mit wässerigen Homogenaten gelegt wurden. Die Resultate von jeweils 50 Läufen sind in der Tabelle zusammengefasst. Der Wert −1 bedeutet hundertprozentige Schreckwirkung, 1 hundertprozentige Führung durch die künstliche Spur.

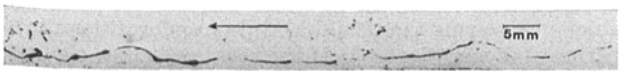

Fig. 1. Durch regelmässiges Abstreifen der Abdomenspitze hinterlässt die heimkehrende Arbeiterin eine deutliche Mittelspur. Die kleinen Punkte und Striche beidseits der Mittelspur sind Fussabdrücke. Der Pfeil gibt die Laufrichtung an.

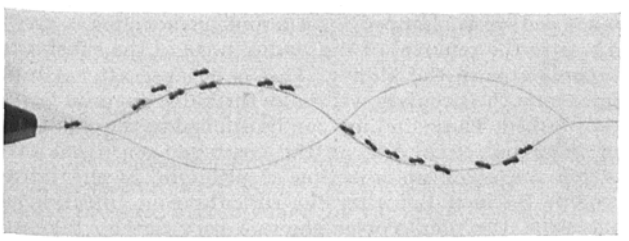

Fig. 2. Künstlich gelegte Spur durch Auftragen einer hundertfachen Verdünnung von Rektalampullen-Flüssigkeit. Die nicht begangene Linie ist als Kontrolle mit Wasser bestrichen worden.

Homogenat	Führungswert	Homogenat	Führungswert
Kopf	−1,00	Kropf	−0,08
Thorax	0,24	Magen mit Inhalt	0,60
Abdomen	1,00	Mageninhalt	0,52
Fettkörper	−0,16	Mitteldarm	0,20
Eischläuche	−0,16	Rektalampulle mit	
Giftdrüse	−0,04	Inhalt	1,00
Dufourdrüse	0,08	Rektalampullen-	
Malpighigefässe	−0,12	Flüssigkeit	1,00
Verdauungstrakt	1,00	Kontrolle:	
Abdomen ohne		Dest. Wasser	−0,12
Verdauungstrakt	0,16	Zuckerwasser	0,16

Diese Ergebnisse zeigen eindeutig, dass die Markierungssubstanz aus dem Verdauungstrakt kommt. Interessant ist, dass bereits der Magen eine deutlich führende Wirkung auf die Ameisen ausübt. Möglicherweise wird die Spursubstanz hier gebildet und in der Rektalampulle angereichert. Ein direkter Beweis dafür fehlt jedoch.

Die ausgeprägteste Führung wird erreicht mit dem Rektalampullen-Inhalt. In sechshundertfacher Verdünnung führt er im T-förmigen Weg noch immer 91% der auslaufenden Tiere. Auf Papier können damit beliebige Spuren gezogen werden, welche auch von schon gefütterten Ameisen genau verfolgt werden. Figur 2 zeigt das Resultat eines solchen Nachlaufversuches.

Nach dem Eintrocknen verliert die künstliche Spur ihre Wirksamkeit; durch Befeuchten mit Wasser wird sie jedoch wieder hundertprozentig führend. Es muss sich bei der Spursubstanz um einen schwer flüchtigen Stoff handeln, wofür auch die Tatsache spricht, dass nach Erhitzen des verdünnten Rektalampulleninhaltes im Wasserbad bei 97°C während 15 min keine Abnahme der Wirkung festzustellen ist[3].

Summary. In this study it was found that the chemical trail laid by workers of the ant species *Lasius fuliginosus* between their nest and a food source, is always laid in the direction food to nest. It was also found that this trail can be artificially created by dissolving the contents of the ant's hind-gut or stomach in water, and then spreading the resulting fluid on paths leading away from the nest. This artificial trail is only effective when moist, but can be reactivated by placing water on the dried remains of the trail.

W. Hangartner und St. Bernstein

Zoologisches Institut und Institut für Hirnforschung der Universität Zürich (Schweiz), 6. April 1964.

[3] Wir danken Herrn Prof. Dr. H. Burla, Direktor des Zoologischen Museums, für seine Unterstützung und Beratung herzlich.

The Use of Tetracycline Fluorescence to Identify Necrosis of Renal Tubules and to Assess Renal Blood Flow

When liver cells have been damaged by toxic agents or by ischaemia tetracycline accumulates in greater quantity in them than in normal cells[1]. As tetracycline is particularly concentrated in the epithelium of the convoluted tubules of the normal kidney[2], it is of interest to know whether it accumulates also in damaged or necrotic renal tubules. Furthermore as the uptake of tetracycline by the normal kidney is proportionate to the blood flow through the organ its uptake can be used as a method of demonstrating alterations in blood flow such as those due to spasm of the renal artery.

The epithelium of the renal tubules in rats was killed by various methods: (a) by clamping the renal pedicle for a period of 1 h; (b) by producing spasm of the renal artery in oestrogen-sensitized rats (1 mg oestradiol benzoate subcutaneously daily for 10 days) by the subcutaneous injection of 10 international units of pituitrin[3] (Parke, Davis & Company); (c) by the subcutaneous administration of glycerol, or mercuric chloride. At 4 h or 24 h after the renal damage had been produced, the

[1] R. Carroll and E. Tapp, to be published.
[2] T. André, Acta radiologica, Supplement 142 (1956).
[3] K. Kovács and M. Dávid, Orvosi Hetilap *104*, 1405 (1963).

animals were given 150 mg/kg of tetracycline hydrochloride by intraperitoneal injection and they were killed 1 h later.

Immediate frozen sections at 5 μ were examined by transmitted UV-light and also by ordinary histological techniques. The tetracycline in normal renal tubules appears as a very fine dust of yellow fluorescence in the epithelium (Figure 1). On the other hand, in necrotic epithelium it accumulates as coarse clumps of brightly fluorescent material (Figure 2). This is seen in the cells of a few tubules as early as 4 h after they have been killed (i.e. before the histological change is apparent) and in all the necrotic tubules at 24 h. This is the same whatever the manner of killing the cells, whether by nephrotoxins or ischaemia. The large take-up of tetracycline by the cells of renal tubules killed by mercuric chloride has been noted by previous workers[4] and a similar phenomenon has been observed in cultures of kidney cells which have been damaged by viruses[5].

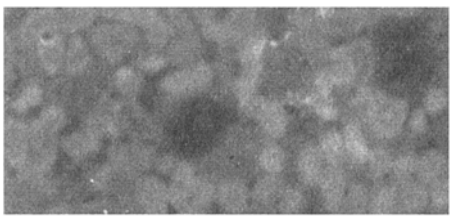

Fig. 1. Tetracycline in normal renal tubules (× 95).

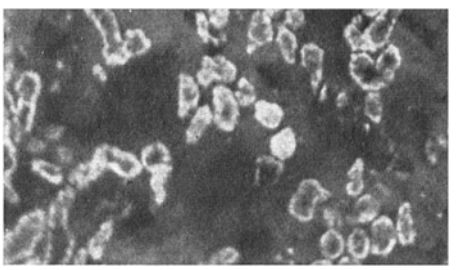

Fig. 2. Accumulation of tetracycline in the epithelium of convoluted tubules damaged by mercuric chloride (× 95).

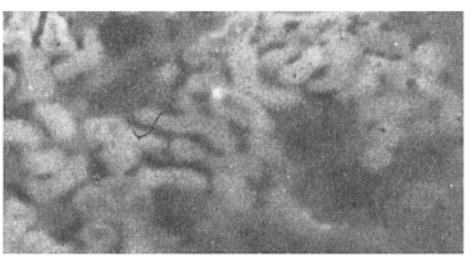

Fig. 3. Junction of normal renal cortex and area where the tubules fail to take up tetracycline. 1 h after injection of pituitrin to oestrogen-sensitized rat (× 95).

Variations in the uptake of tetracycline are also of value in assessing the renal blood flow under different experimental conditions. (1) If the renal pedicle is clamped permanently and tetracycline given 4 h later, it is not taken up by the kidney. This is what would be expected because there is no renal blood flow. (2) If the renal pedicle is clamped for 1 h and tetracycline administered 4 h after the removal of the clamp, the kidney takes up tetracycline in large amounts. This is indicative of a good re-establishment of the circulation through the kidney. (3) If the renal pedicle is clamped for 4 h and tetracycline is given 4 h after the removal of the clamp, none of the substance accumulates in the kidney. This is because after 4 h of ischaemia the circulation through the kidney cannot be re-established. These findings can be applied to the condition of the renal circulation in the oestrogen-sensitized rats which are given an injection of pituitrin. If the tetracycline is given 1 h after the subcutaneous injection of pituitrin, the renal cortex shows a very patchy take-up and there are several wedge-shaped areas in which no tetracycline accumulates (Figure 3). It appears reasonable to infer that there is no circulation at that time in these areas. It has been demonstrated by other methods that the pituitrin damage is due to spasm of branches of the renal artery[3]. However, if the tetracycline is not given until 4 h after the injection of pituitrin, the tetracycline is widely distributed throughout the cortex though some tubules show a greater accumulation of tetracycline than others. This may be taken to indicate that the renal blood flow has returned almost to normal within 4 h after the administration of pituitrin.

Zusammenfassung. Tetracyclin wird in mit vorübergehender Ischämie oder mit verschiedenen Nephrotoxinen geschädigten Tubulusepithelzellen intensiver gespeichert. Diese zunehmende Speicherung ist bereits nachweisbar, wenn histologische Veränderungen noch unausgeprägt sind.

Die Untersuchung der tubulären Tetracyclinaufnahme ist auch für die Beurteilung renaler Blutverteilungsänderungen wertvoll.

E. TAPP, R. CARROLL, and K. KOVÁCS

Department of Pathology, University of Liverpool (England), April 10, 1964.

[4] P. MÁLEK, J. KOLC, F. ŽAK, and V. R. ZASTAVA, Chemotherapia (Basle) *5*, 269 (1962).

[5] L. SAXÉN and T. VAINIO, Nature *201*, 936 (1964).

The Chemoreflex Induced by Intraarterial Injection of Aza-azepinophenothiazine, Veratridine and Bradykinin into Femoral and Brachial Arteries of Innervated and Divided Limbs of a Dog

Since HUNT[1] observed reflex changes of the systemic blood pressure induced by the electrical stimulation of the central end of cut sciatic nerve, many authors have confirmed the general sympathetic excitation as the due cause of this reflex. However, what kind of afferent fibres are brought to excitation is still the question. The authors were wholly unprepared for the evident result of pressor reflex induced by an intraarterial injection of an aza-azepinophenothiazine derivative into the femoral artery of divided limb of a dog, which, up to this point, had

[1] R. HUNT, J. Physiol. *18*, 381 (1895).