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REFERENCES

- Braunstein, A. E. (1960). In *The Enzymes*, vol. 2, part A, p. 113. Ed. by Boyer, P. D., Lardy, H. & Myrbäck, K. New York and London: Academic Press Inc.
- Calvin, M. & Benson, A. A. (1949). *Science*, **104**, 140.
- Davison, A. N. (1956). *Biochim. biophys. Acta*, **19**, 131.
- Dempsey, W. B. & Christensen, H. N. (1962). *J. biol. Chem.* **237**, 1113.
- Ferguson, L. N. & Kelly, I. (1951). *J. Amer. chem. Soc.* **73**, 3707 (1951).
- Fischer, E. H., Kent, A. B., Snyder, E. R. & Krebs, E. G. (1958). *J. Amer. chem. Soc.* **80**, 99.
- Fischer, E. H. & Krebs, E. G. (1959). *Abstr. Pap. Amer. chem. Soc.*, 136th Meet., p. 24c.
- Hughes, R. C., Jenkins, W. T. & Fischer, E. H. (1962). *Proc. nat. Acad. Sci., Wash.*, **48**, 1615.
- Jenkins, W. T. (1961a). *J. biol. Chem.* **236**, 1121.
- Jenkins, W. T. (1961b). *Fed. Proc.* **20**, 978.
- Jenkins, W. T., Orlowski, S. & Sizer, I. (1959). *J. biol. Chem.* **234**, 2657.
- Jenkins, W. T., Yphantis, D. A. & Sizer, I. (1959). *J. biol. Chem.* **234**, 51.
- Kent, A. B., Krebs, E. G. & Fischer, E. H. (1958). *J. biol. Chem.* **232**, 549.
- Kornguth, M. L. & Sallach, H. J. (1960). *Arch. Biochem. Biophys.* **91**, 39.
- Lineweaver, H. & Burk, D. (1934). *J. Amer. chem. Soc.* **56**, 658.
- Lowry, O. H., Rosebrough, N. J., Farr, A. L. & Randall, R. J. (1951). *J. biol. Chem.* **193**, 265.
- Matsuo, Y. & Greenberg, D. M. (1958). *J. biol. Chem.* **230**, 561.
- Meister, A., Nishimura, J. S. & Novogradsky, A. (1962). *International Symposium on Biological and Chemical Aspects of Pyridoxal Catalysis, Rome* (in the Press).
- Meister, A., Sober, H. A. & Tice, S. V. (1951). *J. biol. Chem.* **189**, 577, 591.
- Metzler, D. E. (1957). *J. Amer. chem. Soc.* **79**, 485.
- Moore, S. & Stein, W. H. (1954). *J. biol. Chem.* **221**, 893.
- Nishimura, J. S., Manning, J. M. & Meister, A. (1962). *Biochemistry*, **1**, 442.
- Sakami, W. (1955). *Handbook of Isotope Tracer Methods*, p. 5. Cleveland: Department of Biochemistry, Western Reserve University School of Medicine.
- Sizer, I. W. & Jenkins, W. T. (1962). In *Methods in Enzymology*, vol. 5, p. 677. Ed. by Colowick, S. P. & Kaplan, N. O. New York: Academic Press Inc.
- Snell, E. E. (1961). *Ciba Found. Study Group no. 11: The Mechanism of Action of Water Soluble Vitamins*, p. 18. Ed. by de Reuck, A. V. S. & O'Connor, M. London: J. and A. Churchill.
- Wada, H. & Snell, E. E. (1962). *J. biol. Chem.* **239**, 2089.
- Wilson, E. M. (1963). *Biochim. biophys. Acta*, **67**, 345.
- Wilson, E. M. & Kornberg, H. L. (1963). *Biochem. J.* (in the Press).

APPENDIX

Ultracentrifuge Studies on Crystalline L-Aspartate 4-Carboxy-lyase

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The Spinco model E ultracentrifuge was used with the schlieren optical system. The enzyme was dissolved in 0.5 M-sodium acetate buffer, pH 7, and the protein concentration was determined refractometrically, by assuming a specific refractive increment of 1.85×10^{-3} .

Only one component was observed (see Fig. 2 of the main paper) which had a sedimentation coefficient $S_{20,w}$ of 19.8s at a concentration of 0.784 g./100 ml. of solution. The area under the curve of Fig. 2 (corrected for radial dilution) accounted for 90% of the protein present. The material was re-examined after keeping for 9 weeks ('aged' enzyme), but no change in sedimentation coefficient was observed.

The weight-average molecular weight was determined by the method of Archibald (1947) at a rotor speed of 2994 rev./min., a temperature of 19° and at a protein concentration of 0.784% (w/v). The partial specific volume was assumed to be 0.74 (the average of 31 values for proteins given by Svedberg & Pedersen (1940)), and the average molecular weight was found to be $760\,000 \pm 5\%$ (S.E.M. of five pictures).

REFERENCES

- Archibald, W. J. (1947). *J. phys. Colloid Chem.* **51**, 1204.
- Svedberg, T. & Pedersen, K. O. (1940). *The Ultracentrifuge*, p. 406. Oxford: The Clarendon Press.