The lowered sensitivity to PHE but not to ISO was found in both studies. Only a prolonged cold-acclimation induced an increased response to ISO, but by then the responses to PHE had already returned to their initial levels[13]. LeBlanc et al.[14] have observed an increased β-receptor sensitivity by repeated injections of ISO and by cold-acclimation of 20 days in rats. This was found in the metabolism of the animals but also in cardiac chronotropic response. However, these results are not quite comparable with those in the present study because their experiments were carried out in vivo, where reflex adjustments and other secondary influences, e.g. an increased metabolism in the animals, are involved.

Kunos et al.[5] have suggested that cardiac α- and β-receptors represent allosteric conformations of the same structure. According to their findings that hypothyroidism reduces the β-receptor sensitivity and raises the α-receptor sensitivity, they have further suggested that it is an altered thyroid hormone level which results in an interconversion of myocardial α- and β-receptors[12]. Our present and previous results on cold-acclimated rats[13] are not totally in agreement with the ideas of Kunos et al. mentioned above. The lowered α-receptor sensitivity was not associated with a simultaneous increase in β-receptor response, thus indicating no interconversion of adrenoreceptors. Benfey[15] also has recently reported an opposing suggestion to the adrenoreceptor transformation hypothesis. Harri et al.[13] suggested that an increase in the sympathetic activity of cold-exposured rats was responsible for the subsensitivity of cardiac α-receptors. The present results from rats with higher sympathomimetic amine levels produced by repeated injections of sympathomimetic amines support this suggestion. In agreement are also the findings that the decreased sympathetic activity in rats, resulting from decentralization or from 6-hydroxydopamine treatment, causes supersensitivity to noradrenaline but not to ISO[16,17]. However, the role of thyroxine cannot be excluded. It has been shown that cold-exposure[18] and β-adrenergic stimulation by ISO[19] induce thyroid hormone secretion. Thus a change in sympathetic activity reflects changes in thyroid hormone levels[20], and this could induce changes in cardiac adrenoreceptors. Negative results, however, are also reported of the effects of thyroxine on the cardiac adrenoreceptor sensitivity[21,22].

[14] J. LeBlanc, J. Vallières and C. Vachon, Am. J. Physiol. *222*, 1043 (1972).
[15] B. G. Benfey, Nature, Lond. *256*, 745 (1975).
[16] U. Trendelenburg, Pharmac. Rev. *15*, 225 (1963).
[17] B. Johansson, Eur. J. Pharmac. *24*, 194 (1973).
[18] O. Heroux, Fedn. Proc. *19*, 82 (1960).
[19] A. Melander, E. Ranklev, F. Sulander and U. Westgren, Endocrinology *97*, 332 (1975).
[20] A. Melander, E. Nilsson and F. Sundler, Endocrinology *90*, 194 (1972).
[21] J. B. van der Schoot and N. C. Moran, J. Pharmac. exp. Ther. *149*, 336 (1965).
[22] A. H. Anton and J. S. Gravenstein, Eur. J. Pharmac. *10*, 311 (1970).

Occurrence of Aldehyde-Fuchsin and Performic Acid-Victoria blue Positive Granules in the Ovarian Pedicle of *Dysdercus koenigii* F. (Pyrrhocridae: Heteroptera)

R. C. Srivastava and B. P. Srivastava[1]

Regional Station of Agricultural Research, University of Udaipur, Banswara (Rajasthan, India); and Department of Entomology, University of Udaipur, Udaipur (Rajasthan, India), 4 February 1976.

Summary. A cycle of activity of aldehyde-fuchsin and performic acid-Victoria blue positive granules was observed in the ovarian pedicle of *Dysdercus koenigii* during the first ovipositional cycle. The quantitative variation of these granules in the pedicle can also be correlated directly with the increase or decrease of the neurosecretory material in the A-type cells of the pars intercerebralis medialis region of the protocerebrum of the brain.

The occurrence of Gomori-positive granules in the amoebocytes was earlier reported in *Rhodnius*[2]. Thereafter, the chrome haematoxylin-phloxin (CHP), aldehyde-fuchsin (AF) and performic acid-alcian blue (PAAB) positive granules were observed in the last vitellarial follicles of *Pyrilla perpusilla*[3]. During the course of investigation on the endocrine control of oocyte maturation, a cycle of activity of AF and performic acid-victoria blue (PAVB) positive granules were observed in the ovarian pedicle of *Dysdercus koenigii*. The present study presents some histological and histochemical observations of these AF and PAVB positive granules in the ovarian pedicle and a discussion of their possible functional significance.

The test-insects (*D. koenigii*) were reared in the laboratory at a temperature of 28° ± 2°C and watersoaked cotton seeds were provided as food. For the purposes of the present study, a requisitive number (8–9) of dated female adults were dissected daily in physiological saline[4] for the whole period of one ovipositional cycle of 8 days. The neuroendocrine organs and the gonads from the same individuals were fixed in appropriate fixative and were then stained with AF and PAVB in the manner described by Dogra and Tandan[5]. The preparations were supplemented by histological sections stained either before (PAVB) or routinely after sectioning (AF).

An examination of preparations (both whole mounts and histological sections) of the neurosecretory cells and gonads (ovarian pedicle) revealed a quantitative variation of AF and PAVB positive granules, during the different stages of egg ripening. The staining reaction of these pedicle granules and those of A-type cells were identical. Moreover, the quantitative variations of these granules in the pedicle can also be correlated directly with the increase

[1] The authors are grateful to Director of Research, University of Udaipur, Udaipur (Rajasthan) for providing laboratory facilities.
[2] V. B. Wigglesworth, J. exp. Biol. *32*, 649 (1955).
[3] P. S. Ramamurty and V. Krishnanandam, C. r. Acad. Sci., Paris *226*, 519 (1968).
[4] E. Thomsen, J. exp. Biol. *29*, 137 (1952).
[5] G. S. Dogra and B. K. Tandan, Q. Jl. microsc. Sci. *105*, 455 (1966).

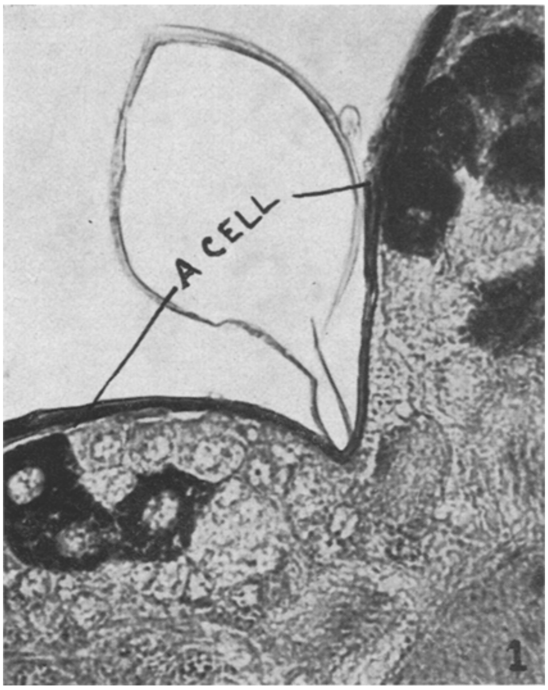

Fig. 1. Cross section (6 µm) passing through the pars intercerebralis medialis region of the brain (early stage of vitellogenesis). Note the plentiful material in the A-type cells (A-cell). AF × 600.

or decrease of the neurosecretory material in the A-type cells of pars intercerebralis medialis and in their axons entering the aortal wall.

In *D. koenigii* the egg ripending is divisible into two stages; an initial stage connected to a neutritive cord and a later free stage. In the newly emerged females (0–6-h-old), there was small amount of stainable material in the perikaryon of the A-type cells. The neurosecretory granules are seen around the nucleus but no distinct aggregates are visible. The cells measure 27.8 × 20.0 µm with a nucleus measuring 11.3 µm in diameter. The NSM was not visible in the axons. Then the developing oocytes were connected to the nutritive cord and no stainable granules were visible in the ovarian pedicle. Thereafter, there was progressive increase of AF and PAVB positive material in the A-type cells of pars intercerebralis. During the early phase of vitellogenesis, the A-type cells of pars intercerebralis were heavily loaded with neurosecretory material (NSM), the neurosecretory pathways were completely visible, the NSM loaded axons were visible in the aorta, the cells measure 31.5 × 20.5 µm with nucleus of 11.0 µm diameter (Figure 1) and the terminal oocytes attain a length varying from 0.90 to 1.20 mm in length, the stainable granules were first revealed in the ovarian pedicle (Figure 2). However, during the active phase of vitellogenesis, when the terminal oocyte measured from 1.60 to 1.75 mm in length the stainable granules in the pedicle were maximum (Figure 3). At this stage, there was considerable decrease in the intensity of stainable NSM in A-type cells. There

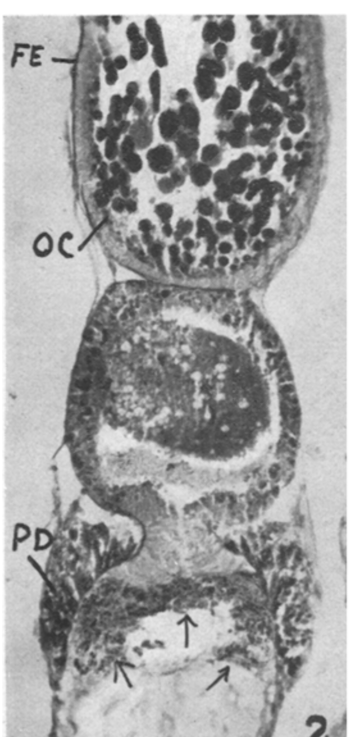

Fig. 2. Sagittal section (10 µm) of ovariole (early stage of vitellogenesis) showing follicular epithelial cells (FE) enclosing the oocyte (OC). Note the presence of AF positive material (arrows) in the pedicle (PD). AF × 360.

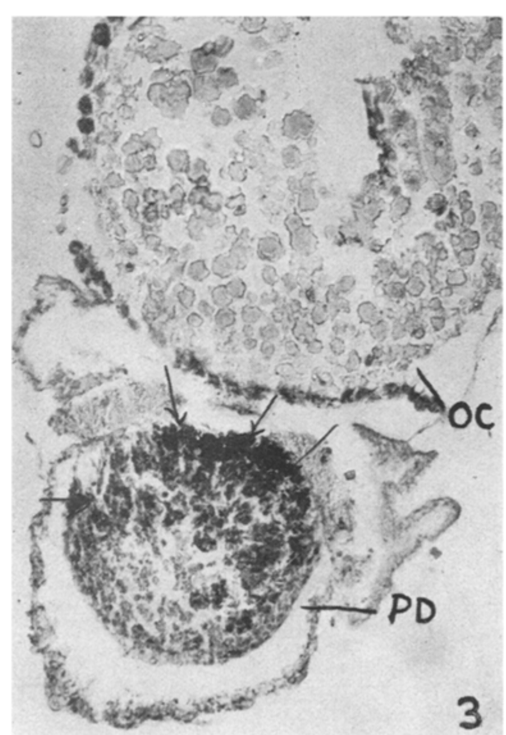

Fig. 3. Sagittal section (10 µm) of ovariole (Active stage of vitellogenesis) showing oocyte (OC) and pedicle (PD). Note the heavy accumulation of PAVB positive granules in the pedicle (arrows). PAVB × 360.

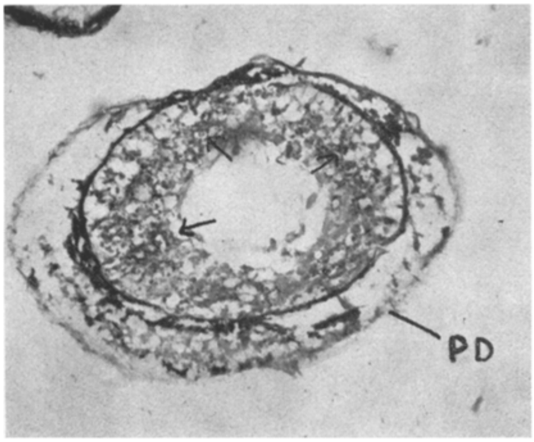

Fig. 4. Cross section (10 µm) of pedicle (PD) showing decrease in AF positive granules (arrows) AF × 360.

was reduction in the cell's size, which measured 30.0 × 20.5 µm with a nucleus of 9.5 µm diameter. During the last phase of vitellogenesis, when the oocytes were fully loaded with yolk spheres and measured from 2.17 to 2.25 mm in length, there is a recorded decrease in AF and PAVB positive granules in the pedicle, (Figure 4) as well as in the A-type cells. Simultaneously, the chorion formation takes place and the stainable granules in the pedicle come to a negligible concentration and some flaky mucoid substance was visible in this region.

It is difficult to trace the source of this AF and PAVB positive granules in the pedicle. But it is definite that the material is not secreted by the cells of the ovarian pedicle, because these cells always responded negatively to AF and PAVB stains. There could, therefore, be two likely possibilities. Either this material is other than the neurosecretory material, since, besides the NSM, a variety of other substances[6] are also revealed by these staining techniques, or this could be an additional storage site for the NSM elaborated by the A-type cells of the brain and ventral nerve cord ganglion. In *P. perpusilla*[3] the CHP, AF and PAAB positive material has been reported in pedicle and is interpreted as stored NSM[7]. Williams[8] also reported that the abdomen of male *Hyalophora cecropia* and *Cynthia* moths acts as a storage organ, for juvenile hormone (JH), which is secreted by the corpora allata. However, on the basis of the observations of Williams on the storage of JH hormone in certain abdominal organs of insects, the question of pedicle granules being a storage for some hormones in the insect under study cannot be ruled out. The maturation of the eggs in the absence of the median neurosecretory cells in *D. cingulatus*, *Rhodnius prolixus*[9] and *Oncopultus faciatus*[10] might probably be due to the presence of similar hormone deposits in the pedicles or in some other body tissues.

Ivanov and Mescherskay[11] reported that the fat body produces a hormone which induces maturity of the ovaries in female cockroaches, *Blattella germanica* and *Blatta orientalis*. In *Iphita limbata*[12], a heat stable and water extractable material obtained from entire ripe ovarioles acts as an ovarian sex hormone which inhibits the neurosecretory supply to the corpus allatum, and simultaneously stimulates the discharge of neurosecretions from neurosecretory cells of the brain and thereby brings about oviposition. But the same result was not obtained when aqueous washings of freshly laid eggs were injected into other female bugs. The present observations suggest that the probable source of the ovarian sex hormone envisaged by Nayar[12] and Doane[13] might be related to the AF and PAVB positive granules of the ovarian pedicle of *D. koenigii* and may represent stored neurosecretory material.

[6] A. G. E. Pearse (J. A. Churchill Ltd. London 1960).
[7] M. Jalaja, D. Muralee Dharan and V. K. K. Prabhu, J. Insect. Physiol. *19*, 29 (1973).
[8] C. M. Williams, Biol. Bull. *124*, 358 (1963).
[9] V. B. Wigglesworth, Q. Jl. micro sc. Sci. *79*, 91 (1958).
[10] A. S. Johansson, Nature, Lond. *181*, 198 (1958).
[11] P. P. Ivanov and K. A. Mescherskaya, Zool. Jb. Abt. *55*, 281 (1935).
[12] K. K. Nayar, Proc. Indian Acad. Sci. (B) *47*, 233 (1958).
[13] W. W. Doane, J. exp. Biol. *146* 275 (1961).

Lateral Hypothalamic 'Feeding' Sites and Gastric Acid Secretion

W. Wyrwicka[1, 2]

Center for Ulcer Research and Education, VA Wadsworth Hospital Center, and Department of Anatomy, University of California School of Medicine, Los Angeles (California 90024, USA), 29 March 1976.

Summary. Electrical stimulation within the lateral hypothalamus which had been effective in evoking stimulus-bound feeding in satiated cats did not produce any significant stimulating effect on gastric acid secretion in the same cats when hungry.

It is generally known that the lateral hypothalamic area contains structures responsible for the initiation of feeding[3, 4]. It is reasonable to ask, therefore, whether the lateral hypothalamic feeding system also controls gastric acid secretion. So far, there have been only a few studies directly dealing with this problem[5–8]. It was found that gastric acid secretion increased as a result of electrical stimulation[5, 6] or stimulation by 2-deoxy-D-glucose (2DG, a compound known to be effective in stimulating feeding)[7] within the lateral hypothalamus in acute rats. It was also observed that the stimulating effect of i. v. injection of 2DG on gastric secretion in chronic cats was abolished by bilateral lesions in the medial forebrain bundle, a hypothalamic structure known to be involved in feeding reactions[8].

[1] The author wishes to thank Dr. M. I. Grossman for advice and valuable discussion and Dr. D. Novin for critical reading of the manuscript. Thanks are also due to Miss Susan Davis and to Mr. R. Garcia for skillful technical assistance.
[2] The author is grateful to Dr. J. D. Elashoff who did the statistical analysis of the results.
[3] B. K. Anand and J. R. Brobeck, Yale J. biol. Med. *24*, 123 (1951).
[4] P. Teitelbaum and A. N. Epstein, Psychol. Rev. *69*, 74 (1962).
[5] A. Misher and F. P. Brooks, Am. J. Physiol. *211*, 403 (1966).
[6] F. P. Brooks in *Handbook of Physiology, Sect. 6, Alimentary Canal* (Ed. Ch. F. Code; Am. Physiol. Soc., Washington, D. C. 1967), vol 2, p. 805.
[7] D. G. Colin-Jones and R. L. Himsworth, J. Physiol., Lond. *206*, 397 (1970).
[8] M. Kadekaro, C. Timo-Iaria, L. E. R. Valle and L. P. E. Velcha, J. Physiol., Lond. *221*, 1 (1972).