their ability to transport electrons to oxygen. Such data indicate the necessity for highly organized particles in which the spatial arrangement of the enzymes and bound coenzymes is important for coupled oxidative phosphorylation. It is apparent, however, that it is dangerous to characterize enzyme systems as particulate or soluble in nature when harsh disruptive procedures are used and when full recognition of the inherent potential of the particles is not used as a base line. We have here used a sensitive indicator of structural integrity, oxidative phosphorylation, as a measure of the degree to which the system can be assumed to represent the pattern of enzyme localization in the intact cell. We realize, however, that some pitfalls common to almost all cell fractionation procedures (*25*) may still apply.

In many respects—for example, in regard to function and degree of presumed organization—the bacterial system resembles the mammalian mitochondrial system (*26*). Certain differences do exist. These include the greater stability of the particles and the soluble nature of factors necessary for coupled activity in the reconstructed bacterial system. Because of these differences, the bacterial systems provide an excellent tool for studying certain aspects of the mechanism of coupled oxidative phosphorylation.

References and Notes

1. A. F. Brodie and C. T. Gray, *Soc. Am. Bacteriologists Proc. 55th* (1955), p. 118; *Biochim. et Biophys. Acta* 17, 146 (1955).
2. ———, *J. Biol. Chem.* **219**, 853 (1956).
3. The following abbreviations are used: AMP, adenosine 5′-monophosphate; ATP, adenosine triphosphate; DNA, desoxyribonucleic acid; P_i, inorganic phosphate; RNA, ribonucleic acid; and Tris, tris (hydroxymethyl) aminomethane.
4. A. Tissieres and E. C. Slater, *Nature* **176**, 736 (1955).
5. I. A. Rose and S. Ochoa, *J. Biol. Chem.* **220**, 307 (1956).
6. P. E. Hartman, A. F. Brodie, C. T. Gray, unpublished.
7. P. M. Nossal, M. F. Utter, D. B. Keech, *Soc. Am. Bacteriol. Proc. 56th* (1956), p. 61.
8. A. F. Brodie and C. T. Gray, *ibid.*, p. 62.
9. P. E. Hartman, A. F. Brodie, C. T. Gray, *ibid.*, p. 63.
10. A. F. Brodie and C. T. Gray, *Biochim. et Biophys. Acta* 19, 384 (1956).
11. Evidence in a paper that is in preparation indicates that the supernatant contains a protein component necessary for oxidation, as well as a dinitrophenol-sensitive protein necessary for phosphorylation.
12. This and preceding investigations were supported by research grant E-827 from the National Microbiological Institute, National Institutes of Health, U.S. Public Health Service. We should like to express our appreciation to J. H. Hanks for advice and to Robert Thomas and Sarah Bond Gilson for their technical assistance.
13. P. M. Nossal, *Biochem. J. (London)* **57**, 62 (1954).
14. M. F. Utter and D. B. Keech, personal communication.
15. G. H. Hogeboom and W. C. Schneider, *Nature* **166**, 302 (1950).
16. We should like to express our appreciation to Paul Munson of the Harvard Dental School for the use of the Spinco preparative centrifuge.
17. T. P. Singer and E. B. Kearney, *Biochim. et Biophys. Acta* 15, 151 (1954).
18. We wish to thank Fred Hoch of the Biophysics Research Laboratory, Department of Medicine, Peter Bent Brigham Hospital and Harvard Medical School, for determinations made with the Cary automatic spectrophotometer.
19. C. M. Todd, *Biochem J. (London)* **45**, 386 (1949).
20. We should like to express our appreciation to H. P. Klein of the Biology Department of Brandeis University for the determinations of DNA and RNA.
21. J. W. Harmon and M. Feigelson, *Exptl. Cell Research* 3, 47 (1952).
22. A. L. Lehninger, *Harvey Lectures,* Ser. **49**, 176 (1953–54); N. O. Kaplan, *The Enzymes* **2**, part 1, 55 (1951).
23. G. H. Hogeboom, W. C. Schneider, G. E. Pallade, *J. Biol. Chem.* **172**, 619 (1948).
24. A. L. Lehninger, in *Enzymes: Units of Biological Structure and Function,* O. H. Gaebler, Ed. (Academic, New York, 1956), p. 217.
25. W. C. Schneider, *J. Histochem. and Cytochem.* 1, 212 (1953).
26. N. O. Kaplan, *Bacteriol. Revs.* 19, 234 (1955).
27. A. M. Pappenheimer, Jr., and E. D. Hendee, *J. Biol. Chem.* 180, 597 (1949).

C. A. Chant, Father of Canadian Astronomy

On 18 November 1956, Clarence Augustus Chant died at the age of 91. For more than 60 years he had been an enormous power behind Canadian astronomy, and the many astronomical seeds which he planted will continue, as strong trees, to bear the fruit of his labors for decades to come.

It was he who was largely responsible for the formation of the Royal Astronomical Society of Canada 60 years ago, for the founding of its monthly *Journal* and annual *Observer's Handbook,* for the setting-up of the department of astronomy at the University of Toronto, and for the establishment of a research observatory and large telescope belonging to that institution. He also made a real contribution to the wide dissemination of scientific knowledge. Textbooks of which he was coauthor—*High School Physics, Mechanics for the Upper School,* and *A Text Book of College Physics*—have instructed several generations, totaling hundreds of thousands, of Canadian high-school students. His popular book on astronomy, *Our Wonderful Universe,* has been published in three English editions and translated into five foreign-language editions. Over the years most of the Canadian astronomers, including five of the directors of the large Canadian observatories, were numbered among his thousands of students.

Chant was born on 31 May 1865, in Ontario, near Toronto. After attending Ontario high schools he was graduated in 1890 from University College, Toronto, and joined the staff there in 1891. From that time on he gave continuous service to the University of Toronto, except for a brief interval when he studied for his Ph.D. degree at Harvard in 1901.

From the time he, as a graduate student in physics, grew interested in astronomy, his life became one of unswerving devotion to the cause of astronomy in Canada. A slight, spare man, of remarkable health and strength, in his later years he typified the hale old age of excellent mental and physical powers which is the dream of many but the reward of few. His vast memory for facts and events remained with him to the end and, combined with his great erudition, made a chat with him a real treat. When the David Dunlap Observatory was built, he and his wife moved from the heart of Toronto, where they had resided for more than 40 years, to the lonely hilltop which the observatory occupies, 10 miles north of the city. Until 2 years before his death he worked daily in his office at the observatory.

A clear and concise teacher, he had a remarkable memory for his students and followed their careers with interest. He took part in five solar eclipse expeditions, including one to Australia in 1922 where photographs confirmed the Einstein displacement of starlight as it passes the strong gravitational field of the sun. Among the recognitions of his achievements were his election as president of the Royal Astronomical Society of Canada, as vice president of the American Astronomical Society, as fellow of the Royal Society of Canada, and his award of a silver medal at the Harvard tercentenary. In 1940 the Royal Astro-

nomical Society of Canada established the Chant medal for outstanding Canadian amateur astronomers.

Superposed on the background of steady day-to-day efforts were memorable dramatic moments in his life. He was a pioneer in the application of x-ray photography and in February 1896 took a shadow-picture of a woman's heel, by means of which a steel needle was located. He sent the first wireless telegraph message in Canada in November 1899, when a message was carried from one side to the other of a lecture room in University College. His long struggles toward the establishment of a large observatory at Toronto, after years of frustration and disappointments, had a dramatic culmination. Through the generosity of the late Mrs. Jessie Donalda Dunlap, as a memorial to her husband, some of the golden riches from the depths of Canadian mines were fittingly transformed into a beautiful observatory for exploring the worlds beyond. The David Dunlap Observatory, with its 74-inch reflecting telescope—at that time the second largest in the world—was formally dedicated on Chant's 70th birthday, on which day he became director emeritus and received an LL.D. degree from the University of Toronto.

A major task of his life was his editorship of the *Journal of the Royal Astronomical Society of Canada,* which he had founded and edited from its beginning. As late as the issue of September 1956, he contributed an article, the obituary of his old friend Walter S. Adams of the Mount Wilson Observatory. As the last issue of volume 50 of the *Journal,* of which he was still editor, was on the press, his lifework ended. A record of exactly 50 years of continuous editorship of a scientific journal has few challengers.

In his life, as he followed the pathway to the stars, he typified the motto of the society he founded: *Quo Ducit Urania.* Canadian astronomers agree with Harlow Shapley who, on hearing of Chant's death, wrote, "No one can so rightly be adjudged the father of his country's astronomy and astronomers as Dr. Chant."

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News of Science

Mellon Institute to Cultivate Fundamental Research

Plans recently adopted by the board of trustees of the Mellon Institute, Pittsburgh, Pa., call for a major expansion of fundamental research in that institution. According to Matthew B. Ridgway, the board chairman, the decision to reorient the institute's principal investigational activities toward long-range basic scientific objectives represents the culmination of a broad assessment of the role of the institute over a period of several years. In this appraisal, the advice and counsel of eminent scientists from academic life and from the industries were brought to bear on the question of the types of effort in which Mellon Institute could make its greatest contributions in the future under the leadership of Paul J. Flory, executive director of research.

The imperative need for more active replenishment of the reservoir of scientific knowledge through fundamental research is widely recognized. Yet, notwithstanding the funds available for the support of research, the progress of fundamental science has seriously fallen behind the proliferation and consequent requirements of applied science and technology. For these reasons it has been concluded that Mellon Institute can perform a service to the sciences and industries and, hence, to the nation by structuring its organization as a center of advanced investigation, with comprehensive attention to fundamental problems. The course decided upon is a reaffirmation of the original purpose of the institute, a nonprofit institution founded in 1913 and dedicated to scientific research for the benefit of mankind.

Although it is the aim eventually to direct the institute's main efforts along the lines of fundamental scientific research, there is no intention to depart from the field of applied research. Indeed, a healthy collaboration between fundamental and applied research will be fostered. In applied research, investigation of long-range character, or pioneering nature, will be especially encouraged. Then, too, much of the fundamental research will naturally enter potentially practical areas that will invite industrial participation. Ultimate possibilities of technologic application will not, of course, be regarded as criteria for judging the scientific merit of fundamental research undertakings. As is well known, however, results of fundamental investigation, totally unactuated by economic considerations, may now and then reveal high utility.

Fundamental research is contemplated in fields embracing physical chemistry, chemical physics, and inorganic, organic, and analytic chemistry. Solid-state investigations, polymer chemistry and physics, radiation studies, and biophysics and biophysical chemistry will be emphasized, according to present plans. The importance of granting freedom commensurate with ability to individual research workers is recognized, and a wide latitude of opportunity will be assured for creative research. Members of the research staff will be encouraged to direct their efforts toward significant objectives of their own choosing, and to evolve their own problems and programs. Thus the institute will nourish professional motives pointed at generating new ideas of value in scientific investigations for human welfare.

AAAS Socio-Psychological Prize

Through the generosity of an anonymous donor, the AAAS offers an annual prize of $1000 for a meritorious essay in socio-psychological inquiry. Previous winners of this prize and the titles of their essays have been: Arnold M. Rose, "A theory of social organization and disorganization"; Yehudi A. Cohen, "Food and its viscissitudes: a cross-cultural study of sharing and non-sharing in sixty folk societies"; and Herbert C. Kelman, "Compliance, identification, and internalization: a theoretical and experimental approach to the study of social influence."

The conditions of competition for the prize to be awarded at the 1957 annual meeting, Indianapolis, 26–31 Dec., are as follows.

1) The contribution should further the comprehension of the psychological-social-cultural behavior of human beings —the relationships of these hyphenated words being an essential part of the inquiry. Whether the contributor considers