of this pepsin solution, and the flask suspended with agitation in a constant temperature bath at 37° C. When by visual examination with transmitted light no solids could be seen in suspension upon vigorous agitation, the protein was considered digested. The data in Table 1 show that with prolonged dry heating (dehydration ?) of the protein powder it becomes less readily lysed by enzymatic action—a property which paralleled the physical phenomenon of decreasing water insolubility.

Gelatin powders such as those which were heated 25 hours or longer have been injected into the peritoneal cavities of rats for preliminary investigations. Animals sacrificed after 4–5 weeks showed no granulomata or adhesions; no trace of the injected gelatin powder was in evidence.

Since several of these denatured protein fractions appeared to serve satisfactorily as a rubber glove powder for lubrication, the physiological aspect of this problem is being investigated further and will be reported later in greater detail.

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## A Method of Drying Partial Protein Hydrolysates and Other Hygroscopic Materials for Nutritional Studies


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Drying a protein hydrolysate by lyophilization is a procedure that often is desirable as a means of preparing diets for studies of the nutritive value of the hydrolysate. Unfortunately, the tendency to fuse during lyophilization and the hygroscopic nature of the dry material detract from the usefulness of the lyophile technique for this purpose. It has been found in this laboratory that these difficulties are overcome largely by concentrating the solution *in vacuo* and adding dextrin to the concentrated solution. Of the common dietary carbohydrates, only dextrin or starch is suitable; sucrose or cerelose does not aid in subsequent lyophilization.

The vacuum concentration of protein hydrolysates is difficult with ordinary types of distillation apparatus because of the severe foaming usually experienced. With an apparatus of the type described by Mitchell, Shildneck, and Dustin (*1*), distillation rates up to 5 l./hour may be attained at temperatures below 50°C., without any antifoaming agent. An efficient condenser is necessary. A copper water-heater coil, surrounded by a water jacket, was found to be convenient and adequate for this purpose. With this apparatus typical hydrolysates were concentrated to at least 50 per cent solids.

The concentrated hydrolysate is placed in bottles, and dextrin is added and mixed by shaking, after which shelling and lyophilizing are carried out in the usual way. The volume of hydrolysate in each bottle should not be over 10 per cent of the total volume of the bottle. In this laboratory, sufficient dextrin is added to give 30–50 per cent protein in the dry product. The lyophilized material is easily powdered for incorporation in diets.

The same procedure is useful in drying hygroscopic materials, such as liver extract, for use in experimental diets.

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## Synergistic Insecticides


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During the recent war an added war had to be fought against an army of insects in order to keep our fighting men from falling prey to disease. In this connection the well-known, freon-propelled "aerosol" bomb (*3*) made its appearance. Since the end of the war the ease of handling and effectiveness of this bomb have caught the public's fancy, and it may be expected that it will be used as an additional weapon in the expanding war on insects on the home front.

Contrary to some popular misconceptions, the rapidity of knockdown action of the "aerosol" bomb on insects has been due solely to the presence of pyrethrins, which have the unique property of quickly paralyzing insects and other cold-blooded animals while being innocuous to warm-blooded animals.

Because of the high cost of the pyrethrins, many attempts have been made to replace them, and the patent literature of the last few years describes a host of synthetic organic compounds which are highly toxic to insects. None of these, however, possesses the outstanding property of the pyrethrins.

A more promising approach was initiated through the interpretation by Haller and his co-workers of the discovery by Eagleson (*1*) that the addition of sesame oil to pyrethrum extracts increased their effectiveness (*4*). These investigators linked the increased effectiveness with the synergistic effect of the sesamin present in the oil and later with the presence of a methylene-dioxy-phenyl group in the sesamin. They subsequently synthetized the amides of 3,4-methylene-dioxy cinnamic acid and found them active as synergists with pyrethrins (*2*).

These products, however, did not find practical application because of the difficulty of preparing them in quantity and because of their limited solubility in freon and in petroleum hydrocarbons, which are used as vehicles for insecticidal sprays.

O. F. Hedenburg, of the Mellon Institute, Pittsburgh, had been independently investigating compounds containing the methylene-dioxy-phenyl group as insecticides. The results with the chemicals alone did not appear too promising because of the poor knockdown property of the compounds, but when they were tested in combination with pyrethrins, a different result was obtained. While the majority of the compounds tested, including safrole and isosafrole, esters, etc., displayed little or no activity, a new product with outstanding activity was discovered. This was obtained by the condensation of the alkyl-3,4-methylene-dioxy-styryl ketones with ethyl aceto-acetate (*5*). The insecticidal effect of this product is apparent