Molecular Rearrangement of Arylimino Diaryl Carbonates

IN the course of work on the properties of arylimino diaryl carbonates, we have found that phenylimino diphenyl carbonate (I)[1,2,3] rearranges quantitatively to phenyl diphenyl carbamate (II)[4] on heating at 330° for one hour, or on slow distillation at *c.* 360°. No by-products could be detected, and no indication of reversibility of the rearrangement could be found.

$$\underset{\text{(I)}}{PhN : C(OPh)_2} \rightarrow \underset{\text{(II)}}{Ph_2N.COOPh}$$

This rearrangement of the triad system

$$-N=C-OR \rightarrow -RN-C=O$$

recalls the observations of Chapman[5], who found that N-phenyl benziminophenyl ether, PhC(NPh)OPh, rearranged irreversibly to give N-benzoyl diphenylamine, $PhCONPh_2$, on heating for one hour at 270–300°.

We have been unable to demonstrate a similar rearrangement of the sulphur analogue of (I), phenylimino diphenyl dithiocarbonate $PhN : C(SPh)_2$, prepared from phenyl carbylamine chloride and sodium thiophenate. This compound remained unchanged on heating at 330°, and on distillation at *c.* 370° was recovered unaltered, though a little disruptive decomposition may have occurred, indicated by the odour of thiophenol produced. This finds a parallel in the work of Chapman[6], who found that the sulphur analogue of N-phenyl benziminophenyl ether, namely, PhC(NPh)SPh, remained largely unchanged under conditions which sufficed for the complete rearrangement of the former. At higher temperatures (> 320°), however, decomposition occurred giving products indicative of reversible rearrangement having occurred.

Unsymmetrical analogues of phenylimino diphenylcarbonate, $PhN : C(OR_1)(OR_2)$, where R_1 and R_2 are alkyl or aryl groups, have been prepared via the iminochloride $PhN : CCl(OR)$, and work on their rearrangement, aimed at determining the relative ease of migration of different groups, is in progress and will be reported in full elsewhere.

The rearrangement affords a convenient method for the synthesis of unsymmetrically substituted derivatives of phenyl diphenyl carbamate and hence of diphenylamines.

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Green Pea Juice as a Medium for the Production of Penicillin

AQUEOUS extracts of ground dried peas form a good medium for the production of penicillin[1]. There are, however, certain disadvantages in the use of such material on a large scale, although it forms a very convenient basis for a scheme of fractionation of the active constituents concerned[2]. Last summer we found that a press juice made from entire green peas (seeds and pods) formed an excellent medium for penicillin production.

2,200 gm. of entire peas were put through a juice extractor and yielded 1,450 ml. (1,520 gm.) of juice. A medium was made up containing NaCl 10 gm., $NaNO_3$ 3 gm., KH_2PO_4 0·5 gm., $MgSO_4.7H_2O$ 0·25 gm., lactose 30 gm., pea juice 100 ml. and tap water to 1 litre. The *p*H was 5·8. After mixing well and bringing to the boil, the medium was clarified either by passing through paper pulp or by centrifuging.

The medium was placed either in 40 ml. amounts in 250 ml. conical flasks or 200 ml. amounts in Roux bottles. After autoclaving for 15 min. at 15 lb. pressure the medium was seeded with a culture of *Penicillium notatum* 1,249 *B* 21. The flasks were incubated at 24°. Flasks containing the Coghill medium were set up at the same time.

Penicillin production was assayed both by the dilution method and by Brodie's[3] method. Typical results obtained were: Pea medium 150 units per ml. after 9 days, Coghill medium 150 units per ml. after 9 days. With both media values ranging from 125–225 units per ml. were found in different flasks.

A striking feature of the pea medium is the rapid covering of the surface of the culture medium.

Yields of 80–100 units per ml. were obtained with the diluted pea juice to which only sodium chloride had been added. The residue left after making the pea juice is inactive. The pea juice may be preserved either in a dry form or in the frozen state. The cost of peas to prepare such a medium would be, for peas at 54*s.* per cwt., 9*d.*–10*d.* per gallon of medium.

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Assay of the Rates of Secretion of Antibiotic in Different Regions of a Growing Mould Colony

IN research on antibiotics, one field is conspicuously blank: that of how a species produces a certain antibiotic. There is no definite answer for any antibiotic to even such elementary questions as: Is the metabolism of the antibiotic linked up with cell multiplication and growth? Is the antibiotic an intra- or extra-cellular metabolite? Is it secreted from the same cells that produce it, or is it secreted from a different part of the mycelium? A technique which may help in solving parts of these problems has now been worked out.

Colonies are grown on disks of permeable 'Cellophane 600' over a very dilute agar medium (for example, Czapek-Dox diluted fifty times). The medium may be kept constant, if the aim of the experiment requires it, by transferring the 'Cellophane' disk with the colony to another Petri dish as often as necessary. When the colony has reached the desired diameter, it is transferred for periods of one hour three or more times on to fresh medium: this removes any appreciable amount of lingering antibiotic. The colony is then transferred on to hard (3 per cent) agar 3 mm. deep and left there for a short time (10 min.–1 hr.): the antibiotic secreted during this time diffuses into the agar. The colony is removed and can be tested again if required. The region of the agar over which the colony was lying is immediately punched all over with a glass tube 3 mm. in diameter. The resulting small cylinders of