

not sufficiently affected to prevent the use of this dose in a sterile eradication programme. A dose of 23,000 rads renders the sperm inactive, shortens adult longevity and adversely affects wing development.

In preliminary release experiments using normal fifth instars caged with irradiated fifth instars we have been able to reduce progeny production according to the ratio of sterile to fertile insects.

The results so far indicate that we have a large safety margin within which we can produce sterility, without significantly affecting sperm motility, mating behaviour or adult longevity.

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## BIOLOGY

### Morphogenetic Effects of Acidic Glycoproteins on the Development of Sea Urchin Eggs

It is known that certain chemical agents can influence the differentiation of the ectoderm and the entomesoderm in the larva of the sea urchin. Thus certain acidic organic derivatives which carry sulphonic groups tend to favour the differentiation of ectodermic structures (animalization). The animalizing activity of these agents increases with their affinity for proteins<sup>1</sup>.

It was considered to be of interest to determine whether acidic proteins, such as glycoproteins, are also able to induce the animalization of larvae. This article reports some investigations of the effect of the glycoproteins of fraction VI of ox serum (prepared by the method of Cohn *et al.*<sup>2</sup>). This fraction contains concentrated acidic glycoproteins such as orosomucoid and  $\alpha$ 2-glycoprotein<sup>3,4</sup>, and the acidity of these is linked with the presence of acetylneuraminic acid in their molecule.

Fertilized eggs of the sea urchin *Paracentrotus lividus* were cultivated in sea water containing from 2 to 1 mg/ml. of Cohn fraction VI (obtained from the Nutritional Biochemicals Corporation) and a sodic derivative of sulphadiazine (M/1,000). Each culture contained in the region of 1,000 eggs/ml.

The larvae which developed under these conditions showed the morphological characteristics of animalization and radialization. The animalized larvae, however, predominated in cultures containing 2 mg/ml. of fraction VI, and were hyperciliated blastulae corresponding to type 3/4 in Hörstadius's<sup>5</sup> classification. The radialized larvae predominated in cultures containing 1 mg/ml. of fraction VI; these showed a typical radial symmetry, a body elongated parallel to the animal-vegetal axis and a well-developed pre-oral lobe covered with long, movable cilia. The radialization exhibited an attenuated aspect of the animalization when eggs were treated with animalizing agents at a concentration slightly less than that necessary to induce animalization.

In the control cultures prepared with the complete lyophilized ox serum (2 mg/ml.), the pluteus developed normally. The larvae also showed a normal morphology with acetylneuraminic acid at the same concentration.

It has been known since 1892 (ref. 6) that lithium ions tend to favour the development of entomesodermic

structures (vegetalization). Eggs cultivated in the presence of lithium chloride ( $6.5 \times 10^{-3}$  M and  $3.25 \times 10^{-3}$  M) and fraction VI material (2 and 1 mg/ml., respectively) produced larvae more strongly vegetalized than did those cultivated in the presence of lithium chloride only.

These experiments thus revealed two new activities: (1) the animalizing action of acidic glycoproteins of the fraction VI of ox serum; (2) the reinforcement of the vegetalizing effects of the lithium ions by such acidic glycoproteins.

In the animalized larvae, the differentiation of an ectodermic type extends to territories which, in a normal larva, would have formed entomesodermic structures. This phenomenon can be interpreted when it is considered that, in territories the differentiation of which is thus modified, the genes responsible for the ectodermic differentiation are derepressed.

Histones (basic proteins) are able to repress the activity of the genes<sup>7</sup>. According to Frenster<sup>8</sup>, nuclear polyanions by combining with histones can derepress the activity of the genes.

Acidic glycoproteins form compounds with histones<sup>9</sup>. I therefore suggest that, in these experiments, acidic glycoproteins, as well as polysulphonic derivatives, by combining with basic proteins 'derepress' the activity of the genes responsible for the differentiation of the ectodermic structures. This derepression can be observed at the level of the genes, at the time of passing on the genetic message, and at the level of the ribosomes when this genetic message is translated. Concerning the first sphere of activity, it will be recalled that a hormone of a glycoprotein nature, gonadotrophin, has been shown to be capable of stimulating the synthesis of RNA within the nucleus<sup>10</sup>. Regarding the second sphere of activity, the cytoplasm of the sea urchin egg contains basic proteins of the histone type associated with ribosomes<sup>11</sup>.

The second result which was brought to light by these investigations is the reinforcement by the acidic glycoproteins of the vegetalizing action of lithium ions. This effect suggests an increase in permeability to the lithium ions; such a phenomenon could be attributed to a modification of the physicochemical properties of the cellular membrane, or to the carrier role of the glycoproteins at the time when the lithium ions penetrate into the cells.

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### Exposure of Cut Flowers to Ethylene in the Presence and Absence of Carbon Dioxide

FLOWERS produce ethylene<sup>1,2</sup>, and ethylene in low concentration has a marked effect on development and senescence of the cut bloom<sup>3</sup>. With gas chromatography and flame ionization detection<sup>4</sup>, it has been possible to examine critically the effect of exposure to a concentration of 0.05 p.p.m. ethylene on carnations over a range of temperature. The time interval between cutting and the first appearance of petal wilt can be readily determined.