tence d'une fraction qui migre rapidement vers la cathode et qui se manifeste principalement au cours de la phase exponentielle. Les caractéristiques de cette fraction laissent suggérer une composition chimique et un rôle physiologique assez particuliers. L'existence de fractions semblables a également été observée à partir d'autres préparations d'entérobactéries.

Discussion. Divers procédés de fractionnement électrophorétique des protéines endocellulaires ont déjà été proposés pour la différenciation et la taxonomie des microorganismes[3-11].

Les résultats rapportés dans le présent travail montrent les possibilités analytiques de l'acrylamide-agarose et son intérêt non seulement pour la taxonomie mais aussi pour l'exploration de la synthèse des protéines bactériennes. Le fractionnement électrophorétique pouvant être rendu plus spécifique ou plus sensible par l'emploi de réactions enzymatiques ou immunologiques, il sera possible de préciser la nature et la signification physiologique des diverses fractions obtenues, et d'étudier les variations des distributions électrophorétiques en fonction des conditions de culture ou des modifications du génome bactérien.

Summary. Acrylamide-agarose gel electrophoresis was employed to separate proteins obtained by sonication of various gram negative bacilli. The bulk of bacterial protein migrate at pH 8.7 to the anode, but often some fractions are quickly migrating to the cathode. Some 30 fractions can be distinguished this way. This technique proves interesting for the study of microbial protein metabolism and may easily be applied to numerous bacteria.

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Gibberellin-Sugar Interaction Regulating the Growth Habit of Bermudagrass (*Cynodon dactylon* (L) Pers.)

Little evidence is available on the role played by hormonal and nutritional factors in the plagiotropic[1] responses of rhizomes and stolons of grasses. Existing reports[2], however, suggest that a balance between the levels of auxins, gibberellins and cytokinins in the plant are of importance in the growth habit of diageotropic organs.

In this connection, this laboratory has recently reported[3] that gibberellic acid (GA_3) induced the upward curvature of horizontally growing stolons of bermudagrass (*Cynodon dactylon*). This was obtained either by spraying the parent plant or by immersing the stolon tips in GA_3 solutions. Moreover, it was shown that this can also be studied by using 'explants' consisting of apical pieces of stolons, 10 cm long.

Further experiments established that a daily spray of 100 mg/l GA_3 to plants growing in the field provoked the same response on the horizontally growing rhizomes, i.e. diageotropic rhizomes and stolons both became orthotropic.

In searching for the mechanism regulating the horizontal growth habit of bermudagrass stolons, evidence was found that the liminal position of this organ might be determined by the balance between gibberellins and sugars within the plant.

Much of this work will be published elsewhere[4] but the brief description of the main experiments which furnished the evidence for this assumption is given here.

Apical pieces of stolons prepared as previously described[3] (Figure 1) were placed horizontally on wet sand in a growth chamber ($26 \pm 1°$) under continuous illumination of about 300 foot-candle from fluorescent lamps (Gro-Lux, Sylvania), appropriate for inducing upward curvatures of the nodes. Cut ends of explants were introduced into 10-ml flasks containing distilled water (control) or the test solutions containing hormones and/or sugars. All the solutions were prepared with glass distilled water and renewed every 12 h. 10 explants/treatment were used. The significance of the differences between the control and the treatments were statistically evaluated by the Student's *t*-test, previous proof that the standard deviation were similar.

Figure 2 depicts the angles attained by the tips with reference to an horizontal line in the different treatments after 72 h. A significant inhibition of the upward curvature caused by 7 and 10% sucrose can be observed as compared with the control. Similar responses were obtained with 5% glucose. The effect of sucrose was completely overcome by 50 mg/l GA_3, while in contrast, indolacetic acid (IAA) from 0.001–30 mg/l had no effect whatsoever.

In order to determine whether the inhibition was simply due to an osmotic effect of the sugars, polyethylene glycol 6000 and mannitol solutions of identical or higher osmotic pressures were tested but neither of them showed the inhibitory action of the sugars.

The full meaning of these results cannot yet be evaluated with certainty. However, it appears reasonable to assume

[1] Plagiotropic: geotropism by which the plant part orients its axis at an angle to the plumb line. Diageotropic: The special case of plagiotropism in which the organ orients itself in the horizontal direction. Orthotropic: direction of the axis parallel to the plumb line. Liminal direction: orientation which can be maintained by a plant organ for prolonged periods of time without carrying out geotropic movements. See P. LARSEN, Handb. PflPhysiol. *17*, 34 (1962).
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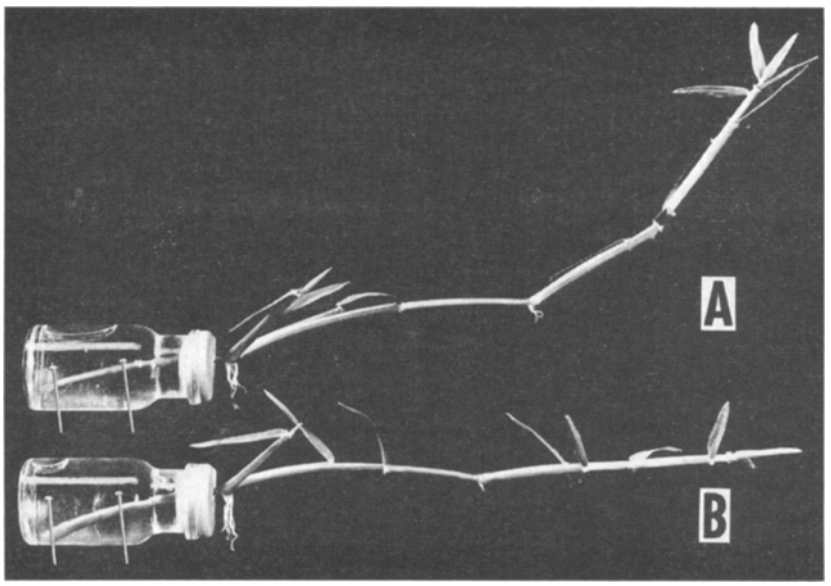

Fig. 1. Procedure used in the experiments. The cut ends of these explants were immersed in water (A) and 10% sucrose (B). Time of the experiment, 48 h.

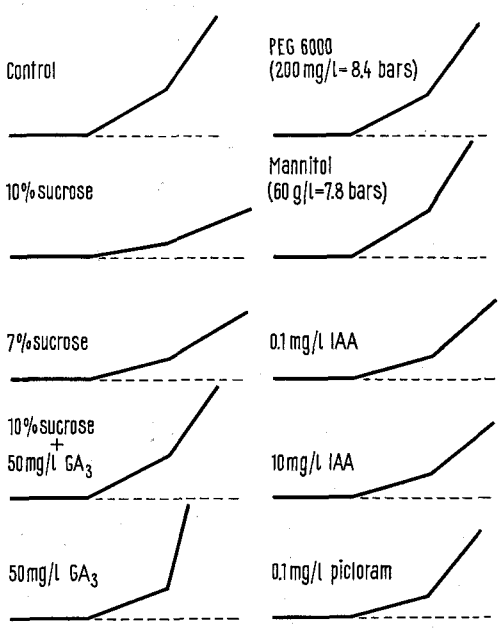

Fig. 2. Schematic representation of curvatures attained by the explants in the different treatments after 72 h. Difference between 10% sucrose and control is significant, $P < 0.01$.

that sugars and gibberellins are involved in the mechanism controlling the plagiotropic growth habit of bermudagrass and that the shoot position is determined by the relative amount of sugars and gibberellins present in the nodes. The following of the observed facts are consistent with this hypothesis: (a) darkening of the plants induces a gradually upward curvature of the stolons. (b) If the parent plant is kept in light while the stolons are in darkness, the latter remains horizontal. (c) If the parent plants are shaded, the stolons gradually curve upwards. (d) Horizontal rhizomes when severed from the aerial parts of the shoots, became orthotropic. (e) The tips of the main stolons, which show the strongest tendency to remain diageotropic as compared with the lateral branches, constitute powerful sinks with a remarkable priority for the supply of sugars synthetized in other parts of the plants[5]. Besides these observations, a very suggestive fact is that diageotropic stolons bend upward shortly after the vegetative apex has been transformed into a reproductive structure, which is generally accompanied by an increasing[6] gibberellin level and possibly by sugar consumption.

The lack of activity of IAA as well as of the new potent synthetic auxin picloram[7] is specially noteworthy, in view of the Cholodny-Went classic hypothesis of geotropism.

The general picture that emerges from this work is in agreement with the idea[8] that an antihormone is present in the horizontal organs counteracting the effect of the growth factors. In this scheme, gibberellins undoubtly would be promotors and sugars the inhibitors or its precursors.

Nonetheless, the unusual activity of sucrose and glucose in this system and the lack of knowledge of the interactions of sugars and gibberellins at the cellular level in the nodes, do not permit any further speculation of the mechanism regulating the growth habit of bermudagrass[9,10].

Zusammenfassung. Saccharose und Glucose unterbinden die von schwachem Licht erzeugte negativ geotropische Kurvatur von Bermudagrasausläufern. Gibberellinsäure erzeugt eine Umkehrung dieses hemmenden Effekts.

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