Comments and Communications

Two Spheres Collide

MR. ERIC LARRABEE (SCIENCE, 117, 395 [1953]) warns us, in a rather wordy and opaque style, of the dangers of contemporary barriers between science and humanity, between scientists and people. His suggestion that where science fails to answer the demand for popular enlightenment, the "faddist and crank" will step in, seems unfortunately true.

However, SCIENCE readers should be reminded that only three years ago Mr. Larrabee, under the title "The Day the Sun Stood Still" (Harpers Magazine, January, 1950), made a strong plea for serious scientific consideration of Velikovsky's "Worlds in Collision," and in a later article Velikovsky had the last word on his critics.

The controversy over that extraordinary work of the imagination has almost entirely died down, and the judgment of scientists is admirably expressed in Dr. Laurence Lafleur's "Cranks and Scientists" (SCIENTIFIC MONTHLY, November, 1951). But we have a right to ask whether Mr. Larrabee still compares Velikovsky with Galileo and Copernicus, or whether he now relegates him to purgatory with L. Ron Hubbard and Gayelord Hauser. Is Mr. Larrabee a clear-sighted guide into the future, or a distressing example of past lack of comprehension?

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DR. SCHAFER raises an issue which I discussed with the then editor of SCIENCE before the article appeared, since I knew that Mr. Meyerhoff disapproved of my attitude toward Velikovsky in equally vehement terms. On March 23, 1953, I wrote him as follows:

"It occurs to me, re-reading a few passages in it, that some readers may be annoyed at a presentation of such views without comment indicating that I have been associated with a man like Velikovsky, who is generally regarded as un-scientific. Those who remember my *Harper's* article, in other words, may feel that I am appearing here under false pretenses. As you know, I don't wish to make a point of that association, or intrude it into scientific publications unless so requested, but neither am I ashamed of nor anxious to conceal it."

Apparently it is necessary for me to explain that in spite of my "wordy and opaque style" I have no scientific credentials and do not presume scientific standing for my opinions. I did not compare Velikovsky to Galileo or Copernicus (nor did I consign Hubbard and Hauser to purgatory, for that matter). I did, however, make what amounted to a plea for serious consideration of Dr. Velikovsky's thesis, and I have not been persuaded to abandon that position by the criticisms of his books that have so far been published.

Since my views are requested, I can only state that the "attack" on Velikovsky seemed to me singularly unconvincing. Dr. Lafleur's article, which was the last of many, was also the first to make even a modest pretense of pertinence and rationality; its predecessors for the most part struck me as ill-considered, ill-tempered, and ill-informed. They were also accompanied by a campaign of suppression, distortion, and intimidation. Under such circumstances, I have no alternative but to oppose myself to the 99-and-some-fraction per cent of American scientists who believe the issue to be closed.

Though I am not a Velikovsky disciple, I am prepared to be held accountable for my belief that he has not been fairly dealt with by the academic community. *Harper's* allowed him the "last word" only as it would any of its authors who was under fire. I am in debt to the editor of SCIENCE for permitting me the same, though I doubt that the controversy is quite as dead as Dr. Schafer suggests.

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Removal of the Impurity in Bovine Serum Albumin and Its Effect on Zinc Binding[1]

IT has recently been reported in this journal by Feldman and Havill (*1*) that Armour's bovine serum albumin contains citrate as an impurity. The existence of a non-protein impurity has been known in this laboratory for some time, and, since its probable identification as citrate must throw some doubt upon the validity of metal binding studies previously reported from this laboratory (*2*), a preliminary report of some experiments performed with bovine serum albumin from which this impurity has been removed would seem to be indicated.

Armour's bovine serum albumin was purified by passage of a concentrated solution through an ion exchange column, exactly as specified for human serum albumin by Oncley and Dintzis (*3*). Comparative citrate analyses, by the method of Saffran and Denstedt (*4*), indicate that at least 90% of the impurity has been removed.

Titration curves have been run both on the commercial and purified preparations. They indicate that the former contains about two extra carboxyl groups per mole. This figure is, within the experimental error, compatible with the presence of about 0.5 mole of citrate per mole of albumin. Most of this difference affects the titration curve acid to the iso-ionic point;

[1] This investigation was supported by a research grant from the National Institutes of Health, USPHS.

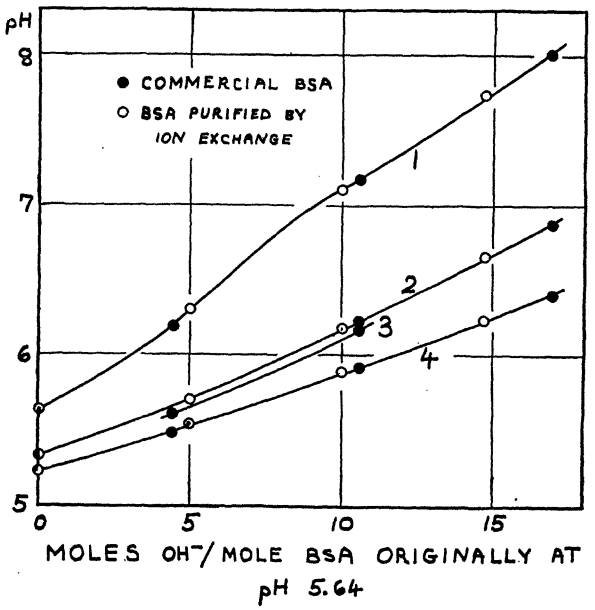

FIG. 1. Titration curves of bovine serum albumin (BSA). Curve 1—no added Zn. Curve 2—0.0025 *M* Zn. Curve 3—0.0029 *M* Zn. Curve 4—0.0075 *M* Zn. All solutions contained about 2.2% BSA and 0.15 *M* KNO_3. The molecular weight of BSA has been taken as 69.000.

between pH 5.6 and pH 9 the two titration curves are virtually superimposable.

An accurate way to observe differences between the purified and commercial preparations with respect to metal binding is to measure the effect of the metal ion on the titration curves. Large pH drops accompany the binding of metal (*5, 6*).

Figure 1 shows a portion of the titration curves of bovine serum albumin before and after purification, in the presence of 0.15 *M* KNO_3 and varying amounts of $Zn(NO_3)_2$. These curves show clearly that no appreciable difference has resulted from the removal of the impurity. It can therefore be concluded that the interpretation of metal binding studies on bovine serum albumin previously reported from this laboratory is not invalidated by the findings of Feldman and Havill.

A more complete study of the titration curves of bovine serum albumin is currently in progress and will be reported elsewhere at a later date.

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References

1. FELDMAN, I., and HAVILL, J. R. *Science*, **116**, 691 (1952).
2. TANFORD, C. *J. Am. Chem. Soc.*, **74**, 211 (1952).
3. ONCLEY, J. L., and DINTZIS, H. M. Paper presented at the 122nd National Meeting of the American Chemical Society, Atlantic City, N. J., September 1952.
4. SAFFRAN, M., and DENSTEDT, O. F. *J. Biol. Chem.*, **175**, 849 (1948).
5. MARTELL, A. E., and CALVIN, M. *Chemistry of the Metal Chelate Compounds*. New York: Prentice-Hall, 39 (1952).
6. GURD, F. R. N., and GOODMAN, D. S. *J. Am. Chem. Soc.*, **74**, 670 (1952).

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Scientific Book Register

Notes on Qualitative Analysis (Fenton). Revised by B. C. Saunders. New York: Cambridge Univ. Press, 1953. 126 pp. Illus. $2.75.

Beginning Algebra for College Students. 2nd ed. Lloyd L. Lowenstein. New York: Wiley; London: Chapman & Hall, 1953. 279 pp. Illus. $3.50.

A Theoretical Study of Interphase Mass Transfer. Robert W. Schrage. New York: Columbia Univ. Press, 1953. 103 pp. Illus. $3.50.

Atlas of the Skeletal Development of the Rat, Normal and Hypophysectomized, Vols. I and II. Hermann Becks and Herbert M. Evans. Berkeley, Calif.: American Institute of Dental Medicine, 1953. 145 pp. incl. photomicrographs and roentgenographic contact reproductions. $48.00.

Synchros, Self-Synchronous Devices and Electrical Servo-Mechanisms. Leonard R. Crow. Vincennes, Ind.: Scientific Book Pub., 1953. 222 pp. Illus.

Sewerage and Sewage Treatment. 7th ed. Harold E. Babbitt. New York: Wiley; London: Chapman & Hall, 1953. 674 pp. Illus. $8.00.

Spadework in Archæology. Leonard Woolley. New York: Philosophical Library, 1953. 124 pp. Illus. + plates. $4.75.

An Introduction to Statistics. Charles E. Clark. New York: Wiley; London: Chapman & Hall, 1953. 266 pp. Illus. $4.25.

A Brief Introduction to Organic Chemistry. Leland A. Underkofler. New York–London: Van Nostrand, 1953. 352 pp. Illus. $4.25.

Man and His Physical Universe: An Integrated Course in Physical Science. Richard Wistar. New York: Wiley; London: Chapman & Hall, 1953. 488 pp. Illus. $4.75.

A Guide to the Moon. Patrick Moore. New York: Norton, 1953. 255 pp. Illus. $3.95.

Histology. 2nd ed. Arthur Worth Ham. Philadelphia–London: Lippincott, 1953. 866 pp. Illus. + plates. $10.00.

A Policy for Scientific and Professional Manpower. A statement by the National Manpower Council with facts and issues prepared by the research staff. New York: Columbia Univ. Press, 1953. 263 pp. Illus. $4.50.

Weather Inference for Beginners. D. J. Holland. New York: Cambridge Univ. Press, 1953. 196 pp. Illus. $6.00.

An Illustrated Catalogue of the Rothschild Collection of Fleas (Siphonaptera) ***in the British Museum,*** Vol. I: Tungidæ and Pulicidæ. G. H. E. Hopkins and Miriam Rothschild. London: British Museum (Natural History), 1953. 361 pp. Illus + plates. 4£ 4s.

Chemistry of Carbon Compounds: Alicyclic Compounds, Vol. II, Pt. A. E. H. Rodd, Ed. Amsterdam–Houston: Elsevier, 1953. 487 pp. Illus. $12.50.