

salt leads to an increase in curariform action if the ring is aromatic and to a decrease if the ring be saturated. It is possible, however, that the quasi triple bond $H_3\equiv C-$ in methyl may hyperconjugate⁸ if the ring be aromatic; this would cause an electron shift towards the ring and hence a decrease in the charge on the N atom which could not occur to such an extent if $C_2H_5^-$ were present instead of CH_3^- .

This theory does not explain why tetraethyl arsonium is more active than tetramethyl arsonium; but as Malone⁹ has pointed out, the relationship between relative electro-negativity and bond dipole moment between arsenic and several other atoms is anomalous; and in the absence of further physico-chemical information on the bond in the trimethyl and triethyl arsonium iodides, it is difficult to see how these considerations can connect the physical and pharmacological anomalies in these two compounds.

¹ Ing, H. R., and Wright, W. M., *Proc. Roy. Soc.*, B, **109**, 337 (1932).

² Ing, H. R., and Wright, W. M., *Proc. Roy. Soc.*, B, **114**, 48 (1934).

³ Ing, H. R., *Physiol. Rev.*, **16**, 527 (1936).

⁴ Raventos, J., *Quart. J. Exp. Physiol.*, **26**, 361 (1936-37).

⁵ Clark, A. J., and Raventos, J., *Quart. J. Exp. Physiol.*, **28**, 375 (1936-37).

⁶ Raventos, J., *Quart. J. Exp. Physiol.*, **27**, 99 (1937-38).

⁷ Pauling, L., "The Nature of the Chemical Bond", 2nd Edition (Cornell University Press, 1944).

⁸ Mulliken, R. S., Rieke, C. A., and Brown, W. G., *J. Amer. Chem. Soc.*, **63**, 41 (1941).

⁹ Malone, J. G., *J. Chem. Phys.*, **1**, 197 (1933).

SCIENTIFIC EXPEDITION TO THE ANTARCTIC WHALING GROUNDS, 1946-47

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A BRITISH scientific expedition is on its way to the Antarctic whaling grounds on board the new whale-factory ship *Balaena*, which has been equipped with a laboratory for biochemical and physiological work with specially designed apparatus for use at sea. The expedition has been organised by the Department of Scientific and Industrial Research on the initiative of Dr. Franklin Kidd, superintendent of the Low Temperature Research Station, Cambridge. It has as its main aim a study of the fuller utilization of the large potential supplies of whale meat protein for human food in view of the present world shortage of high-grade protein. Its secondary aim is the general one of advancing knowledge of the physiology and biochemistry of the whale. The expedition has been made possible by the collaboration of Messrs. United Whalers Ltd., who generously provided a laboratory and facilities for the investigations on board their new ship.

A preliminary investigation in 1939-40 by the Department under the leadership of Lieut.-Commander Marr of "Discovery" Investigations confirmed in the first place what whaling personnel have always stated, namely, that a large proportion of meat from the carcass is scarcely distinguishable from beef, and in the second place showed that there are wide variations in the quality of the meat from different carcasses and from different parts of the same carcass. The meat shows a great diversity of colour, ranging

from a pale veal tint through many shades of red to a curious deep red black, and this may possibly be correlated with the age of the whale¹.

The lean meat from the back muscles alone, the longissimus dorsi and psoas, on the basis of the total British and Norwegian pre-war catches, was estimated to amount to more than half a million tons, which is equivalent to about half the total amount of meat imported into Great Britain before the War.

The expedition will carry out palatability tests on a large number of whales and make observations on various factors which may have an influence on quality, such as: mode of death; whether accompanied by exhaustion; with or without bleeding; the time between slaughter and cutting up; and the subsequent freezing and storage history. Biochemical analyses will be carried out on board the whaling vessel on selected representative samples, and control samples frozen at various temperatures will be brought back for re-assessment and more complete analyses at the Low Temperature Research Station.

The above data, it is hoped, will be correlated with the biological data on the whole catch of the factory ship, collected by an inspector of the Ministry of Agriculture and Fisheries and by a biologist working for the "Discovery" Committee.

The diversity of colour will be studied, attention being paid to various fractions of the muscle pigment such as myoglobin, hæmoglobin and a third yellow protein fluorescing in ultra-violet light which has not yet been fully investigated, but which I have recently found in considerable quantities in frozen whale muscle by extraction with *M*/15 phosphate buffer at a pH of 6.5.

The opportunity will be taken to study the physiology and especially the under-water physiology of the whale and of collecting specimens of interest in other branches of science. The physiological work has the support of the Royal Naval Physiological Laboratory and the Royal Naval Personnel Research Committee. The interest of the former has led to the loan to the expedition of special equipment, such as, for example, recording thermographs of the harpoon type, for obtaining carcass temperatures, which will be of great value in collecting data required in fulfilment of the main objective. An attempt to obtain samples of blood and tissues from the whale carcass after it surfaces from its final dive will be made by a scientific man working in a self-contained oxygen swim-suit ('frog man suit'). In this way it is hoped to obtain some information about the gaseous equilibrium of a recently surfaced beast. A proper understanding of the diving mechanisms of whales might be used to throw more light on some problems of human divers. Members of the team underwent special training at Fort Blockhouse to enable them to carry out this project, and the Royal Navy has placed diving-gear at their disposal.

The under-water physiology of the whale is by no means unconnected with the qualities of whale meat as a food, because the character or composition of the muscles of the whale are adapted in several striking respects to the requirements of its submarine existence. There are indications from work carried out on material from the previous expedition that, as an indirect consequence of this adaptation, the proteins of whale meat are of exceptional value for growth by comparison with the meat proteins of land animals.

¹ Bate-Smith, E. C., and Sharp, J. G., *Food Manufacture*, **21**, 371 (1946).