A simple applicator for preparative thin-layer and paper chromatography

One of the most important factors in the resolution of a mixture of different substances by thin-layer or paper chromatography is the size of the spot or streak initially applied to the chromatogram; in general, the smaller the size, the better the resolution. The problem of keeping the size of the spot down to a minimum is comparatively simpler than that of obtaining a fine, straight, streak. This problem is even more acute in the case of thin-layer chromatography owing to the fragility of the surface of the layer.

There are at present at least two devices available for streaking thin-layer chromatograms[1,2]. Both of these are commercially available*, but are rather expensive for what they do. The apparatus described below is simple to construct from perspex, costs very little, and utilises an Agla Micrometer Syringe which is available in all routine or research laboratories. The dimensions for the apparatus are of little importance and can be varied to suit personal requirements.

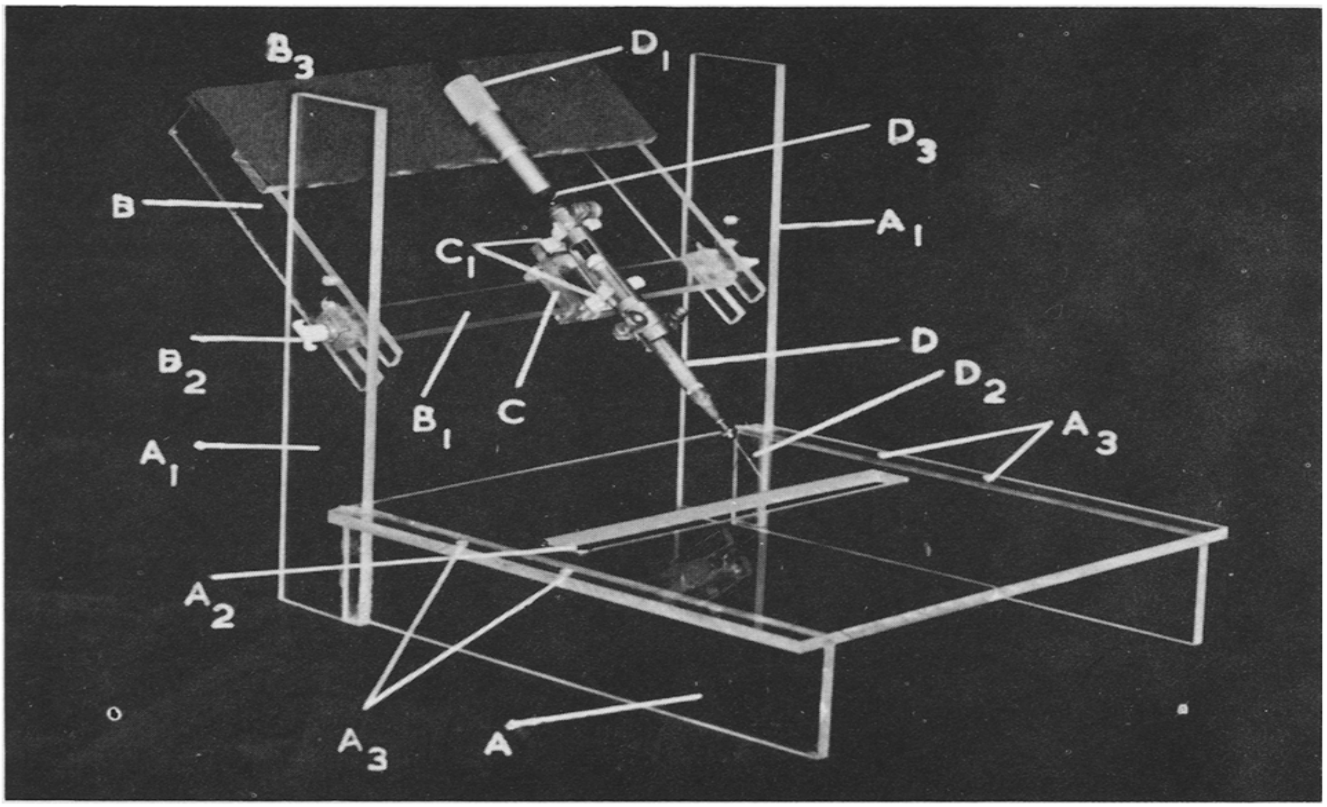

Fig. 1. Photograph of the applicator (1/5th reduction of actual size).

The apparatus (see Fig. 1) consists of a platform (A) and three detachable parts, a stage (B) and a cradle (C) for holding the Agla micrometer syringe (D). The apparatus is made of ¼ in. thick perspex sheet throughout. The stage supports (A_1) have holes drilled through them to accept screws fixed in the guide bar (B_1) of the stage. Fly nuts (B_2) can be tightened to allow the angle of the stage to be adjusted.

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The cradle (C) should slide freely along the guide bar (B_1) without any play. Two Terry-clips (C_1) are screwed into the cradle and the metal syringe holder is clipped into them. The height of the cradle is determined so that when the syringe is fixed in the clips, the knurled micrometer screw (D_1) lies flat on the felt which is pasted on to the friction bar (B_3). A very fine plastic cannula* (0.5 mm i.d.) (D_2) which is stretched by pulling is fitted on to the needle of the syringe. The stretching softens the nylon cannula so that it does not damage the surface of the thin layer if it touches it during the streaking.

The glass syringe is now loaded with the solution to be streaked and fitted on to the micrometer. The screw (D_3) is tightened to prevent any accidental release of the solution. The thin-layer plate is placed on the platform (A) and the stage (B) is tilted to allow the point of the cannula (D_1) to be just above the thin layer. After this final adjustment, the fly nuts (B_2) are tightened and the cradle containing (D) is moved over to the extreme right of the bar (B_1). The screw (D_3) is loosened and the cradle moved very gently and at a uniform speed until it reaches the opposite end of the bar (B_1). During the progress of the syringe along the bar, a very fine stream of the solution will be applied as a fine straight streak on the thin layer. The process can be repeated as many times as necessary, taking care to lock the screw (D_3) between each operation.

The apparatus can also be used for applying streaks to paper chromatograms by a slight modification. A slit (A_2) ¾ in. wide is cut in the platform and four holes (A_3) are drilled in it. A flat piece of perspex conforming with the slit and the holes is used for clamping down the piece of paper by means of screws inserted into the holes (A_3) and secured by fly nuts. The mode of applying the streak to the paper is the same as that for the thin layer.

Using the above technique, it has been possible to resolve the optical isomers of 5-hydroxy-DL-tryptophan on a preparative scale (to be published).

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* Trade name E.R.P. available from ESCO (Rubber) Ltd., Seal Works, Seal Street, London E.8.