

plants at Bodega Head and Point Arena in northern California and by Southern California Edison to construct a plant at Malibu in southern California. Meehan also refers to the highly publicized controversy concerning the licensing of the nuclear power station at Diablo Canyon on the central coast of California. The book was published a few weeks before the production of commercial quantities of electricity by Unit I of this power plant began in November 1984, after 16 years of licensing procedures.

In this kind of controversy, an immediate reaction of a scientist who has not had experience with frustrating regulatory procedures might be that what is wanted is a round-table conference where the various protagonists, as scientists, can settle the issues on the "facts." Nowadays, however, there is wide agreement that only certain kinds of issues admit of such solutions. Meehan demonstrates that attitudes on appropriate criteria of risk are extremely difficult to change and that sometimes no common mode of refutation of geological claims is available. Indeed, throughout his account of the confrontations, Meehan quotes leading engineers, seismologists, and geologists making appeals for the need for "judgment." We are left only with a moderate likelihood that the present regulatory process will produce convergence on such issues as whether there is an active fault. Our best expectation is that the regulatory activities will lead to the emergence of economically tolerable siting and design solutions that will permit construction of a facility that has a very high probability of being safe if there is a large earthquake or nearby faulting.

In the Vallecitos hearings, the author points out, probabilistic concepts were used for the first time in the strictly geological domain. The geological hazard assessment depended upon two hypotheses: that there was a nearby active fault (of variously estimated type) and that there could be a large landslide. The injection of probability arguments allowed both sides to carry forward discussion. For example, it was agreed that, given a nearby active fault, the odds of a damaging amount of slip on it each year are about one in 10,000. The odds of movement occurring along a closer slip plane are about one in 100, so that the joint probability of such fault displacement occurring under the plant is about one in a million. The question then becomes: Is this risk so small as to be overwhelmingly acceptable to all?

It is of interest that the legal underpinnings of the procedures described seem

to be few, and, indeed, it is clear that the regulatory process has generated its own common law. On the matter of standards for admitting scientific evidence, the traditional legal doctrine (*Frye v. United States*, 293 F. 1013 [D.C. Cir. 1923]) discourages scientific originality in court testimony by directing judicial motives toward scientific principles that have already gained general acceptance among the scientific profession. From the evidence presented in the book, this doctrine is more honored in the breach than in the observance. On the matter of using probability to weigh evidence in the courtroom, the strongest precedent is in *People v. Collins* (66 Cal. Rpt. 242 [1968]), in which the court rejected prosecution testimony offered by a mathematician that guilt or innocence could be established by probability calculations.

The book is written with verve and style, and this reader found it absorbing. Undoubtedly, my fascination was helped by knowing many of the participants who are named and discussed. Although many other readers will not have this background, they should still find the book both provocative and stimulating.

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A Medical Misreckoning

To Do No Harm. DES and the Dilemmas of Modern Medicine. ROBERTA J. APFEL and SUSAN M. FISHER. Yale University Press, New Haven, Conn., 1984. xii, 199 pp. \$15.95.

In 1971 the Food and Drug Administration (FDA) ruled that the synthetic estrogen diethylstilbestrol (DES) was contraindicated for use in the prevention of miscarriages. Seven years later, a letter from a task force on DES sponsored by the Department of Health, Education and Welfare informed every licensed physician in the United States about the results of the most recent research. Some 4 to 6 million American women and children had been exposed to DES during pregnancy. Studies had shown a clear association between intrauterine exposure to DES and vaginal cancer and other female and male genital abnormalities, and also an excess in breast and gynecological cancers in the women for whom DES had been prescribed.

In addition to a description of the social and historical context within which the DES story unfolded, Apfel and Fisher, both psychiatrists, provide

an exposition of the psychological dimensions of the DES problem. The authors discuss the history of DES, showing how this powerful drug quickly won wide acceptance after it was synthesized in 1938. Among other factors, the authors stress that, had higher standards of research design been required to assess the safety and efficacy of pharmaceutical products, the subsequent problems might have been mitigated. The FDA approved DES for use in humans in 1941, after extensive reviews to ascertain the safety of the product, the major criterion under the 1938 Food, Drug, and Cosmetic Act.

Efficacy was not to be a standard until 1962. Approved usage was limited to gynecological conditions, not including conditions of pregnancy. However, DES was used throughout the 1940's in clinical trials involving high-risk pregnancies, and seven papers reported that DES reduced pregnancy accidents and produced babies that were larger than average for their gestational age (p. 21). By 1952, the FDA declared the drug safe, thus opening the way to extensive usage in pregnancy at higher doses than before.

The authors point out that none of the seven studies were blind and that other studies in the 1950's and 1960's demonstrated that when appropriate control groups were used DES seemed at the least ineffective and possibly harmful to the fetus (p. 23). By the late 1960's all but one of the major obstetrics textbooks concluded that DES was not effective in preventing spontaneous abortions, but thousands of pregnant women continued to receive it, an example of "the power of the anecdotal report and the resistance of medical practice to the results of well-designed clinical drug research" (p. 24).

Finally, in 1971, when the *New England Journal of Medicine* published the first reports of a rare vaginal cancer in adolescents whose mothers had taken DES, "the medical community was stirred, alarm ran through the media, and the FDA issued a drug alert to all physicians in the nation, warning them that DES was contraindicated for use in pregnancy" (p. 25).

These chapters and one describing the physical effects of DES are brief but well documented. The remaining chapters describe the emotional effects on DES daughters, on their mothers, and on the physicians.

The authors state that their sample of DES mothers and daughters is biased. They studied activists, people seeking help for emotional distress, and litigants. The authors are aware of the need for

rigorously controlled studies, but they argue that clinical descriptions are essential for the development of specific, testable hypotheses in this area.

The psychological effects of DES and the relationships among daughters and mothers, physicians and mothers, and physicians and the DES daughters are presented within a psychoanalytic framework. The essential question the authors explore is the disruptive effect of the trauma, given the identification of the female child with the mother, the need for the adolescent to experience both closeness to and movement away from the mother, the importance of and emphasis on the genitalia in normal development for both boys and girls, and the caretaking-caregiving relationship that both physicians and their patients strive to maintain.

Though they do not present their data in a systematic manner with references to specific cases, their narrative "rings true" for the reader who appreciates the authors' viewpoint. The limitation of examining problems chiefly through one set of lenses, however, is that other possibilities are excluded. For example, the authors detail psychological reasons when they try to understand why few obstetricians have complied with requests from the American College of Obstetrics and Gynecology to actively contact, inform, and examine exposed female children. They reject the idea that the doctors fear lawsuits from alerted patients, without providing evidence from the doctors. Nor do they consider that the problems of searching through years of voluminous records might make the task nearly impossible.

The authors are to be credited for furthering the discussion of the psychological and social dimensions of the DES problems. Though they cannot fully "explore the history of DES in relation to the general history of medicine and to the ongoing scientific establishment" in 130 pages of text, there is useful information in this work and provocative insights into a problem that is far more than physical. The book is well written, has a glossary of medical terms, 20 pages of footnotes, a bibliography of 400 references, and an index, all of which enhance its usefulness. This work could be consulted by clinical therapists and counselors and health professionals and would be of interest to the educated lay person.

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A Syndrome and Its Meaning

Susto, A Folk Illness. ARTHUR J. RUBEL, CARL W. O'NELL, and ROLANDO COLLADO-ARDON, with the assistance of John Krejci and Jean Krejci. University of California Press, Berkeley, 1984. x, 186 pp. + plates. \$22.95. Comparative Studies of Health Systems and Medical Care.

A seemingly endless controversy has exercised anthropologists as to whether there are culture-bound emotional disorders or simply ethnic variants of universal patterns of human aberration. This book will not resolve that issue, but it constitutes an important contribution toward a clearer understanding of it. Two decades ago Arthur Rubel suggested that the emotional-behavioral syndrome known as *susto* (soul loss, magical fright) that is found throughout Hispanic America was a culture-specific folk illness, "syndromes from which members of a particular group claim to suffer and for which their culture provides an etiology, a diagnosis, preventive measures, and regimens of healing." Thus defined, a folk illness could be studied not only in the traditional ethnographic mode but also by employing the rigorous, quantitative techniques of epidemiology. To implement this proposal, the present study was launched among three populations (Zapotec, Chinantec, Mestizo) in Oaxaca, Mexico, with an interdisciplinary team of anthropologists and physicians. The results represent the most systemat-



Zapotec *susto* specialist calls a victim's name into a clay pot "to induce return of her vital essence. The greater the distance that separates her vital essence from her body, the more often her name is called" into the pot. [From *Susto*; copyright Carl W. O'Neill]

ic study of an ethnic behavioral disturbance since Foulks's (1972) multifactorial investigation of Eskimo *pibloktoq* ("arctic hysteria").

The authors present their theoretical assumptions and objectives together with their findings and conclusions in compact form. The appendix usefully includes instruments used for measuring and scoring psychiatric impairment, social factors, and clinical history. The original focus of Rubel and O'Neill on social and cultural data was broadened at the urging of their medical collaborators to include physiological material. Their analysis shares the biocultural approach of the Foulks study but adds methodological advantages: controlled comparison across three populations, inclusion of controls for all three groups, more objective and systematic measuring instruments, and evaluations of cultural and medical data made independently by anthropologists and physicians (Foulks, physician and anthropologist, was a one-person interdisciplinary team).

These investigators found that the onset of *susto* could be separated from the initial traumatic event by days, months, or even years and that the nature of the traumatic events was widely variable. Asustados (victims) differed significantly from controls in being afflicted "by a cluster of symptoms representing diffuse systematic attacks on the organism" (loss of appetite, weight, strength, motivation); they similarly suffered more from several, though not all, organic diseases endemic among peasants of the region, as well as experiencing more emotional difficulties. Indeed, there was a "relative proliferation of mental pathology among the asustados." The factors just listed were generally uncorrelated with local culture, wealth, education, or social position, although in all groups women seemingly were more susceptible than men. Not only are asustados more disease- and disturbance-ridden, they are likely to die sooner than non-asustados, so that "inclusion of *susto* in a patient's medical history tips the balance toward death." As hypothesized, *susto* sufferers do not adequately perform their social roles and are aware that they have failed. Though having more emotional and nervous problems, they did not seem to be more psychiatrically impaired than their control counterparts. Measures of social stress were not correlated with severity and gravity of illness, not surprising given the ambiguous, multidimensional nature of stress as a behavioral variable.

This volume does raise a few prob-