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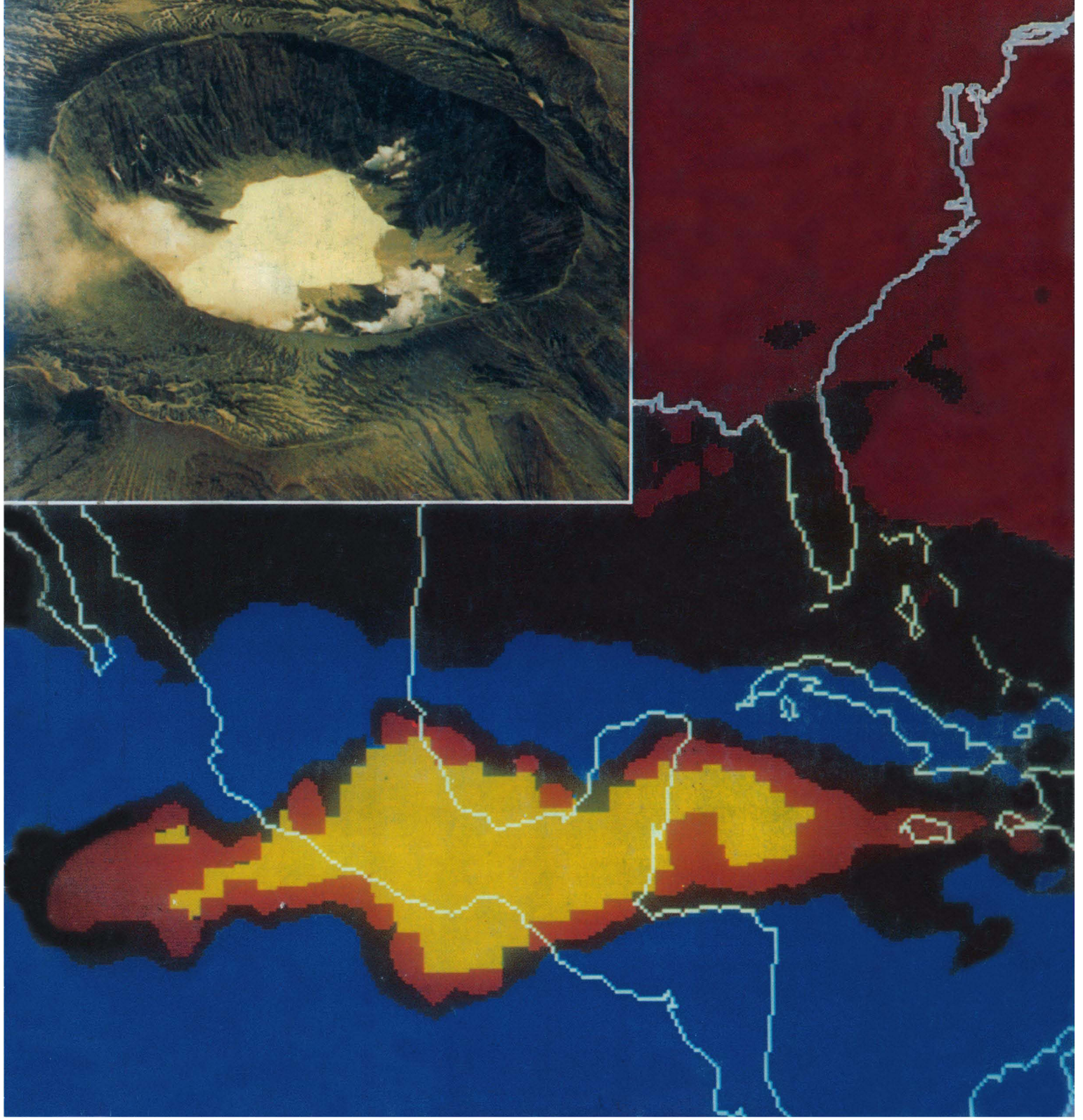

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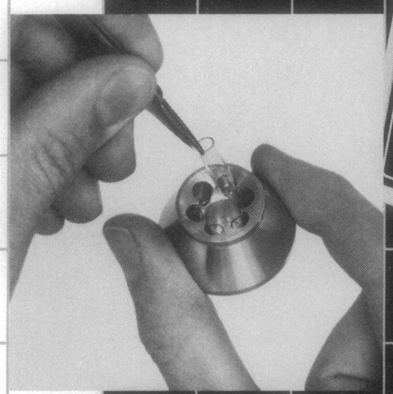

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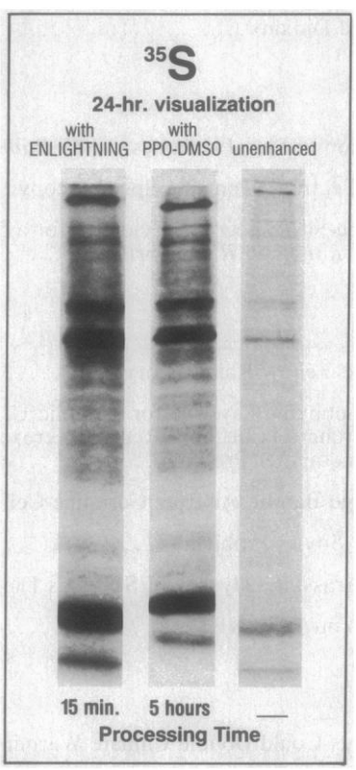

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Volume 220, No. 4604

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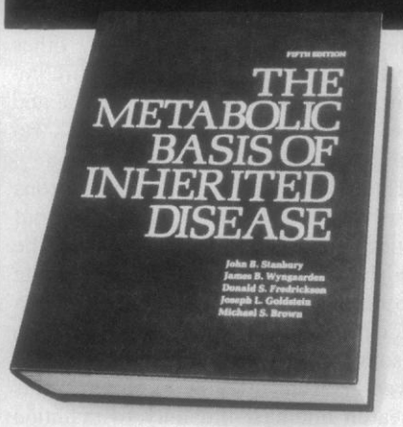
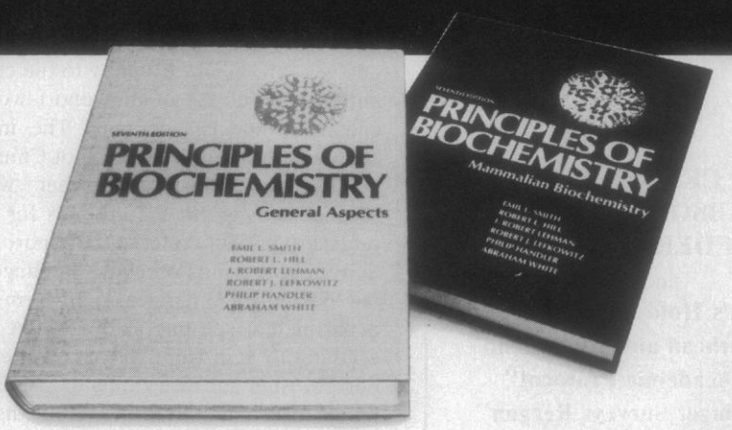
REPORTS

COVER

Sulfur dioxide cloud from eruption of El Chichón appears as a yellow patch across southern Mexico in a false color total ozone map produced with the Nimbus 7 total ozone mapping spectrometer, 5 April 1982. The eruption on 4 April resulted in the 1-kilometer-wide crater shown in the insert photograph. The sulfur dioxide cloud was detected by its ultraviolet absorption at wavelengths used to measure total ozone. The blue area surrounding the volcanic cloud portrays the normal low total ozone found in the tropics. The ozone generally increases at higher latitudes as shown with red and brown colors. See page 1377. [Cover designed by Ronald J. Moltere; insert photo, Robert M. Taylor; false color image, James A. Gatlin—all at NASA/Goddard Space Flight Center, Greenbelt, Maryland 20771]

From Molecules to Medicine...





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gist from outside Stanford. This review is in response to the grievance Mosher has filed with the university (News and Comment, 10 June, p. 1133). We are painfully aware that we have stated the reasons that did not figure in Mosher's dismissal but we have not released the specific reasons for his dismissal. The committee concluded on the basis of the evidence and the corroborating statement in writing Mosher made to someone who provided testimony to the committee that release of the report would endanger innocent persons. The innocent persons in question are not Chinese officials nor Mosher's former wife. Mosher is aware of the grounds for our refusal to publicly release the report and that those grounds preclude a change in our position about release. In terms of departmental self-interest, we have everything to gain from release of the report. Mosher has everything to lose from public dissemination of the report that is in his possession. The grounds for dismissal are fully explored, documented, and persuasive.

CLIFFORD R. BARNETT
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Stanford University,
Stanford, California 94305

According to information that has come to our attention since the *Science* article was published, consular officials did not open the bag that Mosher left at the consulate. Contrary to both our article and Mosher's account, they apparently made no determination, based on the contents of Mosher's luggage, as to whether Chinese suspicions did or did not warrant further investigation. As stated in the article, there is no evidence that Mosher engaged in intelligence activities. As for other points raised in the letters from Mosher and Stanford professor Barnett, we would welcome the release of the full report by either party to clear up uncertainty about the reasons for his dismissal from the Ph.D. program.—Eds.

For the Stanford anthropology department to act in the Mosher case in a closed forum on the basis of undisclosed accusations is to strike at the heart of due process. It cannot but have a dampening effect on field research by other scholars.

The paramount problem with the decision to expel Mosher is that it shifts the emphasis from a researcher's important findings to his alleged indiscretions. In a five-page bill of particulars sent by the Chinese Academy of Social Sciences to Stanford, not a single statement took issue with the facts: that abortions are routinely and systematically taking place in the seventh to ninth months of pregnancy; that infanticide has also been routinely practiced, especially when the newborn was a girl; and, perhaps most serious of all, that these practices reflect an official, or at least established, policy of the People's Republic of China. The academic response from the Chinese Academy of Social Sciences to these awesome charges is a series of allegations about Mosher that, in any other context, or under any other circumstances, would be considered trivial and pale in comparison with Mosher's research.

That Mosher pushed enough buttons to set off a cluster of sirens goes without saying. That such actions required the punishment that was meted out is quite another thing. Mosher's student status made him vulnerable to attack. To claim, as some informants have, that there has never been an attempt to suppress his research findings, but only to maintain standards of probity and proper demeanor, misses the point: the act of depriving Mosher of his degree is ultimately an act of delegitimation, making what he has to say about China appear to be the work of a crank or, at least, of someone without the authority vested by a major graduate department. The punishment—dismissal from the graduate program—does not fit the crime, poor personal conduct while engaging in field research.

The decision to dismiss Mosher from the Stanford anthropology program is a serious blow to social science integrity. It is a questionable extension of due process, and, worse, a denial of research autonomy. It means that the research process is not to be guided or guarded by internal checks and balances (that is, by the findings of other researchers) but rather by the will of the state. Eleven democratic professors have succumbed to the totalitarian temptation. They have chosen a course of action in which power rather than truth prevails. Under such circumstances, the only normal course of action can be to restore Mosher to his candidate status and evaluate his scholarship, not his behavior, either by full departmental reconsideration or by the university itself. In matters of academic freedom and individual liberty, the administration has a responsibility, no less than a right, to overturn poor departmental decisions.

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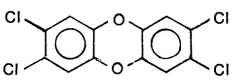
*Horowitz has written an article about the Mosher case which will appear in the July–August issue of *Society*.

24 June 1983, Volume 220, Number 4604 **SCIENCE**

Chlorinated Dioxins

Chlorinated dioxins have become widely recognized as dangerous substances. What are some of their properties, how do they behave in the environment, and what hazards do they present for humans? In the chemical sense, there are actually 75 dioxins that contain chlorine, but the most notorious is 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), which has the structural formula



The compound is thermally very stable, melts at 307°C, has a vapor pressure of 1.7×10^{-6} mmHg at 25°C, and is practically insoluble in water. TCDD is an unwanted by-product of the manufacture of trichlorophenol, which subsequently is used to produce other compounds such as (2,4,5-trichlorophenoxy)acetic acid (2,4,5-T). At an earlier time, TCDD constituted several parts per million of some 2,4,5-T, but it is now present at 0.1 ppm or less. Another source of TCDD is the incomplete burning of municipal and industrial wastes as well as wood. When exposed to solar ultraviolet light in the presence of a hydrogen donor (foliage), TCDD is destroyed in days. When it becomes incorporated in soils, it is only slowly degraded. Because of its low solubility in water and strong adsorption to soil, the chemical moves very slowly.

When TCDD is orally administered to animals, the median lethal dose (LD50) ranges from 1 microgram per kilogram of body weight in guinea pigs to 5000 μg/kg in hamsters. The hazard to humans is assessable only by study of some industrial accidents. One of the most extensively investigated of these occurred in 1976 at Seveso, Italy. Excessive pressure built up in a reaction vessel, the safety disk ruptured, and a cloud containing sodium hydroxide, 2,4,5-trichlorophenol, and an estimated 2 kg of TCDD slowly drifted over a neighboring area depositing much of its contents. An area of 87.3 hectares received most of the material; the 736 people who lived in the area were moved 16 to 23 days later. None of the people died; clinical examinations indicated some effects on liver and nervous system, but later studies did not reveal a continuation of symptoms. The primary medical effect observed was a total of 187 cases of chloracne, a dermatitis resembling common acne. In most instances the symptoms were mild, and in all cases the disorder had disappeared in 2 years. Herbivorous animals were much more severely attacked and thousands died. The presumptive major cause was ingestion of TCDD on grass and foliage.

Observations at Seveso seem to indicate that ingestion of TCDD is necessary to bring out its full toxic effect. They have also been interpreted as showing that chloracne is the most definitive human indicator of exposure to environmental TCDD. No significant change was observed in the incidence of spontaneous abortions, congenital malformations, or postnatal development. It seems unlikely that in future an unusually high incidence of cancer will occur. This guess is based on experience of chemical workers who have been involved in accidents similar to that at Seveso, but whose exposure as indicated by intensity of chloracne was greater. Some of the accidents, notably one in 1949, occurred long enough ago that were cancer to be associated with them, it would now be evident. Some 121 workers were involved in the 1949 accident, and while ironclad proof of a null effect is missing, so too is a basis for believing that TCDD is a dangerous carcinogen in humans. It is clear that, when administered orally, TCDD is highly toxic, but when bound to soil it does not pose much of a hazard. It is also clear that TCDD is unwelcome. In the matter of risk versus benefit, the balance is completely one-sided: all risk and no benefit. Success in curtailing the amount of unwanted industrial production should be followed by vigilance in controlling TCDD formation in the incineration of municipal wastes. With time, natural degradation of the chemical will attenuate its presence in the environment.—PHILIP H. ABELSON

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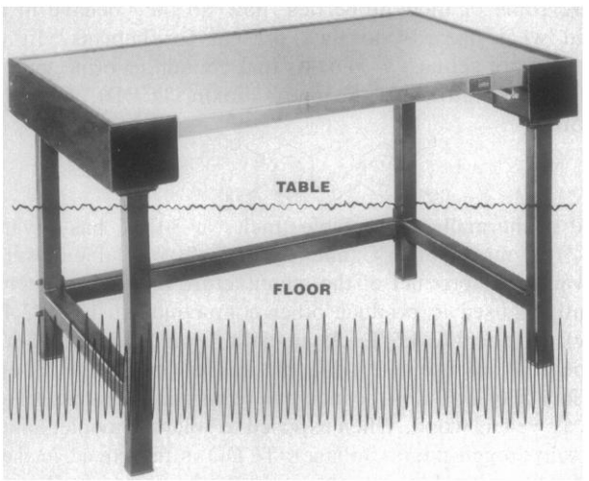

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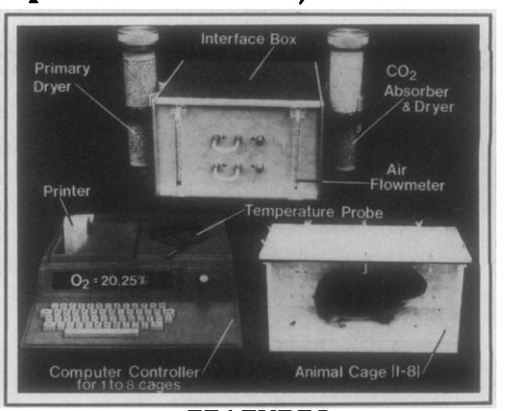

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