(wet sugar) and the no response percentage increased. This leads to the assumption that with the increase in activity there is a decrease in response (that is, retreat and attempt to remove dead body responses). Areas of fluctuating temperature, light and factors governing activity prevent a narrow mean figure for positive response being obtained.

TIMOTHY J. HUNT

5 Acol Road,
London, N.W.6.
March 1.

[1] Studd, J. H., *Nature*, **179**, 431 (1957).

Production of Carbon in the Sea

For many purposes in the study of marine production it is useful to express the quantity of carbon in mgm./m.^{3}/day as a percentage of the standing stock of carbon. This percentage-rate has now been measured in the North Sea with the carbon-14 technique and combined with a measure of the standing stock. The expression is comparable to the 'production increase coefficient' of Riley, Stommel and Bumpus[1] and to the estimate of the rates of division of diatoms made from the decrease in their girdle widths[2].

Steemann Nielsen's method[3] was modified slightly. Samples of water were taken from depths corresponding to fixed percentages of the surface light-intensity at midday. Each was put into a bottle covered with two filters, a neutral density filter, the percentage transmission of which corresponded to that of the depth from which the sample was taken, and a second filter representing the colour of the water, in this case Jerlov's[4] coastal water type I. So, at a number of depths in the photic zone, we have estimates of algal numbers and the rate of carbon production, each per unit volume.

From the algal numbers and from size measurements, estimates of algal volumes were made. It was assumed that these volumes could be converted to dry weight ($\times 1/5$) (see ref. 5) and to carbon ($\times 0{\cdot}44$) (see ref. 6), the combined equivalent being:

$$1 \text{ mm.}^3 = 0{\cdot}086 \text{ mgm. carbon}$$

From the light-extinction coefficients and length of day at the surface, the duration of a given light-intensity at each depth was calculated. An average rate in mgm. carbon/day weighted by the energy reaching each depth was derived. We now have estimates of the average standing stock and its daily production as weight of carbon per unit volume of sea water in the photic zone, as shown in Table 1. Estimates made in 1949 using the same equivalent and the decrease in cell-size method of measuring the rate of division of diatoms are given for comparison. (Note: the figures for 1949 replace those given for carbon stock and production on p. 77 of my paper (ref. 2), for which an inadequate conversion factor was used.)

Table 1. Standing Stock of Carbon and its Rate of Production in the North Sea in Spring in mgm. Carbon/m.^{3}

	Standing stock	Daily production	Production per day (per cent)
10–30.IV.49	44·1	16·7	38
23.IV–16.V.49	15·8	3·8	22
8–15.IV.54	16·6	3·6	21·7
24–28.IV.54	37·5	10·7	28·7
4–14.V.54	12·4	7·6	61·3
23–26.V.54	16·0	13·2	82·5

There is a difference between the two methods of estimating the percentage production per day because the decrease in cell-size method used in 1949 includes the effect of vertical turbulence. There is a sharp increase in the percentage production per day in 1954; this point and others will be considered in a detailed publication elsewhere.

D. H. CUSHING

Fisheries Laboratory,
Lowestoft.

[1] Riley, G. A., Stommel, H., and Bumpus, D. F., Bull. Bingh. Oceanogr. Coll., **12**, 4 (1949).
[2] Cushing, D. H., Fish. Invest. II, **18**, 7 (1955).
[3] Steemann Nielsen, E., *J. Cons. Int. Explor. de la Mer*, **18** (2), 117 (1952).
[4] Jerlov, N. G., Rep. Swedish Deep Sea Exped., 1947–48, **3**, 1, 1 (1951).
[5] Grim, J., *Int. Rev. ges. Hydrobiol. und Hydrogr.*, **39**, 3, 193 (1939).
[6] Sverdrup, H. U., Johnson, M. W., and Fleming, R. H., "The Oceans" (Prentice-Hall, New York, 1942).

Sickle Cell Gene in Indonesia

Dr. Lie-Injo Luan Eng[1] has pointed out the sporadic occurrence of carriers of sickle cell trait in Indonesia. Since carriers of that hæmoglobin who are descended from other than negro or Southern Indian ancestry are rare outside Africa and Southern India, the question arises how sickle-cell hæmoglobin has reached Indonesia. In this connexion, it may be pointed out that in the nineteenth century (from 1835 until about 1890), some thousand negro soldiers formed part of the Dutch Colonial Army in the former Dutch Indies[2]. These soldiers had been recruited from the small Dutch colony on the Gold Coast, Elmina, which was acquired by Britain in 1871. After that a limited number of negro soldiers were still recruited in Liberia. Since in the parts of Africa from which the soldiers were recruited carriers of the sickling gene and of hæmoglobin *C* are numerous, the possibility that the transport of those African soldiers are the cause of the sporadic occurrence of the sickling gene in Indonesia may be taken into consideration. Apart from that, already in earlier times negro slaves seem to have been introduced into Indonesia[3].

J. H. P. JONXIS

Department of Paediatrics,
State University,
Groningen.
March 26.

[1] Lie-Injo Luan Eng, *Nature*, **179**, 381 (1957).
[2] Encyclopaedie v. Ned. Indië, **1**, 13 (1917).
[3] Kern, V., *Med. Kon. Akad. v. Wetensch., Afd. Letterk.*, 10e deel, 2e reeks, 77 (1881).

Accumulation of Ethyl Alcohol and Acetaldehyde in Blackcurrants kept in High Concentrations of Carbon Dioxide

A report of successful storage of blackcurrants in 50 per cent carbon dioxide has led me to investigate the effects of this treatment on the fruit. Freshly picked blackcurrants were kept for four weeks at 4·4° C. in a continuous flow, at the rate of 30 litres an hour, of the following carbon dioxide – oxygen – nitrogen mixtures:

Percentage		
Carbon dioxide	Oxygen	Nitrogen
0	21	79
25	15·75	59·25
50	10·5	39·5
50	5	45
50	2	48