toxin-induced halo around the site of inoculation (in about 6 to 8 days) disks were punched with a miniature cork borer from the bacteria-free parts of the halos and from the normal green areas of the same leaf respectively (control). The activity of glucose-6-P-dehydrogenase was measured in cellfree extracts from the affected and control tissues according to standard spectrophotometric techniques. As shown in Fig. 1 (a, b) the activity of glucose-6-P-dehydrogenase was increased by about 250 per cent over the control. The activity of 6-phosphogluconic dehydrogenase was also markedly higher in the affected areas.

To eliminate the possibility of any contamination by bacterial cells the Pseudomonas tabaci strain used in these investigations was cultivated for 48 hours on Czapek-Dox nutrient and the experiments were repeated by the use of culture filtrates. The culture filtrates were injected into the intercellular spaces of half leaves (intact plants); the other halves of the same leaves injected with Czapek-Dox nutrient served as controls. Samples were taken at various intervals after injection and the enzyme activity was determined. After 3 days, as shown in Fig. 1 (c-e), the activity of glucose-6-P-dehydrogenase was increased in this case too. Other types of controls were also used: (1) one half of the leaves was injected with Czapek-Dox nutrient and the other with H2O and (2) one half with H2O and the other remained entirely intact. The comparison of half leaves indicated that the injection of Czapek-Dox nutrient hardly affects the glucose-6-P-dehydrogenase activity as compared to the water control. However, the injection of water itself leads to an increased enzyme activity over the untreated control (Fig. 1 e, f).

The above results show that the response of host tissues attacked by different pathogens is similar: the activity of the first two enzymes of the hexose monophosphate shunt increases. The eventual contribution of the enzymes of the pathogen to the changes observed was eliminated in the virus work2) and in the present studies with bacterial culture filtrates. The effect is obviously indirect and we are facing a typical "response" of the host tissues. The results presented, particularly those obtained by the injection of pure tap water, give a good evidence for the non specificity of the reaction. The response (increased enzyme activity or synthesis) is apparently evoked by a stimulus migrating from the site of damage. This phenomenon seems to be related to the higher enzyme activities found in sliced and washed tuber tissues3). It is possible that the more intensive operation of the pentose phosphate shunt in diseased tissue4) and in washed tuber slices 5) might be explained by the same phenomenon, i.e. by an increased activity (synthesis) of some of the enzyme systems involved. The similarity between the metabolic alterations in washed tissue slices and diseased tissues is also indicated by the increased "TPNH oxidase" activity characteristic for both cases 2b), 6).

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Gibberellin Activity of Steviol, a Plant Terpenoid

Gibberellin responses are highly specific, i.e. they have not been produced by any other chemical, and no gibberellinanalogs, either natural or synthetic, have so far been reported. It is therefore of interest that a plant diterpenoid, steviol, gave a distinct reaction in a system, the d-5 dwarf mutant of Zea mays, which so far has responded only to gibberellins1). Steviol (I) is the aglycone of stevioside, a glycoside abundant in Stevia rebaudiana, a member of the composites. The aglycone is obtained after enzymatic hydrolysis, acidic hydrolysis yielding iso-steviol²),³). The absolute configurations of steviol and iso-steviol (II) have recently been announced 4),5). Stevioside has three glucopyranose units attached to the aglycone2).

The chemicals (steviol as sodium salt) were applied to the test plants 5 days after germination in 0·1 ml of a 0·05% Tween-20 solution. The plants were raised in 27 °C and 8 hours light daily (approximately 900 foot-candles warmwhite fluorescent tubes plus incandescent lamps). Seven days following treatment the sum of the first and second leaf sheath was recorded. The response to steviol along with that to

gibberellin A_3 (III) is shown in Fig. 1. It can be seen that approximately the same response is obtained with 10 μg steviol and 0.1 μ g gibberellin A_3 per plant. Although the activity of steviol is thus considerably lower than that of gibberellin A_3 the response is highly significant. Iso-steviol, in which the C/D ring has a spatial arrangement different from that in the gibberellins, was inactive.

The specific structure of the A ring of the gibberellins has been considered as of primary importance for its biological

activity, the presence of the lactone ring being particularly emphasized ⁶), ⁷). Steviol is lacking in the lactone Allogibbereric acid, ring. which has the same structure as A_3 except for the absence of the lactone ring, is inactive in most gibberellin tests 6), 8), but was found to have apparent gibberellin activity in delaying flowering in peas by 0.5 nodes while it did not affect stem elongation in the same plant 9). From degradation of C14-labelled gibberellic acid it was concluded that a tricyclic diterpene skeleton may participate as precursor in the biosynthesis of gibbe-

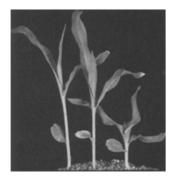


Fig. 1. Growth response of dwarf mutant d-5 of Zea mays to 0.1 μ g gibberellin A_3 (left) and 10 μ g steviol (center). Right = untreated control

rellin. In ring B, contraction with the formation of a cyclopentane-carboxylic acid unit via a 9:10-dioxygenated intermediate was shown to occur from the labelling pattern¹⁰). From these results it appears that steviol may add to our understanding of the structural specificity and the biosynthesis of the gibberellin molecule. Further studies with the compound are therefore in progress and will be reported later

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