

ply of chromosomes in each new organism, so that mutant genes that survive in one parent are often suppressed by dominant genes from the other. Asexual

organisms, by contrast, perform a kind of incest.

That is why sex and all that goes with it makes sense to scientists, if not to others.

## Chaos

"Chaos Theory: How Big an Advance?" by Robert Pool, in *Science* (July 7, 1989), 1333 H St. N.W., Washington, D.C. 20005.

Chaos has crept into science. A century after "chaos theory" was first hinted at by the French mathematician Henri Poincaré (1854–1912), scientists are debating whether it heralds a revolution even more fundamental than quantum mechanics and Einstein's theory of relativity, or whether it is merely a small step forward for science.

Chaos theory is hard to explain, notes Pool, a *Science* staff writer. It suggests that systems described by mathematical equations—the motion of heavenly bodies, for example—sometimes "act in such a complicated way you cannot predict exactly what they will do in the future. The best you can do is make probabilistic statements about them."

Like quantum mechanics, chaos theory has no single author. Many scientists have developed and applied it in different fields. MIT astronomer Jack Wisdom, for example, has shown that Pluto's orbit around

the sun is chaotic. The research of Ary Goldberger, a Harvard cardiologist, suggests that healthy human hearts have chaotic fluctuations in their pattern of beating; ailing hearts have more regular beats.

Nearly 30 years ago, MIT's Edward Lorenz sparked the "chaos revolt" among scientists when he demonstrated the existence of chaotic behavior in atmospheric air flows. As a result, meteorologists accept the idea that weather forecasts more than a couple of weeks into the future are now impossible. But some insist that chaos theory will eventually help them overcome that limit.

Such arguments are the nub of the debate over chaos theory. Is it chiefly a new tool that will help penetrate the mysteries of the universe? Or does it show that some questions never will be answered, that we will have to drop our 200-year-old vision of a clock-like Newtonian universe? An answer may be decades away.

## The Green Hour

"Absinthe" by Wilfred Niels Arnold, in *Scientific American* (June 1989), 415 Madison Ave., New York, N.Y. 10017.

Artists and writers in every age seem to discover a new chemical shortcut to the Muse—marijuana, LSD, cocaine, and, perennially, alcohol. In 19th-century France, the drug of choice was absinthe.

Absinthe owed its popularity to French soldiers who fought in the Algerian wars of the 1840s. While in North Africa, they began to add extracts of the wormwood herb (*Artemisia absinthium*) to their wine, believing that it warded off fevers. It didn't, although according to Arnold, a biochemist at the University of Kansas Medical Center, wormwood did have a few medical uses, such as the treatment of round-

worms, detailed by the ancient Egyptians, Greeks, and others.

In France, the veterans' newly acquired taste for the bitter herb (one ounce diluted in 524 gallons of water can still be tasted) was satisfied by absinthe. The pale green liqueur "was said to evoke new views, different experiences and unique feelings." One of wormwood's ingredients is thujone, a chemical that can cause intoxication and hallucinations—as well as convulsions and permanent damage to the nervous system. (Thujone was later used in research into convulsive therapy for schizophrenics.) By the 1850s, the French

recognized a disease they called *absinthism*, though they were not aware that thujone was the toxic agent.

Nevertheless, absinthe increased in popularity throughout the 19th century, mostly in France, but in other nations as well. During the 1870s, *l'heure verte* (the green hour) became a daily event in Parisian cafes. It was surrounded by a pleasant ritual: With an absinthe spoon, the drinker held a sugar cube over a small quantity of the liqueur and poured water over the cube to dilute the drink's bitter taste. Like most of the drugs that came after it, absinthe was said to be an aphrodisiac. As the poet Ernest Dowson put it, "absinthe makes the tart grow fonder." The liqueur was immortalized in paintings such as Edouard Manet's *The Absinthe Drinker* and championed by the poets Charles Baudelaire and Arthur Rimbaud. The psychosis that drove Vincent van Gogh to suicide in 1890 was probably exacerbated by absinthe, says Arnold.

The French quadrupled their consumption of the drink between 1875 and 1913, despite government efforts to curb it. Finally, in 1913, France followed the example of other nations and banned absinthe. Thereafter the French made do with

drinks such as Pernod and Ricard, which have absinthe's bitter taste but not its bitter consequences.



"This is for my health," insisted a jolly fellow in a turn-of-the-century advertisement for a new kind of absinthe.

---

**RESOURCES & ENVIRONMENT**

---

*Do Computers Kill?*

Almost one out of every 15 white-collar workers in this country uses a computer or word processor with a video-display terminal (VDT). Few of these users know that "they are being exposed to potentially harmful magnetic fields emitted by their machines."

So writes Brodeur, in the last of a three-article series on the hazards of various kinds of electromagnetic radiation.

Complaints about eye problems caused by VDTs began cropping up during the 1970s among the first heavy users of com-

"The Hazards of Electromagnetic Fields: Video-Display Terminals" by Paul Brodeur, in *The New Yorker* (June 26, 1989), 25 W. 43rd Street, New York, N.Y. 10036.

puters—telephone-company operators and newspaper employees. In 1980, matters took an even more serious turn when it was learned that four of seven pregnant women in the classified advertising department of the *Toronto Star* gave birth to children with birth defects. In May 1981, more reports of birth defects and miscarriages prompted a Congressional panel to hold hearings. Government and industry specialists reassured the Congressmen. VDTs emit several kinds of radiation—including x-rays—all harmless. In the radio spec-