the spectral characteristics of which suggest identity with the products reported here.

NATIONAL INSTITUTE OF ARTHRITIS
AND METABOLIC DISEASES, NATIONAL
INSTITUTES OF HEALTH, FEDERAL
SECURITY AGENCY, BETHESDA, MARYLAND
OSAMU HAYAISHI[8]
ARTHUR KORNBERG

RECEIVED APRIL 28, 1951

---

[8] Special Research Fellow.

ISOTOPIC COMPOSITION OF OXYGEN IN AIR DISSOLVED IN PACIFIC OCEAN WATER AS A FUNCTION OF DEPTH

Sir:

Seventeen samples of water collected in the Pacific Ocean at 32° 10′ N. and 120° 19′ W. on 18 Feb. 1951 from 0000 to 0600 PST at depths ranging down to 2870 meters were evacuated and the evolved air collected for analysis by a Toepler pump system. After analysis of the air for its oxygen content, the samples were sent to Evanston, Illinois, where the O^{18}/O^{16} ratio was measured on all of the samples.[1] A Consolidated-Nier isotope ratio mass spectrometer was used to which had been added a double molecular leak input system, using features recommended on the one hand by Halsted and Nier[2] and on the other by McKinney, McCrea, Epstein, Allen and Urey.[3] In addition, the number 2 amplifier was replaced by a vibrating reed electrometer and the galvanometer of the mass spectrometer by a photoelectric recording potentiometer. Relative accuracy in the case of air was 0.03% in the isotope ratio, an accuracy which decreased with decrease of oxygen percentage.

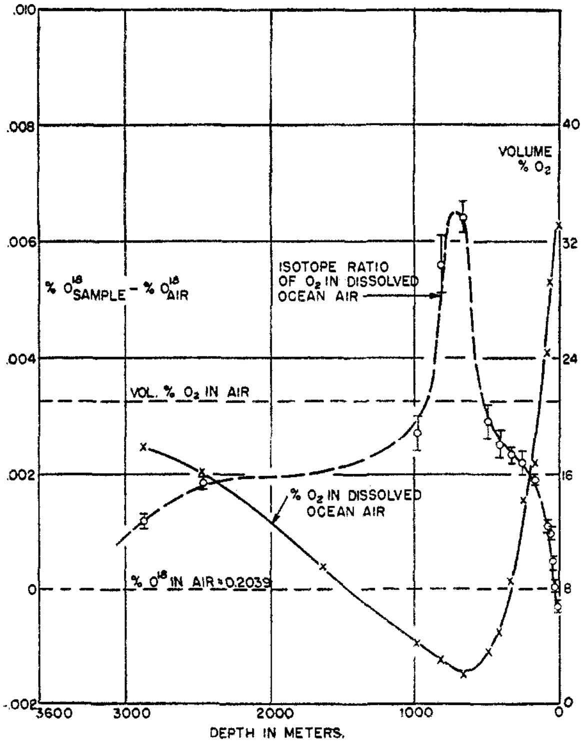

Fig. 1.

The results of the oxygen analysis and isotope ratio study are shown in Fig. 1 where the length of the vertical lines on the isotope ratio points represents the relative uncertainty in the data. The correlation between the rise in the O^{18}/O^{16} ratio and the decline in oxygen percentage is not only extremely striking, but strongly suggestive of a postulate that the same fundamental mechanism is responsible for both effects. The conclusion is almost inescapable that marine vegetation, plankton, bacteria and other sea life which consume oxygen must preferentially metabolize O^{16} at a higher rate than O^{18} to produce this marked isotope fractionation.

The bearing of these results on the enhanced O^{18} content of the atmosphere, photosynthesis in the oceans, and other geochemical and oceanographic problems will be discussed in later publications.

THE SCRIPPS INSTITUTION OF OCEANOGRAPHY
UNIVERSITY OF CALIFORNIA
LA JOLLA, CALIF. NORRIS M. RAKESTRAW
DEPARTMENT OF CHEMISTRY
NORTHWESTERN UNIVERSITY DEFOREST P. RUDD
EVANSTON, ILLINOIS MALCOLM DOLE

RECEIVED APRIL 30, 1951

---

[1] This work was partially supported by the Air Force Cambridge Research Laboratories under contract AF19(112)-157 with Northwestern University.

[2] R. E. Halsted and A. O. Nier, *Rev. Sci. Instruments*, **21**, 1019 (1950).

[3] C. R. McKinney, J. M. McCrea, S. Epstein, H. A. Allen and H. C. Urey, *ibid.*, **21**, 724 (1950).

STUDIES ON LYSOZYME

Sir:

When a several times recrystallized preparation of lysozyme carbonate is chromatographed on a column of IRC-50, two ninhydrin positive peaks (A and B, Fig. 1a) are obtained, both of which contain lytic activity. The experimental conditions are the same as those employed earlier in the chromatography of ribonuclease,[1] except that elution is performed with a 0.2 *M* sodium phosphate buffer of *p*H 7.18. The preparation of

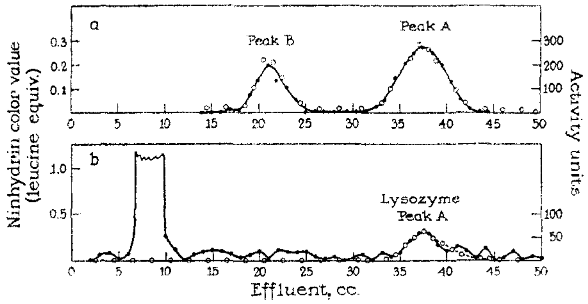

Fig. 1a.—Chromatography of lysozyme: about 5 mg. of lysozyme carbonate was chromatographed. About 60% of the activity initially put on the column appears in peak A, about 40% in peak B.

Fig. 1b.—Chromatography of egg white: about 0.2 cc. of egg white was diluted to 1 cc. with buffer and the entire sample chromatographed: ●———● ninhydrin color value; ○———○ lysozyme activity.

---

[1] C. H. W. Hirs, W. H. Stein and S. Moore, THIS JOURNAL, **73**, 1893 (1951).