

#612

Astronomical Literacy

PICK UP a newspaper on any day and you'll probably see headlines like "Japanese Take Lead in New Superconductor Technology" or "Food Additive Feared Carcinogenic." From the greenhouse effect to the space station, we are constantly confronted with decisions that involve science and technology. And we should expect more of the same in the future. Every American will need a basic grounding in the sciences to make informed judgments about these kinds of issues.

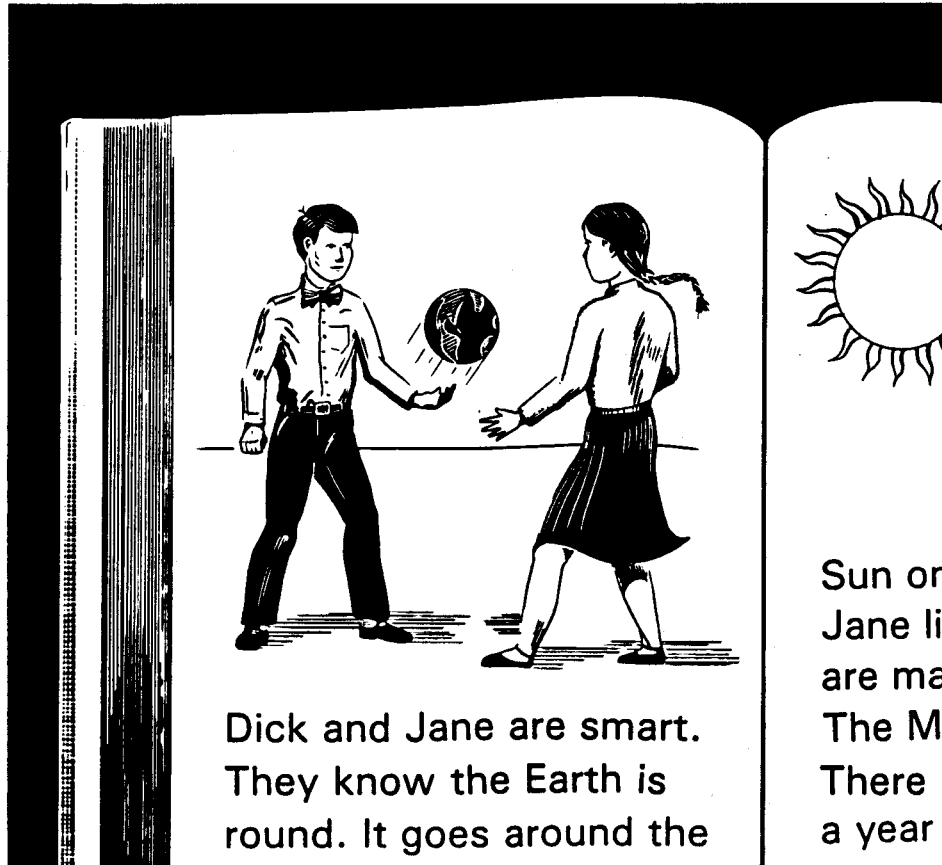
We define scientific literacy as the ability to cope easily with the components of public issues that involve science. It's akin to knowing how our government works, where the world's energy resources are located, and how the Tokyo Stock Exchange affects U. S. farmers. Scientific literacy is simply what every citizen needs to know to function intelligently in today's high-tech society.

There is a big difference between scientific literacy and the knowledge a scientist needs to pursue his or her craft. For example, when astronomers want to point a telescope at an object in the sky, they have to know its right ascension and declination. This sort of detailed knowledge isn't our concern. We're interested in educating the average person so he or she can make sense of newspaper headlines.

The very concept of scientific literacy has an important consequence. It implies that there is a body of knowledge that can, in principle, be written down and the mastery of which guarantees the literacy of the learner. So what exactly does the general citizen need to know about science? We have discovered no overriding rule — no golden bullet — that will tell us whether a particular piece of knowledge is necessary for every individual. Rather, we believe it's better that each person understand some facts, theory, methodology, philosophy, and history.

Astronomy fits nicely into this scheme, since it is apt to come across the average person's horizon in one of two ways: either as a startling new discovery (the Voyager photographs, for example, or a new champion in the "most distant quasar" race), or as a NASA budget item for the space station, a particular research satellite, or the Hubble Space Telescope.

Every person should be aware that the Earth is a sphere that rotates once a day,



that it revolves once a year around the Sun, and that the Sun is a star, one of billions in our galaxy. There should be a sense that our universe is billions of years old and still evolving, and that modern cosmologists are asking questions of unparalleled audacity about how it formed. There should be an understanding of the crucial role instrumentation has played in astronomy, and how this particular aspect of our science is now being developed in advanced ground-based telescopes like the Keck, as well as in major orbiting observatories like the Hubble Space Telescope. Finally, there should be an awareness of the debates in astronomy and space science — for example, about the utility of sending humans into space, or between two camps advocating different values for the age of the universe. It should be understood that such arguments are a sign of vigorous life in a science, not a sign of confusion and error.

And just as we can make a list of facts, theories, concepts, and philosophies that comprise the astronomical component of scientific literacy, we can do the same for each field of science. The result: a compen-

dium of what Americans need to know about science to carry on as well-informed citizens. The mere fact that such a list exists has important implications for our educational system, for it gives us a benchmark against which we can measure that system's performance. The deluge of reports on scientific illiteracy that we have seen over the past few years renders a discouraging verdict on this comparison.

Only when our schools and universities start rethinking science education — so that it reflects what the nonscientist needs and not what the scientific establishment wants to teach — can we have a scientifically literate electorate. It's time to roll up our sleeves and get on with the job.

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Focal Point invites contributions from readers who wish to comment on contemporary issues in astronomy and space science.