ered the cathode-ray particle that we now call the electron because, unlike Mach and Kaufmann, he thought it was part of the business of physics to discover fundamental particles."

▶ And also: "The important thing about Rutherford's work is not just that he had gotten the right idea—that an atom consists of a small, heavy, positively charged nucleus surrounded by orbiting electrons—but that he had found a way to test it."

I believe that most physics teachers not only share Weinberg's view that "most of what I know about physics and mathematics I have learned only when there was no alternative . . ." but also would admit that they never understood Newton's Laws until they had to explain those laws to others. Based on this view and my own experience teaching classical physics to students who had little preparation, I can scarcely believe that Weinberg's book will have wide success among people using it for self-teaching. Undoubtedly, it would go marvelously well if a person could enroll in his course, using the book collaterally. Other gifted teachers may be able to use it with real success. In spite of the clarity and reasonableness of Weinberg's exposition, I believe that only a limited number of previously unprepared readers will reach good understanding of the physics presented without help. On the other hand, this book is a beautiful example of a new approach with which the nonscientist can attain literacy in physics. I hope that Steve Weinberg soon produces his promised second volume on relativity and the quantum theory.

A color composite photo of the Great Glen in Scotland, the large fault that includes the famous Loch Ness, taken by the Landsat-1 satellite. This is one of the over 200 photos of the planets including Earth, and their moons, published in *The Cambridge Photographic Atlas of the Planets,* by G. A. Briggs and F. W. Taylor (Cambridge U.P., New York, 1982. $24.95), that represent the major highlights of planetary research with space probes. Besides the photos, we find detailed maps of the Earth-like planets and also of such distant bodies as the moons of Jupiter and Saturn.

An introductory chapter discusses the origin and evolution of the planets, and each planet is treated in detail in a separate section. The book provides not only an extensive collection of maps and photographs, but also a concise update of what has been learned about the planets during the last two decades of space research with planetary probes.

The New Astronomy

N. Henbest, M. Marten
240 pp. Cambridge U.P., New York, 1983. $24.95

One can scarcely find a scientific field in which the methods of research have not been profoundly influenced by advances in technology—especially those in automatic data processing, computation and telemetry. Astronomy, which has always relied on the observation of happenings in the universe wherever and whenever they occur, has certainly felt the strong impact of electronic data acquisition and processing. With very few exceptions, all astronomers' statements must ultimately, and can only, be supported by the investigation of the radiation from distant objects. Unlike most other scientists, astronomers cannot probe nature through experiments because their target objects (except for the objects in our solar system) are inaccessible at this time.

Under these circumstances, astronomers would not have gained such impressive knowledge about the universe if they had not perfected the arts of observation and data analysis beyond those of any other science. Yet none of us were prepared 40, 30, or even 25 years ago for what happened over the past few decades. For example, in 1947, the Viennese astronomer Oswald Thomas wrote a small brochure "proving" that a trip to the Moon was as improbable as that a shaken apple tree would shed 25 fried pears. In Thomas's time, anyone predicting the developments of microelectronics during the three decades to follow would have been considered a dreamer.

It was in the late 1940s that a few enterprising spirits began to investigate more extensively the radiation from extraterrestial objects in wavelengths other than those of visible light—in particular, radio waves. Few, however, expected much. After all, stars and other objects within the realm of astronomical interest were supposed to radiate more or less like blackbodies and thus not give off much measurable radio radiation. True, toward the end of the Second World War, Henk van de Hulst predicted the 21-cm radiation of neutral hydrogen in his dissertation, but few paid attention. The big surprise came when it was reasoned that the universe must be filled with radiators that produce non-blackbody radiation. The success of astronomical research in the rf region, where the first of the nonoptical wavelengths were investigated, was so spectacular that some enthusiastic science writers and some very young and equally inexperienced astronomers predicted the impending demise of optical astronomy and its replacement by the new radioastronomy.

After 30 years, optical astronomy is still with us and going stronger than ever; but radioastronomy has shown that positions of objects that radiate a measurable amount of rf can be measured with a precision that is better by several orders of magnitude than that of the traditional optical methods.