

SCIENCE & TECHNOLOGY



*Trace element imbalances are only one possible crime-chemistry link. Some researchers believe that high-sugar diets can induce violent behavior. Tests in which junk foods—soda, candy, snacks—were barred from prison diets suggest that the researchers may be correct. But conclusive proof is lacking.*

tify individuals. Beginning in the 1960s, however, when mail-order charlatans promised to diagnose medical problems using locks of hair, disrepute tainted wider applications of hair analysis. Though the field is now governed by stricter standards, the doubts linger.

Meanwhile, Walsh is pushing ahead with his work. At his new Health Research Institute near Chicago, he is beginning to treat delinquent boys for trace element abnormalities. No results yet.

If they are confirmed, notes Raloff, Walsh's findings would raise a host of ethical questions. Can the chemically imbalanced be held accountable for their crimes? Should a young child be tested for chemical hints of criminality? What if his test were positive?

*A Scientific  
Success Story*

"The Origins and Development of the American Patent System" by Morgan Sherwood, in *The American Scientist* (Sept.-Oct. 1983), 345 Whitney Ave., New Haven, Conn. 06511.

New methods of making candles, milling flour, and distilling alcohol were among the first inventions awarded U.S. patents. Today, more than 4,370,000 patents later, the patent system is quietly rolling along.

Americans take the system so for granted that they forget how complex it is, notes Sherwood, a University of California (Davis) historian. The system must balance two competing goals: encouragement to inventors and public access to their inventions. The Founding Fathers wrote their idea of a proper balance into the U.S. Constitution: a patent system granting inventors proprietary rights over their creations, but for a limited term (now 17 years). The Founders were, however, less than unanimous on the virtues of this scheme. James Madison and Alexander Hamilton favored awarding prizes instead. Both Thomas Jefferson and Benjamin Franklin refused to patent their own inventions.

---

**SCIENCE & TECHNOLOGY**


---

When Congress passed the first patent law in 1790, it deemed the matter important enough to create a board composed of the Attorney General and the Secretaries of State and War to evaluate applications. In 1793, a new law dropped the time-consuming requirement that applications be screened. The results were predictable. In 1829, an "inventor" patented the medieval farming technique of letting land lie fallow for a season to increase subsequent crops. By 1836, with the establishment of the U.S. Patent Office, the screening requirement had been reinstated and the foundations of today's system were laid.

The question of what can be patented has also fallen to the courts. The peddling of "patent medicines" during the early 19th century led to a judicial ban on patents for "mischievous" creations. In 1822, a federal court ruled that "mere abstractions" could not be patented. In 1978, the Supreme Court cited the 1822 decision in ruling that computer programs (based on mathematical formulas) were not eligible.

That principle, along with the Court's "obvious" rule—denying patents for common-sense improvements on existing designs—is bound to make for some complex cases as technology races ahead. In 1980, the Supreme Court had to decide whether new genetically engineered organisms could be patented. It said Yes. The patent system, Sherwood concludes, is probably up to any challenge that science can produce.

### *Equality for The Egg*

"The Energetic Egg" by Gerald Schatten and Heide Schatten, in *The Sciences* (Sept.-Oct. 1983), The New York Academy of Sciences, 2 East 63rd St., New York, N.Y. 10021.

Until the 1970s, cell biologists largely concurred with the view of Hippocrates and Aristotle that the female's contribution to human reproduction was essentially passive. Under a normal microscope, sperm appear active, while eggs seem inert.

But during the last decade, new electron microscopes, which magnify details 250,000 times, began to tell a different story. According to the Schattens, biologists at Florida State University, sperm and egg now appear to be "mutually active partners."

The electron microscopes show that as the sperm approaches the egg, it synthesizes a long, thin filament that "harpoons" its target, triggering chemical changes within the egg that rouse it to action. Hair-like "microvilli" on the egg's surface reach out and pull the male cell inward, finally clasping it to the surface.

Meanwhile, the egg begins a series of defensive measures to keep other sperm at bay. (In humans, up to 40 sperm may approach at once.) Within 30 seconds of the meeting of sperm and egg, a tough antisperm "umbrella" composed of proteins fends off possible intruders.

As the captive sperm, "lilliputian" in size relative to its host, begins swimming toward the nucleus, "microtubules" (only 25 billionths of a meter thick) within the egg push the swimmer toward its center. Once it arrives, the microtubules form themselves into a "sperm aster" that