standard U2-containing splicing machinery can remove introns with AU and AC at their termini in the context of splice sites that otherwise fit the standard consensus. A similar observation has been made in mammalian cells, where a G to A mutation in the last position of the fourth intron of the CHO cell *dhfr* gene was isolated as a suppressor of a G to A mutation in the first position (*11*). (The reader may want to verify that non–Watson-Crick A-A pairs with the geometry shown in the figure for G-G and A-C pairs are possible.) Without a good match to the minor class branch point consensus, it is likely that the doubly mutant AT-AA *dhfr* intron is removed by splicing machinery containing U2, but it will be interesting to verify this supposition and related questions. For example, is mutation of the terminal AT-AC nucleotides alone sufficient to allow splicing of introns carrying GT-AG termini by a U2-mediated process (with its less stringent branch point requirement)? There are already results indicating an in vivo preference for splicing between splice sites of the same class (recognized as skipping of both exons flanking a crippled AT-AC intron), as in P120 (*3*) and mutant alleles of the mouse sodium channel Scn8a (*7*).

Finally, there is the question, Why? The possibility that AT-AC introns could provide a mechanism for alternative splicing springs immediately to mind, but there is so far no evidence for regulated use of AT-AC introns. I favor the idea that AT-AC introns are yet another molecular fossil, a way of getting the job done that, like diesel cars or Beta videotapes, is clearly less popular, but whose adherents (people who own diesel cars or Betamax VCRs; genes that contain AT-AC introns) create a continuing demand for the machinery. In any case, AT-AC introns will surely provide a counterpoint to GT-AG introns for testing ideas about the mechanism of pre-mRNA splicing.

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Hydrogen: The First Metallic Element

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Most elements are metals, which remain metallic when they are heated through their melting points at normal (1 atm) pressure. However, the lightest element, hydrogen, is unquestionably a molecular nonmetal in its normal solid and liquid states. Recent experiments by Weir, Mitchell, and Nellis (*1*) on shock-compressed fluid hydrogen give the first direct experimental evidence for metallic hydrogen. In a news story on page 1667 of this issue, Kerr discusses the implication of this work for jovian interiors (*2*).

The key to the Livermore experiments is the shock compression of a thin (0.5 mm) layer of liquid hydrogen contained between two single-crystal Al_2O_3 anvils. The high shock pressures, up to 2 million atm (200 GPa), are generated by high-velocity impact (7 kms^{-1}) of a metal plate onto the surface of a ductile aluminum sample cell. A reverberating shock in the liquid generates a temperature of a few tenths of an electron volt (≈3000 K), low compared to both the initial electronic energy gap of 15 eV and the molecular dissociation energy of ≈2 eV. Importantly, the Livermore group also measured the electrical resistance of the sample at high pressure using electrodes inserted through the rear walls of the cell, flush with the liquid hydrogen–Al_2O_3 interface. The conductivity rises continuously, increasing by over five orders of magnitude, from 50 to 140 GPa and is then essentially constant at 2000 $(\Omega\cdot\text{cm})^{-1}$ from 84 to 180 GPa.

These remarkable experiments also highlight a fascinating intellectual problem; namely, how do we know that the measured conductivity at high pressure is indeed indicative of a "metallic" form of hydrogen? The only rigorous criterion for differentiating between a metal and a nonmetal is the value of the electrical conductivity at the absolute zero of temperature; there, metals have a finite electrical conductivity (or infinite in the case of a superconductor), whereas nonmetals have zero conductivity. At finite temperatures, as in the situation at hand, the thermal excitation of conduction electrons will blur the distinction between metals and nonmetals. This dilemma has led to numerous attempts at predicting the actual value of electrical conductivity at the nonmetal-to-metal borderline. A favored view is that high-temperature fluids metallize when the characteristic mean free path for the valence electrons becomes comparable to, or exceeds, the average distance between particles providing the electrons. This simple but powerful argument leads to an estimate of ≈2000 $(\Omega\cdot\text{cm})^{-1}$ for the conductivity of fluid hydrogen at the metallization threshold (*3*, *4*). Interestingly, not only does the measured electrical conductivity of compressed fluid hydrogen attain this value, but it is essentially the same as that of the alkali metals Cs and Rb in their expanded fluids at 2000 K. This is a testament to the inherent similarities of hydrogen and the other alkali metals.

Although the metallization of the lightest and most abundant element in our universe requires unearthly pressures and temperatures, such conditions are normal in the interior of Jupiter (*2*). That planet, itself a fluid, is composed of an outer layer of nonmetallic, molecular hydrogen that continuously transforms to metallic fluid hydrogen within the core. The outstanding ingenuity and technical skills—and perseverance—of the earthly Livermore researchers will undoubtedly lead to major new insights into the very nature of the jovian planet. Finally, the metallization of hydrogen casts a new perspective on the periodic table itself, devised over the centuries from the observed periodicity in properties of the chemical elements at a pressure of 1 atm. Now that the first element has finally succumbed to metallization, we must add to the age-old question, "What is a metal?" an equally important inquiry, "When is a metal?"

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