

Information for the air traveler —an interview with Elizabeth Wood

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How far is that lake? What color is it? Why does water look white when ocean waves break? What is that rainbow-like ring completely encircling the shadow of the airplane? How do I know I am moving? Why are my ears popping?

The answers to these and many other questions frequently asked by airline passengers are provided by Elizabeth A. Wood, author of a delightful new book written "for fun and the average intelligent citizen." I recently talked with Dr Wood about her book while she was in New York attending the American Institute of Physics Governing Board meeting.

"I think there are many curious, intelligent people, in all kinds of professions, who do a lot of flying," said Dr Wood. "I've met them, and I know that they have questions for which they want easily understood answers. Most of them don't want a complete education on the subject of clouds or optics or geology, but if there is a fairly simple answer these people would like to know it."

The motivation for writing this book came from a combination of Dr Wood's flying experiences and her active interest in presenting science for the nonscientist. In 1964 Dr Wood was attending a conference held in Boulder, Colo. where the main topic of discussion was science for the nonscience major. During the conference she said to Gerald Holton, professor of physics at Harvard, "Some one should write a book about all the wonderful things one sees from the air, especially as they illustrate the principles of science." His answer was, "Well why don't you do it?"—and she did.

Among other matters about which seasoned air travelers and neophytes, too, ask questions are formations and phenomena of land, rock, water and clouds. Elizabeth Wood is well prepared to answer. She got her PhD in geology from Bryn Mawr and has taught there as well as at Barnard College. For two years she also taught beginning physics at Fairleigh Dickin-

son University. Until she and her husband Ira retired last year and celebrated with a five-month trip to the South Pacific, they were both members of the technical staff at Bell Laboratories. She worked in crystallography, and he was an electrical engineer. Mrs Wood is a member of the American Crystallographic Association, of which she is a former president. She has also worked in optical mineralogy. She is a fellow of the American Physical Society and the Mineralogical Society of America, a member of the AIP Board of Governors and of the Advisory Committee on PHYSICS TODAY, of which she was chairman from March 1965 to December 1966.

As a further manifestation of her desire to present science to the nonscientists, she was present in 1964 when the Commission on College Physics and the Advisory Council for College Chemistry sponsored a series of conferences to design a new two-semester course in physical science for nonscience majors. The courses are geared primarily for prospective elementary-school teachers. As an outgrowth of these meetings the Physical Science for Nonscientists (PSNS) project was

born in April 1965 with a National Science Foundation grant at Rensselaer Polytechnic Institute, and Elizabeth Wood was the associate director. Under her leadership the PSNS staff prepared a preliminary version of a textbook entitled *An Approach to Physical Science*. She worked with the staff through a subsequent revision of the text, which is now being used

SCIENCE FOR THE AIRPLANE PASSENGER. By Elizabeth A. Wood. 227 pp. Houghton Mifflin, Boston, 1968, \$4.95.

by more than 50 colleges and universities. The first formal edition of the book is now in its final proofreading stages and will be published by John Wiley and Sons, New York, next month.

In March 1967 PHYSICS TODAY published an article written by the PSNS staff, of which Dr Wood is still an associate director, explaining what the project is and the philosophy behind it. "One of the most important ingredients in the success of a course," wrote the staff, "is the enthusiasm of the in-



SCIENTIST AND AUTHOR Elizabeth A. Wood, left, discusses *Science for the Airplane Passenger*, which sold more than 2000 prepublication copies, with the reviewer.

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structor for teaching it. He will probably have more enthusiasm for it if he has had some share of responsibility in creating it." Elizabeth Wood may not have personally penned these words, but she certainly could have. The enthusiasm with which she talked about science during our recent interview is the same enthusiasm with which her own book, *Science for the Airplane Passenger*, was written.

"People want to know what relevance physics has for their everyday experiences," says Dr Wood, "and my book is meant to be a response to that question. It was written for fun, to be read for fun. When you look out the window of an airplane and start questioning the 'whys' of what you see, there is no time to be afraid of flying, no time to be bored, no time to watch the movie."

Science for the Airplane Passenger uses the air as prime vantage point to survey and answer various questions about geology, oceanography, meteorology, biology, optics and aerodynamics. The chronology of the book follows that of an airplane trip from takeoff to landing. Both day and night flying are discussed and the text is adequately enhanced with line drawings and graphs as well as black-and-white and color photographs. Concepts that may be relatively unfamiliar to the nonscientist are discussed cogently and simply. There is even a "bookback goniometer" for measuring angles to determine the length of a lake, elevation, order-of-

magnitude estimate of the size of an aurora and the angle of roll of the airplane. Dr Wood gives the airline industry a polite hint as she suggests, in relation to aerial photography, "On the side away from the sun the window will cause you much less trouble unless it is very dirty. (Some airlines keep their windows clean and some do not.)"

In the chapter on clouds the author leaves no doubt in the mind of big-city readers about the relevance of physics to "everyday experiences." "From the thousands of cars of the greater New York area, from power plants and factories and chemical plants of all sorts, waste products are poured out into the air. When the wind is blowing or when the usual convection currents are operating and the warm air is rising into the cooler atmosphere, this atmospheric refuse is carried away. When a temperature inversion takes place, the city sits in a pool of its own waste, risking death by asphyxiation."

Dr Wood recently "took to the air" in yet another way when she appeared as a guest on the NBC television "Today" show to discuss her new book. Here again she found herself explaining science to the nonscientists, and "Everybody had a delightful time," she said. The main topic of conversation centered around various lake formations.

"One observation from the air that would be particularly interesting to the physics community," said Dr Wood during our interview, "is the fact that

a very small lake far below you, in just the right position to reflect the sun's rays most brightly, brings to your eye a narrow bundle of rays from the sun. In this way it behaves as though it were a pinhole, letting through the sunlight from a long way off on the far side. If you watch closely as the lake gets brighter and brighter, approaching the optimum reflecting position, you will see briefly, as it flares up with maximum brilliance, a set of irregular dark and light bands surrounding the central beam from the lake. Sometimes you may see a 'rainbow' of colors in the diffraction bands. This arises because diffraction results from the wave nature of light, and light of longer wavelength such as red light, is diffracted at a greater angle to the central beam than is light of shorter wavelength such as blue light."

Science for the Airplane Passenger sold over 2000 prepublication copies, and the number has been increasing steadily since the book officially went on sale a few months ago. To both the reader on the ground and the passenger in the air, it will be immediately obvious that Dr Wood's choice of subject matter is appropriate in view of the questions her audience is likely to ask. The style is generally lucid and the book, like its author, is full of the enthusiasm a nonscientist wants, appreciates and ought to have.

Legacy of a leader

EXPLORER OF THE UNIVERSE: A BIOGRAPHY OF GEORGE ELLERY HALE. By Helen Wright. 480 pp. E. P. Dutton & Co., Inc., New York, 1966. \$10.00

by Charles Weiner

1968 marks the centennial of the birth of George Ellery Hale, whose colossal impact on 20th-century science ranged from his own pioneering studies of solar magnetism, through the promotion of astrophysics as a research field, to the planning, financing and building of a series of astronomical telescopes of increasingly unprecedented size, and to the conception and organization of institutions that are now central to the life of science in the US and throughout the world. Hale's legacy to the scientific community is still very much in evidence 30 years after his death in 1938.

Dramatic photographs of distant spiraling galaxies, star clusters, solar