

# A Gem of Scientific Pedagogy

## *A Review of the Deutsches Museum*

by Jason Ross

On a recent trip to Europe, I had the good fortune to be able to visit the Deutsches Museum in Munich, an extraordinary institution that would have deserved a week-long visit to do it justice. This amazing facility was founded in 1903 by the work of the electrical engineer Oskar von Miller, who pioneered the use of high voltage transmission lines, and three-phase power. Fully opened in its current location in 1925, the Museum currently houses exhibits on all branches of science and every conceivable field of application of technology—the applied arts that make modern economy possible.

Simply walking through the exhibits on such technical arts as ceramics, hydraulic engineering, metallurgy, paper manufacture, and tunnel construction gives an immediate sense of the depth of discoveries and centuries of experience represented in our current capabilities. They also make many visitors cognizant of just how unaware they are of how the manufactured objects that surround them every day are produced. Exhibits of

tools, both scientific and cultural, from machining implements to measurement apparatus, from computer components to musical instruments, demonstrate the wealth of creations formed by human minds over our history.

Most astounding to me, however, (at least on my short visit!) were the exhibits on the history of science. Completely unlike a textbook, which, made of paper and ink, can at best describe experiments, and, more often than not, simply gives the resulting formulas as a basis for answering problem sets, the Deutsches Museum brings the discovery process to life. The enormous physics section encompassed every imaginable aspect of mechanics, and used demonstrations (usually interactive) to make clear the phenomena that provoked the development of the theories used to explain them. Torsion, friction, angular momentum, speeds of bodies in



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free-fall, levers, wedges, pulleys, Bernoulli forces, gyroscopes, fluid flow, and much more, would serve as an ideal educational excursion for elementary and middle-school students. More challenging experiments in electrostatics, magnetism, and electrodynamics trace the way to the development of the motor, cathode-ray tube, and transistor, and reify concepts that, of necessity, can only be abstract when read in books. All children should have the opportunity to experience first-hand such experimental demonstrations, the global patrimony of human thought.

The only acceptable goal for an educational system is one that prompts students to reproduce breakthroughs of the past by confronting them with the experimental evidence written in nature's book itself. On this basis, our young future biologists, fusion scientists, and rocket engineers will develop a firm internal foundation for knowledge, based on no authority other than the world itself, and a familiarity that will inspire confidence in acting on that surrounding world to control and improve it!

The Deutsches Museum provides an inspiring conspectus of what it is to be human.



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One of the more astonishing displays at the Museum.