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The spirally cut tracheal strip preparation

SIR,—Castillo & DeBeer (1947) described the tracheal chain preparation for investigating the *in vitro* action of drugs on the tracheal muscle of small laboratory animals. Modifications of this method have since been introduced by Akcasu (1952) and by Foster (1960). The original method is unsatisfactory in that the magnitude of recorded responses is small, and preparation of the chain is laborious. The subsequent modifications have overcome the first objection, but they have not eliminated the tedious preparation of a tracheal chain. The guinea-pig spirally cut tracheal strip, described here, is quickly and simply prepared, and is suitable for the investigation of spasmogens and their inhibitors.

Male guinea-pigs, 350 to 500 g, were used. The excised trachea was placed on gauze soaked with Krebs-Henseleit solution and cleaned of extraneous tissue. It was then cut, one end to the other, in spiral fashion such that 2 or 3 segments of cartilage separated each turn of the spiral. The entire strip can be used, or it can be cut in half thus providing two preparations from one donor. Each strip was suspended in a tissue bath containing Krebs-Henseleit solution at 38° aerated with 95% oxygen and 5% carbon dioxide. The strip was attached to a Grass FT.03 transducer, and contractions were recorded with a Grass polygraph. The tracheal strip contracted against an imposed tension of 5 g; less tension resulted in inconsistent results. Strips were left in the bath for 1 hr before starting an experiment; during this time the bathing medium was changed 3 to 4 times. Contractions to each spasmogen were elicited at 15 min intervals.

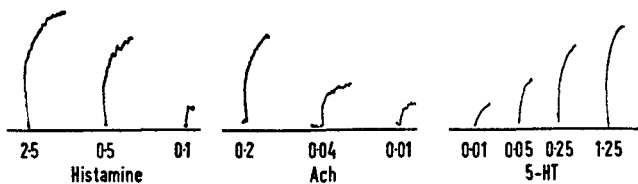


FIG. 1. Contractions of guinea pig spirally cut tracheal strips to: histamine, acetylcholine (Ach), 5-hydroxytryptamine (5-HT). Numbers refer to bath concentrations of spasmogens in $\mu\text{g/ml}$.

Fig. 1 shows responses of tracheal strips to histamine, acetylcholine, and 5-hydroxytryptamine. The strips were more sensitive to acetylcholine than to histamine. This agrees with Carlyle's (1963) finding with the guinea-pig tracheal chain, and with Jamieson's (1962) results with the isolated intact trachea. It is not in accord with Akcasu's (1952) finding that the tracheal chain is equally sensitive to histamine and acetylcholine. The sensitivity of the spirally cut tracheal strip to 5-hydroxytryptamine was approximately the same

as that to acetylcholine; Jamieson (1962) found the intact trachea less sensitive to 5-hydroxytryptamine than to acetylcholine.

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An experiment in programmed learning

SIR,—The principle of programmed instruction, by which a student is given an item of information and his understanding of it is then checked by means of a question before passing on to the next item, is not new and was in fact the method employed by Socrates. However, in recent years interest in this form of teaching, with or without the use of machines, has increased but mainly at secondary school level. The Report of the Committee on University Teaching Methods (Hale, 1964) reviews the state of programmed learning in the universities to date and concludes that the method should be applicable at university level but that its usefulness 'will require to be tested by trial and error'. It would appear that at the present time very little use is made of programmed material for undergraduate teaching in this country, the main impetus coming from the U.S.A. Even there, usage is still at an early stage in medical and similar courses (Allender, 1964) and although a few excellent programmes have been published in book form (Wolf & Crowder, 1964; Nice, O'Connell & Sykes, 1964), these are expensive and still leave very few programmes of instruction available that are directly applicable to pharmaceutical subjects (Gerraughty, 1964). The aim was to produce and use a short programme and compare this method of teaching with the traditional undergraduate lecture.

A programme was produced consisting of 60 "frames" covering 38 quarto-sized pages concerned with the mechanisms of urine formation. The method of programming was that attributed to Crowder—fairly large units of information with questions at the end of each frame which allowed for the correction of wrong responses. The material was presented in scrambled form in such a manner that answers to the question at the end of any particular frame were not in immediate juxtaposition. The experiment was made with first year undergraduate pharmacy students. The programme was given instead of lectures to 44 of the 88 students chosen alphabetically and they were asked to complete it alone, but with free reference to textbooks. The remaining group of 44 students was given two normal 1 hr lectures, care being taken to cover during the course of the lecture every item of information included in the programme. After one week had elapsed both groups were given a 30 point objective test of a fairly searching nature designed to check both factual knowledge and understanding. An analysis of the results of a previous and more extensive examination had shown that the mean marks of the two groups were statistically indistinguishable. In addition those students who had read the programme were