

were recognized. Some of the ganglion cells were non-fluorescent, others showed a low to fairly high green cytoplasmic fluorescence (Figure 3). In many instances both types of nerve cells were closely surrounded by nerve terminals indicative of a synaptic arrangement. Thick bundles of smooth, moderately green-fluorescent nerves were seen to leave the ganglia (Figure 3b).

A small to moderate number of green-fluorescent mast cells (Figure 3), which in ruminants carry dopamine¹³, were found at various sites in the genital organs. They occurred mostly in relation to the thick adrenergic nerve bundles close to the organs rather than in the actual smooth muscle tissue.

Discussion. In analogy with earlier denervation experiments on various species, including the ram⁵, it seems reasonable to assume that also in the bull the very dense adrenergic innervation of the internal male accessory genital organs emanates from ganglia located close to the target organs as, for example, those presently demonstrated in the prostate wall. Furthermore, it is apparent that the bulk of noradrenalin granules isolated from these organs by EULER and LISHAJKO⁶ and by STJÄRNE and LISHAJKO⁷ derives from the terminal portions of *short* adrenergic neurons.

The mode of behaviour of these granules further supports the view that short adrenergic neurons constitute a special kind of peripheral adrenergic system, different from ordinary *long* adrenergic neurons and chromaffin cells. In this connection it is of interest that immunosympathectomy has little effect on the adrenergic innervation of certain organs^{14,15} known to be innervated by short adrenergic neurons, such as the internal male genital organs^{4,6}, or on the adrenal medulla.

In view of the assumption that short adrenergic neurons represent a specific entity in the peripheral adrenergic system, it is tempting to suggest that also the wide-spread system of intensely green-fluorescent branching chromaffin cells¹⁶ may constitute a special type of chromaffin tissue, having functional similarities with adrenergic neurons. Thus, they often occur in large numbers in adrenergic ganglia. Usually, one or more slender processes emerge from the cell. In many instances such a process can be followed for a considerable length in adrenergic nerve bundles or in the terminal adrenergic nerve plexus. A small, intensely fluorescent chromaffin

cell, located in the rabbit uterus, has even been seen to directly issue 3 delicate processes with the typical appearance of varicose adrenergic nerve terminals¹⁷.

These observations would then suggest that during development the autonomic ganglion primordia give rise to essentially 4 types of peripheral catecholamine-containing cells: on the one hand adrenal medullary cells and, on the other, *long* adrenergic neurons, in between which are found 2 step-wise transition forms, the branching chromaffin cells and the *short* adrenergic neurons. The properties of the specific noradrenalin granules in the accessory male genital organs further support the view that the short neurons from which these granules originate represent a special transition form between chromaffin cells and long adrenergic neurons.

Zusammenfassung. Basierend auf dem speziellen Betragen der isolierten Noradrenalin granula der inneren männlichen Geschlechtsdrüsen, die von kurzen adrenergischen Neuronen innerviert sind, werden Definitionen für 4 «Übergangsformen» der peripheren katecholaminenthaltenden Zellen diskutiert: chromaffine Zellen der Adrenomedulla, kleine verzweigte, nicht adrenale chromaffine Zellen, *kurze* adrenergische Neurone und *lange* adrenergische Neurone.

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The Courting Habits in *Atherigona* spp. (Anthomyiidae, Dipt.) and the Probable Role of the So-Called 'Clover Leaf Appendage'

The males of many species of *Atherigona* have at the end of the abdomen an appendage, the so-called 'Kleeblattanhang' or 'clover leaf appendage'. This is a flexible rod at the tip of which are 3 leaflets which are black in colour.

Upon inquiries taxonomists studying Diptera could not provide any information on the function of this organ; it is used as a taxonomic characteristic, since the leaflets differ in shape and proportions in each species¹. The clover leaf appendage protrudes from beneath probably the 7th tergite. Its total length is about 1 mm, of which the petiole is about 800 μ and the leaflets about 200 μ each.

In the course of breeding the species of *Atherigona varia soccata* Rond. at Rehovot, a peculiar mode of courting was observed. Close inspection of the behaviour of the species in the breeding cage, using low-power binoculars, revealed that in the course of courting the clover leaf appendage is in function. When not in use, the appendage is hidden, curved over the hypopygium inside the tip of the abdomen, in a pocket the slit of which is beneath the 3rd sternite (considering the visible segments in the abdomen are 2-5) (Figure 2).

The male approaches the female laterally, with the last abdominal segments stretched out and the clover leaf appendage extended posteriorly. With the lower part of

¹ W. HENNIG, in: *Muscidae* (Ed. E. LINDNER, Stuttgart, Germany; 1955-1964) vol. VII, p. 493.

the head, the male clings to the upper surface of the female wing, and orientates the abdomen obliquely, bringing its tip as near the head of the female as possible (Figure 1). The appendage is then swung from side to side accompanied from time to time by jerking thrusts and quiverings of the wings. The position of the abdomen may remain oblique or parallel to the female body. The duration of contact varies from one to several minutes. Long contact times were observed in 5 couples of 12, 19, 22, 23 and 24 min duration respectively.

Often the male clasps the female abdomen with his middle or hind legs, but no copulation was observed to take place immediately after this contact. Occasionally, 2 males cling to 1 female at the same time, a male to each wing.

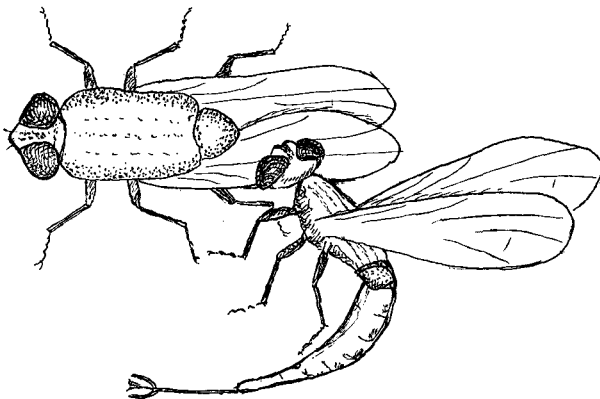


Fig. 1. Schematic presentation of courting position in *Atherigona*.

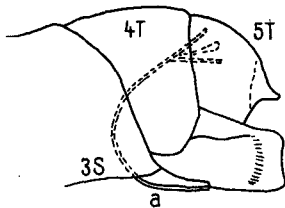


Fig. 2. The tip of the male abdomen of *Atherigona*. Side view. S = sternite; T = tergite.

The fact that this behaviour takes place prior to mating suggests that it is aimed at holding the female stationary and in a position in which she can receive a volatile pheromone which is diffused from the appendage, the petiole of which is an elongated tubule. The efforts to bring the appendage as close as possible to the head of the female further hint that the receptors to this pheromone are located in the head of the female. The function of this volatile substance is obscure, and further studies are needed to ascertain its role.

Observations were made with other insects in which it was found that males of insects may emit volatile attractants or aphrodisiacs². In this connection the courting habits of some other Diptera should be recalled, namely that of the Mediterranean fruit fly *Ceratitis capitata* Wied. and the olive fly *Dacus oleae* Gml. In these species the male, when sexually mature, emits a stale odour and changes take place in the shape of his abdomen, which becomes flattened, laterally swollen and is cocked dorsally; at its tip a minute pinhead swelling becomes visible.

The male assumes a position close to the female, with his head opposite to hers, and then begins to vibrate with his wings against her. Apparently the purpose of this vibration is to ensure that the volatile pheromone reaches the receptors of the female, which are probably in the head also.

Zusammenfassung. In Zuchten von *Atherigona varia soccata* Rond. wurde ein besonderes Balzverhalten, bei dem der sogenannte «Kleeblattanhang» eine funktionelle Rolle spielt, beobachtet. Das Männchen setzt sich mit dem Kopf an einem Flügel des Weibchens fest, die Spitze des Abdomens mit dem «Kleeblattanhang» wird hervorgeschoben und möglichst nahe an den Kopf des Weibchens herangebracht. Während des Vorgangs scheint das Männchen sein flüchtiges, auf das Weibchen wirkendes Pheromon abzugeben.

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Zum Vorkommen von RNS im Nervenfaserbereich

Für die Frage nach dem Ort der Neuroplasmasyntese und damit auch nach dem Ausgangspunkt für den Stofftransport im Nervengewebe ist die Bestimmung der RNS-Lokalisation in der Nervenzelle von ausschlaggebender Bedeutung. Mit Hilfe mikrochemischer Methoden konnten in den Axonen (und Myelinscheiden) der Mauthnerischen Riesenneurone geringe Mengen von RNS mit ribosomalem Charakter nachgewiesen werden¹⁻³. Im Gegensatz hierzu sprechen histochemische, elektronenmikroskopische und UV-Absorptionsuntersuchungen eindeutig gegen das Vorhandensein von RNS in Nervenfasern⁴⁻⁶.

UTAKOJI und HSU⁷ fanden auch mit Hilfe der Mikroautoradiographie nach ³H-Uridin-Inkorporation keine Markierung über den Fasern von in vitro gezüchteten

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