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STUDIES ON SHARK MUSCLE. PART 2. HISTOCHEMICAL STUDIES OF SHARK MUSCLE DECOMPOSITION

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Introduction.

A peculiar phenomenon in the process of shark muscle decomposition was observed, as has been reported already⁽¹⁾. It indicates the presence of a certain step in the accumulating curve of ammonia in shark muscle, which was named O-Step. Before the O-Step stage, the shark meat is not remarkable in respect to putrefaction in spite of its strong ammoniacal odour, but after the O-Step putrefactive features appear for the first time. This speciality was studied histochemically and reported in this paper which also presents a histochemical definition of fish decomposition, referring to Imai's histological results⁽²⁾ which he obtained using gibel or eel fish muscle.

Experimental

One species of shark was used as the experimental material. It was a male of "dochizame" fish *Triakis scyllium* MUELLER et HENLE; it was taken off Maizuru on June 13th, 1951, 90 cm. in total length and 1950 g. in body weight. The dorsal muscles of this fish were cut off in several blocks 10 × 7 × 3 cm. in volume with its skin, and every block was stored separately in closed vessels at the temperature range of 6 to 17°C. At certain intervals of time, the central part of these blocks was studied histochemically by the same method as that described in the previous paper⁽³⁾, and the remaining portion used for determining ammonia and urea by the usual aeration method and the common urease method respectively.

The results are shown in the following (Fig. and Plates).

Results and Observations

From these results (Fig. 1 and Plates 1 to 6), when the muscles are not regarded as being putrefactive (before O-Step stage), next items are observed to exist.

- (1) Proper nuclei of muscular cell are seen.
- (2) Cross striations are observed obviously.
- (3) The presence of muscle urea is remarkable.
- (4) Few crevices in muscular fibers are shown.

But, after the O-Step, these are not to be seen. Imai⁽²⁾ had found already decrease of muscular nucleus and cross striation and increased vacuoles in muscle fiber according to the

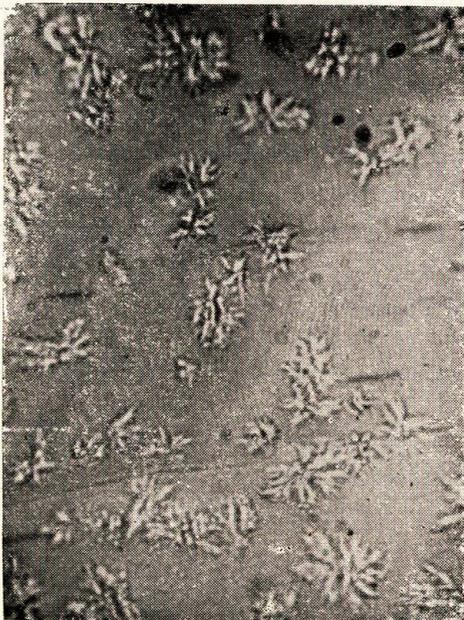
Plates. *Triakis scyllium* fixed by the Stuebel method.



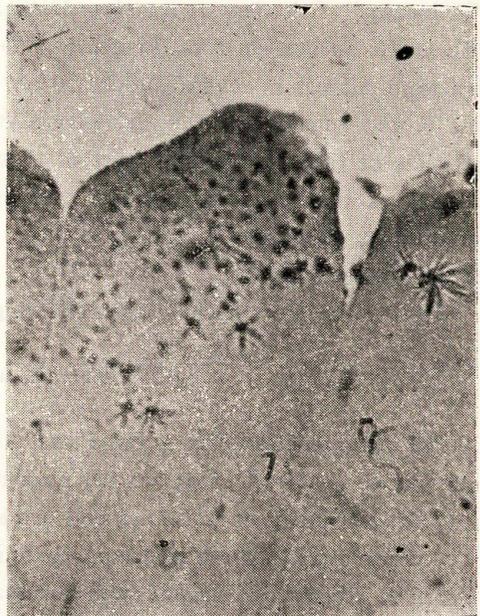
1. Fixed after 3 days of catching.
Fresh. 62×10



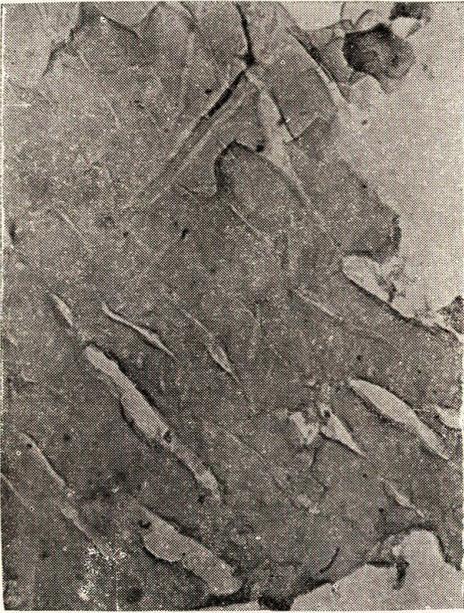
2. ditto. Showing the gathering
of urea crystals. 62×10



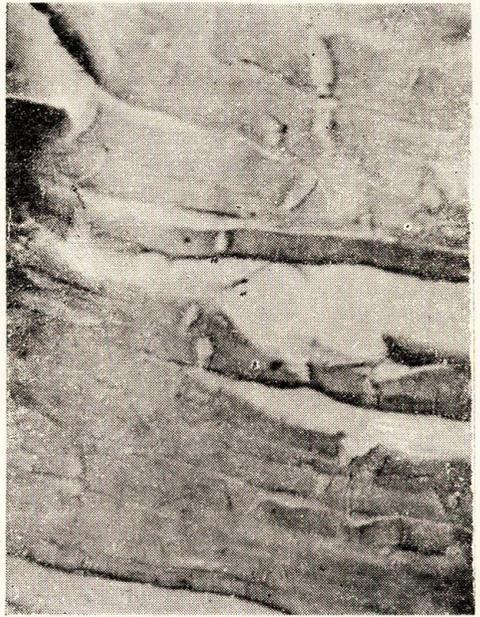
3. After 8 days. Fresh. 62×10



4. After 17 days. Fresh still more.
 62×10



5. After 32 days. Decomposed. 10×10



6. ditto. Decomposed. 10×10



7. ditto. Decomposed but urea crystals are seen. 62×10



8. ditto. Decomposed but cross striations and urea are seen. 62×10

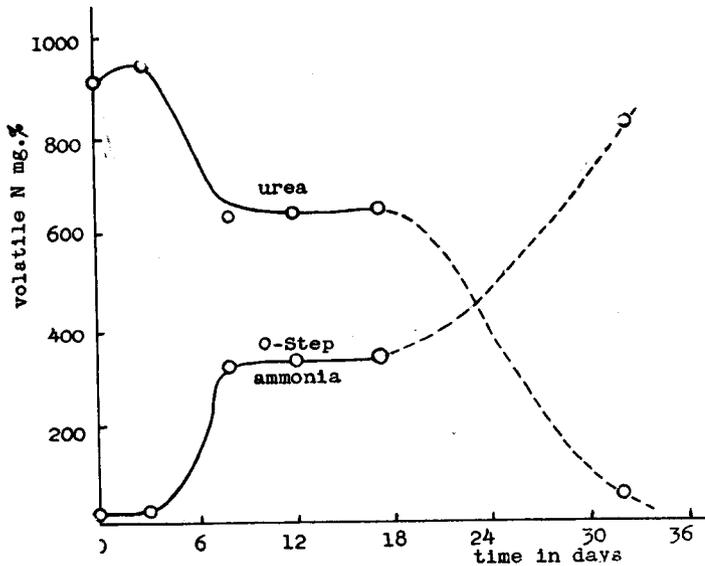


Fig. 1. Showing the increase and decrease of ammonia and urea in a "dochizame" shark muscle.

progress of fish muscle decomposition at 25°C. The above four items, therefore, become a standard for histochemical decision of the freshness of shark muscle and the negative standard decomposition. It will perhaps be similar for ordinary bony fish muscle, excepting the third item. But, items (2) and (3) are not suitable for the strict definition of decomposition. This is because a few urea crystals are seen and cross striations are present rarely even in a specimen which seems to be considerably putrefactive (plates 7 and 8).

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- (2) Y. Imai (1935) : *Kokumin-eisei*, 12, 173.
- (3) K. Ohoishi (1952) : *Kagaku*, 22, 424., Bull. Fac. Fish. Hokkaido Univ., 3, 193.

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