The micrographs indicate that fibrin is produced through a predominantly lateral association of fibrinogen filaments. The characteristic striation does not appear under all circumstances, for example, in fibrils with widths below about 200 Å., or in tapered ends with widths less than this. Unstriated fibrils show a randomly particulate structure, while in the striated portions the particles are more concentrated in the stained bands. The micrographs of fibrinogen do not show any degree of regularity either in length or internal structure comparable to the regularity in fibrin. It appears that the periodicity in fibrin is not a manifestation of rigid dimensional units in fibrinogen, but is, rather, a characteristic developed subsequent to initial aggregation The anomalous variations in protein concentration indicate that some of the constituents have experienced local axial shifts to preferred positions.

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FERMENTATION OF GLUCOSE-1-C^{14}

Sir:

We have synthesized *d*-glucose-1-C^{14} from *d*(−)-arabinose by the Fischer–Kiliani method.[1] The mixed glucono- and mannonolactones were reduced catalytically,[2] carrier glucose added, and the radioglucose isolated and recrystallized to constant specific activity (about 6000 counts per gram minute). The glucose (in 0.2-g. samples) was then fermented anaerobically by Fleischmann's baker's yeast in phosphate buffers in the absence of a source of combined nitrogen; the fermentation yields (based on the carbon dioxide obtained) were 75–90%. The Embden–Meyerhof fermentation mechanism[3] predicts that all the radiocarbon will appear in the methyl group of the alcohol so obtained; this prediction has been substantially confirmed.

The carbon dioxide obtained directly in the fermentation was counted as $BaCO_3$. The alcohol was degraded to acetone by the method outlined below; the latter was counted as its 2,4-dinitrophenylhydrazone.

$$C^{14}H_3CH_2OH \xrightarrow[H_2SO_4]{K_2Cr_2O_7} C^{14}H_3CO_2H \xrightarrow{Ba(OH)_2} (C^{14}H_3CO_2)Ba(O_2CCH_3) \xrightarrow[\text{Vacuum}]{530^\circ} C^{14}H_3COCH_3 + BaCO_3$$

In a set of control experiments on the pyrolysis using methyl-labelled acetic acid,[4] we found 0.1–0.3% of the activity in the barium carbonate produced. Further in these control experiments, the specific activity of the acetone 2,4-dinitrophenylhydrazone was only 77% of that anticipated from the specific activity of the barium acetate, even after making the usual corrections[5] for self-absorption, etc. The specific activities of all samples of acetone 2,4-dinitrophenylhydrazone were therefore corrected by the factor 1/0.77. The final results, together with the counting errors (95% confidence level), are given below:

*p*H	Other conditions	Per cent. of radioactivity (based on glucose fermented) found in CO_2	CH_3	CH_2OH
6.2	Live yeast	6.5 ± 2.4	92 ± 4.0	4.8 ± 2.4
5.7	Live yeast	1.0 ± 1.8	76 ± 4.0	7.6 ± 2.8
5.7	Dried yeast powder	3.7 ± 1.8	92 ± 7.8	0.2 ± 0.4

We are currently investigating the causes of the slight radioactivity in the carbon dioxide obtained directly in the fermentation and in the barium carbonate from the pyrolysis.

(1) Kiliani *Ber.*, **19**, 3033 (1886).
(2) Glattfeld and Schimpf, THIS JOURNAL, **57**, 2204 (1935).
(3) Meyerhof, *Biochem. Symposia*, **V**, 141 (1941).
(4) The methyl labelled acetic acid was kindly supplied to us by Professor Konrad Bloch
(5) Yankwich and Weigl, *Science*, **107**, 651 (1948); Libby, *Ind. Eng. Chem., Anal. Ed.*, **19**, 2 (1947).

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A NEW SYNTHESIS OF 2-PHENAZINOL, THROUGH THE DI-N-OXIDE

Sir:

The chlorine atom of 2-chlorophenazine can be labilized toward aqueous-alcoholic sodium or potassium hydroxide by converting the base to 2-chlorophenazine-5,10-dioxide (red-orange needles, m. p. 190–191° (dec.)[1] *Anal.*[2] Calcd. for $C_{12}H_7ClN_2O_2$: C, 58.4; H, 2.87. Found: C, 58.5; H, 3.06. This conversion is readily effected, using the method employed by Clemo and McIlwain[3] for other phenazines. Refluxing the chlorophenazine dioxide for about twelve hours with aqueous-alcoholic potassium or sodium hydroxide gives a deep purple solution of the alkali salt, from which hydrochloric acid precipitates the free 2-phenazinol-5,10-dioxide (orange-red, begins to darken at 236°). *Anal.* Calcd. for $C_{12}H_8N_2O_3$: C, 63.2; H, 3.54. Found: C, 63.1; H, 3.87. Reduction of this by sodium hyposulfite (sodium "hydrosulfite") in alkaline solution at room temperature gives a red solution of the sodium salt of 2-phenazinol, from which the free phenol[4] is precipitated by acid. (Clemo and McIlwain[3] found sodium hyposulfite effective in reducing 1-phenazinol-5,10-dioxide.) The 2-phenazinol may be purified by vacuum sublimation and chromatographic adsorp-

(1) All melting points are corrected.
(2) Analyses by Mr. W. C. Alford, Mrs. M. M. Ledyard and Mrs. E. G. Peake.
(3) Clemo and McIlwain, *J. Chem. Soc.*, **483** (1938).
(4) Kehrmann and Cherpillod, *Helv. Chim. Acta*, **7**, 975 (1924). As these authors indicate, in saying that the 2-phenazinol melts at "about" 253–254° with decomposition, this compound does not appear to have a sharp melting point.