CHEMISTRY OF PENICILLIN

By the Committee on Medical Research, O.S.R.D., Washington, and the Medical Research Council, London

This brief summary of results obtained by British and American chemists, issued under the joint auspices of the Committee on Medical Research (O.S.R.D., Washington) and the Medical Research Council (London), is a preliminary notice of the principal findings secured up to the end of 1944 in a collaborative effort of a large number of investigators, unnamed at present. It implies some corrections of published data; authors of early publications are among those who have cleared up these points. For the sake of clarity, the account is not given in chronological order of development. The primary object of this communication is to disclose significant facts which have been confirmed by unequivocal synthesis and to record a few essential points which are still matter for conjecture. Full details will be published at a later stage, together with an account of experiments not referred to in this report.

Several antibiotics of the penicillin class are known and all have the empirical formula C₆H₈O₇SN₂·R. In F-penicillin (known in Britain as penicillin-I), R is Δ₄-pentenyl, -CH₂·CH·CH·CH₂·CH₃, in dihydro-F-penicillin, R is n-aminil; in G-penicillin (known in Britain as penicillin-II), R is benzyl; in X-penicillin (also known as penicillin-III), R is p-hydroxybenzyl; in K-penicillin (a recent addition to the series), R is n-heptyl. The best elementary analyses are of pure crystalline sodium salts. Determinations of the molecular weights of the sodium salt and of the methyl ester of G-penicillin indicate that the empirical formulae truly represent the molecular weights.

The penicillins are strong monobasic acids of pK about 2.8; electrometric titration does not disclose the presence of a basic group. Slow titration with perchloric acid in acetic acid solution indicates such a group, but the penicillin is biologically inactivated by this treatment; rapid titration gives a negative result.

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Editor's Summary

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