POLARIZED INFRARED SPECTRA FOR SILKWORM-GUT AND OTHER FIBROUS PROTEINS

Sir:

Infrared spectra observed with anisotropic specimens in polarized light depend upon their orientations relative to both direction of incidence and plane of polarization of the light. Spectra for different orientations of the same specimen can be correlated with structure and arrangement of its molecules. We have been employing this technique to study fibrous proteins. A recent account[1] of results obtained in this way by others encourages us to report some of our own findings at this time.

Polarized spectra for silkworm-gut, a material giving[2] the X-ray diffraction pattern characteristic of fibroin, are shown in Fig. 1. Each spectrum was traced from original instrumental records of *per cent.* transmission through two different samples, one about twenty, another about five microns thick, at left and right, respectively.

These spectra indicate an arrangement that is highly ordered in some respects. The degree of polarization exhibited by several bands approaches the best observed here for single crystals of favorably arranged, simple molecules, exceeding that for the other fibrous proteins we have examined.

The *rachis* of seagull feather exhibited many features appearing in Fig. 1 while quill from pigeon feather was polarized perceptibly at the lower frequencies only. Several natural collagens gave spectra similar to ones described above, with polarizations varying vicariously like ones for feather keratins. Films of rabbit myosin, oriented[3] so as to produce the α-keratin structure, and porcupine quill, showed only small effects of different sort.

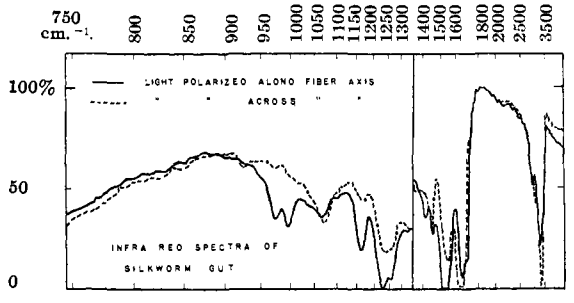

Fig. 1.

Our findings are confirmed in part by those of Ambrose, Elliott and Temple,[1] who worked just in the limited spectral range between 2800 and 3500 cm.$^{-1}$. There they found only slight differences for myosin (91% *vs.* 87% absorption, recalculated from their optical densities) and even smaller ones for porcupine quill and tropomyosin. They report larger effects, however, with feather keratin, as do we.

A full report will be submitted when our work has been completed.

(1) E. J. Ambrose, A. Elliott, and R. B. Temple, *Nature*, **163**, 859 (1949).

(2) R. S. Bear, THIS JOURNAL, **66**, 2043 (1944).

(3) W. T. Astbury and S. Dickinson, *Proc. Roy. Soc.* (*London*), **B129**, 307 (1940).

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RECEIVED JULY 25, 1949

USE OF *p*H INDICATORS WITH ION EXCHANGE RESINS

Sir:

I wish to report the use of *p*H indicators as a means of detecting acids adsorbed on a strong base type resin, Amberlite I.R.A 400.[1]

When the basic form of this resin is treated with phenolphthalein the indicator is quantitatively removed from solution and the resin becomes the characteristic deep pink. Washing has no effect and even strong acid or base will not elute the indicator. Acid decolorizes the resin but base restores the color. If the resin is left for a few days in neutral solution, however, the color is destroyed and base will not restore it. When methyl orange is adsorbed the characteristic color is given with hydrogen ion. Washing removes the color. Again neither strong acid or base will elute the indicator.

The following experiment on the determination of I.R.A 400 capacity for aspartic acid will serve to illustrate the use of a column indicator: Aspartic acid solution was exchanged on the basic form of the resin. The column was washed and 50–100 drops of 1% phenolphthalein passed through. The top of the column remained colorless and a pink zone formed at the junction of the aspartic acid and unreacted resins. The columns were micro burets containing 5–6 g. of 20–30 mesh resin. The acid was 4 mg./ml. and a flow rate of 0.2 ml./min. was used. The value obtained was: 1.5 cc. wet R:NOH resin = 100 mg. aspartic acid.

The method gave a visual illustration of resin efficiency. Not one colored particle was located in the aspartic resin. The pink zone was perfectly even. There was no measurable displacement of aspartic by phenolphthalein.

(1) Rohm & Haas Co.

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RECEIVED SEPTEMBER 19, 1949

THE HYDROLYSIS OF NICOTINYL-L-TYROSYL-HYDRAZIDE BY CHYMOTRYPSIN

Sir:

The recent report that benzoyl-L-tyrosylhydrazide is ineffective as an inhibitor in the chymotrypsin catalyzed hydrolysis of benzoyl-L-tyrosylamide or ethyl ester[1] would lead one to infer

(1) S. Kaufman, H. Neurath and G. W. Schwert, *J. Biol. Chem.*, **177**, 793 (1949).