human malarias is being studied in a number of ecologically diverse situations in Malaya, to determine whether malaria is, under any circumstances, a zoonotic disease in nature.

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Suppression of Shoot Formation in Cultured Tobacco Cells by Gibberellic Acid

Abstract. When tobacco pith was cultured on media containing gibberellic acid, shoot formation was observed. The formation of stem structures was strikingly suppressed by concentrations of 0.5 mg/lit. and above.

Application of gibberellins has generally resulted in promotion, rather than suppression, of plant growth processes. One of the few instances of suppression reported is in the rooting of cuttings. Gibberellin treatments not only inhibited rooting of cuttings, but also counteracted the stimulation caused by auxin (*1*). In tests performed with cultured tobacco cells, I found that gibberellic acid indeed prevented formation of roots under otherwise favorable conditions.

The present report considers the effect of gibberellin on the formation of stem structures in cultured cells. A preliminary study showed complete suppression of shoot formation when 5 mg of gibberellic acid per liter was included in the culture medium. Representative cultures can be seen in Fig. 1. The present experiment extends this observation to other concentrations of the growth regulator.

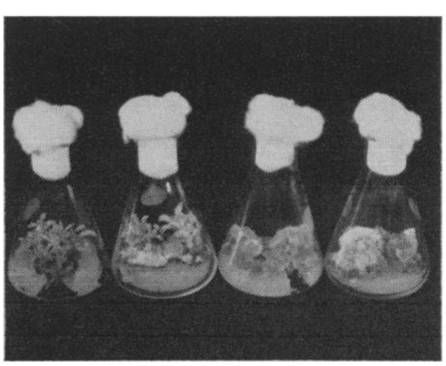

Fig. 1. Formation of shoots in cultured tobacco cells as influenced by gibberellic acid. Pair on left, no gibberellin; pair on right, 5 mg of gibberellic acid per liter.

Tobacco (*Nicotiana tabacum* L. var. Wisconsin 38) pith, which had been in continuous culture for the last several years at the University of Wisconsin, was employed (*2*). The basal medium of Miller *et al.* (*3*), supplemented with three times the level of inorganic phosphate, 0.5 mg of 3-indoleacetic acid, 2 mg of kinetin (*2*), and 150 mg of L-tyrosine per liter, was utilized. The reports of others (*4, 5*) and my experience showed that these levels of the supplements were optimum for shoot formation in cultured tobacco cells. Gibberellic acid (*6*) was included (0, 0.5, 1.0, 5.0 and 10.0 mg/lit.). Solutions of this compound were sterilized by Millipore filtration to avoid any undesirable consequence of heating.

For each level of gibberellin, ten 25- by 150-mm culture tubes, each containing 25 ml of medium, were employed. One piece of callus, roughly 2 mm^3 and weighing about 40 mg, was cultured in each tube. The cultures were maintained at 21° to 27°C under continuous weak light from overhead fluorescent fixtures.

The numbers of cultures with shoot and shoots per culture recorded after 7 wk are shown in Table 1. Controls on basal medium showed profuse shoot development, whereas cultures supplied with gibberellic acid in any concentration exhibited marked suppression. Levels of 5 and 10 mg/lit. of the compound were completely antagonistic. This suppression of shoot formation is most probably not due to toxicity, since no reduction in callus growth was observed in any of the treatments. Furthermore, the concentrations presently employed ranged below that found by Nickell and Tulecke (*7*) to be promotive in growth tests with cell cultures of a large number of species.

These findings, together with earlier reports of inhibition of rooting, show that gibberellin is indeed physiologically distinct from either auxin or kinin. Auxin tends to promote rooting, and kinin enhances shoot formation (*5*). If the amounts of gibberellin presently incorporated into the culture medium can be assumed to have resulted in levels which do not exceed the normal physiological range in the cells, then the data reveal that, whereas gibberellin is known to stimulate organ enlargement, the stem in particular, it antagonizes the initiation of the structure (*8*).

Table 1. Shoot formation in cultured tobacco pith as influenced by gibberellic acid.

Gibberellic acid in medium (mg/lit.)	Cultures with shoot (No.)	Shoots per culture (No.)
0	10	29 ± 4
0.5	3	0.6 ± .4
1.0	4	1.3 ± .6
5.0	0	0
10.0	0	0

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6. A purified sample containing 90-percent gibberellic acid was kindly furnished by Eli Lilly & Co., Indianapolis, Ind.
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8. This report is published with the approval of the director, as technical paper No. 521 of the Hawaii Agricultural Experiment Station.

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Acid-Catalyzed Oxidation of Reduced Pyridine Nucleotides

Abstract. Reduced pyridine nucleotides are oxidatively catalyzed in weakly acidic solutions. The rate is proportional to the acidity, and at constant acidic *p*H, the reaction follows first-order kinetics. The rate of oxidation of reduced triphosphopyridine nucleotide is approximately 3 times that of reduced diphosphopyridine nucleotide. The reaction offers a very plausible explanation for the metabolic efficiency of the malignant tumor cell. It may also play a key role in wound healing and muscle contraction.

When reduced pyridine nucleotides (DPNH and TPNH) (*1*) are dissolved in weakly acidic buffers, they are found to undergo catalytic oxidation which may be followed spectrophotometrically by the decrease in optical density at 340 mμ. If the concentration is expressed in terms of optical density, the reaction follows first-order