

Hypnosis: Guilty of fraud?

Following a murder in Joliet, Ill., last year, an eyewitness who was unable to recall the face of the murderer was hypnotized by a police force hypnotist. Although the crime had occurred at night and the witness had been almost 100 yards away, he was able under hypnosis to zoom in on the murderer's face and identify him as a former classmate. The suspect was brought to trial on the basis of the eyewitness identification and might have been convicted, had not an ophthalmologist testified that, under conditions like those on the night of the murder, accurate resolution of images was impossible beyond 30 feet.

This is one example among many, behavioral scientists say, where unquestioned reliance on hypnosis in criminal investigations could lead to serious miscarriage of justice. Psychiatrist Martin T. Orne, reviewing the literature on hypnosis, said that there is a widely held belief that hypnosis increases recall—a belief deriving largely from Freud's use of hypnosis to unearth repressed memories in his patients. But Freud seriously questioned whether his patients were remembering or fantasizing, Orne said, and there is still no scientific validation of the accuracy of memories brought out through hypnosis. Indeed, Orne added, scientific evidence points to a decrease in critical judgment under hypnosis. Because it is impossible not to ask leading questions when you do not actually know what occurred, hypnotists invariably supply subtle cues indicating what they expect; and because subjects tend to be highly responsive to their hypnotists, it is hardly surprising that they recall new information when hypnotized. But distinguishing between memory and created memory, Orne argued, is very difficult.

The problem of unreliable memories is compounded in the courtroom, Orne explained, because hypnosis has the effect of making an uncertain witness feel quite certain. The demeanor and confidence of a hypnotized witness can be persuasive not only to law enforcement officials but to jurors.

Psychologist Elizabeth Loftus buttressed Orne's conclusion with research data on the malleability of eyewitness memory. Loftus has found that witnesses, when asked intentionally misleading questions, are quite likely to substitute the suggested information for what they actually saw. Vocabulary and syntax are important in determining how potent a question is in contaminating memory, and under some conditions, Loftus reported, as many as 80 percent of the witnesses altered their memories after questioning.

The crucial question, Loftus said, is: what happened to the original information. We tend to believe in the permanence of memory, but there is no good evidence of permanence. Before using any technique such as hypnosis to retrieve "true" memories, Loftus concludes, we must know if there is anything there to be found.

Chromosome number in plant evolution

In the search for mechanisms that might allow abrupt changes in an organism's ability to adapt to its environment, Donald A. Levin suggests that the doubling of a plant's chromosomes can yield a broad array of novel characteristics, some of which may be better suited for available habitats. The botanist from the University of Texas at Austin says that chromosome doubling, a relatively common occurrence in the plant kingdom, had been considered maladaptive. But he argues that the resulting "polyploids" may be better suited to certain habitats. By comparing related species containing two and four sets of chromosomes, he has observed that some polyploids are better suited to dry habitats or colder temperatures than their diploid relations. Other polyploids do better than diploids in high-calcium or high-nitrogen soils. Polyploids typically contain higher levels of

alkaloid chemicals, which play a major role in resistance to disease organisms and herbivores, Levin says. Some of the metabolic consequences of polyploidy have been determined. "The organism is more laid back with polyploidy," Levin says. Polyploids have larger cell sizes than diploids, so they have less surface to volume ratio. This decrease is thought to be responsible for lowered transpiration and metabolic rates, which in turn may lead to retarded growth and increased life span. The effect of chromosome doubling on individual enzymes is unpredictable, Levin finds. Some enzymes double in activity, whereas others stay the same. "Chromosome doubling is an important source of evolutionary novelty," Levin concludes. He suggests polyploids may be preadapted for the colonization of habitats near or beyond the tolerance limits of the original diploid.

Ancient butchers

Modern butchers may not realize what a time-honored trade they practice. According to new anthropological evidence man was using cutlery, albeit very primitive, to butcher ancient beasts—such as hippos and elephants—and presumably eating them as far back as one-and-one-half to two million years ago. The evidence raises new questions in an old debate about the evolution of human diet and the origins of organized human society.

The new fossil evidence, uncovered in several East African archaeological sites and examined by anthropologists Glynn Isaac and Henry Bunn of the University of California at Berkeley and Richard Potts of Yale University, shows animal bones with very fine knicks and grooves. These markings, analyzed by Potts under an electron scanning microscope, are distinguishable from other markings—such as teeth marks—and thus indicate that ancient man used knife-like pieces of stone to remove meat from animal carcasses, the researchers say. There is also evidence that ancient butchers used primitive hammers to fracture animal bones in order to extract the marrow.

The fossil evidence is the first solid data to emerge in an area of much speculation and debate. Two anthropological schools have argued, respectively, that either male hunting or female gathering played the central role in primeval diet and social evolution. Although most anthropologists are convinced that a vegetable diet was the mainstay of ancient human life, the evidence of meat eating suggests that primitive societies were making choices about food. It suggests further that meat had become more important for early humans than it was for other primates, and therefore that man had moved past the individualistic feeding characteristic of apes to a more cooperative form of food gathering. "Collective acquisition of food," Isaac says, "may in turn have stimulated the development of language ability and of intricate social patterns."

What is still unknown, Isaac says, is how often early humans fed on meat—whether weekly, yearly, or, perhaps, only once in a lifetime. The number of bones bearing the characteristic butchery marks suggests, however, that meat eating probably occurred with some regularity. Because the earliest known stone tools are at least two million years old, the researchers believe that their fossil evidence comes from a time when humans were just developing the habit of butchering animals for food. In addition, Isaac notes, the findings come not only from identifiable campsites but also from isolated areas, suggesting that ancient butchers were carrying their cutlery around with them.

The fossils under examination come from the Olduvai and Koobi Fora sites in East Africa and date back to a time when at least two early human species—*Homo habilis* and *Australopithecus boisei*—coexisted.

More motivated, but no happier

If the feminist movement has produced a "new breed of women" more motivated to achieve, these women are apparently no happier for it. Rutgers University psychologist Lillian Troll has since the late 1960s interviewed more than 200 three-generation families—grandmother, mother and daughter—and although she has found that there has been a movement toward wanting to achieve in the nontraditional feminine area, she has found no simple connection between high achievement and happiness. The "innate urge" to do well appears to run in the family, Troll reports, but happy women seem to remain just as happy whether they are competing in the traditionally masculine workplace or pursuing the more traditional role of homemaker.

'Test-tube' baby tally

This month's newsworthy baby—the first child born in the United States who owes her existence to the technique called *in vitro* fertilization (SN: 1/2/82, p. 7)—joins a small, but rapidly expanding club. At least nineteen babies already have been delivered following fertilization of an egg in the laboratory and transfer of the early embryo to the mother's uterus, LeRoy Walters of Georgetown University reports. Twelve births in Australia and six in the United Kingdom preceded the first U.S. success. And more than 150 women are currently pregnant as a result of the *in vitro* fertilization technique.

Statistically the outcome of pregnancies begun by laboratory fertilization is similar to that of natural pregnancies, says John D. Biggers of Harvard Medical School. At the end of 1980, in the Australian laboratory about 15 percent of the laboratory-fertilized eggs produced established pregnancies, counted after 10 weeks. And Biggers says there has been an increase in the success rate since then. In natural pregnancies only 30 percent of fertilizations result in a baby, he estimates. He says that the one step that still needs improvement in the *in vitro* technique is the transfer of the fertilized egg into the uterus.

There is no ethical impediment to *in vitro* fertilization, Walters argues. He considers three concerns: the moral status of a young embryo, the risks of the procedure to potential offspring and the allocation of health-care resources. Walters argues that in the procedures now being used the early embryo receives strong protection. Only one or a few eggs are fertilized at a time and all those that show normal early development are implanted into the woman's uterus. Only early embryos that are grossly asymmetrical, and thus unlikely to develop into a baby, are discarded.

"The currently available data suggest that infertile couples who elect these procedures are not exposing their potential offspring to unreasonable risk," Walters says. So far neither animal studies nor clinical experience has revealed any systematic pattern of abnormality. Only one infant has had an abnormality—a congenital heart defect, which was successfully repaired. (And one fetus with an extra set of chromosomes aborted spontaneously in the eleventh week of pregnancy.) The single birth defect is consistent with the 2 to 3 percent rate of serious medical abnormalities among children born of natural pregnancies.

Finally, Walters predicts that if the success rate of the procedure continues to improve and the cost, now \$4,000 to \$8,000, declines, there will be public pressure for its coverage under private and public health-insurance plans. He says that resource-allocation decisions are difficult to judge. "However, given the importance of decisions about bearing or begetting children in the lifeplans of most people, a strong equity argument can be mounted for making *in vitro* fertilization and embryo transfer available to all infertile couples who request these services—at least in countries where other basic health-care needs have been met," Walters says.

Ruth Hubbard of Harvard University is more skeptical of widespread use of the new technique. She warns that the physicians who advise a couple act as both advocate and judge. She

says there is no way to predict whether more babies will be born with genetic and developmental defects, and she worries about the dominant role of the physician who may require that a woman consent to an abortion if the doctor believes it should be done.

Both Walters and Biggers complain that the U.S. government is neglecting the problem of research involving *in vitro* fertilization. In 1979 an Ethics Advisory Board prepared a 958-page report that recommends funding such research on a limited basis. The Department of Health and Human Services has still made no response. Walters says, "The result of this neglect has been a de facto prohibition of federal support for either controlled clinical trials of *in vitro* fertilization and embryo transfer or laboratory research with early human embryos which might improve the safety or efficacy of clinical techniques."

Seed and ye shall find . . . oil

Peanuts, safflowers, sunflowers and soybeans are well-known sources of oilseeds. But there also are some not-so-illustrious oilseed plants that now deserve more attention, report Eugene B. Shultz Jr. and colleagues of Washington University in St. Louis, Mo. These are the marginal-land oilseeds—a variety of specific plants, not widely cultivated in the United States, that can thrive on otherwise unproductive dry, wet, hilly, nutrient-poor or saline soils. Shultz and cohorts are one of a number of groups nationwide who are investigating whether "marginal-land oilseeds can contribute in a major way to future fuel and chemical stocks with ecological as well as economic acceptability."

Like the conventional oilseeds, the marginal-land plants are sources of vegetable, or triglyceride, oils. Some triglycerides are edible; others are inedible but contain structures chemically valuable to industry. For example, seed oils may be converted to compounds such as benzene, toluene and xylene for use as chemical raw materials or in high-octane gasoline. In addition, they can be transformed into two- or four-carbon paraffins and olefins for use as liquefied petroleum gas or chemical raw materials. The oilseeds also could replace the firewood or charcoal used to cook food in rural areas of developing countries with deforestation problems.

One example of a marginal-land oilseed Shultz says is approaching commercialization is the buffalo gourd (*Cucurbita foetidissima*). "This presently uncultivated plant indigenous to the southwest United States and northern Mexico has the remarkable ability to withstand hot, dry growing conditions and still produce oil yields per acre that are comparable to those obtained from sunflower growing in North Dakota and Minnesota on better soil and with much more water," he and co-workers report. Under development at the University of Arizona by W. P. Bemis and associates, the buffalo gourd is one of four arid-land plants that would receive substantial government support under the Arid Lands Renewable Agricultural Resources Corporation Act. "If this proposed legislation becomes law," Shultz says, "price guarantees, loan guarantees, direct loans and joint ventures would be made available to encourage the production of buffalo gourd, along with guayule [SN: 6/6/81, p. 365], jojoba and *Euphorbia lathyris* [gopher plant]."

But novel oilseed cultivation need not be confined to the southwestern United States, says Shultz. Several other oilseeds—including the Chinese Tallow tree (*Sapium sebiferum*) currently under study by H. W. Scheld and colleagues of SIMCO, Inc. and the University of Houston—"may have promise for the Southeast," he says.

Still, Shultz is quick to point out the need for an extensive investigation of the economic and ecological risk of novel oilseed cultivation. For example, he says, "experience indicates that fertility of marginal lands, in general, often declines rapidly after only a few years of cultivation unless correct cropping practices are followed closely." This could enhance the food-versus-fuel competitions for good cropland "that have already surrounded the development of alcohol fuel from food crops."