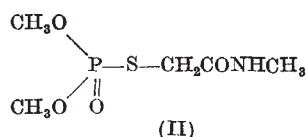
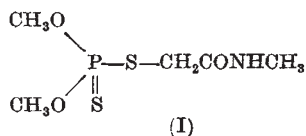


Mode of Action and Biological Properties of the S-(Methylcarbamy) Methyl O,O-Dimethyl-Dithiophosphate

PREVIOUS investigations have demonstrated that S-(methylcarbamy) methyl O,O-dimethyl-dithiophosphate (I), which possesses a peculiar insecticidal and systemic activity, very effectively controls the olive fly (*Dacus oleae* Gmel.)^{1,2}, the olive moth (*Prays oleellus* F.)³, the cherry fruit fly (*Rhagoletis cerasi* L.)⁴ and many other important pests. It was of interest, therefore, to investigate the metabolic behaviour and biological properties of this insecticide.

Experiments carried out by means of paper chromatography have demonstrated that oxidation of compound (I) by potassium permanganate and by hydrogen peroxide produces some derivatives. Among them one component has been isolated, purified (by means of 100-tube Craig countercurrent distribution) and identified: the S-(methylcarbamy) methyl O,O-dimethyl-thiophosphate (II). The low R_F values of the spots and other evidence suggest that the other products of the oxidation of compound (I) are due to hydrolysis (possibly O,O-dimethyl dithio- and thiol-phosphoric acids). Metallic ions (Fe^{3+} , Cu^{2+} , Zn^{2+}) catalyse the conversion of dithiophosphate (I) to thiophosphate (II).



The same transformation has been shown to occur, at least partially, *in vivo* in plants such as broad beans, after root absorption of the insecticide, and in cherries, picked from sprayed trees; and *in vitro* in animal tissues, by incubating the insecticide (I) with mouse liver. Other derivatives (possibly products of hydrolysis), besides the thiol metabolite (II), from hydrogen peroxide oxidation of compound (I), were not found in the paper chromatographed tissues.

A gradual reduction in the amount of compound (II), obtained by chemical synthesis and applied to broad beans and cherries in the same conditions as insecticide (I), was demonstrated by paper chromatography and bioassay, but no evidence was obtained on the conversion of this compound to other derivatives.

Toxicological researches indicate that the thiol-phosphate (II) is a much stronger esterase inhibitor than the dithiophosphate (I): 185 times as effective as bovine cholinesterase inhibitor and 883 times as effective as house fly (*Musca domestica* L.) cholinesterase inhibitor. Nevertheless, compound (II) is only four times as toxic as (I) to mice by oral administration.

The insecticidal activity of both substances (I) and (II), tested on 11 species of insects, is nearly equal; the small differences being related to species and stages of insects and methods of testing. This suggests also that insects may metabolize the dithiophosphate (I) to thiophosphate (II). On the other hand, the two substances possess different acaricidal activities: compound (II) is about 38 times as toxic as (I) to adults of *Paratetranychus pilosus* Can. and Fanz.

Finally, studies on systemic properties have been conducted. Both products, when applied to roots, stems or leaves of beans are absorbed and translocated to other parts of the plants in amounts lethal to the test mites (adults of *Tetranychus telarius* L.) feeding on untreated parts of the same plants. Furthermore, both compounds penetrate from the outside to the inside of fruits and exert a lethal effect on some species of fruit-eating larvae.

Detailed results will be published elsewhere.

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¹ Pellegrini, G., *L'Ital. Agric.*, **92**, 747 (1955).

² Pellegrini, G., Antongiovanni, E., and Santi, R., *Lab. Sper. Agric. Soc. Montecatini* (1956).

³ Antongiovanni, E., *Olivicolt.*, **XI**, 5, 1 (1956).

⁴ de Pietri-Tonelli, P., *L'Ital. Agric.*, **93**, 49 (1956).

α -Tocopherol and Hyaluronidase *in vivo*

THE description of exudative diathesis in chicken by Dam¹ indicates a considerable degree of capillary damage. In a further publication² he attributed this to a deficiency of α -tocopherol.

Reports^{3,4} on the interaction of α -tocopherol and hyaluronidase suggested to me that, apart from its anti-oxidant activity, α -tocopherol might be involved in the protection of inter-cellular cement substance. Thus, in the condition described by Dam, the exudation could be due to the effect of hyaluronidase acting on the inter-cellular cement substance of the capillary walls and surrounding supporting tissues without the restraining influence of adequate α -tocopherol.

We divided twelve chickens into three groups of four each. Group 1 was fed a basal ration low in vitamin E and containing 17 per cent protein, 3.3 per cent fat, 1.3 per cent calcium, 0.8 per cent phosphorus and 0.5 per cent added sodium chloride; group 2 received the same ration plus 14 I.U. vitamin E/lb. fed as added 'Rovimix' (F. Hoffman, La Roche et Cie.); group 3 a normal commercial ration. After 5 weeks on these diets two birds in each group were injected intraperitoneally with a commercial brand of hyaluronidase 'Rondase' (Evans Medical Supplies, Ltd.). Each bird received 6,000 I.U. daily for 7 days. On the eighth day the birds were killed together with the control uninoculated birds, and Table 1 shows the results of post-mortem examination.

Table 1

Group	Control birds (no hyaluronidase)	Birds injected with hyaluronidase
1	Slight hæmorrhages in muscles	Hæmorrhages and advanced exudative diathesis
2	Normal	Normal
3	Normal	Slight hæmorrhages in muscles

These results indicate that *in vivo* β -tocopherol can act as a regulator of hyaluronidase activity.

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¹ Dam, H., and Glavind, J., *Nature*, **142**, 1077 (1938).

² Dam, H., and Glavind, J., *Nature*, **143**, 810 (1939).

³ Miller, W. H., and Dessert, A. M., *Ann. N.Y. Acad. Sci.*, **52**, 167 (1949).

⁴ Cascio, J., *Amer. J. Ophthalmol.*, **36**, 278 (1953).