CHAIRMAN'S INTRODUCTORY REMARKS

MARTHE VOGT
Institute of Animal Physiology, Babraham, Cambridge, England

ON READING the abstracts of to-day's session, and, even more so, on surveying the current literature, one is struck by the contradictions in the interpretation of results relating catecholamine activity to behaviour. It may be helpful to try and analyse some of these discrepancies. In order not to complicate matters, I will take it for granted that there is universal agreement about the need to keep the distinction between dopaminergic and adrenergic neurones clearly in mind.

(1) Many statements about function are based on the results of damage to neuronal activity. The degree of damage done by what appears to be the same procedure can vary with fine distinctions in technique. Owing to the remarkable capacity of the brain to maintain crucial activities when an enzyme, an amine, or a group of neurones responsible for a particular function have been severely reduced in quantity, results will differ according to whether the experimenter has just reached or just failed to reach the threshold beyond which cerebral compensatory mechanisms fail. A good example of this is found in the work by Breese, Cooper and their co-workers (COOPER, BREESE, HOWARD and GRANT, 1972; BREESE and COOPER, this session). They found it necessary to reinforce the damaging effect of intracisternal 6-hydroxydopamine (6-OHDA) with either pargyline or α-methyltyrosine in order to reduce aminergic activity sufficiently to obtain an impairment of the acquisition of avoidance responses in rats.

(2) Hardly ever do different experimenters use the same procedures for testing behaviour. This in itself should be a useful thing, permitting one to pin down the particular feature of a test which either can, or cannot, be compensated for after what is presumed to be the infliction of identical damage. This requires much consultation between groups of workers, and one would hope that a symposium like the present one will offer opportunities to resolve some of the apparent contradictions.

(3) The site of the damage is, needless to say, all-important. This, however, is the most difficult feature to assess, particularly when the comparison concerns the results of electrolytic lesions, or of local, or even of intraventricular injections of damaging substances like 6-OHDA. Since intraventricular injection of 6-OHDA is both useful and frequently used, I wish to report on some observations with the injection, into the lateral ventricle of rats, of a somewhat related compound, 5,6-dihydroxytryptamine (5,6-DHT). This substance does not seriously interfere with catecholamine-containing neurones, but damages selected 5-HT containing neurones. For reasons not yet known, the spinal cord appears to be the most permanently affected region (BAUMGARTEN *et al.*, 1972). 5,6-DHT leaves a brown pigment on the surface of those ventricular regions which are reached by high concentrations of the drug. It was surprising to see that, in spite of keeping injection time, and volume and concentration of the injected solution, constant, the distribution of the brown stain was variable. Sometimes it only covered the caudate nucleus and septum on the injected side, but occasionally it also stained the aqueduct and the third ventricle.

It is unlikely that such differences did not produce variations in the groups of neurones affected. Another point is of importance in the interpretation of early behavioural changes after the intraventricular injection of 6-OHDA. During the first days which follow the injection of 5,6-DHT, the rats are excitable, tend to fight if not caged singly, and are aroused by the slightest noise. The same signs, however, are familiar consequences of the injection, by the same route, of 6-OHDA (e.g. JACKS, De CHAMPLAIN and CORDEAU, 1972). To try and relate these emotional changes to either release or lack of NA or DA is obviously not going to be compatible with the production of the same syndrome by 5,6-DHT.

We know a great deal about correlations between effects of drugs on behaviour and on brain biochemistry, but the transformation of mere correlations into causal relationships is in its mere infancy. The same holds for the subject which is sometimes called "manipulation of cerebral catecholamines" and its effects on behaviour; causal relationships are extremely difficult to establish.

REFERENCES

BAUMGARTEN H. G., EVETTS K. D., HOLMAN R. B., IVERSEN L. L., VOGT M. and WILSON G. (1972) *J. Neurochem.* **19,** 1587–1597.

COOPER B. R., BREESE G. R., HOWARD G. L. and GRANT L. D. (1972). *Physiol. Behav.* **9,** 727–731.

JACKS B. R., DE CHAMPLAIN J. and CORDEAU J.-P. *Eur. J. Pharmacol.* (1972) **18,** 353–360.