ing arrangement with the Food and Drug Administration. In this section, we first consider the measures taken by USDI and then the relation with FDA.

USDI Measures

USDI certificates of inspection are withheld from all products that are produced under conditions, practices, or operations determined to be unsanitary in accordance with USDI regulations. The use of any promotional devices and inspection shields on the labels of such products is also disallowed.

USDI inspection services may be suspended or terminated completely at plants where good overall plant sanitation practices are not applied or maintained on a routine basis. Frequently recurring adverse sanitation reports are used as a basis for suspending or terminating inspection services.

Relation with FDA

The Bureau and the Food and Drug Administration have certain related objectives in the areas of plant sanitation and product quality in carrying out their respective service and regulatory activities. Because of this relatedness of missions, an agreement has been consumated between the two agencies outlining working arrangements that are being followed, thereby permitting each agency to discharge its responsibilities effectively. To eliminate any difference in the interpretation of what constitutes good sanitation, the Bureau and FDA representatives jointly examined and interpreted the criteria that support a good sanitary environment. The results indicated that both agencies employ very similar criteria for measuring the adequacy of sanitation in processing plants.

With regard to sanitation, the managers of the firms operating under USDI inspection have been made aware of our working arrangements with the Food and Drug Administration. We have made it clear, however, that our service is not intended to provide immunity from the mandatory regulations enforced by the Food and Drug Administration.

Antimicrobials From Sea Food

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Abstract

Antibacterial and antiviral agents have been isolated in our laboratory from the abalone *(Haliotis rufescens)*, the oyster *(Ostrea virginica)*, the clam *(Venus mercenaria)*, the sea snail *(Tegula gallina)*, the queen conch *(Strombus gigas)* and the squid *(Loligo pealii)*. Two methods were used for these isolations, namely DEAE cellulose ion-exchange chromatography and dilute acetic acid extraction. The final products obtained were usually white powders, readily soluble in water, nondialyzable, stable at a temperature of 95C for 45 minutes, and resistant to digestion by trypsin and pepsin. They were precipitated by all the protein precipitants. Acetic acid extract of shucked oysters was used for most of our experimental studies. This extract contained an antibacterial factor (designated as paolin 1) and an antiviral factor (designated as paolin 2); they could be separated by chromatography. The extract was not toxic for Swiss white mice. By oral route, doses of 1, 2, and 4 g/kg of body weight were well

tolerated. Mice inoculated intravenously tolerated 1, 2, and 3 g/kg and showed no gross pathology upon sacrifice.

Paolin 1 inhibited the *in vitro* growth of gram positive as well as gram negative organisms such as *Staphylococcus aureus, Streptococcus pyogenes,* beta-hemolytic strain, *Salmonella typhosa, Shigella dysenteriae,* etc. at a concentration varying from 4 to 100 ug/ml. Its *in vivo* activity against *S. pyogenes* is illustrated by the following typical experiment. A group of 50 Swiss white mice were fed with oyster extract for 2 weeks using a daily dose of 0.1 g/kg of body weight. Three days after the first feeding these mice, along with 50 controls, were challenged intraperitoneally with a sublethal dose of *S. pyogenes* beta-hemolytic strain. Although about 60% of mice in either group developed abscesses, the death rate at the end of 50 days was 36% for the controls and 10% for the treated animals. Paolin 1 was also prepared in a more purified form by chloroform extraction and Reinecke salt precipitation. The purified material inhibited the growth of *S. aureus in vitro* at a concentration of 1 ppm.

Paolin 2 inhibited poliovirus, type I, in tissue cultures and in mice. In tissue cultures, paolin 2 was not toxic for primary monkey kidney monolayer culture cells at a concentration of 100-500 ug/ml and did not inactivate poliovirus in absence of living cells. However, it interfered with multiplication of the virus when incorporated in the medium, reducing virus yield by 1 or 2 logarithmic units. When Swiss white mice were fed for 3 days with oyster extract in a daily dose of 0.5 g/kg of body weight starting 24 hours before intracerebral infection with type I poliovirus, the death rate of the treated mice was about 25% to 50% lower than that of the controls. After further purification by alcohol fractionation, paolin 2 in a single intra-peritoneal dose of 2.5 mg/kg of body weight, given 5 hours before intracerebral infection with type I poliovirus, reduced the death rate from 53% in 30 control Swiss white mice to 26% in the same number of treated animals.

Estuarine Pesticide Studies

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Abstract

During the past four years, the Bureau of Commercial Fisheries has been engaged in a nation-wide pesticide research program involving laboratory and field studies to determine the effects of pesticides on estuarine organisms. The acute toxicity of a majority of the more widely used chemicals has been established, under controlled laboratory conditions, to plankton, crabs, shrimp, oysters, and fish. The sub-lethal effects of some of the most important insecticides have been studied by exposing mollusks and fish to low concentrations for several months. The significance of laboratory data is being evaluated in the field by the study of pilot scale applications and large scale pest control programs.

The economic importance of pesticides insures that not only will they be widely used for some time to come but also that a variety of new types and formulations will be developed to fill specific needs. Consequently, a continuing objective of the research program must be the screening of these chemicals to evaluate their effect on commercial fisheries resources. At the same time it will be possible to assist manufacturing chemists in the screening of potentially