
 COMMUNICATIONS TO THE EDITOR

 LONG X-RAY DIFFRACTION SPACINGS OF
 COLLAGEN

Sir:

Various values have been proposed for the unusually large fiber-axis structural periodicity found in collagenous tissues. R. B. Corey and R. W. G. Wyckoff [*J. Biol. Chem.*, **114**, 407 (1936)] concluded that their measured meridional spacings indicated a fundamental period of 330 Å., while the results of G. L. Clark and J. A. Schaad [*Radiology*, **27**, 339 (1936)] introduced the figure 432 Å., or multiple. Using purely speculative arguments, W. T. Astbury [*J. Int. Soc. Leather Trades Chemists*, **24**, 69 (1940)] suggested 838 Å. as the probable value.

Photographs recently obtained in this Laboratory show that the period is in reality close to 640 Å. for air-dried collagenous tissues. Technical improvements comprise principally the use of fine slits with long collimating tubes. The slits, by causing registration of a series of equally spaced line-shaped diffractions, greatly facilitate the resolution and accurate measurement of diffraction orders.

The table shows results obtainable from a typical diffraction pattern of dried beef tendon, citing only the more intense innermost orders of the fundamental period (filtered Cu K α radiation, specimen-to-film distance 26.1 cm.):

Measured diameter, mm.	Bragg spacing, Å.	Order no., <i>N</i>	<i>N</i> times spacing, Å.
15.1	53	12	636
13.8	58	11	638
12.6	64	10	640
11.4	71	9	639
10.0	80	8	640
8.8	91	7	637
7.6	106	6	636
5.0	161	4	644
3.7	217	3	651
2.5	322	2	644

Average 640

The first order (strongest, but difficult to separate completely from the central beam) and every one of the fainter orders to the twentieth can be seen. No lines requiring a period greater than 640 Å. have been observed in this range. Occasional orders can be made out on some films up to the position of about the thirtieth.

The fundamental periods as thus measured are included in the range 638–648 Å. when air-dried native materials (tendon, skin, cornea) from a variety of sources (rat, beef, human) are used, and in all such instances relative order intensities do not change materially. Under certain conditions, however, the positions and intensities can be altered. These effects are being studied and will be reported in due time.

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1,2-DIPHENYL-3,4-DIHYDRONAPHTHALENE

Sir:

Before the publication of the paper by Bergmann, Eschinazi and Schapiro [*THIS JOURNAL*, **64**, 557 (1942)], Dr. Bergmann asked for my explanation of the fact that he found the melting point of 1,2-diphenyl-3,4-dihydronaphthalene to be 94–95° while I had reported [*ibid.*, **61**, 608 (1939)] a melting point of 77°. He sent me a sample of his hydrocarbon (m. p. 93–94°) which I have compared with my sample and with the carbinol which he was unable to get. My samples were bottled and put away in October, 1938, at the conclusion of that particular problem. My carbinol which melted at 98–99° in 1938, melts now at 98.5–99°, and the mixture of this compound with Dr. Bergmann's sample melts at 88–94°. The bottle which contained my pure 76.5–77° hydrocarbon in 1938, now contains two distinct varieties of crystals: colorless, transparent plates which melt at 76.5–77° and white, opaque plates melting at 91.5–93.5°. A mixture of my two kinds of crystals melts at 76–94°, a mixture of Dr. Bergmann's compound with my high melting form melts at 90–93°, and a mixture of his compound with my low melting form melts at 75–93°. Recrystallization of my mixture from either methanol or ethanol and ethyl acetate gives the high melting form identical with Dr. Bergmann's compound.

I have just repeated this preparation and again had no trouble in preparing 1-hydroxy-1,2-diphenyl-1,2,3,4-tetrahydronaphthalene by the addition of phenylmagnesium bromide to 1-oxo-2-