Numbers can confuse jurors

A jury's interpretation of DNA evidence depends largely on how that evidence is presented, says Jonathan J. Koehler of the University of Texas at Austin. When the probabilities of a DNA match are described in two different—yet mathematically equivalent—ways, juries reach different conclusions regarding them.

In an experiment conducted by Koehler, DNA experts presented two groups of mock jurors with testimony that differed in only one respect—the description of the likelihood that DNA evidence came from the suspect. One group heard the odds expressed as a percentage: The suspect has a 0.1 percent probability of matching the DNA purely by coincidence. The second group heard the odds as a frequency: One in 1,000 other people also match the DNA (SN: 7/13/96, p. 24).

Eighty-two percent of the jurors in the first group thought that the DNA came from the suspect, compared to only 43 percent of the jurors in the second group. Moreover, most of the jurors in the first group were very confident of their judgment. Only 10 percent of the second group were.

Expressed as a percentage, says Koehler, the probability "sounds like there's a 99.9 percent chance that the suspect is the source of the DNA, but that's not what it means." Although both ways of framing the evidence are correct, people tend to make fewer errors with the frequency approach, he adds. "It's our interpretation of the numbers that's problematic." *—C.W.*

Texas-sized molecule battles cancer

Fancifully named after the Lone Star State, a light-sensitive drug called texaphyrin has shown success in treating metastatic brain cancer. Given intravenously to a patient, texaphyrin boosts the effectiveness of X-ray therapy and makes small clusters of cancer cells easier to see on magnetic resonance images.

Researchers at Pharmacyclics in Sunnyvale, Calif., are conducting preliminary tests of the drug on 17 people with metastatic brain cancer. The patients' median survival time after radiation treatments increased from 4 months to 1 year. "These early stage data are exciting and inspire us to keep going," says Jonathan L. Sessler of the University of Texas at Austin, who first synthesized texaphyrin 2 decades ago.

To treat brain cancer, the researchers use texaphyrin bound to gadolinium ions. Sessler says they are "still sorting out" how the drug works, but it may mop up free electrons, preventing them from neutralizing tumor-attacking hydroxyl radicals.

The group is also testing texaphyrin's value as part of a cancer treatment called photodynamic therapy, or PDT (SN: 1/14/89, p. 26). In PDT, a doctor gives the patient a light-sensitive drug that collects in tumors. Shining light on the tumors activates the drug and kills the cancer cells.

The drug most often used for PDT is Photofrin, which is activated by red light. Other PDT drugs being developed absorb infrared light, which has a longer wavelength and penetrates tissues more easily. Although texaphyrin is one of a dozen such drugs, says Thomas Dougherty of the Roswell Park Cancer Institute in Buffalo, N.Y., it absorbs the longest wavelengths of the group. "It's rather unique in that sense." *—C.W.*

Science pokes loopholes in cloning bans

The much-debated bans on human cloning may be full of loopholes, says Lori B. Andrews, who teaches the legal aspects of genetics at Chicago-Kent College of Law. Andrews has analyzed the bans under consideration in 20 states. On Jan. 1, California's became the first such prohibition to go into effect.

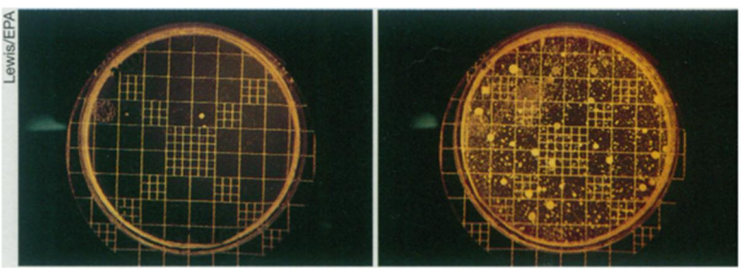
"Once again, technology may be running circles around the law," Andrews says. At least seven state bans prohibit transferring the nucleus from a human cell into a human egg, but that doesn't address the possibility of transferring a human nucleus into a nonhuman egg, she notes. In January, Neal L. First of the University of Wisconsin–Madison described promising early results from that sort of procedure, using cow eggs as incubators for other animal species.

Seven state proposals ban the creation of "genetically identical" individuals, but that leaves another loophole, Andrews points out. An egg cell donated for cloning has its own mitochondrial DNA, which is different from the mitochondrial DNA of the cell that provided the nucleus. The "clone" will therefore not be truly identical, she argues. *—S.M.*

Bacteria may hide in hunks of gunk

Processed sludge from waste treatment plants that is sold as fertilizer for home gardens may harbor disease-causing fecal organisms, contends microbiologist David L. Lewis of the Environmental Protection Agency in Athens, Ga.

To test his suspicion that fats and petroleum products in sludge interfere with assays for bacteria, Lewis mixed bacteria from sludge with a silicone lubricant. When he analyzed the resulting mixture for colonies of live bacteria, he found few. However, when he dissolved the silicone with acetone and tested again, he found 100,000 times as many colonies.



Colonies of bacteria before (left) and after (right) treatment with acetone.

Lewis suggests that bacteria such as *Salmonella* get caught in clumps of gunk in the sludge. If the clumps get coated with water-repellent substances like chicken fat, petroleum, or industrial lubricants, standard tests may significantly underestimate the number of bacteria hidden inside them, he says. If people accidentally ingest clumps sticking to unwashed hands or vegetables, he says, the acids and churning action of the digestive tract would expose the bacteria.

Although EPA regulates the methods used to decontaminate and test sludge, Lewis remains "skeptical as to whether the regulations protect us or not." Alan B. Rubin of EPA's Washington, D.C., office says sludge used as fertilizer does not make people sick when applied according to the regulations.

The agency should use Lewis' methods to test sludge certified as free of pathogens to see whether the bacteria indeed escape detection, says Ellen Z. Harrison of the Cornell Waste Management Institute in Ithaca, N.Y. *—M.N.J.*

New faces to fill top science posts

President Clinton announced that he will nominate Neal F. Lane, director of the National Science Foundation, to succeed John H. Gibbons as director of the White House Office of Science and Technology Policy. Gibbons, who has held the post for the last 5 years, plans to resign on March 15.

To fill the NSF directorship, Clinton will nominate Rita R. Colwell, president of the University of Maryland Biotechnology Institute in Baltimore. If confirmed by the Senate, Colwell will become the first woman and the first life scientist to lead the foundation, which funds basic science research nationwide. *—C.W.*