Dr. Rees has provided valuable information for this work. While it would be premature to report the result of the experiments, it can be stated that confirmation of the presence of manganese and aluminium toxicity has been obtained at Leeds.

A matter of general interest is that the manganese and aluminium toxicities found in the 'fly ash' are associated with high alkalinity, namely, *p*H 8·5 and higher in the Leeds samples. Manganese and aluminium toxicities in Britain are usually part of the 'toxicity-deficiency' complex of acid soils. There are reports of aluminium toxicity from some of the alkali soils of the United States, however[2]. Preliminary results in pot-experiments suggest that reduction of the *p*H by various means has a considerable effect upon these toxicities and can lead to increased plant growth.

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A New Imino-Acid in some Liliaceae

LINKO and I[1] isolated, last autumn, from *Polygonatum officinale* (and also from *Convallaria majalis*), a new imino-acid which on acid hydrolysis gave mostly homoserine. The elementary composition of the new compound corresponded to the formula $(C_4H_7O_2N)_n$ and had $[\alpha]_D^{20}$ − 118·4° (in water). The compound had all its carboxyl groups free and contained no primary but only secondary amino-groups. Because the compound contained no double bonds, it must have a cyclic structure. A 4-membered ring containing an imino-group and a free carboxyl group linked to the ring could have satisfied the formula, but using the method of Wendt[2] a molecular weight of approximately 300 was found, which is three times as high as that calculated for the simple molecule (six determinations in concentrations of 0·63–2·22 per cent in a non-polar solvent, the lactam of 4-amino-*cyclo*-hexane-carboxylic acid; calculated for $(C_4H_7O_2N)_3$, 303·3). On the basis of the molecular weight found, the compound seemed not to contain a simple 4-membered ring, even if all other known facts suggested this structure, but a corresponding ring three times as large and with three imino-groups in a ring to which three free carboxyl groups were linked. There was no other possibility of explaining the high molecular weight.

Fowden[3] isolated recently the same compound from *Convallaria majalis* without knowing of our work. His results are in good agreement with ours, with one important difference. Using the method of Barger, he found a molecular weight of approximately 100 for the compound, which thus probably contained a 4-membered ring containing an imino-group, and also a free carboxyl group. He has confirmed this conception by comparing the isolated compound with synthetic azetidine-2-carboxylic acid.

There is no doubt about the identity of the compounds isolated by us and Fowden. The three-fold molecular weight found by us is apparently wrong. The method of Wendt gave a correct molecular weight for some dipeptides and amino-acids in control experiments, but seems for an unknown reason not to be suitable in the present case.

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Use of a Computing Machine as a Mechanical Dictionary

THE method for locating 'words' in a 'dictionary' proposed by Booth in his recent communication[1] has been standard practice for a long time in coding edge-punched cards used for indexing scientific literature and for many other purposes. Thus, if one denotes a consecutive series of holes 1, 2, 4, 8, . . . , any number may be represented by punching the appropriate combination of holes with a ticket punch so that they become slots communicating with the edge of the card; for example, the number 678 would be indicated by slotting 2, 4, 32, 128, 512. To find a desired card, it is necessary to ask N 'questions' if the numbers run up to $(2^N - 1)$; in practice, one inserts a knitting needle into each hole in turn, rejecting or retaining (as appropriate) cards which remain hung up on the needle when the pack is lifted from the table and shaken.

The system has another interesting property[2]: that $(2^N - 1)$ cards can be sorted into perfect serial order by only N successive operations of one needle. Thus if there are up to 1,023 cards, the code will consist of ten holes, denoted 1, 2, 4 . . . 512. To sort the cards, one inserts a needle in the hole 1; all cards which drop out of the pack when it is lifted are replaced behind it without disturbing their order. This operation is repeated with the hole 2, the order of the cards being carefully preserved, and so on along the series. After the hole 256 has been dealt with, it will be found that the pack is in exact numerical order; to sort the 1,023 cards required only ten operations. It is a consequence of the method of representation of the numbers that in theory the economy of the method increases as the number of cards become greater—even though in practice the mechanics may become more difficult. To take the example of Booth's lecture demonstration[1], a set of cards, on each of which was written a single entry of the Concise Oxford Dictionary, could be arranged in alphabetical order in fourteen operations: and even the half-million entries in the thirteen-volume Oxford English Dictionary would need only nineteen operations.

At the cost of using a few more holes and a number of knitting needles simultaneously, a more rapid 'selecting' procedure is possible; with n holes one can code ${}_nC_{n/2}$ items (if n is even) and select any desired card in a single operation using $n/2$ knitting needles simultaneously (for example, 924 items with a twelve-hole code using six needles: twenty-two holes and eleven needles for the Oxford English Dictionary). On the other hand, serial sorting becomes more complicated.

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