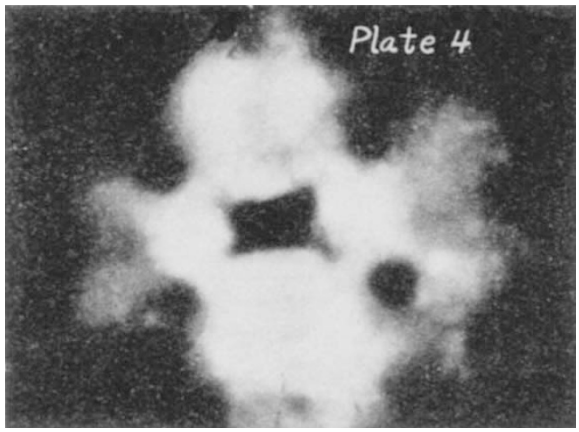

Fig. 4. The pattern of ammonia has the characteristically bright and dark regions along the (001)–(011) zone. $e\Delta\varphi$ is about −0·1 eV.

These results indicate that N(a) on one hand and NH(a) and/or NH_2(a) on the other hand are walled off from each other by a slow step, which is just surmounted in either direction by the later heat treatments; hence the conclusion (2) is arrived at, suggesting that catalysed ammonia synthesis proceeds through the sequence of steps: $N_2 \rightarrow 2N(a)$, $H_2 \rightarrow 2H(a)$, $N(a) + H(a) \rightarrow NH(a)$, $NH(a) + H(a) \rightarrow NH_2(a)$ and $NH_2(a) + H(a) \rightarrow NH_3$.

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K. Azuma

Research Institute for Catalysis,
Hokkaido University,
Sapporo, Japan.

Detection of Trace Quantities of Acenaphthene by Gas Chromatography

In the course of investigations into the *c*-mitotic effect we wished to determine the acenaphthene uptake in the root tips of onions grown in a saturated water solution of acenaphthene. As the quantities expected were of the order of μ, the very sensitive flame ionization detector described by McWilliam and Dewar[1] was used. A 6-in. long $\frac{1}{8}$-in. bore column packed with 60–80 mesh brick dust carrying 15 per cent w/w silicone oil was used for the analysis, and pure hydrogen was used as the carrier gas.

Because of the small amounts of material being handled it was necessary to introduce the samples on to the column in a solvent. For this purpose it was found that redistilled commercial 'Decalin' (b.p. 184–187° C.) was suitable. At the temperature of the column (183° C.) the main peaks of the 'Decalin' had been eluted before the appearance of the acenaphthene peak, and, although the sample used 'tailed' badly, the tailing was not sufficiently serious to interfere badly with the detection of acenaphthene.

More volatile solvents or solvent mixtures had, of course, very short retention times, and tended to give a sooty flame which interfered with the operation of the detector.

Tests with prepared solutions showed that we could detect quantities as small as 0·2 μgm. acenaphthene.

Onion roots were treated with ether and the extract, after evaporation to dryness at room temperature, was redissolved in 0·25 ml. decalin. 20-μl. samples of decalin solution were injected on to the head of the column. The detector sensitivity was turned down to minimum until the main decalin peaks had been eluted and was then increased until the 'noise-level' was about 2 per cent of full scale.

Chromatograms made with extract from onions grown in pure water showed no peaks in the region about the retention time of acenaphthene. The extract from onions grown in acenaphthene solution and showing *c*-mitotic activity gave peaks which on comparison with the test chromatograms correspond to about 5 μgm. acenaphthene (that is, about 60 μgm./gm. of root tip).

An attempt was made to determine the solubility of acenaphthene in water. 10 ml. of saturated solution was evaporated to dryness and any residue dissolved in 0·25 ml. decalin. No trace of acenaphthene was found in this solution. The solubility of acenaphthene is therefore less than 250 μgm./l. These results suggest a considerable uptake of acenaphthene in the root tips, the significance of which will be discussed in a later paper in conjunction with other experiments on the *c*-mitotic effect.

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W. G. H. Edwards

Department of Chemistry,
Royal University of Malta.

J. G. Clarke
A. G. Williamson

Department of Chemistry,
University of Otago,
Dunedin, New Zealand.

[1] McWilliam and Dewar, *Nature*, **181**, 760 (1958).

Polypeptide Formation from Asparagine under Hypothetically Primitive Conditions

This is a report of the formation of polyaspartic acid from asparagine[1] in aqueous solution under conditions which satisfy suggested primitive terrestrial conditions[2] better than thermal polycondensation[3,4].

When an aqueous solution of L-asparagine (5–10 per cent) was refluxed for several days, a part of the asparagine hydrolysed to aspartic acid; the other somewhat larger part formed a non-crystalline product[5]. This non-crystalline product was a mixture of aspartyl oligo- and poly-peptides which were separated as either water-insoluble Cu(II) or Pb(II) salts. Lyophilization of the solution of the free peptides, obtained with hydrogen sulphide from the salt, gave a white material. The yield was 62 per cent. When the polymerization of asparagine was carried out at 70–75° instead of 100°, the yield was 18 per cent. Van Slyke amino-nitrogen determination and dinitrophenol end-group analysis indicated average molecular weights between 380 and 530, corresponding to 3·3 and 4·4 units per molecule. Paper chromatogram (butanol–water or phenol–water) demonstrated the presence of a series of aspartic acid peptides, polypeptides and some aspartic acid. β-Aspartylaspartic acid was identified as being one of the oligopeptides present by comparison of the R_F value with that of an authentic sample[6].

Polyaspartic acid of higher molecular weight was obtained by dialysis of the original solution or of the