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# THESIS ABSTRACT

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TITLE: Interaction Between Paralytic Shellfish Poison and Clam  
Melanin and Protein

Interactions between paralytic shellfish poison (PSP) and components of the butter clam (*Saxidomus giganteus*) were studied to determine which component was involved in the binding and retention of PSP by the butter clam, and to characterize the nature and strength of the interaction. A simple and accurate assay for PSP in buffer and salt solutions was developed for this study using the Folin-Ciocalteu phenol reagent.

Equilibrium dialysis binding experiments with PSP and bovine serum albumin or fibrinogen indicated that proteins did not interact significantly with PSP. Binding experiments with PSP and a butter clam siphon homogenate indicated an apparent electrostatic interaction between PSP and some component of the clam siphon homogenate, which was later identified as melanin. Synthetic and natural clam melanin interacted strongly with PSP, and the interaction was similar in nature to a cation exchange reaction.

The interaction between PSP and melanin was rapid, reaching an equilibrium within one hour at 25°C. The interaction was strongly influenced by pH; maximum binding took place at pH 6.0 to 8.0, but at pH 2.0 to 3.0 there was essentially no binding. The interaction was reversible and rapid desorption of bound PSP took place at pH 3.0. The interaction was also affected by the presence of competing cations; tri-, di-, and monovalent cations, in that order of effectiveness, interfered with the binding and caused desorption of bound PSP.

The anatomical distribution of melanin in butter clams paralleled the distribution of PSP, and PSP was apparently bound to melanin in toxic butter clam siphons. Butter clams, which retain PSP for longer periods than do other bivalve mollusks, had a higher melanin content in the interior walls of their siphons than the other mollusks studied.

The close relationship between the distribution of PSP and of melanin in butter clams together with the observed electrostatic interaction between PSP and melanin suggest that melanin may play an important role in the retention of PSP in butter clams. The reversible nature of the PSP-melanin interaction in the presence of competing cations suggests that polyvalent salt solutions may be used in the detoxification of toxic butter clams.

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