THE EXTRACTION OF NUTRITIONAL PROTEINS FROM UNDER-UTILIZED RESOURCES

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BACKGROUND

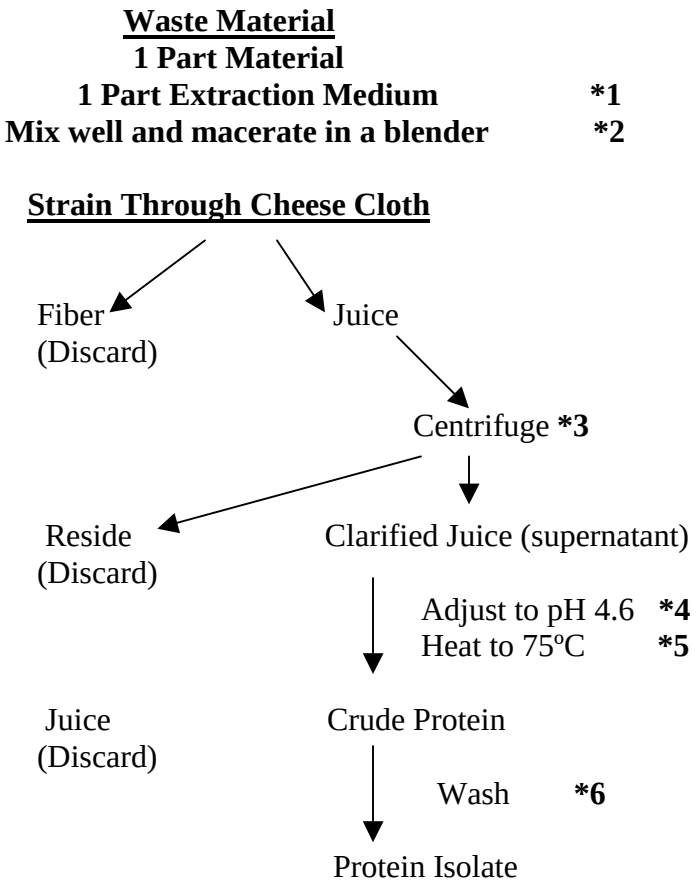
In many nations the nutrient that limits the attainment of full genetic potential is protein. Not only is high quality protein relatively scarce, but also it is extremely costly. Often a poor quality protein source provides the majority of protein these people consume. Many novel protein sources have been investigated. Some of these include alfalfa, yeast protein concentrate, honeybee protein, pigweed, etc. Almost any plant or animal is a potential source of protein. The problem is to discover one that is economical, of high nutritive value, and can be easily incorporated into existing food products to increase their nutritive value.

PROBLEM

Evaluate the nutritional and functional quality of protein that can be extracted from a currently under-utilized resource. This resource might well be a by-product of current food processing, e.g., blood, tomato waste, potato waste, etc.

MATERIALS AND METHODS

A protein source can be extracted to recover the protein with an appropriate buffer or solvent. A possible extraction scheme might look something like this:



***1** The ratio of Waste Material to Buffer may be varied to optimize the procedure.

***2** The Medium may be water, salt, and may be pH adjusted. As a suggestion, first try to adjust the pH of the Macerated Material to about 8.0.

***3** Whatever speed is available will probably be acceptable; 1,000 to 10,000 x G is suggested.

***4** As a suggestion, try 4.0, 4.5, 5.0, etc., and see which gives the best yield.

***5** May be adjusted higher for increased yield or lower for better functionality.

***6** You may try water at pH 4.6, alcohol, acetone, etc. It will depend upon the nature of your material how much washing you must do. Try to obtain a white, bland-smelling powder. The less treatment needed to achieve this outcome, the better.

Experimentation will be required to determine conditions that give an optimum yield of purified protein at a reasonable cost. The protein can then be fed to rats to determine its ability to promote growth and to screen for possible toxic contaminants. The protein could also be evaluated as described in reference 3 for its ability to form foams, emulsions, gels, etc., to determine its potential utility in a food product.

REFERENCES

1. Champagnat, A. "Protein from Petroleum," Scientific American, October 1965.

2. Cherry, J. P. "Protein Functionality in Food." American Chemical Society Symposium Series #147. 1981.

3. Fruton, J. S. "Proteins." Scientific American, June 1950.

4. Pirie, N. W. "Orthodox and Unorthodox Methods of Meeting World Food Needs. "Scientific American, February 1967.