animal fibres to acquire a permanent set decreases with increasing time of heating with water and mercury at 80° C.

Time of treatment with water and mercury at 80° C.	Percentage set after release in boiling water for :				
	0 min.	2 min.	15 min.	30 min.	60 min.
Untreated	40.2	24.0	22.3	22.5	22.2
6 d. 2 hr. 15 min.	40.4	19.0	17.6	17.4	17.1
8 „ 23 „ 6 „	40.2	15.9	15.2	14.9	14.4
13 „ 3 „ 50 „	40.3	12.9	12.2	12.0	11.5
22 „ 2 „ 30 „	40.3	2.9	1.6	1.1	0.5

In accordance with setting theory, too, the treated fibres showed an increased power of supercontraction in boiling 2 per cent borax solution. For example, fibres which had been treated for 22 days contracted 42 per cent after 40 minutes boiling, whereas the length of untreated fibres remains unaltered under similar conditions. Contrary to Elöd's observations, therefore, supercontraction is promoted and set prevented when sulphur is removed from animal fibres by the combined action of water and mercury at 80° C. The present conception of the chemical mechanism of permanent set³ remains valid, and the theoretical superstructure which Elöd has erected need not be discussed.

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¹ Speakman, J. B., *NATURE*, **132**, 930 (1933); Speakman, J. B., and Cooper, C. A., *J. Text. Inst.*, **27**, T 191 (1936).

² Elöd, E., Nowotny, H., and Zahn, H., *Koll. Z.*, **93**, 50 (1940).

³ Speakman, J. B., *J. Soc. Dyers and Colourists*, **52**, 335 (1936); Speakman, J. B., and Whewell, C. S., *ibid.*, **52**, 380 (1936); Speakman, J. B., and Stoves, J. L., *ibid.*, **53**, 236 (1937).

⁴ Speakman, J. B., Stoves, J. L., and Bradbury, H., *J. Soc. Dyers and Colourists*, **57**, 73 (1941).

Carcinogenic Agent without the Condensed Carbon Ring Structure

In an earlier publication¹ the formula of the highly active synthetic oestrogen analogue, stilboestrol, was contrasted with those of oestrone and chrysene. The figures in this earlier letter in *NATURE* indicated that by ring closure in the case of stilboestrol a condensed carbon ring compound similar to oestrone on one hand and to chrysene on the other could be obtained. Since all the known carcinogenic hydrocarbons possess the condensed carbon ring structure, it was decided, by analogy with oestrone, to see if it were possible to break down the condensed ring structure of the carcinogenic hydrocarbons without losing all carcinogenic activity.

Two groups of twenty-five adult stock male mice, one group of coloured, the other of albino mice, have been painted twice weekly with a 0.3 per cent solution of α -ethyl- β -sec-butylstilbene in benzene. Fig. 1 indicates how this substance can be derived from either benzpyrene or dimethylchrysene by fission of the rings.

Two tumours have developed in these groups. One of the seven coloured mice (CM 160/40) surviving after 12 months painting, had a tumour on the edge of the painted region at the back of the neck. It grew more rapidly than was expected, reaching a size of 2 cm. $\times$ 2 cm., and became necrotic. A second tumour was found in one of the thirteen albino mice (CM 44/40) surviving after 15 months painting. This was a slow-growing tumour situated subcutaneously on the rump 2 cm. distant from the painted area. At autopsy it was hard and 1.5 cm. $\times$ 0.5 cm. in size. In neither case were any metastases found.

Histologically, the two tumours were very similar (see Fig. 2), being spindle-celled and malignant. The first one was a spindle-celled carcinoma, the second a sarcoma. Attempts to transplant the first were unsuccessful, but fragments of the sarcoma were implanted in ten stock albino mice and, at the time of writing, two months after implantation, tumours have developed in five of the ten. The largest tumour (2 cm. $\times$ 1 cm.) has been sectioned and proved to be similar to the parent sarcoma.

Fig. 2.

A further group of fifty mice is now being painted with the same compound in an attempt to confirm the results, and other chemically related compounds are being investigated. If the results are confirmed, we believe that this is the first instance of carcinogenesis associated with painting a hydrocarbon without a condensed ring structure.

No positive results have been obtained by painting mice with diphenylhexane, diphenylhexadiene or diethylstilbene for shorter periods (6-9 months) in the same way; and no tumours were found on painting groups of twenty-five coloured mice twice weekly with 0.3 per cent acetone solution of 4:4'-dihydroxy- $\alpha\beta$ -diethylstilbene (stilboestrol), 4:4'-dihydroxydiphenylhexane (hexoestrol) or 4:4'-dihydroxystilbene for similar short periods. Stilboestrol when given by this method was unexpectedly toxic, and none of the mice survived for more than three months.

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