CYTOLOGY

Development of the Yolk Nucleus in the Oocytes of Some Fishes

IN the young oocytes of the cyprinids *Barbus everetti* Boulenger and *Barbus fasciatus* Bleeker the ameiurid *Ameiurus nebulosus* Lesueur and the silurid *Synodontis nigriventris* David the development of the so-called yolk nucleus has been examined.

This body originates in the above-mentioned species from the nucleus by means of an extrusion, corresponding to the nucleolar extrusion, which is a well-known phenomenon in the oocytes of fishes[1-5] and amphibians[6].

In the nucleus of the young oocyte (fixed in picroformol-acetic, paraffin sections cut at 4–6 μ thickness and stained iron hæmatoxylin Heidenhain and hæmatoxylin Delafield) an intranuclear body, which is larger than a nucleolus and shows a fair staining intensity, migrates to the periphery, pierces the nuclear membrane, passes through the cytoplasm as the yolk nucleus becomes vacuolated, spongy and loses part of its staining intensity, ultimately to reduce in the cortical layer of the cytoplasm, close to the cell membrane to a granular cytoplasmic inclusion, which is predestined increasingly to lose its staining intensity and ultimately to merge completely with the cytoplasm.

In this intranuclear inclusion two types could be distinguished, namely, the granulated intranuclear body the vacuole of which contains a central granule, and the non-granulated intranuclear body, the vacuole of which lacks this central granule. The development of both types shows some differences. In general, the non-granulated intranuclear body is after extrusion sooner vacuolated than the granulated intranuclear body, whereas also the occurrence of the spongy structure and the decrease in staining intensity occurs sooner.

The first type was observed in *Barbus everetti* and *Barbus fasciatus*, the second in *Ameirus nebulosus* and *Synodontis nigriventris*. As these types correspond very well with those described by Sathyanesan[7] in the cyprinid *Barbus stigma* (Cuv. et Val.) and the silurid *Mystus seenghala* (Sykers), the intranuclear body and the yolk nucleus formed from it possibly have a certain typological significance and this inclusion shows some peculiarities concerning its structure and development in the various fish families.

In the descriptions of some authors[1,2,4] one lacks the migration of this structure towards the periphery of the oocyte, the occurrence of vacuoles and the final complete disappearance.

The nuclear origin of the yolk nucleus had already been suggested by Wheeler[5] and other authors[1].

The functional significance of the extrusion of the intranuclear material according to the general opinion will probably consist just as was observed for the nucleolar extrusion, in a certain metabolism between nucleoplasm and cytoplasm.

How this metabolism is to be imagined, is not such a simple matter, however. In fact, the presence of the ribonucleic acid in the cytoplasm could for example be due in part to a nuclear extrusion, but this would in any event be an exceptional type of mechanism, for Caspersson and Schultz[8] demonstrated that the synthesis of the ribonucleic acid could certainly be carried out direct in the cytoplasm, which is localized next to the nuclear membrane. The possibility exists that this nucleic acid would serve as a quantity of reserve substances, which can be used for the formation of the chromosomes in the segmentation of the mature oocyte.

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MINERALOGY

Salt Desorption from Halloysite

ABNORMALLY high cation exchange capacities (40–70 m.equiv./100 gm.) have been reported for halloysite[1]. Since isomorphous substitution is of inconsiderable magnitude in halloysite, White[2] has suggested that allophane, which sometimes is associated with halloysite, may account for these large values. The recent work of Wada[3], however, shows that salts of potassium and ammonium can replace H_2O from between the layers of hydrated halloysite and form heat-stable complexes with the clay. The amount of salt so held is large (200–300 m.equiv./100 gm.).

I felt that there might be a connexion between this large 'salt-holding capacity' and the high cation exchange capacities variously reported for halloysite. Accordingly, hydrated halloysites from Floyd and from Piney River, Virginia, were saturated with potassium chloride, then washed with 25-ml. portions of either water, 100 per cent methyl alcohol or 95 per cent ethyl alcohol. In addition, similar samples were dehydrated prior to saturation with potassium chloride and washed in the same manner.

Ethyl alcohol was particularly ineffective in removing interlayer salts from the hydrated halloysites. After washing the Floyd sample with 100 ml., 109 m.equiv. of salt/100 gm. remained ; after 200 ml. this had been reduced by only 3 m.equiv. The Piney River halloysite behaved similarly, with values of 81 and 79 m.equiv./100 gm. after 100 and 200 ml. of washing, respectively. Clays washed with methyl alcohol retained about 50 m.equiv. of salt per 100 gm. after washing with 100 ml., but were fairly well cleaned by washing with 250 ml. Water quite effectively removed the bulk of the salt after three washings (75 ml.). Dried halloysite was found to release salt readily when washed either with alcohol or water, implying that the interlayer salt complex discovered by Wada[3] is the site of the salt which is difficult to remove.

It is concluded that the use of ethyl or methyl alcohols as washing reagents, where hydrated halloysite is encountered, is liable to result in incomplete removal of salts. This conceivably could lead to the anomalous cation exchange capacities reported for halloysite in the literature.

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