active about the twenty-fourth day and were still active after fifty days. During the first phase kojic acid was present in the solutions, which were active not only against the Gram-positive organisms *Staphylococcus aureus*, *B. megatherium* and *Bact. fascians*, but also against a range of Gram-negative bacteria, namely, *E. coli*, *Ps. pyocyaneus*, *Chr. prodigeosus*, *Ps. fluorescens liquefaciens*, *Bact. aerogenes* and *B. carotovorus*. During the second phase the solutions inhibited the growth of Gram-positive organisms only.

When 1, 2 or 4 per cent lactose was used in place of glucose, all the lactose cultures and those containing 1 and 2 per cent of maltose were similar in antibiotic production to those containing 1 per cent of glucose; in 4 per cent maltose antibacterial activity exactly paralleled that produced in 4 per cent glucose solutions, with a transient formation of kojic acid during the first phase of activity.

Attempts were made to find convenient substitutes for yeast extract, without which antibiosis was considerably delayed and was less pronounced. Freshly prepared extract of bakers' yeast and an extract of lettuce seedlings were effective supplements, but individual compounds such as aneurin, lactoflavin, pantothenic acid, pyridoxine, *p*-aminobenzoic acid, or heteroauxin, were almost valueless. The dual phase of activity when 4 per cent glucose was used in these media was apparent in the culture fluids of all these solutions, though it was not always so clearly marked as in the experiments described above.

Clearly at least two antibiotics were produced in these experiments, the speed of their production apparently depending on the availability of the carbohydrate nutrient; but it is possible for the following reasons that more than two antibiotics were being formed. (*a*) The activities against the range of organisms examined did not run parallel during the first phase. For example, in 4 per cent of glucose after eight days, the solutions inhibited *Staph. aureus* at a dilution of 1 : 100, with only a trace of activity against *E. coli*; after ten days the solution was about equally effective (limiting dilution 1 : 100) against these two organisms, whereas after sixteen days it was less active against *Staph. aureus* than against *E. coli*. (*b*) During the early part of the first phase of activity, kojic acid was detectable in solution and was readily isolated; its activity proved to be small, as it inhibited *Staph. aureus*, *E. coli* and *Ps. pyocyaneus* at a limiting dilution of 1 : 2,000–3,000, and there was a very considerable discrepancy between the amounts of kojic acid isolated and the amounts which would have been anticipated if it had been responsible for all the antibacterial activity. Moreover, kojic acid disappeared from the solutions before the latter part of the first phase was reached and did not reappear during the more restricted second phase.

Several products from kojic acid (for example, mono- and di-acetyl, monobenzyl, monomethyl ether derivatives) were examined, but their effectiveness against *Staph. aureus* was negligible. The antibiotic produced during the second phase was easily extracted from acid solution by ethyl acetate and the activity could be recovered in neutral solution. The chemical nature of these products is being examined. It is evident in these experiments that even though kojic acid is produced, only a part of the antibacterial activity can be ascribed to this compound.

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Root-formation on Cuttings of Plants which Normally do not Root

THE process of rooting of cuttings has proved to be a very complex problem. A good deal of work has shown that root-formation on stem and leaf cuttings depends on many factors, of which auxin and carbohydrate are the most important[1,2,3]. This work has enabled many investigators not only to produce, more quickly, more numerous roots on cuttings which normally root easily, but also to induce root-formation on cuttings which normally do not root. Thus Cooper[4,5], Hitchcock and Zimmerman[6], and many others have obtained excellent root-formation on cuttings of many economically important plants by application of auxin alone or with sugar solution.

In the present investigation, we are trying to induce rooting of cuttings from *Bougainvillœa spectabilis* var. *Lateritia*, and *Mangifera indica*. Cuttings of *B. spectabilis* usually root successfully (success is normally 50–60 per cent); but cuttings from the variety *Lateritia* do not root normally. We have, however, succeeded in inducing root-formation on 50 per cent of woody cuttings from the latter variety by basal application of β-indole acetic acid solution. Different concentrations of the latter have been used for different periods of time, the optimum concentration being 0·015 per cent for a period of twelve hours. Feeding with sugar solution after the application of hetero-auxin did not increase the number of rooted cuttings, thus suggesting that the cause of failure of these cuttings to root under normal conditions is the shortage in the auxin and not the food factor.

Cuttings of *Mangifera indica* have been more difficult to root; but the experiments, which are now in progress, seem to indicate that these cuttings do respond to auxin application. Basal application of β-indole acetic acid solutions induced formation of root initials on these cuttings (collected last autumn), but the cuttings shrivelled and died later in the winter. Cuttings will be collected and treated in different seasons, and the results will be communicated later.

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