammalian red blood-corpuscle is not, strictly speaking, a cell according to the old definition of Leydig (4) and Schultze (5). It is therefore possible that the Golgi elements, if present in the younger stages of the mammalian red blood-cells, may undergo a similar change.

Da Fano's cobalt-silver-nitrate method¹ followed by gold chloride toning and suitable staining gave us the results desired. The material worked on was the ovary of *Trionyx hurum*, *Testudo graeca*, *Uromastix hardwicki*, and *Gallus bankiva*. The Golgi bodies in the erythrocytes of these forms consist of one to several small bodies which are densely impregnated with the silver. Their position in the cytoplasm varies in different cells; they are more frequently to be seen close around or even plastered on to the nucleus (Pl. 22, figs. 2, 3, 4, and 8), but in some cases one or more of the bodies may be situated between the nucleus and the periphery of the cell (Pl. 22, figs. 3, 5, 6, 7, and 8), yet in other cases one has been observed to occupy a peripheral position (fig. 9). The accompanying figures were drawn to scale with the help of a camera lucida, and show the relative size and position of the nucleus (*N.*) and Golgi bodies (*G.A.*). Figs. 1-5 represent erythrocytes of the bird (*Gallus bankiva*), and figs. 6-9 those of the tortoise (*Testudo graeca*). The ground cytoplasm of the cells appeared smooth and homogeneous, and a faintly staining reticulum could be discerned in the nucleus.

In conclusion, we wish to express our thanks to Professor J. Brontë Gatenby for suggesting this work and for his valuable criticisms.

¹ More recently, D. R. Bhattacharya has succeeded in showing the same bodies by osmic methods in a variety of reptiles.

REFERENCES.

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3. Gatenby, J. Bronté.—"The cytoplasmic inclusions of the germ-cells", 'Quart. Journ. Micr. Sci.', 1919.
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5. Schultze, M.—'Arch. Anat. u. Phys.', p. 11, 1861.

DESCRIPTION OF PLATE 22.

Figs. 1-9 were drawn with the help of camera lucida, $\times 2,700$.

Fig. 1.—Side view of red blood-cell of *Gallus bankiva*, showing the Golgi apparatus (*G.A.*) situated close to the nucleus (*N.*).

Fig. 2.—Same as fig. 1, surface view.

Fig. 3.—Same as fig. 2, showing Golgi bodies (*G.A.*) around the nucleus (*N.*), and one at the periphery.

Fig. 4.—Same as fig. 1, showing several Golgi elements around the nucleus.

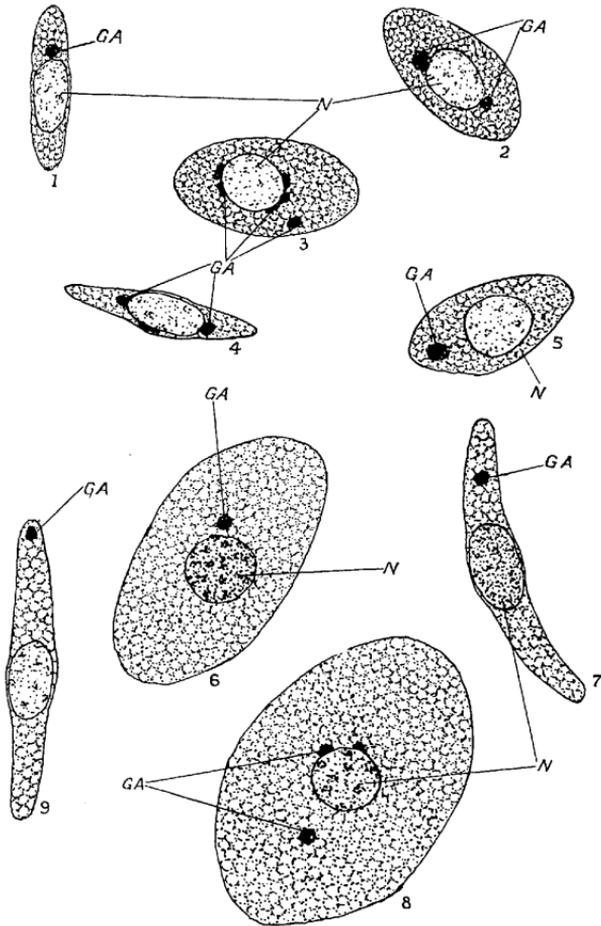
Fig. 5.—Surface view, same as figs. 1-4, showing Golgi body in peripheral cytoplasm.

Fig. 6.—Surface view of red blood-cell of *Testudo graeca*, showing Golgi body (*G.A.*) near the nucleus.

Fig. 7.—Side view, same as fig. 6.

Fig. 8.—Same as fig. 6, showing Golgi bodies (*G.A.*), around the nucleus and in cytoplasm.

Fig. 9.—Same as fig. 7, showing Golgi body (*G.A.*) close to the periphery of the cell.



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