Optical Activity in the Orgueil Meteorite

In a recent report (*1*) Hayatsu has independently confirmed our previous finding (*2*) of fatty acids in the Orgueil carbonaceous meteorite but advanced the view that the slight levorotation observed (*3*) in Orgueil saponifiable organic matter was caused by instrumental artifacts. It was suggested that the Rudolph polarimeters employed in the investigation showed a levo bias at low transmissions.

In my opinion this debate about optical activity could be avoided if the following points were considered:

1) Hayatsu used a significantly different chemical process to extract the meteorite samples for the optical rotation measurements: that is, he used benzene, methanol, and chloroform separately for extracting the meteorite samples. The extraction time also differed from the original procedure (*2, 3*). Since the Orgueil meteorite contains a variety of compounds (*4*), different processes can extract different components. Hayatsu used colloidal copper chromatography, which also alters the composition of the extracts by retaining polar molecules from the eluates (*5*).

2) In the original study (*3*) the Orgueil extracts from three stones were found to be levorotatory by three independent operators on three Rudolph polarimeters in three laboratories. Our procedure blanks and synthetic-dye solutions containing sulfur showed no optical rotation, whereas Hayatsu's did. The optical density of the synthetic-dye solutions (*3*) was nearly identical with that of the Orgueil extract. The terrestrial controls measured were dextrorotatory. Recent experiments with a Bendix Polarmatic recording spectropolarimeter gave the following results: Synthetic-dye solutions containing sulfur were optically inactive and did not show spurious rotations in the 60- to 100-percent transmission range.

An Orgueil meteorite saponifiable extract did show rotation of −1.7, −2.1, −2.6, −3.3, and −4.1 millidegrees at wavelengths of 588, 546, 476, 445, and 417 mμ, respectively, in the 70- to 100-percent transmission range. The error in the various experiments was ± 0.3 mdeg. Dilution of the meteorite extracts resulted in a proportional decrease of the optical rotations. The meteorite used for this experiment weighed approximately one-fourth as much as those used in the previous study (*3*); all extract was contained in a 1-cm cell. Standard sucrose solutions diluted to give +2.0 mdeg rotation at 546 mμ wavelength gave in effect +2.0 to +2.1 mdeg readings. The measurements on the Orgueil meteorite do not disprove, of course, the possibility that this slight levorotation was caused by terrestrial contaminations.

BARTHOLOMEW NAGY
Department of Chemistry,
University of California, San Diego,
La Jolla 92038

References

1. R. Hayatsu, *Science* **149**, 443 (1965).
2. B. Nagy and M. C. Bitz, *Arch. Biochem. Biophys.* **101**, 240 (1963).
3. B. Nagy, M. T. J. Murphy, V. E. Modzeleski, G. Rouser, G. Claus, D. J. Hennessy, U. Colombo, F. Gazzarrini, *Nature* **202**, 228 (1964).
4. M. H. Briggs and G. Mamikunian, *Space Sci. Rev.* **1**, 647 (1963).
5. M. Blumer, *Anal. Chem.* **29**, 1039 (1957).

2 December 1965

Sarcolemma: Tension Transmission

Street and Ramsey [*Science* **149**, 1379 (1965)] argue that tension developed in the myofibrils of a striated muscle fiber, instead of being transmitted at their ends to the tendon-cap, may be transmitted laterally to the sarcolemma and thence to the tendon. Their argument rests on evidence that the sarcolemma and its attachments to myoplasm are strong enough to bear the stresses of active tension. This, however, is not persuasive. To show that something is possible is not to demonstrate that it is actual.

A crucial argument against lateral tension transmission is that it fails to explain the development of active isometric tension. The sarcolemma is a passive elastic tube attached along its length to the contractile sarcoplasm. In isometric contraction, since the length of the passive sarcolemma does not change (it does not scallop at each sarcomere), the tension in it can be no greater than it was during resting length. Even assigning all of the resting elasticity of the muscle fiber to the sarcolemma does not change the crucial failure of the lateral-transmission theory to explain how, in isometric contraction, much greater active tension is delivered to the tendon than was present during rest through a passive element that remains the same length.

The only way lateral transmission through sarcolemma can explain isometric contraction is if contractile force is transmitted laterally primarily at the tendon-sarcolemma cap. Of course, this is essentially end transmission.

An anatomical structure to transmit tension from the ends of myofibrils to tendon-cap may not exist. Intermolecular forces between these elements or the cohesive strength of water in the interspace are sufficient. These ideas have previously been outlined [H. Lamport, A. Mauro, and L. Stark, *Proc. Intern. Physiol. Cong. 10th* (1965)].

HAROLD LAMPORT
Department of Pathology,
Yale University School of Medicine,
New Haven, Connecticut

13 October 1965

Our argument does not rest on any calculation. It rests on the experimental fact that there was a region of sarcolemma tube in the connection between the strain gauge and the part of the muscle fiber still able to contract. Since the tube transmitted large active isometric tensions (100 percent of normal in one case), there must have been lateral transmission of that tension from sarcoplasm to sarcolemma in the uninjured part of the fiber.

In these experiments the sarcolemma-tube region was only a small percentage of the fiber length, but it always included the junction between fiber and tendon at one end. We observed that even when the injured fiber was held quite taut, the active part of the fiber shortened a little when stimulated and stretched this small region of the sarcolemma tube, but we have not yet measured this tube stretch and active tension simultaneously.

SIBYL STREET
ROBERT RAMSEY
Medical College of Virginia,
Richmond 23219

8 December 1965