

cells, but that it gives entirely artificial appearances in the cytoplasm of the cells.

The true structure of the cytoplasm of nerve cells has been the object of much investigation by Flemming, v. Lenhossek, Dogiel, Held, Lugaro, Cajal, Marinesco, van Gehuchten, Cox, and many others, in fact, nearly all the works mentioned contain references to it, and there are good reviews of the literature in van Gehuchten, and in Goldscheider⁸⁶ and Flatau. The question is whether there are independent fibrillæ, or fibrillæ forming a reticulum in the cell, or whether the cytoplasm has a foam-like structure.

In this paper I do not intend to discuss the structure of the cytoplasm but shall point out, that since the substance of the Nissl granules does not diffuse into the cell body before the structure of the cytoplasm is determined, (in other words, these are superadded to the cytoplasm), they cannot be a part of the fibrillæ or reticulum. Thus the Nissl granules are not thickenings of the protoplasmic fibrillæ, or are not the nodal points of the cytoplasmic reticulum, but are independent of the cytoplasmic structure; and although the fibrillæ, if they exist, might even run through the granules, they would never lose their independence. Several of the above-mentioned authors have reached the same conclusion, but could give no definite proof of its truth.

No definite conclusion has been reached as to whether the nucleus keeps sending new material from the nucleolus to the cytoplasm, during the life of the cell. If it does give out new material to the cytoplasm it certainly does not do so in the manner described by Rohde. The latter has described the migration of the accessory nucleoli into the cell body to become the Nissl granules, and the migration of the ordinary nucleoli to become the nuclei of neuroglia cells. He used iodine green and fuchsin as stains, and found the accessory nucleoli (which are only masses of oxyphile substance) resembled in their staining power the Nissl granules. Iodine green and fuchsin form a difficult combination to differentiate exactly, and the two appearances described by Rohde⁸⁷ can be obtained by a little longer or shorter differentiation; in any case, the resemblance of the staining properties of the oxyphile nuclear substance to the Nissl granules is much better seen by using Flemming's orange method (*vide ante*). Rohde says that by staining with iron-alum hæmatoxylin and long differentiation, the accessory nucleoli retain the stain longer than any other part, and thus the process of migration of

⁸⁶ Goldscheider und Flatau, "Anatomie der Nervenzellen," Berlin, 1898.

⁸⁷ L. c., p. 705.