part of the catch at Suez, the Red Sea fish are not esteemed as much as those of the Mediterranean, and the Alexandria catch is more valuable.

Finally, and in addition to the evidence of the commercial catch, my own observations (based on the change in hydrogen ion concentration on storing water samples, *loc. cit.*) and those of Natterer[2] show that there is more organic matter in the water of the southern than in the northern part of the Suez Canal.

The explanation of this anomaly seems to me to be a tidal one. At Suez there is a considerable ebb and flood, which is absent at Port Said. This tidal scour must cause a thorough vertical and horizontal mixing of the water mass in the head of the Gulf of Suez and the southern end of the Suez Canal. It would replenish with basic food materials areas that might otherwise have become exhausted as a result of the synthetic activities of marine algæ. On the other hand, and particularly so between February and August, when the Nile out-flow is dammed, the water of the Mediterranean coast of Egypt must be relatively stagnant, and, for such mixing as there is, will depend mainly upon the strength and direction of the wind in the coastal area. Under these conditions, one can quite easily see that in long periods of calm weather the basic food materials necessary for algal growth would be used up, and in the absence of further supplies being circulated, this growth would cease. It is, of course, upon this algal and other plant growth that the yield of the fishery ultimately depends.

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[1] "Some Hydrographic Data from the Suez Canal, 1928–1929", Fisheries Research Section, Bull. No. 1. Govt. Press, Cairo, 1930.
[2] "Berichte der Comm. für Erforschung der Östliche Mittelmers." 1893.

Cystine and Wool Production

ATTENTION continues to be directed to the difficulty of accounting for the manner in which sheep on pastures secure the cystine necessary for wool growth. In a recent communication to NATURE,[1] Rimington and Bekker conclude that the amount of cystine consumed in the grass fails to account for the amount present in the fleece and formulate an alternative hypothesis that "The intestinal flora and fauna .... are almost certainly able to synthesise cystine from inorganic sulphur and it is conceivable that the population of the sheep's intestine, by continual increase, is transforming sulphates into cystine, built into their own protoplasm, with a high grade of efficiency. As bacteria die, their cell protoplasm autolyses, again setting free the sulphur, now in the form of cystine, which is readily available to the sheep."

Although this hypothesis is attractive, the evidence against it is considerable. Various Continental and American workers have noted that the bacterial flora of the intestine readily decompose sulphur-containing bodies and even elementary sulphur to hydrogen sulphide, ethyl mercaptan and similar compounds which, on absorption, are very rapidly oxidised by the blood stream and excreted as urinary sulphates. The possibility of the transformation of inorganic sulphur into cystine by such means has not been demonstrated, however. Recently, we have also studied the activity of cellulose-splitting bacteria isolated from the contents of the sheep's rumen by continuous sub-culturing in a medium containing ammonium sulphate as a source of nitrogen and sulphur. Although there was a pronounced decrease in sulphate sulphur and the formation of hydrogen sulphide, there was no evidence of the formation of cystine or any similar sulphur compound. Fraser and Roberts[2] have made the suggestion that "cystine is formed during keratinisation, and that cystine synthesis is a function of the wool follicle itself. The amount of cystine produced in a fleece would then depend upon the number and activity of the wool follicles, and not upon the cystine content of the food or the bacterial population of the intestines."

It is of the utmost importance, from the point of view of pastoral industry, that the whole problem should be brought into its proper perspective. The recent work of Evans[3] has shown that cultivated pasture, under English conditions at any rate, contains about 0·1 per cent of cystine on the basis of dry matter (*not* 0·01 per cent as is accepted as the average figure by Rimington and Bekker). Considering the case cited by these investigators, and assuming that a fully-grown sheep is able to consume daily an amount of pasturage containing 4 lb. of dry matter, it follows that the necessary 0·78 lb. of cystine in a 12 lb. fleece would be secured from the pasturage during a grazing period of 195 days. Even on the assumption that only 50 per cent of the cystine in the grass is actually retained in the animal for purposes of wool-protein synthesis, it is clear that a sheep would consume per annum roughly all the cystine necessary for the growth of a 12 lb. fleece. If, however, the average wool production per head of the sheep population in Great Britain be taken at the much lower official estimate of 5–6 lb.,[4] then the argument becomes even more convincing.

We are led to the belief, therefore, that under English conditions, there is no difficulty in accounting for wool production in sheep subsisting wholly on pasturage. The cystine content of the herbage, although apparently low, is adequate for this purpose. The previous interpretation of the figure obtained for the cystine content of grass as indicating the presence in the herbage of a cystine precursor becomes therefore superfluous.

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[1] Rimington and Bekker, NATURE, **129**, 687; 1932.
[2] Fraser and Roberts, NATURE, **130**, 473; 1932.
[3] Evans, *J. Agric. Sci.*, **21**, 806; 1931.
[4] Wool Survey of the Empire Marketing Board, 57; 1932.

Radiation and Enzyme Activity

A SYSTEMATIC study of metabolic radiation by a modified photographic method in this laboratory (to be published at a later date) has revealed the following facts: (1) Radiation is a general function of normal organic metabolism, being exhibited by blood, milk, eggs, brain, bone-marrow, lung, the pituitary (anterior and posterior lobe) and the parathyroid gland, urine, roe of plaice, yeast, Demerara sugar, honey, etc. (2) Radiation fades with the lowering and re-appears with the raising of temperature; it is inhibited at $-5°$ to $-10°$, destroyed by heating at 98°–100° for two hours, inhibited by carbon monoxide in the dark but regenerated in sunlight, and destroyed by hydrogen peroxide, potassium permanganate and potassium cyanide. (3) Pure cholesterol, vitamins (C and D), sucrose, hormones and alkaloids as such are void of radiation.