killing activity reappears. The manner in which the colicin encompasses the fission of the 16S RNA is still unknown. The dependence of the reaction on the presence of 50S subunits has also now been reported by Bowman (*FEBS Lett.*, **22**, 73; 1972).

NEUROENDOCRINOLOGY

Neurones and Hormones

from a Correspondent

THE nature and significance of the connexions of the hypothalamus, the sites of action and effect of gonadal steroid hormones on the neural structures which control the secretion of pituitary gonadotrophins, and the significance of the high concentration of monoamines in the hypothalamus were the principal themes of the neuroendocrinology symposium held at the University of Oxford on April 6.

The symposium, part of the spring meeting of the Anatomical Society of Great Britain and Ireland, missed the wisdom and subtle wit of the late Professor G. W. Harris by whom it was conceived and planned. The elegance and precision of Harris's experiments, discussed by Dr B. T. Donovan (Institute of Psychiatry, Maudsley Hospital), substantiated the neurohumoral hypothesis of the control of the anterior pituitary gland and laid important foundations for modern endocrinology, It is ironic that Harris's insistence on excellence may have robbed him of an ultimate goal—the characterization of luteinizing hormone releasing factor—for the physiological methods he used to assay this factor were much slower than those used by the apparently successful American teams.

Although most of the seven contributions were prepared for an audience of general biological and medical scientists, the scholarly review of the neural connexions of the hypothalamus by Dr T. P. S. Powell (University of Oxford) will have pleased the specialist. Dr Powell focused attention on relatively novel data which suggest that the hypothalamus achieves connexions with the chief sensory association areas of the neocortex through multisynaptic pathways. These connexions could convey to the hypothalamus highly integrated visual stimuli, and, therefore, may prove to be an important component of the pathways which subserve the marked effect of light on the hypothalamo-hypophysial activity.

Professor B. Halasz (Semmelweis University) reviewed comprehensively the outstanding work by Hungarian anatomists on the determination of the area of the hypothalamus which secretes pituitary hormone releasing factors (hypophysiotrophic area) and the investigation of the function of the deafferentiated hypothalamus. Although few new data were offered, this contribution stimulated lively discussion on the degree to which the hypothalamus is able to function independently of other areas of the brain.

The intriguing question of the role of the monoamines of the hypothalamus was reviewed by Dr K. Fuxe (Karolinska Institutet). Little information was added, but Fuxe did admit that the presence of axo-axonic synapses in the median eminence, the premise which underlies his theory that catecholamines exert an inhibitory influence on the secretion of gonadotrophins, could not be substantiated.

Three contributors discussed the effect of gonadal steroids on the brain with special reference to the control of pituitary gonadotrophin secretion. Dr W. Stumpf (University of North Carolina) led the audience speedily over a detailed atlas of the intracranial and extracranial structures which have an affinity for tritiated oestrogens as determined by autoradiography. Unfortunately, the functional significance of grains in relation to cells was taken for granted, and no evidence was offered to show that presence of grains was attributable to oestrogen rather than a metabolite. The fact that Dr P. MacKinnon (University of Oxford) and her colleagues were able to demonstrate significant changes in the rate of protein synthesis (as determined by the incorporation of ^{35}S-methionine) in the manipulation of the concentration of preoptic area and median eminence during the oestrous cycle and following gonadal steroids in blood suggests that this may prove a more meaningful technique for detecting the site of action of steroids than the determination of their distribution in brain tissue.

The finding by Professor B. A. Cross (University of Bristol) and his colleagues that oestrogen increases the firing rate of certain neurones in the hypothalamus of the intact brain and in hypothalamic islands (which included the preoptic area) is especially significant in the context of the current concept that oestrogen triggers the preovulatory surge of luteinizing hormone, and provides further evidence for the autonomy of the hypothalamus, emphasized previously by Halasz, in controlling the secretion of pituitary gonadotrophins. But whether the hypothalamic neurones involved in the control of gonadotrophin secretion are driven by neural influences arising within the hypothalamus, or by changes in the concentration of gonadal steroids in plasma, remains unanswered.

Action of the Cholesterol Molecule

CHOLESTEROL is known to exert a profound effect on the physical properties of membranes, both artificial and natural. When introduced into phospholipid bilayers it decreases the degree of fluidity of the interior, and it has been suggested that it does so by forming a stoichiometric complex with the phospholipids at a mole ratio of 1:1. Engelman and Rothman offer an alternative explanation of the observed effects in next Wednesday's *Nature New Biology*.

A model of the cholesterol molecule shows that the cyclic part is about twice as large as the linear hydrocarbon tail. Where the two join there is a sharp change in cross-section. Therefore the hydrocarbon chain of a lipid packed in a bilayer next to the cholesterol will have much less freedom of motion in the part lying next to the ring than that near the tail, given that all chains are known to lie essentially perpendicular to the plane of the bilayer. X-rays show that the total area of a lecithin: cholesterol pair in a mixed bilayer of composition 1:1 is close to the calculated minimum, for an all-*trans* hydrocarbon chain.

From molecular dimensions it follows that the first seven methylenes of the phospholipid in the all-*trans* state will stretch the length of the cholesterol ring. Beyond this the space available to the hydrocarbon chain becomes much greater, and Engelman and Rothman in fact calculate that the effective cross-sectional area here will be larger by 50 per cent. Such a hydrocarbon chain will therefore have increased configurational degeneracy, which will be reduced in a neighbour not in contact with cholesterol, and reduced still more in the next molecule along and so on. This means that phospholipid chains adjacent to cholesterol are spatially largely independent of the other chains in bulk phospholipid regions, which explains why they are not expected to be involved in the cooperative changes of state (phase changes) with temperature, to which close-packed phospholipid chains are subject, and also why no phase transition is observed in a 1:1 complex, where all phospholipid chains are flanked by cholesterol.

This scheme of interaction sets no restrictions on the length of the hydrocarbon chain: everything beyond the first seven methylenes will be relatively fluid. The cholesterol thus reduces all neighbouring phospholipid chains to structural equivalence, and Engelman and Rothman suggest that it is for this reason that lipids can be exchanged between plasma membranes and the surrounding fluids, without disturbance of the basic structure.