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Investigations on the Types of Clostridia Occurring in Food Products of Animal Origin.

In the manufacture of canned meat products the deteriorations are sometimes noticed which are caused among others by the anaerobic bacteria of Clostridium genus (1), and which are characterized by the organoleptic changes determined generally as a "bombage".

These changes are the results of gas formation in the product the process being usually accompanied by an intense putrid smell, which is the effect of the enzymatic decomposition of meat protein (2,3,6,7,8,9,11).

A typical feature of Clostridia is their property of producing the spores which sometimes are able to survive the thermic treatment during the industrial processing, and which depending on the circumstances of storage can germinate and multiply leading in consequence to the deterioration of a product.

In our previous own investigations (8) these facts were noticed quite frequently, wherewith in case of pasteurized products it was shown that the multiplication of anaerobic

bacteria depended largely on the intensity of contamination, the temperature of storage and finally on the percent contents of NaCl and $NaNO_2$ in the product. Besides of some other investigators (2,4,7,11) also Kelch (10) represents the similar point of view.

The regulations which concern the bacteriological examination and estimation of products showing the presence of Clostridia are in our country rather severe. However, it is known that the preparation of food articles free of anaerobic bacteria is difficult.

The purpose of this work was to show which kinds of anaerobic bacteria occur most frequently in food products of animal origin. Special attention was paid to the occurrence in these products of pathogenic anaerobes like Cl. botulinum and Cl. perfringens. The results obtained can be of some use in preparation of objective regulations for the bacteriological estimation of food products of animal origin.

Material and Methods.

The investigations were made with 354 strains of Clostridia from various food articles, among which there were 171 strains from normal and 40 strains from "bombaged" canned pasteurized meats, 77 strains from normal and 17 strains from "bombaged" sterilized meat products and 49 strains from other food articles, like canned fish, raw meat, smoked meat and spices.

The examined strains were differentiated by biochemical and biological methods, and their classification was done in accordance to the Bergey's Manual of Determinative Bacteriology, 1957.

Results.

Results obtained prove that the normal conserves both pasteurized and sterilized were most frequently contaminated with Cl. sporogenes 101 strains and then with Cl. bifermentans

61 strains and Cl. perfringens 55 strains. The remaining strains of Clostridium group appeared relatively rarely. Somehow different picture was with "bombaged" conserves e.g. in the pasteurized canned meats Cl. sporogenes (19 strains) and Cl. perfringens (16 strains) came to the forefront, while in the sterilized meats the first place was taken by Cl. bifermentans (9 strains) with Cl. sporogenes (5 strains) on the second plan. In the "bombaged" canned sterilized meats Cl. perfringens played a considerably lesser part (1 strain) similary as Cl. bifermentans in the pasteurized meats. The results obtained during the examination of normal and "bombaged" canned hams show that the most frequent type was Cl. pefringens, and in chopped ham and luncheon meat - Cl. sporogenes.

It must be emphasized that among the strains studied in no case Cl. botulinum was found. In spite of a relatively frequent finding of Cl. perfringens among the strains isolated from foods with the regular organoleptical properties, this type does not make a problem in the food poisonings in Poland.

Summary.

Three hundred and fifty four Clostridium strains, isolated from normal and spoiled canned meat and from other meat products, were investigated. The incidence of different Clostridium types in relation to the environment, i.e. the kind of meat product, was determined. Some correlation was found between the incidence of Clostridium types and particular, examinated meat products.

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