attraction of potassium by kinetin in the hypocotyls of *Helianthus annuus*[5] (Figure 1). In *Salvinia auriculata*, the dependence of both plasmolysis and potassium content on some kinins was found to follow a similar dose-response curve[6] (Figure 2).

From these experimental data the following concept can be derived (compare its graphical form in Figure 3): Making the initial supposition of a hormone with a monotone gradient in the tissue, and a biphasic dose-response dependence of the transport of some substance on hormone concentration, there must then exist in the tissue both regions 1. which submit and 2. regions which take up the substance 1. into and 2. out of the diffusion space. This is a purely logical statement based on some not very unlikely premises. Knowledge of the distance and compartment over which such a mode of transport can occur must be provided experimentally. However, the difficulty of finding useful experimental systems for this purpose has to be pointed out. Some authors report results about regulated transport of substances between cells without plasmatic connections[7–9]. The regulation of the submission in such systems is also very probable. Experiments with strophantine[6] led to the supposition that this regulation may only conceivably be carried out by the membranes. This is the reason (in the case of the plasma-lemma) for considering the apoplasmatic space as a diffusion space between source and sink which then are particular cells.

In conclusion, the proposed hypothesis can be examined in every system in the plant where the transported substance moves from the source to the diffusion space and from that to the sink over regulatable sites. A dominating role of the membranes in such a process is very probable.

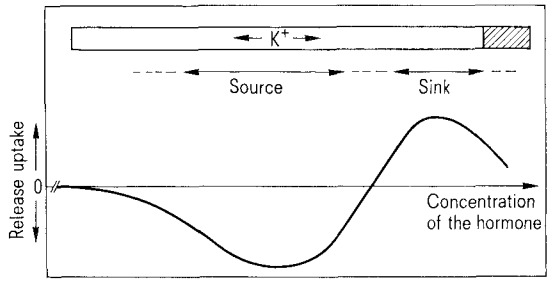

Fig. 3. Projection of a dose-response curve introduced above along a hypothetical part of tissue with the resulting responses (source, sink) on the different hormone concentration (site of the hormone production is hatched).

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The Accessory Salivary Gland as the Source of Water in the Saliva of Hemiptera: Heteroptera

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Summary. Ablation of the accessory salivary glands of a pentatomid and of a coreid reduced quantitatively the flow of alkaline, watery saliva that can be induced by topical application of pilocarpine.

It has been assumed that the accessory salivary gland in the Heteroptera – and, where one has been identified, in the Homoptera – functions to recycle or excrete ingested water[1,2]. The evidence, although often strong, has so far remained circumstantial. At the same time, digestive enzymes have been reported in the accessory gland of mirids[3] and polyphenol oxidases and peroxidases have been shown to be secreted by the accessory gland of Heteroptera[4]. The two functions: excretion of excess water and secretion of salivary enzymes would not seem entirely compatible and hence direct evidence was sought for the function of the accessory gland in contributing to salivary water.

Incubation of the accessory gland of *Poecilometis punctiventris* (Stål) (formerly *Eumecopus punctiventris* Stål[5]) (Pentatomidae), or of the whole salivary apparatus, either on its own or still attached to the head capsule, with 10^{-8} *M* 5-hydroxytryptamine in the saline used by Berridge and Prince[6] for Caliphora salivary glands did not result in secretion of saliva in vitro. A saline developed in this laboratory for maximum longevity of muscular tissues in vitro (cricket sperm, cockroach heart, and a variety of structures from Heteroptera)[7] kept salivary glands of *Poecilometis* contracting rythmically for over 24 h, but again addition of 5-HT at 10^{-8} *M* or higher concentration failed to elicit discharge of saliva from the salivary ducts.

Secretion of saliva by intact Heteroptera and ticks can be induced with pilocarpine, injected as the nitrate[4] or applied topically as the free base[8]. Pilocarpine functions in vertebrates as a parasympathomimetic, acting selectively on tissues innervated by post-ganglionic cholinergic nerves; its stimulation of salivation in Hemiptera and ticks points, therefore, to central neural control of salivation in these organisms. The innervation of the salivary glands of *Poecilometis* proved complex, the accessory gland receiving fine connexions from the suboesophageal salivary nerve, the prothoracic part of the ventral ganglionic mass, and part of the stomatogastric system innervating the pericardial muscles[9].

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[7] In 1 l, 7.5 g NaCl, 1.2 g KCl, 1.0 g 'dried' $CaCl_2$, 0.4 g $MgCl_2$ $6H_2O$, 0.6 g $NaHCO_3$, 0.7 g sodium acetate trihydrate, 0.55 g KH_2PO_4, 11.0 g glucose.
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Table I. Volumes of saliva (± SD) secreted by *Poecilometis punctiventris* within 10 min after stimulation with pilocarpine

	Saliva (µl)
Unoperated controls	3.4 ± 1.6
Accessory gland exposed but not cut	1.8 ± 0.6
Accessory gland cut on one side	0.011 ± 0.006
Accessory glands cut on both sides	0.008 ± 0.003

Table II. Volumes of saliva (± SD) secreted by *Amblypelta lutescens* within 10 min after stimulation with pilocarpine

	Saliva (µl)
Unoperated controls	0.45 ± 0.07
Accessory gland exposed but not cut	0.33 ± 0.04
Accessory gland cut on one side	0.13 ± 0.02
Accessory glands cut on both sides	0.03 ± 0.02

Attempts by us to cut these nerves in the live insects were unsuccessful in that they resulted in gross damage to the neural system.

In a further attempt to investigate the source of water in the saliva of Heteroptera, parts of the accessory glands were removed surgically. Fully fed 5th instar larvae of *P. punctiventris* were collected from beneath the bark of *Eucalyptus cladocalyx* (F. Muell.), chilled, and immersed in saline[7]. The accessory glands (and ducts) were pulled gently to their fullest extent through flaps cut in the pronotum. The glands either were not damaged further, or were cut on only the one side as near to the origin (at the hilus of the principal gland) as possible, or on both sides. On removal of the insect from the saline, the exposed parts of the salivary apparatus tended to retract themselves automatically. The integument was then carefully pushed back into place.

Treated insects lived for several days if disturbed no further. When an unoperated control was treated topically with 2 µl of 20% pilocarpine base in acetone, it usually began to salivate freely within 1 min. The volume was readily measurable to about 0.005 µl if collected into a calibrated capillary tube. Table I indicates the amounts of saliva produced by groups of 10 insects, 10 min after the completion of any operation, when stimulated with pilocarpine.

One of the insects from which the 'both sides' statistic was calculated produced the inconsistently large amount of 0.06 µl saliva. All operated insects were subsequently dissected to observe the actual state of the salivary glands and it was discovered that this particular insect (but no other) had not been operated on properly and had an appreciable amount of the sinuous proximal part of the accessory gland remaining on one side.

At this stage of the investigation it was the time of the year when the *P. punctiventris* larvae were beginning to become adults (the species is univoltine), and the insect could no longer be collected readily in numbers. A further experiment was therefore done on adults of *Amblypelta lutescens* (Dist.) (Coreidae) from a laboratory culture maintained on fresh broad beans. Table II indicates the results.

The secretion discharged from the rostrum in the experiments with either species was routinely tested on pH paper. The reaction was always >8 and was thus clearly distinguishable from that of the haemolymph or the contents of the gut or principal salivary gland, all of which were <7.

It is clear from these experiments that ablation of the accessory gland reduces the volume of saliva in a quantitative fashion and hence that the accessory gland contributes the bulk of the volume of the watery saliva secreted by these insects when stimulated to do so by the action of e.g. pilocarpine on the central neural system.

Relation of Efferent Impulse Activity in Splenic Nerve to Reflexly Induced Reactions of Resistance and Capacitance Vessels of Spleen

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Summary. Constrictory responses of splenic resistance vessels arising under pressor reflexes were abolished by hexonium (2 mg/kg) as well as the high amplitude (above 15 µV) impulses in sympathetic splenic nerves. Constrictory and dilatory responses of splenic capacitance vessels were preserved after administration of the same dose of hexonium and correlated as to the directivity with the changes of the low amplitude (15 µV and lower) impulsation in the splenic nerve.

It was previously shown[1-4] that under pressor cardiovascular reflexes on the background of constrictory response of resistance vessels, constriction or dilatation of capacitance vessels might take place or capacitance response was absent. Differently directed reactions of capacitance vessels under pressor reflexes were observed both in skeletal muscle and in splanchnic region. Analysis of mechanisms contributing to the differentiation of resistance and capacitance vessel responses showed[5,6] that the ganglionic blockade with hexonium (2 mg/kg) abolished reflexly-induced constrictory reactions of resistance vessels while the capacitance vessel responses were persistent. Additional dose of hexonium abolished reflexogenic reactions of capacitance vessels as well.

This study was intended to reveal the changes of postganglionic efferent activity in splenic sympathetic nerves after administration of 2 mg/kg of hexonium and the relation of the sympathetic efferent activity to the reactions of splenic resistance and capacitance vessels under pressor carotid sinus reflex.

Method. Experiments were performed on cats (14) anaesthetized with urethane (1 g/kg) and α-chloralose (20 mg/kg). Reflexogenic reactions of splenic resistance and capacitance vessels were studied with the aid of the