be under specific control, a situation distinct from that of bacteria where all messengers seem to suffer degradation almost immediately after their transcription (presumably by non-specific systems). One possible implication is that translational as well as transcriptional control may be important in mammalian cells.

INSECT REPRODUCTION

Fertilization in Housefly

from our Insect Physiology Correspondent

THE spermatozoa of insects, whether introduced into the female by means of a spermatophore or by direct insemination, must first gain access to the receptaculum seminis or spermatheca for storage, and subsequently to the vagina where fertilization of the eggs takes place. The extent to which these movements are brought about by mechanical forces exerted by the ducts of the female, or by the active migration of the spermatozoa themselves, is still obscure and may well vary in different species.

The best known example of mechanical control is in the queen bee, where a muscular pump regulates the transfer of spermatozoa from the spermatheca to the vagina. But active movements of the spermatozoa, induced by various glandular secretions, are usually believed to be the means of transfer. When the spermatozoa reach the egg as it enters the vagina at ovulation, they must surely migrate actively to find the micropyle, and must then be able to penetrate the covering membrane of the oocyte.

Leopold and Degrugillier (*Science*, **181**, 555 ; 1973) now show that the accessory glands in the female housefly (*Musca domestica*) are not needed to bring about the active migration of the spermatozoa to the spermatheca, which is unaffected by extirpation of these glands. That is in agreement with the conclusion of Davey, a good many years ago, that the opaque secretion from certain of the accessory glands of the male in *Rhodnius* induces peristaltic movements in the genital ducts of the female, which serve to transport the sperm to the receptaculum. On the other hand, Leopold and Degrugillier show that removal of the accessory glands in the female housefly leads to a reduction in fertility to less than 1% of that in normal flies.

The egg enters the "anterior chamber" just behind the point of junction of the common oviduct and the vagina. Here it is held for several seconds only while from one to four spermatozoa enter the micropyle and make their way into the ooplasm. In the absence of female accessory glands the sperm remain aggregated near the entrance of the micropyle. Whether this striking effect of the accessory gland secretion on fertility is due to activation of sperm movement, or whether it induces some change in the vitelline membrane which increases its permeability for spermatozoa, remains undetermined.

HORMONES

Sites of Action

from a Correspondent

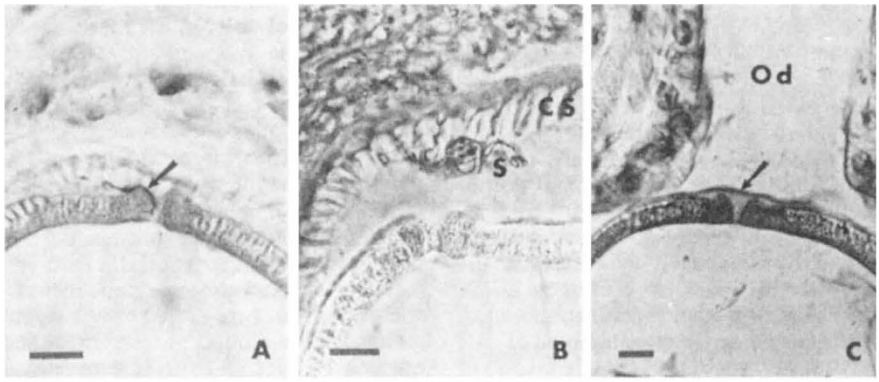
IT takes a brave man to attempt to turn the tide of evidence that oligopeptide hormones act by activation of nucleotide cyclases. Sharma (*J. biol Chem.*, **248**, 5473 ; 1973) now reports, however, that adrenocorticotrophic hormone (ACTH), when added to isolated adrenal cells, affects the conversion of (20S)-20-hydroxycholesterol to pregnenelone ; this effect is insensitive to cycloheximide and is not mimicked by cyclic AMP or its derivatives. Previous observations that the complete conversion of cholesterol to pregnenelone is modulated by cyclic AMP are not contradicted, however, as the first step in the conversion, the formation of (20S)-20-hydroxycholesterol from cholesterol, is found to be sensitive to both cycloheximide and cyclic AMP.

The significance of Sharma's observation presumably depends on the relative rates and sensitivities to ACTH stimulation of the two reactions. It has been reported previously that there are two different classes of binding site for ACTH ; and two different receptors may be responsible for the two actions of the hormone. Sharma's experiments will probably be repeated elsewhere, as the unifying hypothesis of cyclic AMP activation is unlikely to be easily discarded.

Two classes of renal binding sites have been reported for calcitonin (Marx *et al.*, *ibid.*, 4797). These authors very carefully document the activity of their ^{125}I-calcitonin by investigating its chemical purity and ability to activate adenylate cyclase, thereby forestalling the common criticism of this kind of study---the poor characterization of a labelled hormone. The degradation of the peptide, another difficulty in such studies, was reduced by the addition of ACTH, which reduced degradation but did not block binding. The sites with high affinity and low capacity for the hormone are thought to be where the biological potency resides, and are clearly distinguishable from the sites of hormone degradation. Although two classes of binding sites have been reported for several systems, it is not clear in every case that one class can be identified with the receptor-cyclase, and the other with degradation. Considerably more study will be required to determine whether this is an observation of physiological relevance.

Any enzymologist, asked to interpret the probable mechanism of hormone-stimulated adenylate cyclases, would surely automatically invoke "conformational change". Physical measurements in poorly purified membrane preparations are obviously not feasible, and the use of chemical modification reactions is a sensible approach. Storm and Dolginow (*ibid.*, 5208) have utilized the known reactivity of adenylate cyclase with sulphydryl reagents and found that glucagon increases about ten times the rate of inhibition of adenylate cyclase activity by iodoacetamide. Such an enhancement, besides being an excellent indication in itself of conformational change, may prove useful in chemical studies of more purified preparations.

Klein *et al.* (*ibid.*, 5552) present evidence which they interpret as the dis-



Sagittal sections of the micropyle region of eggs within reproductive tracts of female houseflies taken in the process of oviposition. (A) Sperm (arrow) are penetrating the micropyle of an egg held within the anterior chamber of a sham-operated female. (B) Numerous sperm (S) have coalesced into a single mass in the anterior chamber of a female without sex glands. Flexible cuticular spines (CS) project into the lumen of the anterior chamber (phase contrast illumination). (C) Arrow indicates the presence of the micropyle cap on an egg that has stopped within the common oviduct (Od) of an ovipositing female. Scale bars, 10 μm. (Reproduced, by permission, from Leopold and Degrugillier, *Science*, **181**, 556; 1973.)