

Vale Arnold Arons (1916 - 2001)

Arnold Arons died on February 28, 2001 at his home in Seattle. His passing is a great loss to his wife and family and to the cause of improved, humanistic, and thoughtful physics education. He received his undergraduate training in engineering and did his doctoral degree in physical chemistry at Harvard University. After graduation he took a research position at the Woods Hole Oceanographic Institute, then taught physics at Stevens Institute of Technology, and from 1952-1968 at Amherst College. In 1968 he was appointed to the University of Washington where he remained until his retirement and appointment as Professor Emeritus. He was one of the founders and continuing leaders of physics education research in the United States.



At the University of Washington he initiated hugely successful programs for elementary and high school teachers. He had a long standing interest in general education, including the enhancement of scientific literacy among non-scientists. His research was directed principally to aspects of teaching, learning and cognitive development. He strongly believed that understanding scientific concepts meant more than the manipulation of mathematical expressions and formulae; and that phenomenological and qualitative thinking, which was directed by the history and philosophy of the subject, contributed to proper understanding of physical concepts.

Among his books are *Science and Ideas* (with A.M. Bork, Prentice-Hall, 1964), *Development of Concepts of Physics* (Addison-Wesley, 1965); *The Various Language: An Inquiry Approach to the Physical Sciences* (Oxford University Press, 1977); *A Guide to Introductory Physics Teaching* (John Wiley, 1990).

He published numerous articles, among which are: 'Newton and the American Political Tradition', *American Journal of Physics*, vol. 43 1975; 'Cultivating the Capacity for Formal Reasoning', *American Journal of Physics*, vol. 44 1976; 'Phenomenology and Logical Reasoning in Introductory Physics Courses', *American Journal of Physics*, vol. 50 1982; 'Achieving Wider Scientific Literacy', *Daedalus*, Spring 1983; 'Critical Thinking and the Baccalaureate Curriculum', *Liberal Education* vol. 71 1985; 'Newton's Laws of Motion and the 17th Century Laws of Impact', *American Journal of Physics*, vol. 32 1964; and 'Uses of the Past: Reflections on United States Physics Curriculum Development, 1955 to 1960', *Interchange*, vol. 24 1992.

In the Introduction to his *A Guide to Introductory Physics Teaching* he wrote: 'much as we might dislike the implications, research is showing that didactic exposition of abstract ideas and lines of reasoning (however engaging and lucid we might try to make them) to passive listeners yields pathetically thin results in learning and understanding' (p. vii). This well captures his appreciation of the importance of teachers' understanding student learning, and modes of cognitive development. He believed that knowledge of the history of physical concepts, and the hard-won path of their development, could profitably inform student learning and classroom exercises.

He contributed to the 1988 'foundational' special journal issue that launched the International History, Philosophy and Science Teaching Group. This was his article 'Historical and Philosophical Perspectives Attainable in Introductory Physics Courses', *Educational Philosophy and Theory* vol. 20. After dealing with Galileo and Free Fall, the Newtonian Synthesis, the Atomic-molecular theory, Field Theory, Ampère's Discovery of Electromagnetism, and a number of other topics, he concluded that: 'I have tried to illustrate, through specific and fairly detailed examples, how historical and philosophical elements can be infused into introductory physics courses so as to enhance scientific literacy on the one hand and induce a deeper grasp of the physics itself on the other' (p. 22). This statement fairly summarises the vision that guided his life-long research in physics education.

His scholarship embraced the fields of physics, cognition and the history and philosophy of science. This journal was privileged to have had Arnold Arons as a member of its Editorial Committee; and the

International History, Philosophy and Science Teaching Group was fortunate to have had him as a participant in its inaugural conference (Tallahassee, 1989), and at subsequent conferences.

His contribution to physics education, and to the wider project of liberal education, will live on in his published work, and in the work of those who were encouraged by his fine example of scholarship and commitment to enriched education and meaningful learning.

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