unter normalen als auch anormalen Umständen in schwankender Anzahl vorhanden sind.

Bei Myopathien können Ringbinden auftreten[6], doch sind sie für diese Erkrankungen nicht charakteristisch[7]. Von ATHANASIOU und DZIALLAS[8] wurden diese Gebilde im Reizleitungssystem des Herzens beschrieben. In letzthin ausgeführten eigenen Untersuchungen konnten Ringbinden bei Knochenfischen, Lurchen, Kriechtieren und Säugern gefunden werden. Bei sehr jungen Organismen und Kindern sind diese Strukturen kaum festzustellen. Ringbinden können in der somatischen wie auch in der quergestreiften viszeralen Muskulatur auftreten. Das Prinzip dieser Struktur ist bei allen Organismen dasselbe[9].

Im Licht der bisherigen Ergebnisse erscheinen die Ringbinden als eine allgemeine, im tierischen und menschlichen Muskel auftretende Reaktionsweise. Die eventuelle Feststellung einer solchen stereotypischen Antwortsweise im Bereich der quergestreiften Muskulatur dürfte für die vergleichende Morphologie, für entwicklungsgeschichtliche Überlegungen und vor allem für die «symptomarme» Stresstheorie von Bedeutung sein. Mit Hilfe dieser Theorie könnte man das schwankende Auftreten und Verschwinden der Ringbinden in normalen und pathologischen Zuständen wie auch das Entstehen dieser Gebilde unter dem Einfluss verschiedener Stressoren besser verstehen.

Summary. On the basis of the research of other workers, and of the author's own results, an attempt is made to conceive the «Ringbinden» as a commonly occurring, non-specific form of reaction of striated muscle tissue.

A. JONECKO

Institut für Histologie und Embryologie, Schlesische Medizinische Akademie, Zabrze-Rokitnica (Polen), 1. November 1961.

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Histochemistry of the So-Called 'Golgi Complex' in the Mammalian Spermatid

By employing light, phase-contrast and electron microscopy, the 'Golgi complex' in the mammalian spermatid has been the subject of extensive research for many years. The earlier workers[1], especially the light microscopists, held different opinions with regard to its morphology. To the best of my information, no attempt has been made to study its histochemical nature. It was therefore decided to treat the spermatids with various histochemical techniques, summarized by the present author[2] elsewhere, in the hope that the histochemical nature of their 'Golgi complex' would come out clearly. This study was undertaken on the male germ-cells of the goat and the buffalo. Their testicular material was easily available in abundance from the slaughter houses. The material was also treated with the silver nitrate technique of Aoyama in order to study the action of silver on the 'Golgi complex'. The various techniques employed reveal a conspicuous spherical or reniform area, identical with the 'Golgi complex or zone or apparatus' of earlier workers[3–7], in the early spermatids and also in the spermatocytes (Figure 1–7). A close examination of this area reveals that it consists of three elements: (1) idiosome or archoplasm, (2) rods and granules, and (3) vacuoles of various sizes. In order to avoid the details of their histochemical reactions, only their positive reactions will be described here.

(1) *Idiosome or archoplasm.* The idiosome or archoplasm, which is in the form of a concentrated spherical mass, stands out in sharp contrast to the general cytoplasm. It is usually situated near the nucleus of the early spermatids. In the case of buffalo, it is of comparatively larger size. It colours feebly with Sudan black B, used according to BAKER[8], indicating some lipids in it. Its lipid component continues to colour with this dye after acetone and ethanol extractions, showing its insolubility in these fat solvents. However, after pyridine extractions, it disappears as judged from the negative reaction of the idiosome with Sudan black B. These solubility tests indicate that its lipid component is of lipoprotein nature. The main substance of the idiosome resists the action of various fat

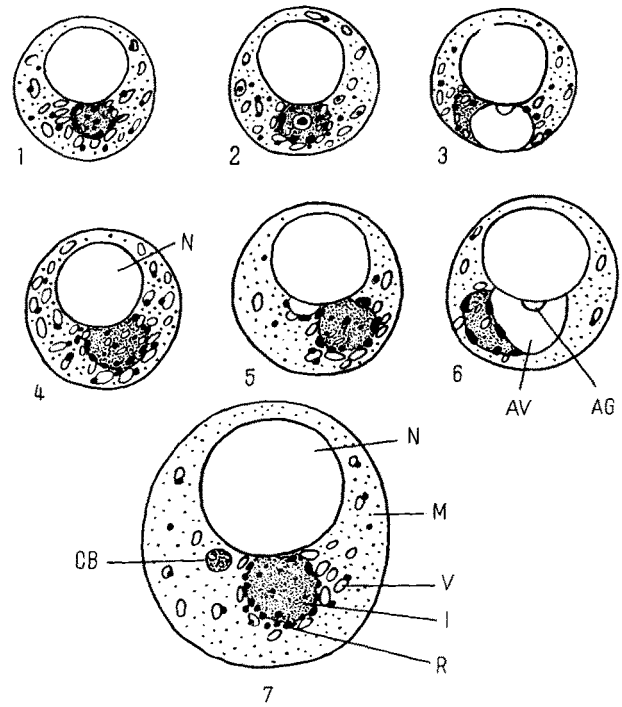

Fig. 1–3. Early spermatids of the goat. – Fig. 4–6. Early spermatids of the buffalo. – Fig. 7. Primary spermatocyte of the buffalo. AG = acrosomal granule; AV = acrosomal vacuole; CB = chromatoid body; I = idiosome; M = mitochondria; N = nucleus; R = rod; V = vacuole.

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solvents used. It reacts positively to acid fuchsin and mercuric bromophenol blue (Hg · BPB) but negatively to periodic acid-Schiff (PAS). From these reactions it can be said that the main substance of the idiosome is made up of proteins, with some amount of lipoprotein component. It is argentophobe, but in over-impregnated spermatids it is blackened with silver.

(2) *Rods and granules.* The rods and granules are distributed inside and around the idiosome (Figure 1–7); most of them usually lie at the periphery of the latter. They are also present in the general cytoplasm. They have been studied in the living spermatids and spermatocytes examined with a wracked down sub-stage condenser. They colour intensely with Sudan black B, indicating lipids in them. Their lipid contents are of a phospholipid nature, as interpreted from their positive reaction with acid haematein followed by a negative reaction in the pyridine extracted material. They continue to colour with Sudan black after acetone extractions, but after ethanol extractions their lipids are dissolved away as shown by the negative reaction with Sudan black. These solubility tests further reveal the phospholipid nature of their lipids. They seem to contain some proteins as, after pyridine extractions, some corroded material, which is sudanophobe, Hg·BPB-positive and PAS-negative, is left behind. They are easily blackened with silver, showing their argentophil nature. Thus they have been identified as 'Golgi bodies or granules' by SHARMA et al.[9], and DHILLON[10] in the guinea-pig and rat respectively; 'Golgi plates and rods' by GATENBY and WOODGER[11] in Cavia; 'Golgi rods and granules' and 'Golgi substance or material' by GRESSON[1] in the mammals; 'rods' by AUSTIN and SAPSFORD[3] in the rat; and 'rods and curved plates (dictyosomes)' by LACY and CHALLICE[4] in the mouse. The paired 'Golgi membranes' bounding flat vesicles, as studied under the electron microscope[4–7], evidently correspond to the argentophil rods and granules associated with the idiosome. The rods and granules are also seen in the general cytoplasm. They have been identified as the 'extra idiosomic Golgi granules' by SHARMA et al.[9] and DHILLON[10].

Vacuoles. The argentophobe and sudanophobe vacuoles of various sizes lie inside and around the idiosome (Figure 1–7); most of them are situated at the periphery of the latter. They are also present in the general cytoplasm of the early spermatids. The histochemical nature of their contents could not be determined with the techniques employed. The earlier workers, using light and phase-constrast microscopy, have overlooked them. However, LACY and CHALLICE[4] have described them as forming a sudanophobe part of their 'Golgi apparatus'. They can easily be studied in the gelatine sections coloured with Sudan black B (Figure 1–7). By using electron microscope, the earlier workers have identified them as vacuoles or vesicles. CLERMONT[5] has described them as spherical vesicles of various sizes. He has suggested their origin from the flat vesicles (vesicles bounded by the Golgi membranes). According to him, the vacuoles of the general cytoplasm have moved out from the 'Golgi zone'. When a careful examination of the electron micrographs of the 'Golgi complex', described by earlier workers[4–7], is made, then there appears a dark-shaded, fundamental substance or material which encloses or bounds the spherical vacuoles or vesicles. This substance seems to represent the idiosomic material.

Résumé. L'examen histochimique des spermatides du bouc et du buffle montre que le «complexe de Golgi» des auteurs comprend l'idiosome constitué par des protéides et des lipidoprotéides, les bâtonnets et granules constitués par des phospholipides et peut-être des protéides et enfin les vacuoles.

S. S. GURAYA

Department of Zoology, University of Gorakhpur (India), October 24, 1961.

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Prolamellar Body of the Proplastids in Barley Root Cells

Since the work of STRUGGER[1,2] confirming Schimper-Meyer's theory of the individuality and continuity of plastids, it has generally been recognized that chloroplasts as well as leucoplasts are not formed *de novo*, but originate from a common precursor, proplastid. In the case of chloroplasts, the occurrence, in this proplastid stage, of a structure designated as *'prolamellar body* (= Primärgranum)' has been widely observed, preceding the development of their characteristic lamellar structure[3–5]. Similar findings have been reported concerning leucoplasts in various plant cells, such as the root cells of *Vicia faba*[6], in the root hairs of *Trianea bogotensis*[7] and in the epidermal cells of *Allium cepa*[8] and *Chlorophytum comosum*[9]. The leucoplasts in these cells have also been shown to develop from proplastids of meristematic cell, which are also reported to possess a prolamellar body.

However, no detailed description of the fine structure of the prolamellar body in leucoplasts has yet been published. STRUGGER[10] recognized an electron dense structure in the leucoplasts of meristematic cells of *Allium* root, and considered this to represent a prolamellar body. Close inspection of his electron micrographs, however, fails to reveal the vesicular structure which is characteristic of the prolamellar body. HEITZ[11], studying the leucoplasts of *Vicia*, found prolamellar vesicles arranged in a curved line, which, however, bore no resemblance to known figures of typical prolamellar bodies. Recently, SITTE[12], WHALEY et al.[13] and CAPORALI[14], investigating the fine

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