

could be made by it. The staining reactions prove this. It is more probable, on the other hand, that the nucleotides in a ribose state exist within the nucleus itself and in the second phase of the nuclear history of the spermatid, are converted into those of the desoxyribose type.

Throughout spermateleosis there is a continuous process of concentration and reduction of the volume of the nucleus but while in the first phase, there is only reduction in volume, in the second, there is in addition, a synthesis of desoxyribose nucleic acid.

Much of the above account of spermateleosis refers to the Apoda (Amphibia) which illustrate the phenomenon admirably, but it is probable that other animals display much the same process.

It is, therefore, clear that nucleination, far from being associated *always* with division, occurs at least in one other condition, i.e., in spermateleosis, but in a fundamentally different relationship and unassociated with the formation of definitive visible chromosomes. Chemically and even quantitatively, the protein and nucleic acid of the metaphase chromosome may resemble those of the ripe sperm-head, but in one case, the protein is a fibrous framework with which at certain localised areas, the nucleic acid becomes associated, while in the other case, no chromosomes are seen. In one case, the synthesis of nucleic acid is associated with division and in the other, it is unattended by division.

The subsequent history of the sperm nucleus is also interesting. After entry into the ovum, it exhibits reactions which fall under two different categories. In the sea-urchin, it becomes converted back again into a resting nucleus and from all existing accounts of the details of fertilization (Wilson<sup>8</sup>) it is in this condition that it fuses with the nucleus of the ovum. On the other hand, in *Ascaris*, soon after the entry of the sperm the nucleus almost immediately becomes organized into the definitive haploid number of chromosomes characteristic of the species, and in this condition, with the chromosomes distinct within the nuclear membrane, it approaches the female pronucleus. A spindle is soon formed—the spindle of the first cleavage division,—and on it by the dissolution of the nuclear membranes of the sperm and the ovum, the chromosomes are placed; so that in *Ascaris* no mingling or flowing together of the nuclear material is involved.

The difference between the sea-urchin and *Ascaris* would appear to lie in the interpolation in the former of a resting stage before the actual fusion of the sperm nucleus with that of the ovum.

The significance of this from our point of view is important. In the sea-urchin processes which are the reverse of what take place

during spermateleosis must occur during the early stages of fertilization. Nucleination which occurred during spermateleosis is followed by denucleination during the early stages of fertilization, where the sperm nucleus gets back into the resting condition. Obviously this supports the view expressed earlier that spermateleosis is a remarkably unique phenomenon without parallel in any other aspect of cell life, where nucleination occurs with reference to the resting condition, and unassociated with division of the nucleus.

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## THE INDIAN INSTITUTE OF ART IN INDUSTRY

THE Indian Institute of Art in Industry, which has, during the last five years, pioneered the art-in-industry movement, has been registered and invested with an All-India status. The Institute will have a secretariat in Bombay and representatives in other important centres. It aims at becoming "the central guiding force in the country's art applied to industry".

The Institute will develop the art in industry exhibitions and will also build up an annual industrial fair of goods of attractive appearance, and this will greatly stimulate trade in the immediate post-war period. The Institute will engage experts in commercial art and industrial design, and will assist in the training of teachers for government technical institutions. It is intended that as soon as possible a monthly magazine will be published, followed in due course by other types of bulletins. A register of commercial artists and designers will be compiled. The Institute will strive to become as rapidly as possible a valuable complement to industry in matters pertaining to design, packaging, and the various aspects of commercial art. It is understood that a substantial grant from the Central Government is now under consideration and it is hoped that Provincial Governments and Indian States will give generous support to the Institute. It is expected that a revenue of 5 lakhs of rupees will be forthcoming to enable the Institute to carry out its programme, and of this sum, it is estimated that two lakhs will be contributed by industrialists.