A New Antimalarial Drug

THROUGH the courtesy of Dr. J. Needham of the British Scientific Office in Chungking, samples of two indigenous plants regarded locally as of value in the treatment of malaria have been obtained and tested in experimental animals.

One of these, *Fraxinus malacophylla*, was found to be without action on *Plasmodium gallinaceum* in chicks. Contrary to the report of Liu *et al.*[1], no alkaloid could be found in the bark.

The root of a second plant, known locally as 'chang shan' and reputed to be *Dichroa febrifuga*, Lour., was ground and extracted with water and with dilute acid. Neither extract at a concentration where 1 c.c. corresponded to 1 gm. dry root gave the usual alkaloidal reactions, but both showed considerable activity against a trophozoite-induced infection of *P. gallinaceum* in chicks. The growth of exo-erythrocitic forms was not prevented by the extract.

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[1] Liu, Chang, Ch'uan and Tan, *Chinese Med. J.*, **59**, 573 (1941).

Effect of some Arylcarbamic Esters and Related Compounds upon Cereals and other Plant Species

IN the studies of the control of plant-growth by chemical compounds at Jealott's Hill Research Station, attention has been given to those compounds which affect cell extension growth (plant-growth substances), and to those which interfere with cell division. An earlier communication[1] has described work on plant-growth substances as selective weed-killers. The present letter describes our work on compounds which affect cell division.

Colchicine, acenaphthene, chloral hydrate and ethyl phenyl carbamate, all well known for their effects on cell division, were tested upon cereals. Lefevre[2] has described the morphological and cytological changes in plants caused by ethyl phenyl carbamate. We found that ethyl phenyl carbamate arrested the growth of cereals at lower concentrations than did colchicine, acenaphthene and chloral hydrate.

In December 1940 a differential effect was discovered. Ethyl phenyl carbamate, applied at 50 mgm. per sq. ft. to oats sown with charlock, affected the oats but not the charlock. The oats germinated and the first leaf appeared through the soil; then, however, growth was arrested; the first leaf ceased to grow in length, but its base became very much thickened and bulbous and no further leaves appeared. Root-growth ceased, and after remaining in this static condition for some time the seedling withered and died. Under certain conditions, applications as low as 10 mgm. per sq. ft. gave this effect. We found that 10 p.p.m. ethyl phenyl carbamate in aqueous solution in contact with the germinating cereal seed brought about this morphological effect. Higher concentrations prevented germination.

The activity of about fifty related arylcarbamic esters and thiocarbamates was then examined. Judged by the concentrations required to give the morphological effect, the relative activity of some of these compounds was as follows:

n-Butyl phenylcarbamate Ethyl *o*-methoxyphenylcarbamate Methyl phenyl thiocarbamate Ethyl phenyl thiocarbamate	active, but much less than ethyl phenylcarbamate.
n-Propyl phenylcarbamate Ethyl *o*-chlorophenylcarbamate Methyl phenylcarbamate Allyl phenylcarbamate	active, but less than ethyl phenylcarbamate.
N : N-Di(carboethoxyaniline)	activity equal to ethyl phenyl carbamate.
iso-Propyl phenylcarbamate	Activity approximately three times that of ethyl phenyl carbamate.

Aniline, α- and β-naphthylamine, methyl carbamate, urethane (ethyl carbamate) and formanilide were inactive under the conditions of our tests.

Iso-propyl phenylcarbamate in concentrations which stopped cereal seedling growth did not affect the growth of mangolds, sugar beet, flax, rape and yellow charlock. In heavier applications it arrested the growth of established cereal plants even when these were in flower, and, once arrested, very little or no further growth occurred. In one interesting experiment, 30–50 mgm. per square foot applied to winter rye during mid-May when the ears were just appearing resulted in fully formed heads containing no grain. The ears remained upright, whereas those of the untreated plants bent over under the weight of the grain.

This action of the aryl carbamic esters on monocotyledonous plants and lack of action on dicotyledonous is especially interesting, since it is the exact converse of the action we discovered with the growth substances of the phenoxy acetic acid class of plant-growth substances.

Fuller details of these and subsequent experiments are being published elsewhere.

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[1] *Nature*, **155**, 497 (1945).
[2] Lefevre, J., *C.R. Acad. Sci.*, **208**, 301 (1939).

Crystallization and Identity of the Triose and Triosephosphate Dehydrogenases of Muscle

THE triose (glyceraldehyde) dehydrogenase was studied by Green, Needham and Dewan[1], who concluded from its distribution that it was a different enzyme from the triosephosphate dehydrogenase. We have succeeded in isolating and crystallizing the triose enzyme from rabbit skeletal muscle. After this was accomplished, we discovered that the crystals were in fact those of triosephosphate dehydrogenase. Their activity is actually some three hundred times greater with triosephosphate than with triose. It is therefore no longer necessary to assume the existence of triose dehydrogenase as a separate enzyme, as the two are identical.

The triosephosphate enzyme from yeast was crystallized by Warburg and Christian[2], who found that the pure enzyme also acted on glyceraldehyde, though only at about a thousandth of the rate with triosephosphate.

Our procedure for crystallizing the muscle enzyme is as follows: 600 gm. of muscle from a freshly killed and bled rabbit is cooled in ice, minced and extracted with 1,200 ml. of cold glass-distilled water. The extract is squeezed through muslin and about