dinitrophenol was removed from the sample; chromatograms of the last fraction of that sublimate gave two bands with the same $R_{DNP-leu}$ -values as in the sample. The butanol extract from the sea-water showed three bands with $R_{DNP-leu}$ -values 0.08, 0.17 and 0.32, as yet not identified.

The ether extract of the artificial sea water sample showed 14 distinct bands and the butanol extract showed four bands on the chromatograms. These results are in good agreement with the statement of Smith⁹ regarding the solubilities of various DNP-amino acids in ether and butanol.

The results, while of a preliminary nature, indicate that DNFB can be used to identify amino acids in sea water samples. It may also be possible to study peptides and proteins in sea water with this reagent although their concentrations may require the use of a preliminary concentration step, such as the ferric hydroxide gel procedure described by Jeffrey and Hood¹⁰. Further studies using this method are currently being carried out in order to determine the amino acid patterns of sea water samples obtained at various localities at different times of the year.

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The Crystal Structure of Aberrant Otoliths

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The main constituent of cod otoliths, calcium carbonate, has been shown by Dannevig¹ and others² to be present in the form of aragonite.

We have investigated the nature of the aberrant forms which occasionally occur, since it was thought that this knowledge might be of use in studying the factors affecting the structure and growth of normal otoliths. There appear to be two main aberrant forms, which we have designated Type 1 and Type 2 (Fig. 1).

In the Type 1 modification the nacreous smooth-ribbed structure of the normal cod otolith is completely lost, being replaced by a translucent randomly-crystalline structure which does, however, retain the general overall shape of the normal otolith. The Type 2 modification partly retains the structure of the normal otolith, but a portion is covered by markedly crystalline accretions which may cause considerable distortion of the normal shape.

X-Ray powder analyses of whole Type 1 otoliths and the crystalline accretions from Type 2 otoliths showed that Type 1 otoliths contain a mixture of calcite and vaterite while the accretions from Type 2 contain calcite only (Fig. 2).

The occurrence of vaterite in the Type 1 aberration is interesting since this modification of calcium carbonate only appears to have been found once in plant or animal sources before³ namely in small amounts in human gallstones⁴.

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Fig. 1. The two types of otolith modification.

Fig. 2. X-Ray spectra of cod otoliths (CuK α radiation). A: aragonite. C: calcite. V: vaterite.

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