A Research Note

Identification of Enterobacteriaceae Isolated from Seafoods

J. A. KOBURGER* and C. L. WAHLQUIST

Food Science and Human Nutrition Department, IFAS, University of Florida, Gainesville, Florida 32611

(Received for publication March 5, 1979)

ABSTRACT

Fifty-three retail samples of seafood were examined for members of the family Enterobacteriaceae, using violet red bile agar with 1% glucose. Isolation and identification of 99 typical colonies showed them all to be members of the family Enterobacteriaceae. Enterobacter species were most frequently isolated with frequency.

The total Enterobacteriaceae count (6) is simple, rapid and capable of indicating both enteric contamination and organisms of public health significance in the absence of coliforms (6). It differs from direct plating for coliforms in that glucose is added to the enumeration medium to detect all Enterobacteriaceae, not just those that ferment lactose. The method has been suggested as an indicator system (1, 8); however, limited information is available regarding the numbers and kinds of organisms recovered from various foods by this procedure.

While many questions still remain unanswered concerning applicability of this type of analysis, it seemed to have sufficient merit for routine monitoring of certain foods that we undertook a study of its use in analyzing retail samples of seafood products. This study was primarily concerned with isolation and identification of organisms forming typical colonies on the Enterobacteriaceae plates.

METHODS

Samples were obtained from retail stores in Gainesville, Florida. Samples were obtained from retail stores in Gainesville, Florida. (Table 1). Dilutions were prepared as recommended (1). Duplicate pour plates were prepared with violet red bile agar containing an added 1% glucose (VRBG) (6), followed by incubation at 35°C for 24 h. In addition, a three-tube MPN series was prepared in parallel for analysis of coliforms (1).

Typical "coliform type" colonies were picked for identification from the VRBG plates. If there were less than five colonies on the duplicate plates, all colonies were picked for identification. When the number of colonies exceeded five, the square root of the number of colonies on the plates was used to determine the number of isolates to be picked.

Identification of the isolates was by standard microbiological procedures and followed accepted characteristics (3).

RESULTS AND DISCUSSION

All isolates recovered from the VRBG agar plates were members of the family Enterobacteriaceae (Table 1). Four of the 10 species identified were unable to ferment lactose and therefore would not have been detected by using the standard coliform test. Since many of the

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

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*Florida Agricultural Experiment Stations Journal Series No. 1679.
Enterobacteriaceae, including at least one Erwinia species, are suspect regarding their pathogenicity (7,9), inclusion of as many of this family as possible in an indicator system would seem to have merit. This is particularly true when organisms such as Yersinia enterocolitica are detected, because this organism is gaining increased recognition as a cause of gastroenteritis in man (5). Y. enterocolitica was recovered from a frozen grouper sample in our study and was probably present at a level of less than one organism per gram.

The samples used in this study were of various backgrounds representing different degrees of processing, with most of them not having received any heat treatment. Identification of large numbers of Erwinia herbicola can be accounted for on the basis of the change in the taxonomic status of this organism. Previously classified as Enterobacter agglomerans, this organism has been reclassified as Erwinia herbicola (3). Hafnia was also included within the genus Enterobacter in earlier classification schemes; however, it is now a separate genus (3). Ten species and eight genera were recovered from the 53 samples. Edwardsiella, Citrobacter, Salmonella and Shigella were not found.

In a study of broiler carcasses (4), a more restrictive group of organisms was found during total Enterobacteriaceae counts. Escherichia and Enterobacter were the principle genera isolated. In vegetables, 85% of the salads tested were found to contain E. agglomerans (10). In addition, Klebsiella, Enterobacter and Serratia were recovered with high frequency.

Although Mossel et al. (6) indicated that certain organisms would mimic the Enterobacteriaceae on VRBG, none were encountered in this study. Addition of 1% glucose to VRB agar results in much more easily recognizable colonies than on VRB alone and this may account for our success in picking colonies of the Enterobacteriaceae. Total Enterobacteriaceae counts were generally higher than coliform counts; however, six samples were negative for Enterobacteriaceae by the VRBG method, but positive for coliforms using the MPN procedure (Table 1). This occurred mainly with samples that contained small numbers of coliforms and may have been due to use of a 3-ml sample per dilution with the MPN procedure and only 2 ml by the pour plate method. In that coliform numbers are generally low in seafood products (2), use of only duplicate plates in this procedure is not recommended.

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