Two Colour-Types in *Solitaria*-Phase Adults and Hoppers of the Desert Locust

COLOUR differences between the *gregaria* and *solitaria* phases in the desert locust, *Schistocerca gregaria* (Forskål), are well known. In the *gregaria* phase the adults are pink when immature and yellowish when mature (Künckel d'Herculais[1]); *solitaria* adults are greenish when very young and greyish afterwards (Johnston[2]). *Gregaria*-phase hoppers have a black pattern; *solitaria* hoppers lack this pattern and are green (Johnston[2], and others). (*Vide* also Kennedy's[3] recent account of coloration in *solitaria*.)

I have however observed, both in Nature in Baluchistan as well as in the laboratory, that two distinct colour-types occur in the *solitaria* phase among adults and hoppers. (i) *Adults*. Among 367 adults examined, the majority (about 91 per cent) were suffused with a blue-grey tinge, resembling the *solitaria* individuals mentioned by Johnston; others (about 9 per cent) had no blue-grey but were fawn all over. The occurrence of the two types has no relation to age or season. (ii) *Hoppers*. The majority of *solitaria* hoppers are green. Occasionally, however, both in Nature and in the laboratory, fawn-coloured hoppers, with no trace of green, turn up, as briefly reported earlier in an account of my painted-box experiments (Roonwal[4]). Though exact figures are not available, my distinct impression is that the frequency of occurrence of the fawn hoppers did not exceed about 10 per cent. The colour difference was especially noticeable from the third stage onward, and was not correlated with the environment, as shown by rearing experiments as well as field observations.

It is probable that (*a*) the fawn hoppers give rise to fawn adults, and green hoppers to the blue-grey adults; and (*b*) the two colour-types have a genetical significance, since they are not related to phase or environment.

A detailed account will be published elsewhere.

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Chemical Constitution of the Nucleolar Inclusions in Growing Oocyte Cells

IN many animals during the second period of growth of the oocyte there is a production of nucleolar substance by means of a multiplication of numerous little nucleoli, or the budding of small nucleoli from a principal nucleolus[1]. When a principal nucleolus exists, in general concomitantly with the production of the buds, some inclusions with a more or less vacuolar appearance are formed in its interior[1]. In a study of the nucleolar physiology in two species of Helicidæ—*Helix aspersa* Müll. and *Tachea nemoralis* L.—we have examined the constitution of these inclusions. They are not aqueous vacuoles; though they can be, and probably in general are, less dense than the body of the nucleolus; when centrifuged they are not markedly dislocated and in concentrated salt solutions the volume of the inclusions does not diminish more than the rest of the nucleolus.

By means of the histochemical arginine reaction[2] we have seen that these inclusions are less rich in arginine than the body of the nucleolus. Millon's reaction for tyrosine and the test for protein SH groups[3] are also less strong in the inclusions. On the other hand, Voisenet's reaction for tryptophan[4] gives a violet coloration more intense in these inclusions.

The Feulgen reaction is completely negative for the nucleolus and the inclusions, while a histochemical test for organically bound phosphorus is positive for the nucleolus body and is more intense in the inclusions. This phosphorus test consists essentially in a slow hydrolysation of the tissues by a molybdate-hydrochloric acid reagent followed by treatment with an acetic solution of benzidine and saturated aqueous sodium acetate[5]. This test demonstrates the presence of phosphorus in thymo- and ribo-nucleic acids, and the reaction is very intense, for example, in the spermatozoa heads and the chromosomes of dividing cells. The test reveals the presence of phosphorus in conjugated phospho-proteins and specially in nucleoproteins.

The coloration of the oocytes with basic (toluidine blue) and acidic (Ponceau *PR*) stains, minimizing at the same time the adsorption[6] by addition of 1 per cent saponine, gives results which agree with the histochemical tests. Toluidine blue gives a coloration more intense in the inclusions than in the rest of the nucleolus, while the contrary happens with Ponceau. By means of nucleases extracted from rice bran[7] we have digested the nucleic acids. After this digestion, the inclusions do not show any differential response to staining and the phosphorus test is negative.

It is known that the nucleolus is formed of, at least, basic proteins and also some non-basic proteins[7,8], and nucleotides of the ribose type[8]. It seems that we can safely conclude that the phosphorus reaction, the coloration with basic and acidic stains and the nuclease action, show the existence of nucleotides of the ribose type in the nucleolus, and the nucleolar inclusions must have a greater concentration of these nucleotides than the remaining part of the nucleolus. It would be interesting to test the same material by means of the ultra-violet microscope.

This accumulation of nucleotides in the inclusions is probably related to the production of nucleoproteins rich in basic proteins, by the nucleolus during the elaboration of the cytoplasm and the yolk of the growing oocyte. The nucleoli are more rich in nucleotides (phosphorus test) when young. It is possible that the synthetization of nucleotides is a function of the nucleolar inclusions, while the basic proteins are particularly formed in the nucleolus body.

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