Historical Surprises

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ABSTRACT: The capsule histories of physics that students learn in their physics courses stem basically, I believe, from a linear view of history—that physicists in making fundamental discoveries follow a Royal Road to them, as Hermann von Helmholtz put it in 1892. The actual routes they follow, however, are generally highly nonlinear, and when historians display these routes to students, they express surprise. I suggest that such historical surprises could constitute one or more units of instruction in physics–education or other courses. To illustrate what I have in mind, I will provide examples of historical surprises that I have uncovered in my own historical researches on Isaac Newton's work on diffraction, Robert A. Millikan's photoelectric-effect experiments, Arthur H. Compton's X–ray scattering experiments, James Chadwick's discovery of the neutron, George Gamow's creation of the liquid–drop model of the nucleus, and Lise Meitner's and Otto Robert Frisch's interpretation of nuclear fission. I am confident that teachers and students can discover many more historical surprises—ones just as provocative as these—by exploring the historical literature.

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