Table 2. NITROGEN FIXATION BY TWO *Bacillus* STRAINS AS INDICATED BY ASSIMILATION OF ISOTOPIC NITROGEN

Determination No.	Culture	Total nitrogen (mg/sample)	pH of supernatant solution	Time of exposure to $^{15}\text{N}_2$ (h)	Atom % ^{15}N excess	Aeration conditions during exposure to $^{15}\text{N}_2$
1	<i>Bacillus</i> 170	0.53	4.6	24	0.45	aerobic (16% O_2 * at end)
2	<i>Bacillus</i> 170	1.16	4.5	48	0.49	anaerobic
3	<i>Bacillus</i> 170	1.04	4.5	48	0.24	anaerobic
4	<i>Bacillus</i> 301	1.19	4.8	48	0.10	aerobic (9% O_2 * at end)
5	<i>Bacillus</i> 301	1.19	4.8	48	0.43	anaerobic

* Determined mass spectrographically.

asterosporus, now considered to be identical with *B. polymyxa*⁷. In contrast, Wilson *et al.*^{4,5} found in their investigations on nitrogen-fixing strains of *B. polymyxa* that fixation was almost completely inhibited when 1 per cent of air was present in the gas phase.

The presence of hydrogenase, which may be related to nitrogen fixation⁸, was reported in the case of the foregoing strains of *B. polymyxa*^{4,5,9}. The presence of 7 and 3 per cent hydrogen gas (measured by means of the mass spectrograph) at the end of the gassing period in determinations 4 and 5 respectively (Table 2) suggests the presence of hydrogenase in strain 301 also. Only a trace (<0.01 per cent) of hydrogen was present in the case of the first determination and no measurements of gas concentrations were made for determinations 2 and 3. Hence no evidence is presented for the presence of hydrogenase in strain 170.

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Stabilizing Experimentally Leached Soil Columns with Synthetic Resins

EXPERIMENTALLY leached soil columns can be prepared for examination under the microscope by first stabilizing them with a polyester resin. To do this with least disturbance to phenomena developed in the columns, they ought to be kept wet during the whole process.

Water, which inhibits setting of the resin, must therefore be removed by displacement instead of drying. A successful technique has been to: (1) displace water from the column by perfusing with acetone (previously dried to ≤ 0.15 per cent water with anhydrous potassium carbonate) until a sample of the eluate causes no turbidity or layering after shaking with four volumes of petroleum ether; (2) displace acetone from the column by perfusion with monostyrene until no colour develops when 5 per cent nickel acetate solution is added to a mixture of equal parts of the eluate with a solution of hydroxylamine

Fig. 1. Apparatus for forcing resin mixture through a column

hydrochloride and sodium acetate¹; (3) replace monostyrene with resin mixture (Fig. 1) (the resin chosen in this instance was *Marco Resin SB28C*, supplied by Scott Bader and Co., Ltd., Wollaston, Wellingborough, Northants; the diluent for it is monostyrene²); (4) polymerize by heating.

Both acetone and styrene move readily through the columns, but the resin does not. Positive pressure applied at the top of the column (Fig. 1) is effective in making it do so, and is much more efficient than the alternatives of applying pressure from below or suction from above or below.

Complete replacement of monostyrene by a suitable resin mixture is desirable if later work on the samples is to include optical mineralogy. If the optical properties of the resin are not important, the method can be shortened by using polymerization of monostyrene, with or without added resin mixture, to stabilize the columns.

A series of columns treated in this way has since been cut and polished or thin-sectioned satisfactorily. All the structures appear to have been adequately and faithfully preserved. Some organic staining was considerably bleached.

The procedure was worked out with the help of colleagues in the Pedology Department at Rothamsted Experimental Station.

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