Epithelial cells of the paraphysis

1. Mostly cubic or low cylindrical.
2. Nuclei mostly ovoid to oval with long axis perpendicular to the free surface of the cell.
3. Relatively much nuclear substance in cell.
4. Continuous thin cuticula lining the free border. Broken up during secreting phase.
5. No cilia.
6. Basement membrane in immediate contact with the endothelium of venous sinusoïds.
7. No attachment of particulated matter injected.
8. Cells have secretory function.

The secretion activity of the cells could also be detected although in a much less conspicuous way. Here the secretion happens merely merocrine and eccrine.

It stands to reason that these experiments do not give us a conclusive idea as to the quality of the substance evidently secreted by the paraphysis. It may be possible that in the experiment described some cerebrospinal fluid is lost and that the paraphysis tends to secrete more liquor than it does normally making up for the loss or for the eventual disturbed chemical balance caused by the suspension injected. It may also be that the paraphysis secretes only more special chemical substances. But, as it is, this investigation points strongly in the direction that in Urodelia the paraphysis is more concerned in the production of the spinocerebral fluid or of its constituents whereas the plexuses may have primarily if not exclusively an absorbing function. Summarizing, some differences between the epithelium of the paraphysis cerebri in Urodelia and that of the choroid plexuses are computed see above.

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Zusammenfassung


1. Mostly flat or low cubic.
2. Nuclei mostly oval with their long axis parallel to the free surface of the cell.
3. Relatively more cytoplasm in cell.
4. Relatively high striated cuticular membrane, never broken up.
5. Cilia in bundles from the parts of some cells.
6. Basement membrane especially in younger stages much more in contact with endothelium of choroidal vessels but more with underlying mesenchyme.
7. Strong attachment of particulated matter especially at the cilia.
8. Cells have certainly resorbing function. Secretory function could not be demonstrated in the experiment described.

The Effect of Nitrogen-Mustard on Sea-Urchin Eggs

It is well known that nitrogen-mustard compounds cause a delay or inhibition of mitotic divisions in yeast¹, *Tradescantia*², and *Triton embryos*³; an effect on cleavage of sea-urchin eggs has also been reported⁴. The present work was carried on the fertilized and unfertilized eggs of two species of sea-urchin (*Arbacia lixula* and *Sphaerechinus granularis*) at the Zoological Station Naples, in August and September, 1948, while the senior author was on a UNESCO fellowship.

Eggs were treated with hydrochloride salt of methyl (dichloroethyl)amine. No cleavage occurred in the first hour after insemination, and from then observations were made at intervals of 10 minutes to 1 hour up to 8 to 10 hours.

The results are expressed graphically as number of divisions plotted against time after insemination. Divisions 1, 2, 3, 4, 5, and 6 represent the number of blastomeres 2, 4, 8, 16, 32, and 64 respectively. Each point in the graphs represents the average number of blastomere per sample at a given time.

Eggs treated with 0-001 %—0-003 % of the substance for 10 minutes developed normally up to the 4th day, forming normal plutei. There was only slight decrease in rate of cleavage as compared with the controls (Fig. 1). Longer treatment at these concentrations resulted in abnormal gastrulae or failure of gastrulation. A concentration of 0-01 % for 10-minutes treatment delayed cleavage more considerably, but the eggs reached the 6th division forming normal swimming blastulae. They however, only reached the beginning of invagination and cytolysed in a further 20 hours. Longer

¹ V. E. KINSEY and W. M. GRANT, J. cell. and comp. Physiol. 29, 51 (1947).
treatment prevented the formation of normal blastulae. Concentrations above 0.01% delayed cleavage to a considerable extent and the eggs never reached 64 cells. Some eggs showed irregular cleavage planes even at the first division. The degree of such irregularity and the maximum number of blastomeres they could form depended on the concentration of the substance and the length of the treatment. Using 0.05% for 10 minutes, about half of the eggs ceased to develop further than the 4th division. With 0.1%, they could hardly complete the 4th division. At 0.5%, most of the eggs stopped developing after first irregular cleavage, and at 1.0% only a small minority of eggs began to divide. In the last two cases, the eggs soon became coagulated and cytolyzed in about 24 hours.

Fig. 1. Retardation of cleavage by different concentrations of nitrogen-mustard at room temperature.

Other series of experiments were run, employing concentrations from 0.01 to 0.1%, but varying lengths of treatment. The longer time of treatment, the stronger is the effect and the earlier the eggs become incapable of further development. A typical case is represented in Fig. 2, which gives the result of a series of experiments with an 0.1% solution. The eggs were treated after insemination at intervals from 2 to 80 minutes. The graphs show the results.

The effect of nitrogen mustard on the different stages of development was then studied. Two types of experiments were made. First, three sets of eggs, namely, unfertilized, two minutes after insemination, and 20 minutes after insemination were submitted to varying concentrations for fixed times. Secondly, using only fertilized eggs and one-minute treatment with 0.1% solution, the effects at varying times after insemination were studied up to 90 minutes.

Fig. 2. Retardation of cleavage by concentration of 0.1% after different length of time of treatment following insemination at room temperature.

Maximum number of blastomeres they could form depended on the concentration of the substance and the length of the treatment. Using 0.05% for 10 minutes, about half of the eggs ceased to develop further than the 4th division. With 0.1%, they could hardly complete the 4th division. At 0.5%, most of the eggs stopped developing after first irregular cleavage, and at 1.0% only a small minority of eggs began to divide. In the last two cases, the eggs soon became coagulated and cytolyzed in about 24 hours.

Fig. 3. Differential susceptibility to varying concentrations of nitrogen-mustard at different stages of development at 18°C.

Fig. 3 describes the results of two experiments of the first type, using three different concentrations. The retardation effect is most pronounced in the unfertilized eggs, suggesting a higher susceptibility in this stage. Eggs treated 2 minutes after insemination appear to be relatively more sensitive as compared to those treated 20 minutes after insemination, though the difference is not significant especially with respect to the late cleavage divisions. Observations on the development subsequent to the morula stage are also in agreement with the above. At concentration 0.01% while the fertilized eggs formed free-swimming blastulae similar to the controls, although with a delay of about 40 minutes, the unfertilized eggs succeeded to hatch in due course of time, but remained as massive ball of cells which soon cytolyzed. The fertilized eggs did, however, differ from the control in that if treated 2 minutes or 20 minutes after insemination were not capable of completing gastrulation. At higher concentrations, namely, 0.05% and 0.1%, where cleavage division stopped before 64-cell stage, subsequent development likewise differed between the unfertilized and fertilized eggs. In the former the irregular massive ball of cells started cytolyse before they showed any sign of hatching, whereas in the fertilized eggs most of them died during hatching.

The results of the second series of experiments with one-minute treatment are presented in Table I, in which each value represents an average of readings taken from two experiments. The intensity of the effect decreases as interval between insemination and treatment becomes longer. But even as late as 90 minutes after insemination, one-minute treatment in 0.1% solution proved to be effective not only in delaying the rate of cleavage beyond the first one which most of the eggs