It is apparent that, of the solvents used, No. 4 was perhaps the most satisfactory, although with sodium tetraborate it induced a double spot. This may be attributed to dissociation from the tetraborate to give some monoborate ion.

It is thus evident that the biologically active boron compounds here used may be successfully separated by paper chromatography, and also detected in microgram quantities on paper. In addition, the method of detection appears to have a more general application to other metallic hydroxides.

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Chromatography on starch columns

MOORE AND STEIN[1] showed that phenylalanine, tyrosine and tryptophan could be separated on a column of starch using 0.1 *N* hydrochloric acid as the developing solvent, and suggested that the retardation was due to adsorption. Other workers have employed starch columns developed with immiscible solvents for the chromatography of the iodotyrosines[2] and purine–pyrimidine mixtures[3]. Using a starch (Morning Star Nicol, Inc., N.Y.) column and 0.1 *N* hydrochloric acid phenylalanine, tyrosine, monoiodotyrosine, tryptophan and diiodotyrosine have been easily and quantitatively resolved (Fig. 1).

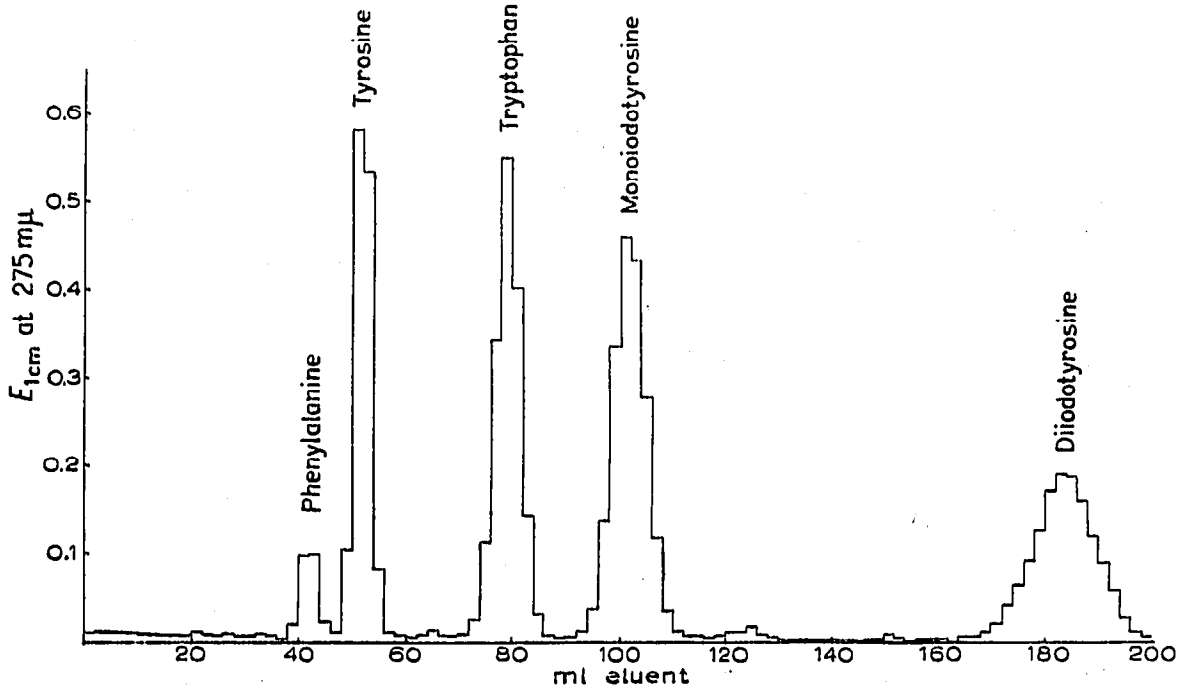

Fig. 1. Separation on a starch column 45.3 × 1.2 cm.

Other mixtures have also been separated by means of this system (Table I). It is interesting to note that on changing the developing solution from 0.1 *N* hydrochloric acid to 0.025 *N* sodium borate, pH 9.3, the retention of tryptophan was unaffected but that of diiodotyrosine was reduced to give a peak coincident with that of tyrosine (column 4). Table I also summarizes the results obtained with purines and pyrimidines.

TABLE I

Column	*Size (cm)*	*Eluting medium*	*Compound and retention volume (ml)*
1	45.3 × 1.2	0.1 *N* HCl	Phenylalanine (42), tyrosine (51), tryptophan (79), monoiodotyrosine (101), diiodotyrosine (184)
2	50.1 × 1.2	0.1 *N* HCl	Tyrosine (56), dihydroxyphenylalanine (61)
3	21.0 × 1.2	0.1 *N* HCl	Tryptophan(36), 5-hydroxytryptophan(42)
4	21.5 × 1.2	0.025 *N* borate	Tyrosine and diiodotyrosine(24), tryptophan(36)
5	21.5 × 1.2	0.025 *N* borate	Xanthurenic acid(12), kynurenic acid(15)
6	50.1 × 1.2	0.025 *N* borate	Nicotinic acid(44), tryptophan(87)
7	56.5 × 1.2	0.1 *N* HCl	Thymidine(39), cytosine(48), adenine(65), guanine(73)
8	56.5 × 1.2	0.1 *N* HCl	Uric acid(73).

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