onism of the para-aminobenzoic acid and nicotinic acid on sulfonamides in inorganic catalysts is a difference from the conception of the antagonism or competition in living systems. However, this may be more apparent than real, as there are well-known difficulties in reconciling the actions of these agents and their properties and the relationships of antagonisms which need not be considered here. Certainly, it is of more than passing interest that the sulfonamides can reduce inorganic catalytic actions like other antiseptics and poisons.

CONCLUSIONS

(1) The sulfonamides decrease the liberation of oxygen from hydrogen peroxide by such inorganic catalysts as fullers' earth, platinum black and collargol, but the depression is much weaker than that caused by quinine, pamaquine, quinacrine and a number of other protoplasmic poisons. This agrees with current theories of an anticatalytic action as being fundamental to the antiseptic action of these agents.

(2) Para-aminobenzoic acid and nicotinic acid and the sulfonamides are non-competitive, or not antagonistic to each other, on the inorganic catalysts used, a difference from their action on microorganisms.

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GROWTH STIMULATION BY AMMONIUM SULFAMATE IN LOW CONCENTRATION

IN laboratory experiments on the toxicity of ammonium sulfamate $NH_4O_3SNH_2$ for nut grass (*Cyperus rotundus* L.),[1] it was observed that the poisonous action of the salt was preceded by a marked increase in the number of plants during the first three days of the experiment. Indications of a growth-stimulating action have been discussed also in investigations of other herbicides, *e.g.*, the chlorate,[2] the sodium bromate[3] and the thiocyanate.[4] The latter one has already found application for hastening the germination of seeds and potatoes.

It seemed worth while to investigate the possible stimulating effect of the ammonium sulfamate. Duckweed (*Lemna minor*) was selected as a test plant as in former experiments[3] because the increase in the number of plants offered a convenient way of watching the effect of the compound. The plants (on the average 20) were kept in glass jars filled with two inches of soil and two liters of tap water. The number of plants was counted daily and expressed in per cent. of the initial number. The curves reproduced below give the average of all the experiments performed during several months.

Curves 1 and 2 represent the effects of so much ammonium sulfamate as to make the solution 0.01 and 0.005 molar with respect to this salt (Fig. 1). In both

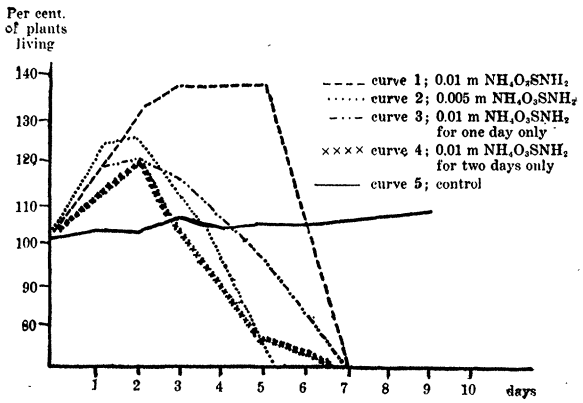

FIG. 1

cases the increase in number over the control experiments (curve 5) is very remarkable for the first 2 to 5 days, but then the poisonous action of the salt leads to a rapid and complete destruction of all the plants.

It seemed possible that a reduction of the time of action of the salt on plants might lead to a separation of the stimulating and the toxic effect. In further experiments the plants were therefore removed from the sulfamate-containing jar after a limited period of time and transferred to another one containing tap water and soil only. Curves 3 and 4 show that an action of the sulfamate for two- or one-day, respectively, reduced mainly the stimulating effect but did not alter appreciably the rate of poisoning. However, the killing of the plants could be avoided when the contact with the sulfamate was limited to five hours (curve 6, Fig. 2). The increase in the number of

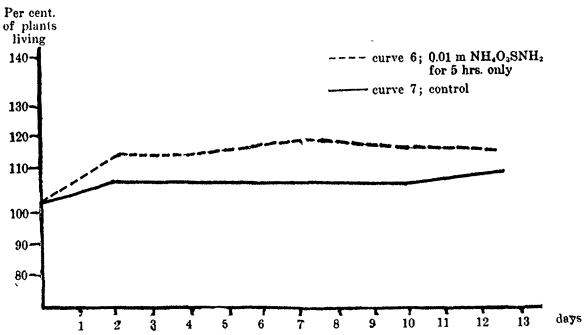

FIG. 2

plants was small under these circumstances, in fact only about one fourth of that obtained in the first experiment, but the rate of growth in the first two

[1] Fromm, *Ciencia y Técnica*, 1: 69, 1943.
[2] Shear, *Phytopathology*, 25: 440, 1935.
[3] Hessenland, Fromm and Saalmann, *Angew. Chem.*, 46: 577, 1933.
[4] Denny, *Biol. Abstracts*, No. 674, 1930.

days was twice that of the controls and thrice that of the controls for the first seven days, so that this stimulation appears to be well established.

There is not yet anything known as to the mechanism of this stimulation, but it seems of interest that the inorganic sulfamate causes here similar increases in growth as they were described recently by Lamanna[5] for low concentrations of sulfanilamide on bacteria.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A COOL LIGHT FOR DISSECTING MICROSCOPES

INVESTIGATORS who find the use of dissecting microscopes essential to their work are usually confronted with the problem of satisfactory illumination. After three years of extensive use, lights of the type described have proven superior to all others which we have tried.

The principle is simple and the parts are inexpensive. An automobile headlight bulb mounted in a small metal can (35 mm bulk load film can or a deep salve box) in which ventilating louvres have been cut serves as the source. This may be mounted on any convenient stand or on the microscope itself. Power is furnished by a transformer which delivers six volts and will carry up to two and one-half amperes of current. If intensity control is desired, a rheostat may be inserted in series with the primary coil of the transformer (in the input—110 volt—line). The important feature of the light is the lens system. It is composed of a rod of methyl methacrylate polymer (du Pont Lucite) $\frac{5}{8}$″ by 3″ or larger upon the ends of which a lens combination has been ground. The rod is mounted in the lamp housing so that the filament of the light is centered and thus serves to focus the source and at the same time to filter out nearly all the heat. Small pieces of Lucite may be obtained in the form of utility lights from drug and department stores or in rods from the manufacturer.

In order to concentrate the source of light upon the object, a bi-convex lens system can be ground upon the two ends of the rod. Grinding a curved surface is in reality easier than a plane surface and can be done by clamping the rod at the desired radius of curvature in a flexible support and working the surface into a curve by moving the end in an irregular manner over a plane surface covered with a fine abrasive. Final polishing should be done with rouge or Tripoli powder. The lens can be ground and polished in about thirty minutes. The radii of curvature may be calculated from the common formula for a thick lens which can be obtained from handbooks of physics and chemistry. Details of the assembly are apparent in Fig. 1.

For work on living material or material immersed in a saline solution, water or a solvent this light has proved most satisfactory since very little heat is transmitted to the object. Physiological processes are not upset, salines and solvents are not evaporated rapidly, and an intense spot of light is directed to the object. When water or saline solutions are used to cover the object, undesirable surface reflections can be avoided by immersing the end of the rod. These features are unique with this light.

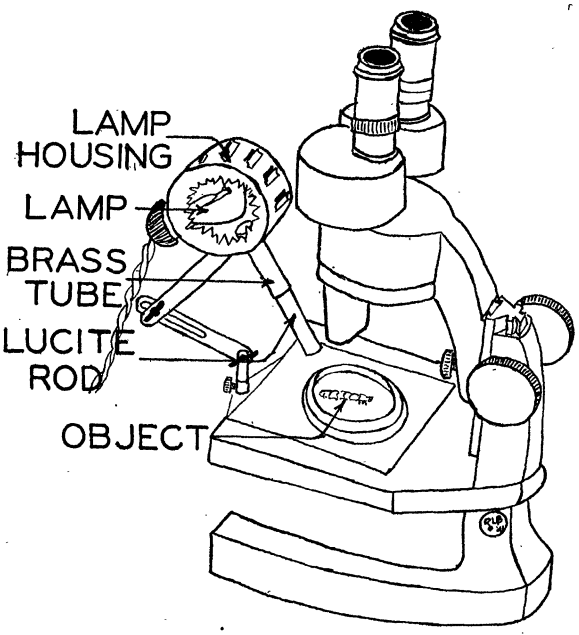

FIG. 1

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[5] Lamanna, SCIENCE, 95: 304, 1942.

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