ALUMINUM

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ALUMINUM AT A GLANCE

Name: From Latin *alumen,* alum.

Atomic mass: 26.9815.

History: Discovered in 1825 by Danish chemist Hans Christian Oersted.

Occurrence: Aluminum is the most abundant metal in the earth's crust, but it is not found free in nature. Today, nearly all of the world's aluminum is obtained by isolation from aluminum oxide derived from bauxite ore.

Appearance: Silvery white, lightweight metal.

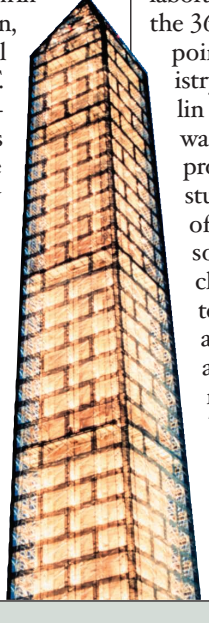
Behavior: Soft, nonmagnetic, and nonsparking. Pure aluminum is easily formed, machined, and cast, and it can be alloyed with a variety of metals. It is also a good conductor of electricity and an excellent reflector of radiation. The metal is generally nontoxic, but can be harmful when ingested.

Uses: Used to make cans, kegs, wrapping foil, and household utensils. It has numerous applications in the vehicle, aircraft, and construction industries.

PERHAPS MORE THAN ALL OTHERS, the 13th element on the periodic table is one of utter contrasts. Although once highly valued as a "precious metal," the price of a kilogram of this element today is considerably less than one's morning cup of gourmet coffee; alloys of this element are often dense and durable, yet the pure element is a light and soft metal; although this element is reasonably reactive, it is also readily passivated, rendering it essentially "rustproof."

Even its position on the periodic table—gracefully residing between the only nonmetallic element of group 13, boron, and the oddly mercurial metal of gallium—is perhaps indicative of how extraordinary element 13 is. There is not even complete agreement on the spelling and pronunciation: Americans typically employ aluminum, while significant portions of the remaining English-speaking world prefer *aluminium.* Aluminum, like most elements, has its share of interesting trivia: For example, a 2.73-kg pyramid of "precious" 1884 aluminum metal sits atop the Washington Monument.

While Hans Christian Oersted is acknowledged as the first to isolate aluminum in 1825 in Copenhagen, Denmark, the eminent German chemist Friedrich Wöhler is generally regarded as the first to secure a pure sample of the element by chemical reduction in 1827. The intriguing international tale of the discovery of the economical production of aluminum independently by two young men, the American Charles M. Hall and the Frenchman Paul L. T. Héroult, via electrolysis of alumina dissolved in cryolite, is well documented. Certainly, the aluminum industry as we know it today is due to the creative genius of Hall and Héroult. My fascination with aluminum, however, has less to do with the actual element and more with the relationship between Frank Fanning Jewett and Hall.



HOLDING UP **Aluminum alloys are strong but lightweight and are used for a variety of construction needs, such as the Washington Monument's scaffolding.**

Jewett, educated at Yale University in chemistry and mineralogy, had a passion for travel. Indeed, he studied briefly at Universität Göttingen spending time in the laboratory of Wöhler. In 1880, the 36-year-old Jewett was appointed professor of chemistry and mineralogy at Oberlin College. Thus, the stage was set for the well-traveled professor and the prodigious student. Jewett is the (most often) anonymous "professor" at Oberlin, who opined to his chemistry class, where Hall was in attendance, that great financial rewards awaited the person who could devise an economical means to produce aluminum metal from its ubiquitous ore. The role of Jewett in Hall's life proved crucial in the seminal discovery that would ultimately spawn the Aluminum Co. of America, Alcoa (2002 revenues of $20.3 billion) and the worldwide aluminum industry.

The initiative and drive of Hall remain impressive. For an amateur scientist to doggedly pursue a scientific problem of such magnitude, and ultimately succeed in such an endeavor, is almost unimaginable. Records indicate that Jewett was a counselor, mentor, adviser, and friend to Hall. Furthermore, Jewett often provided materials and laboratory space to the budding entrepreneur. Jewett, a modest man by all accounts, apparently was not interested in sharing the praise, fame, or financial rewards that would soon befall his student. As Oberlin College's Norman C. Craig has so elegantly stated, Jewett was "content to report to his Yale classmates that his greatest discovery was the discovery of a man—Charles Hall" [*Chem. Heritage,* **15,** 36(1997)].

In my mind, the Jewett-Hall relationship epitomizes the idyllic professor-student dynamic. It is this relationship that I envision when I am working with students: a synergistic pursuit of the scientific unknown. To be sure, the stakes are much lower in my day-to-day struggles in the laboratory. The problems that my students and I face are much smaller in magnitude and any potential immediate impact is often ambiguous.

Nonetheless, the Jewett-Hall relationship drives me in an oddly personal manner as I strive to improve my teaching skills and hone my research capabilities. Might my perspective on this relationship be a rather naive interpretation? Almost certainly. Is this simply an outdated commentary on the contemporary professor-student dynamic? Most clearly. Could this all be little more than a "nonprofessorial" waste of time? Absolutely not! The professor-student dynamic represents much of what I find uniquely attractive in academia. I have observed parallels to the Jewett-Hall relationship in athletics: In tennis, it is that perfectly executed service ace down the middle of the court; in basketball, it is that gracefully arching jumpshot from the corner, hitting "nothing but net"; in golf, it is that splendid tee shot on the par 5, 18th hole—you know, that one shot that keeps bringing you back time and time again.

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CELEBRATING C&EN'S 80TH ANNIVERSARY

Gregory H. Robinson *is a distinguished research professor of chemistry at the University of Georgia. His research interests, the organometallic chemistry of the main-group metals, are tempered by his recent obsession with golf.* *The author acknowledges the gracious assistance of Norman C. Craig (Oberlin College) and Richard K. Hill (University of Georgia).*