sequestered CO_2. Combined-cycle CH_4-fired power stations dominate new generation, but are starting to be displaced by onsite co- and trigeneration, which deliver electricity about 2- to 10-fold more cheaply after crediting useful heat (*2*). Renewables are increasingly competitive, the fastest-growing energy source in Europe, and plausible sources of half the world's total energy by 2050 (*3*).

Progress is even greater in supereefficient conversion and end-use. Ultralight hybrid-electric cars (*4*)—uncompromised and competitive—have multibillion-dollar private commitments, are coming quickly to market (*5*), and will ultimately save as much oil as the Organization of Petroleum Exporting Countries now sells. The most efficient will use H_2 fuel cells whose immediate commercialization, now feasible (*5*), can displace most if not all oil, coal, and nuclear power at a profit.

If oil became scarce, its rising price would speed these alternatives; yet most can beat even today's low and falling energy price. Many will be bought for other reasons—end-use efficiency's superior service quality, renewables' and fuel cells' distributed benefits (*6*). Most important, a decade ago, available end-use efficiency could have saved four-fifths of U.S. oil use at average costs of around $2.50 per barrel (*7*). The scores of market failures that left most of these savings unbought are now becoming well understood—along with ways to turn each obstacle into a business opportunity (*8*).

Together, these technical and barrier-busting innovations could make oil uncompetitive even at low prices before it becomes unavailable even at high prices. Like uranium earlier, and coal increasingly, oil could become no longer worth extracting—good mainly for holding up the ground. Of course, this cornucopia is the manual model: you have to turn the crank. But many smart firms are already doing so (*9*).

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Kerr states, "Their [the pessimists'] case for the past being the best predictor of the future depends heavily on their success in predicting the oil production peak of the lower 48 states of the United States, the only major province whose oil production has already peaked." In fact, however, in addition to the lower 48 peak mentioned above, three other major provinces have peaked: total U.S. (lower 48 plus Alaska) in 1970; North America (the United States, Canada, and Mexico) in 1984, and the former Soviet Union in 1987.

Kerr also states, "If technology can greatly boost reserves, then the U.S. production curve should at least stabilize, while if the pessimists are right, it will soon resume its steep downward slope." The data show that the U.S. production trend has long since been on a steep downward slope. For example, from 1991 through 1997, it decreased every year, averaging minus 2% per year for that period.

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"Bow Tie" Correction

In our research article "High-power directional emission from microlasers with chaotic resonators" (C. Gmachl *et al.*, 5 June, p. 1556) (*1*), the upper limit for the stability-range of the "bow-tie"–shaped resonance was incorrectly given as $\varepsilon \approx 0.23$ instead of $\varepsilon \approx 0.18$, which is the correct value within the flattened-quadrupole model of the resonator. The value of $\varepsilon \approx 0.23$ is correct for the simple quadrupole parameterized in polar coordinates as $r(\phi) \propto [1 + \varepsilon \cdot \cos(2\phi)]$. We thank Anthony E. Siegman of Stanford University for pointing out this error.

Whether the bow-tie resonance has destabilized in the highest deformation

lasers looked at experimentally ($\varepsilon \approx 0.2$) depends on the local curvature of the boundary at the locations of the bow-tie bounce-points, rather than on the global parameterization. Furthermore, because the bow-tie destabilizes only gradually, a strong effect on the experimental findings at high deformation is neither expected nor observed.

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Cope's Rule

Cope's Rule—that famous 19th-century notion that there is a general tendency toward size increase in evolution (J. Alroy, Reports, 1 May, p. 731)—has become a fixture of debates about pattern and process in paleobiology. Many recent studies have concluded that trends toward increased size are illusory, although some confirmed them in specific groups (*1–4*). Other papers have commented on possible mechanisms explaining Cope's Rule: some argued for co-adaptation, some for species sorting, and some for context-dependent statistical factors (*5, 6*). All used new data or new logic to evaluate Cope's long-held truism, which has arguably dominated our perception of the fossil record for more than a century.

But has it really? The diligent reader of Cope's 1300-plus publications may be puzzled to find little about body size. Cope wrote about sharks' hearts, women's waists, and men's minds, but not about body mass (*7*). One rare statement about size was quoted by Stanley (*2*): "It is true, as observed by Marsh, that the lines of descent of Mammalia have originated or been continued through forms of small size" (*8*). But this was an anomaly, occurring only in the final version of Cope's "Doctrine of the Unspecialized" (which, restated, says that ancestors are less derived than their descendants). Autogenic trends were antithetical to the neo-Lamarckian thesis that individual striving causes variation (*9, 10*). Cope's Rule is neither explicit nor implicit in Cope's work.

If not from Cope, from where does Cope's Rule come? Size was a hot topic in the post-war synthesis: Its stimulus was Schindewolf's resurrection of Eimer's orthogenesis (*11*). Simpson's review (*12*) and Rensch's English-language tirade (*13*) alerted Anglo-American synthesizers to a Germanic sitting duck on whom to train their sites. The idea that directed variation could drive lineages to extinction was a perfect target for the new weaponry of genotype, phenotype, and selection. Simpson and Newell wielded new quantitative techniques to disprove it (*10, 14*). Simpson blasted out a rewriting of horse evolution, undermining Schindewolf's best example (*15*). Other papers followed (*16*).

The epithet "Cope's Rule" was coined during this flurry by Rensch (*11*), who cited *Evolution of the Vertebrata, Progressive and Retrogressive* (*7*), notable for its anti-trends stance. Rensch apparently did not read Cope's work himself, but copied his information from sometime orthogenist Charles Depéret, who had lionized Cope to discredit his fellow countryman Albert Gaudry (*17*). Then Newell copied Rensch, others copied Newell, and the idea that Victorians unanimously embraced "Cope's Rule" had been invented. After being enshrined in Raup and Stanley's popular textbook (*18*), the mismanaged synthesis strawman grew into a scientific urban legend.

What is interesting is that there were only a few advocates of Cope's Rule before the late 20th century: Eimer in the late 19th, Depéret in the early 20th, and Schindewolf at mid-century (*19*). But there have been an increasing number of supporters in the past two decades, making the rule anything but a 19th-century phenomenon (*1, 4, 6*). Among them, Alroy is arguably the most sophisticated advocate, having presented broad, well-analyzed data apparently demonstrating an across-lineage trend toward increased body mass. Cope's Rule might be better named "Alroy's Axiom."

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