tensive areas and time periods totally unknown. One can get a general picture of the main historical trends from these reports, and, on the basis of this, can formulate questions that may be answered by future field excavations.

Some significant questions that must be answered before attention can be paid to "explanations" are included in the problems of origins (How did the West Mexican tradition develop?), mechanisms (What supported and maintained the observed cultures?), and interactions (What were the effects of external peoples on local developments?). There is also an important "decline and fall" question about the Historic period, the entry of the Spanish, and the effects of this entry on native civilization. Without field excavation data to provide reasonably clear understanding of such basic questions, more abstract studies on laws of human development must remain speculative.

Summary

Limited archeological studies along the west coast of Mexico show that two basic native civilizations existed in the prehistoric past. One is the Mesoamerican tradition, dating back to the Olmecs; this tradition dominates West Mexico after about A.D. 500. Before that time, there existed an indigenous tradition of quite different and unknown origin, characterized by a religion centering on a death cult involving large shaft tombs and mortuary offerings of pottery figures. The earliest periods, before about 1000 B.C., are just becoming known from current excavation programs.

References and Notes

1. G. F. Ekholm and I. Bernal, Eds., *Handbook of Middle American Indians*, vol. 11, *Archaeology of Northern Mesoamerica* (Univ. of Texas Press, Austin, 1971). This summary volume contains numerous articles reviewing subregions of the area discussed here. Although in part out of date, since the articles were largely written some years before publication, the several relevant discussions and bibliography are comprehensive up to about 1965 and variable in quality for work done after that date. Reference to this extensive work makes it unnecessary to cite all the articles individually, and the references cited below are limited to more recent studies and to a few of the key site reports that provide the foundations of scientific archeology in Western Mexico.
2. H. F. Cline, Ed. *Handbook of Middle American Indians*, vol. 12, *Guide to Ethnohistorical Sources* (Univ. of Texas Press, Austin, 1971); C. O. Sauer, *Colima of New Spain in the Sixteenth Century* (Ibero-Americana No. 29, Univ. of California, Berkeley, 1948).
3. C. O. Sauer and D. Brand, *Aztatlan, Prehistoric Mexican Frontier on the Pacific Coast* (Ibero-Americana No. 1, Univ. of California, Berkeley, 1932).
4. J. C. Kelley and C. L. Riley, Eds., *Precolumbian Contact within Nuclear America* (Mesoamerican Studies No. 4, University Museum, Southern Illinois Univ., Carbondale, 1969).
5. R. E. Taylor, R. Berger, C. W. Meighan, H. B. Nicholson, *West Mexican Radiocarbon Dates of Archaeological Significance* (Occasional Paper No. 1, Museums and Laboratories of Ethnic Arts and Technology, Univ. of California, Los Angeles, 1969).
6. C. W. Meighan, L. J. Foote, P. V. Aiello, *Science* **160**, 1069 (1968).
7. S. V. Long and R. E. Taylor, *ibid.* **154**. 1456 (1966).
8. J. B. Mountjoy, R. E. Taylor, L. H. Feldman, *ibid.* **175**, 1242 (1972).
9. C. Brush, *ibid.* **149**, 194 (1965).
10. I. Kelly, *INAH Bol.* **42**, 26 (dated 1970, issued 1972).
11. P. Tolstoy and L. Paradis, *Science* **167**, 344 (1970).
12. C. Crain, unpublished manuscript (1960).
13. J. Oliveros, thesis, Escuela Nacional de Antropología e Historia, Mexico City (1971).
14. S. Long, thesis, University of California at Los Angeles (1966).
15. S. Long and R. Taylor, *Nature (Lond.)* **212**, 651 (1966); S. Long, *Razon Fabula Rev. Univ. Andes No. 1* (1967), pp. 1–15.
16. C. Meighan and H. Nicholson, in *Sculpture of Ancient West Mexico: The Proctor Stafford Collection* (Los Angeles County Museum of Art, Los Angeles, 1970), pp. 17–32; H. von Winning, *Southwest Mus. Pap.*, in press.
17. P. T. Furst, in *The Iconography of Middle American Sculpture* (Metropolitan Museum of Art, New York, 1973), pp. 98–134; R. Taylor, *Am. Antiq.* **35**, 160 (1970).
18. C. Meighan, *Archaeology of the Morett Site, Colima* (Univ. of California Publications in Anthropology No. 7, Berkeley and Los Angeles, 1972).
19. I. Kelly, *Excavations at Chametla, Sinaloa* (Ibero-Americana No. 14, Univ. of California, Berkeley, 1938).
20. G. Ekholm, *Excavations at Guasave, Sinaloa* (Anthropology Paper No. 38, American Museum of Natural History, New York, 1942), part 2.
21. C. Meighan and L. Foote, *Excavations at Tizapan el Alto, Jalisco* (Publication No. 11, Center for Latin American Studies, Univ. of California, Los Angeles, 1968).
22. J. Mountjoy, thesis, Southern Illinois University, Carbondale (1970); S. Scott, Ed., *Archaeological Reconnaissance and Excavations in the Marismas Nacionales, Sinaloa and Nayarit* (State Univ. of New York, Buffalo, 1968–71), five parts.
23. C. Meighan, Ed., unpublished manuscript (1973).
24. G. Willey, in *The Iconography of Middle American Sculpture* (Metropolitan Museum of Art, New York, 1973), pp. 153–162.

25. Among many colleagues whose work has contributed to the present summary, I thank H. B. Nicholson and Isabel Kelly for generously sharing their knowledge and unpublished data over a period of years. Essential field and laboratory studies were supported by NSF grant GS-911.

NEWS AND COMMENT

20 June Tape: Critics Fault Logic of Experts' Final Report

The panel of experts on the White House tapes last week produced the data to support its conclusion of 15 January, that the renowned 18½-minute buzz on the tape of 20 June 1972 was caused by at least five separate hand operations of the tape recorder's keyboard controls.

The panel's verdict was corroborated by Michael H. L. Hecker, an expert hired by the President's lawyer James St. Clair. Hecker, of the Stanford Research Institute, said last week that he was "in general agreement" with the panel's conclusion, except that it was "somewhat unreasonable" of the panel to reject all hypotheses involving a faulty machine; in his view the Uher 5000 tape recorder used by the President's secretary was electronically faulty at the time the erasure was made, and faults of this nature might account for some, but not all, of the marks taken by the panel as proof of manual operation.

With the two rival groups of experts in substantial agreement, the matter might seem to be all wrapped up, and certainly it has generally been reported that way. In the eyes of the panel's chief critic, however, the issue is very far from closed. According to Allan D. Bell, president of Dektor Counterintelligence and Security Inc. of Springfield, Virginia, the data in the panel's report do not support, and in fact invalidate, the panel's conclusions. "My inference," says Bell, "is that the panel's final report is not so much an impartial display of the evidence as an attempt to justify the precipitous conclusion they announced in January."

The significance of the 20 June tape is that it contained a conversation between President Nixon and H. R. Haldeman that occurred three days after the Watergate break-in. If the panel's theory is correct, it would follow that the 18½-minute gap is a deliberate erasure. If on the other hand the marks on the tape were caused by a malfunction in the machine, as Bell suggests, it is more possible that the erasure was caused accidentally.

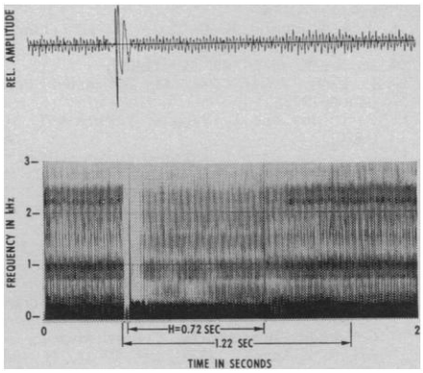

Fig. 1. Is there any discernible change in the waveform (upper trace) or spectrogram (lower trace) at the right-hand boundary of the 1.22-second segment? The panel of experts says there is, and that the segment contains a double layer of buzz, indicating that the tape recorder was stopped and wound back before resuming play. Bell says no significant change is visible at this point, and that the event cannot therefore be a buzz-on-buzz segment.

Although the issue between Bell and the panel must be decided on its merits, there is also some question of standing. The six panelists and Hecker are all highly skilled in acoustics and include some of the most distinguished experts in the country. Bell, on the other hand, is quite unknown in the academic community. Is there any serious chance that Bell could be right and the distinguished panelists quite wrong?

Charles S. Rhyne, Rose Mary Woods's attorney, is not the most impartial of sources in the matter, but may have a point when he argues that the panelists are primarily experts in the theory of acoustics rather than the practicalities of tape recorder function. (Hecker also has a background in academe and with panel chairman Richard H. Bolt's firm of Bolt, Beranek, and Newman). Bell, by contrast, has worked with electronics in the security and defense fields. The intelligence community to which he belongs is not renowned for its ultraliberal views; on the other hand there is no known reason to contradict his statement that he has no political axe to grind in the matter and is challenging the panel's thinking as an intellectual exercise. (Bell communicates his results to Rhyne but says he receives no fee from him.)

One reason why Bell's objections are at least worth considering is that he seems to have been correct so far. His tentative hypothesis of 29 January that the marks on the buzz section could have been caused by an erratic power supply (see *Science*, 22 February) is conceded by the panel—though not explicitly—to be an adequate explanation of the facts then publicly available. Moreover, the facts which the panel says refute this and similar hypotheses seem to have been developed after, not before, the panel announced the conclusions of its study in January—certainly the salient tests were not mentioned when the panel outlined the reasons for its conclusions in three days of hearings before Judge John J. Sirica.

Further, the panel is adamant to the point almost of dogmatism in rejecting any idea that the Uher 5000 might have been malfunctioning at the time of the erasure. Even Hecker, who agrees with the panel in almost all other aspects, finds this position unreasonable. After all, he says, the Uher 5000 continued to make its famous buzz until it finally failed in the panel's hands, and once the panel had replaced the faulty rectifier in the power supply, it would buzz no longer. Yet the panel states that the Uher 5000 was functioning "more or less normally" at the time of the erasure, on the grounds that "before it failed it showed no signs of erratic operation."

Also suggestive of a defensive attitude on this point is the panel's less than frank description of what it did when the Uher 5000 failed. The final report states that the faulty rectifier was replaced but fails to mention that one of the panel members at the same time tightened down several screws including possibly a ground connection. The repairs may have made any malfunction hypothesis impossible to test.

If only because of these methodological infelicities, the panel's critics deserve at least a hearing. The panel members and Hecker have been ordered by Judge Sirica not to comment, even on the published report, until their other work for the court is completed, and have been unable to give their answers to Bell's critique.

The panel's final report* is a handsomely produced document, some 300 pages in length, authored by Daniel Page, a technical writer employed by the company of panel chairman Richard H. Bolt. How does the report differ from what is already publicly available in the summary of conclusions and the 300 transcript pages of testimony given in presenting the summary to Sirica in

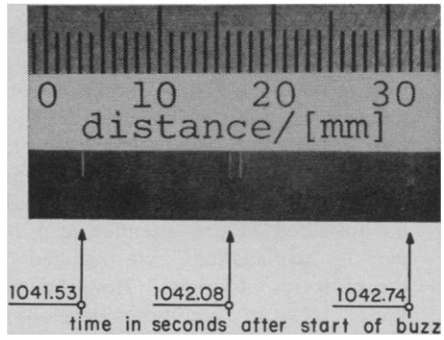

Fig. 2. Are there one or two marks at the region marked 1042.08 seconds? According to the panel, the pair of marks "is actually a single . . . mark." Bell says there are two marks, the existence of which cannot be explained by the panel's theory.

January? The new information consists most importantly of three types of test data, each of which is held to corroborate the panel's theory that the marks on the tape were caused by hand operations of the control buttons.

In his critique† of the panel's final report, Bell argues that none of the new tests described is a conclusive proof of the panel's theory, and that one of them flatly refutes it.

What is at issue is essentially the question of whether the tape was stopped, as the panel's theory requires, or whether it acquired the buzz and the various marks in one continuous operation, as Bell has proposed. His hypothesis assumes that the Uher 5000 was put into record mode (Rose Mary Woods has testified she may accidentally have done this by pressing the wrong button while answering the telephone), and kept so without change for 18½ minutes, during which time the observed marks were imprinted on the moving tape through electronic malfunctions in the machine.

The two sides' explanations of the three new tests are as follows.

● *Buzz-on-buzz.* At three instances in the 18½-minute section the tape bears snatches of double buzz, the panel states. The only way this could happen is if the recorder had been stopped and the tape wound back a little before continuing the erasure. Since the erase head erases before the record head puts on the buzz, the small segment of tape lying between the two heads at the time the machine

* The EOB Tape of June 20, 1972. Obtainable from the U.S. District Court for the District of Columbia, Washington, D.C. Price $10.

† Evaluation of Report on a Technical Investigation conducted for the U.S. District Court of the District of Columbia by the Advisory Panel on the White House Tapes. Allan D. Bell. Obtainable free from Dektor Counterintelligence and Security Inc., 5508 Port Royal Road, Springfield, Va. 22151.

is restarted will be missed by the erase head and will receive the new buzz on top of the already recorded buzz. The segment must be precisely the length of the gap between the erase and record heads on the Uher 5000, which is 28.6 millimeters, and last for 1.22 seconds at the Uher's play speed.‡

Sound on tape can be visualized by measuring its amplitude or taking a sound spectrogram. Figure 1, taken from the panel's report, shows the amplitude wave form and sound spectrogram of a portion of the 20 June tape said by the panel to contain a buzz-on-buzz segment. The segment begins with a signal which the panel says is a "record head on" mark and ends 1.22 seconds later. Says the panel: "As can be the case, the hypothesized buzz-on-buzz appears quite subtle, but may be discernible in the low-frequency components of the spectrograms."

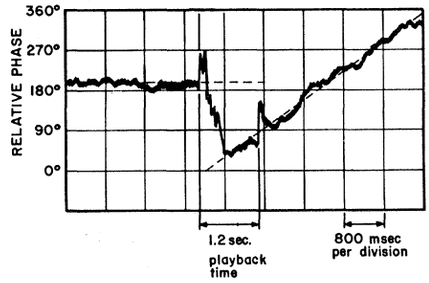

Fig. 3. Tracing shows a change in the phase of the 60-cycle-per-second buzz. The panel says the change of phase means that the tape recorder stopped, Bell that the motor changed speed by less than 1 percent.

Bell's position is that the hypothesized buzz-on-buzz is subtle to the point of not in fact existing. The two buzzes should create an interference pattern but none can be seen. Neither the spectrogram nor the wave form show any change at the end of the 1.22-second period, yet the buzz-on-buzz segment must be precisely this length if the panel's theory is correct. One of the other two postulated buzz-on-buzz segments shows a significant change at approximately the 1.22-second mark, but, says Bell, there are also seven other significant changes within one second's range of the mark.

● *K-1 and record head on pulses.*

‡ The buzz-on-buzz segments would last for less than 1.22 seconds if the tape were wound back for a distance less than the gap between the heads; in this case, however, the magnetic signature left by the record head when it is de-energized—the "record head off" mark—should also be present on the segment, and the panel found no instances of this kind.

NSF's Public Understanding of Science Program

The National Science Foundation is one of the last organizations in Washington that anyone would suspect of leading a crusade against nuclear energy. But just to make sure no one gets the wrong impression—least of all the powerful Joint Committee on Atomic Energy in Congress—the NSF has been refusing lately to sponsor seminars on the pro's and con's of nuclear power reactors because the subject is too controversial.

This, at least, was the explanation relayed to North Carolina State University in Raleigh and the University of Washington when the NSF recently turned down their requests to sponsor public forums on nuclear power. The two universities had independently sought a few thousand dollars apiece from the NSF's Public Understanding of Science Program to sponsor discussions by experts that would, it was hoped, help make sense out of the multiple controversies swirling around the safety and reliability of nuclear power plants.

How the explanation for their rejection came about is unclear, partly because everything transpired on the telephone. The NSF official in charge of the Public Understanding of Science Program, Richard E. Stephens, acknowledges turning down proposals for nuclear seminars, but denies it was because they were too sensitive. "Even if I believed that," Stephens says, "I wouldn't be stupid enough to come right out and say so."

But Stephens did say so in telephone conversations, insists a former staff member of the AAAS who acted as a go-between in the matter. "He was quite open about it," Kate Ecker says. "He said NSF couldn't be associated with anything like that. He mentioned that they were wary of being charged with sponsoring something that looked like a crusade against nuclear power."

The Public Understanding of Science Program spends about $1.8 million a year on projects ranging from traveling exhibits, to public symposiums, to the highly acclaimed "NOVA" series of science films produced by WGBH-TV in Boston, with AAAS assistance. The AAAS has received a little more than $100,000 in the current fiscal year for an assortment of educational projects, including a series of seminars on energy issues organized mostly through universities for the benefit of local civic and government leaders. Five have been held thus far, from San Diego, California, to Portland, Maine. And three of these have dealt at least peripherally with nuclear energy—among them the one at Portland, where an audience that included the governor of Maine heard the superintendent of the Maine Yankee Atomic Power Plant briefly debate a representative from the Sierra Club.

Ecker (who left the AAAS in May for Stanford University) helped organize the seminars. She says the NSF didn't object to including nuclear energy on the program, so long as it was only one of several topics. "That way," she says, "if it turned out to be an inflammatory meeting, we could just say 'that's the way it happened.' "

Last March, she invited North Carolina State's Energy Information Program to send the AAAS a proposal for a public seminar using NSF money. The university's energy group leaped at the chance and—with half a dozen nuclear reactors planned in the Raleigh area and two public hearings on the power plants coming up this summer—quickly settled on nuclear energy as the logical topic. After setting up a planning committee that included state energy officials, local civic leaders, and a representative of the local utility (Carolina Power and Light), the group notified Ecker. She described it all to Stephens, who turned it down cold. University staff, upset at the decision, related the issue in a letter to *Science*.

"He [Stephens] indicated that if we could guarantee a pallid academic discussion that would be all right," Ecker recalls. "But we couldn't do that."

The so-called K-1 pulses have a somewhat clouded history. They were not mentioned by the panel in its January presentations and, according to Rhyne, were in fact discovered by Hecker, who was hired by the President on 22 January. (Hecker claims in his report to have "made many contributions" to the panel's work. Be this as it may, the panel acknowledges help from no one.) Again according to Rhyne, Hecker disagrees with the panel on the identification of at least five of the six K-1 pulses on the tape.

The significance of the K-1 pulses is that, according to the panel and Hecker, they originate from a switch on the Uher 5000 called by the manufacturer the K-1 switch; further, the K-1 switch is only activated when the control buttons on the keyboard are pressed down. Bell, on the other hand, goes to the actual genesis of the pulse (an aspect the panel does not discuss) and argues that because of the way the K-1 switch is connected in the Uher's circuitry, the only mechanism for the pulse to be generated is by a slight arcing when the switch is closed or opened. But the same kinds of pulse can be produced by an arcing in any switch or relay in the recorder. The panel's criteria for recognizing a K-1 pulse are so loose that, Bell estimates, there are probably some 18,000 K–1 pulses on the 18½-minute section. Therefore it is only to be expected if some of the pulses appear to occur in association with record head pulses.

The panel claims that pulses which are K-1 pulses occur six times in such an association, three times with a record head on pulse and three times with a record head off. But Bell disputes the identification not only of the K-1 pulses but also of the record head on pulses. The so-called record head on pulses, he believes, are also proof positive that the panel's theory of keyboard manipulation cannot be right.

What the panel calls record head on pulses often occur twice or more in close conjunction. In each of these six instances the panel states—without explanation—that what appears to the eye to be a double mark is in fact a single mark. Only once does the panel explicitly refer to this discrepancy; describing the double mark occurring at time 1042.08 seconds (see Fig. 2), it says: "The pair of marks in the approximate middle of the picture is actually a single record head on mark." In

Treads Lightly around Nuclear Controversies

Stephens, in contrast, told *Science* that the reason he rejected the idea was that it didn't fit his program's guidelines. The rules say that proposals dealing broadly with science and technology "will generally be favored" over those treating a single discipline or field. On the same ground, he says, he's turned away proposals for solar energy seminars, even though NSF is the government's "lead agency" in this field. "We're just being cost-effective," he insists.

James Butler, the director of AAAS communications programs, noted that North Carolina had been considered only informally as a site for an energy seminar. He emphasized that, "I've never felt the NSF has tried to influence the content of our programs in any way."

Stephens says further that, while he strives for strict neutrality in public forums—"we're almost eunuchoid that way"—nuclear energy isn't taboo. As evidence, he notes that his program is spending $75,000 on a 6-month series of environmental and energy symposiums at Spokane's world fair, Expo '74. However, the main energy symposium has come and gone. Only one session, on 26 May, dealt exclusively with nuclear fission and fusion. The speakers advertised in a flyer were a top manager from General Electric, a leading vendor of nuclear power reactors, and a scientist from the Battelle Northwest Laboratories, one of the Atomic Energy Commission's contractors at Hanford, Washington. (The AAAS was not associated with this program.)

At another energy seminar the NSF helped sponsor —in Utah last October—Ernest J. Sternglass, who believes as firmly as ever in the dangers of low-level radiation, took part in a panel discussion of nuclear energy. Afterward the Denver *Post* reported that the panel was "dominated by the nuclear establishment" and that some panelists had privately threatened to boycott the affair if Sternglass were given full rein to discuss what the *Post* described as his "widely discredited" theories. Sternglass reportedly settled for jousting with fellow panelists and fielding questions from reporters.

Neither program, in any event, involved the kind of frontal approach to the nuclear debate that North Carolina State's plan—and a similar one from the University of Washington—envisaged. Ecker, though, says her "clear impression" is that NSF's resistance stemmed not from any hard and fast policy, but instead from a hypersensitive instinct for self-preservation.

She says she was given to understand that NSF's sensitivity stemmed from displeasure on Capitol Hill with a study the NSF released last August on nuclear power plant licensing and citizen involvement. The report, by two researchers at George Washington University, liberally criticized both the AEC and its adversaries.

An NSF official said the Joint Committee on Atomic Energy apparently first learned of the report from a newspaper story early last summer and had expressed "mild embarrassment" at not having been appraised of it sooner. But, the official said, the Joint Committee's reaction to the report itself had been "much milder than expected."

"There may have been a drawing in of horns [in NSF] since then, but I'm not aware of it," the official said.

It seems clear that the NSF as a whole has not adopted a policy of steering clear of nuclear controversies, although levels of caution in political minefields tend to vary from one part of the agency to another. (The NSF's energy policy office, for instance, is about to award a series of grants totaling about $500,000 for such things as a review of reactor safety R & D.) Whatever the reason though—caution, a lack of money, or a combination of the two—universities seeking to sponsor public discussions of nuclear issues will have to look for help somewhere other than the NSF's Public Understanding of Science Program.—ROBERT GILLETTE

other instances the double mark is simply stated to be a single mark.

According to Bell, the double mark is indeed what it appears to be, and the problem becomes one of explaining why the panel says it is not. The answer is that if the record head was twice turned on, then in between it must have been turned off, and the pair of marks should be separated by a record head off mark. Moreover, the record head off mark must be accompanied by an erase head off mark 28.6 millimeters down the tape. No such marks are there. This proves, says Bell, that the so-called record head on pulses could not have been caused by manipulation of the keyboard but were probably made by strong transient pulses, perhaps originating in the faulty power supply.

The panel has a second string to its bow on the identification of the record head on pulse. It says the pulse can be recognized because it "has a duration of 100 milliseconds." Here, according to Bell, the panel is simply confused. As can be seen from Fig. 2, the so-called record head on mark is about 0.2 millimeter thick, and hence at the tape speed of 15/16 inch per second the pulse that made the mark could have had a maximum duration of about 8 milliseconds. The panel's confusion arises because it has tried to measure the duration of the pulse from the disturbance in the wave form, but the wave form is primarily a product not of the duration of the pulse but of its amplitude. Moreover, because magnetic tape is saturable, any kind of pulse above a minimum amplitude will produce a wave form of similar duration.

● *Phase change measurements.* The buzz on the 18½-minute section is composed of the 60-cycle-per-second frequency of alternating current and of the harmonics thereof. A good way of telling whether the tape was stopped, as the panel's theory supposes, is to see if there are discontinuities in the phase of the buzz. The panel has done this with the aid of a phasemeter and produced the result shown in Fig. 3. The downward shift in the middle of the figure "indicates a discontinuity in phase and therefore a stopping of the tape," the panel says. The sloping line that follows "indicates that the tape has changed speed. In this case the speed change is about 0.3 percent." Speed changes of this sort "occur frequently at the start of test recordings that we made on [Rose Mary Woods's] Uher."

Bell's rejoinder is that the observed discontinuity in phase does not necessarily imply that the machine stopped, only that its speed changed and, as the panel observes, changed by as little as 0.3 percent. Such a variation is probably well within the Uher's motor speed regulation. Moreover the Uher's motor is connected in a way that makes the motor speed particularly vulnerable to fluctuations in the current reaching the transformer. As it happens, the failed rectifier which the panel had to replace was located in a power supply whose variations would have affected the transformer.

Finally, Bell observes that there are several marks on the tape for which the panel offers no explanation. One feature in particular on which the panel offers no comment is the indication that at one point the tape has been played on a 4-track recorder. Both the Uher 5000 and the Sony 800B used to record the tapes in the first place are 2-track recorders.

Another mark the panel cannot explain is a click that occurs 46 seconds into the buzz section when there is a sharp drop in the loudness of the buzz. "We do not completely understand this event, but we conclude that it does not alter our interpretation of the other events on the tape," the panel stated in an early draft of its report. In the final report this qualification has been omitted, but no explanation is provided in its place. Elsewhere in the final report the panel states that "only one explanation, the one given here, accounts for the data in their entirety."

Finally, the panel summarily dismisses the hypothesis proposed by Bell in January on the grounds that "it was based, erroneously, on the assumption

Briefing

Court Limits Class Actions

The Supreme Court on 28 May handed down a decision that puts significant restrictions on the scope of class action suits in which monetary damages are sought. One attorney called it a "devastating" blow to the effectiveness of such suits, but lawyers say it will not have much effect on environmental or civil rights class action cases, the vast majority of which seek injunctive rather than financial relief.

The decision is the culmination of an 8-year court battle initiated by one Morton Eisen, who claimed in behalf of some 6 million fellow buyers of odd-lot stocks (lots less than 100) that two brokerage firms were monopolizing the odd-lot market and charging excessive brokerage fees. The court maintained that it was the plaintiff's responsibility to individually notify all identifiable fellow victims, and to pay for the notification—a procedure which, at present postal rates, would have cost him about $315,000. Since a major function of class action suits is to enable large numbers of people to recover damages in cases where individual stakes are low (Eisen would have recovered only $70), the notification requirement is somewhat self-defeating. Hitherto, courts around the country have been deliberately flexible both in notification requirements and in apportionment of court costs so that one of the perceived purposes of class action suits—giving the little man his day in court—could be served. The purpose of the notification requirement is to allow some members of the class to opt out of the suit, which some might do if they were planning separate actions that would be invalidated if they had to abide by the result of the class action. However, the decision could prevent large numbers of people from collecting damages in antitrust or product liability suits where the plaintiff is forced to narrow down the definition of the afflicted class to the point where notification is financially feasible. One Washington lawyer points out that the decision may relieve large business concerns from excessive worry about being held accountable for faulty products, overpricing, and usurious or monopolistic practices that may have little effect on individuals but significant impact on their customers as a group.

While environmental class action suits do not now appear likely to suffer, a Sierra Club official says they may in the future if large numbers of people want to seek reparations for environmental damages wrought by such developments as airports and power plants that their injunctive suits had failed to halt.—C.H.

that PS-1 had failed." (The Uher has two power rectification systems, PS-1 and PS-2, of which the former supplies the bias oscillator which drives the erase and record heads. The panel reveals in its final report that the rectifier it had to replace was in the PS-2 power supply.) Bell had postulated that drops in the power to the bias oscillator—now known by powered by PS-1—were what had caused the record head off and erase head off marks on the tape. The total failure of some part of the power supply, known in January, was corroborative of this hypothesis but was not, as the panel now implies, a necessary consequence of it. Power drops to the oscillator could be caused, Bell wrote in January, by the momentary —and self-healing—breakdowns that commonly occur in the power system component known as a filter capacitor. If the breakdown were continuing, the January hypothesis stated, "it would result ultimately in catastrophic failure of the power supply. If it were for short durations, it would not."

Bell's conclusion is that "evaluation of the information contained [in the final report] has allowed us to take a considerably stronger position. It allows us to state with confidence that the panel's conclusion concerning keyboard manipulation cannot be valid and a reasonable hypothesis based upon power supply malfunction has become probable." "My motive in the first place," he said last week, "was to inspire them to go back and do their homework. They haven't done it. They have stretched their data as far as possible and still haven't proved their case."

The panel and Hecker, were they free to comment, might well have strong replies to Bell's criticisms. On the other hand, in compiling the final report—which the panel promised Sirica in January would follow their conclusions by only three or four weeks—there was ample opportunity to amass and marshal evidence which would both unarguably refute Bell and establish their own theory beyond reasonable doubt. It is not clear to Bell, at least, that they have yet succeeded in doing either.—NICHOLAS WADE

Chemical Warfare: Binary Plan, Geneva Talks on a Collision Course

Every Tuesday and Thursday at 10 a.m. for 5 months a year, representatives of 25 nations gather in Geneva, Switzerland, for another meeting of the Conference of the Committee on Disarmament (CCD). For the last 2 years, as the delegates have risen each in turn to deliver speeches from scribbled notes, their main subject has been how the world can ban development, production, and stockpiling of chemical weapons. However, military plans to start procuring binary weapons for its chemical arsenal could make such an agreement impossible.

The CCD talks have in fact been going on for 14 years, moving from one disarmament issue to another. Some of the discussions have dealt with far-out proposals, such as the creation of a nuclear free zone in the Balkans; its successes have included the nuclear nonproliferation treaty of 1968 and the Biological Weapons Convention of 1972. The talks are multilateral in nature; a 26th member nation, France, doesn't even participate. Despite these complications, however, CCD has been successful from time to time, largely thanks to its two superpower member states, the United States and the Soviet Union, whose seriousness of purpose is viewed as essential to any CCD scheme.

But CCD's current efforts at chemical weapons disarmament are threatened by an obscure, $5.8 million procurement item in the fiscal 1975 Department of Defense (DOD) budget now being debated by Congress. In the last month, experts have testified before three separate House of Representatives committees to the effect that if the DOD is allowed to go ahead with procurement of binary weapons—which is the first step toward the modernization of our entire chemical weapons arsenal—other countries at the CCD will assume that the United States is not seriously interested in negotiating a chemical weapons ban.

The United States has the largest stockpile of chemical weapons of any nation. Its exact size is classified, but outside experts have estimated that the nerve gas portion alone totals 40 million pounds—or enough to kill 25×10^{12} people! On the basis of its research, the DOD has been talking about replacing this vast stockpile with a new form of chemical weapon, known as the binary. A binary weapon keeps component agents in two separate compartments. Only after the munition has been fired do the two components mix to form the lethal gas. Present chemical weapons have their agent stored and transported in lethal form.

The military has pushed for the development of a binary system on the grounds that it will be safer than conventional chemical weapons to handle. However, some arms control experts argue that binaries are more likely to proliferate to other nations than conventional chemical weapons because their chemical makeup is simpler.

Typical of the fears that have been expressed in the three House hearings in the last month were those of Fred C. Iklé, the director of the Arms Control and Disarmament Agency (ACDA), who told a new subcommittee on arms control and disarmament of the House Armed Services Committee on 8 May:

"It is my personal judgment that the disadvantages of procuring chemical binary weapons at this time outweigh the advantages." And a British binary expert from the University of Sussex, Julian P. P. Robinson, told the defense subcommittee of the House Appropriations Committee on 21 May: "By defense budget standards, $5.8 million is not a lot of money. But its appropriation may well be interpreted in this country and abroad as Congressional approval for the binary program as a whole. It may thus be the thin end of a rather substantial wedge."

Representative Wayne Owens (D–Utah) estimated the size of that wedge before the same subcommittee. He claimed that the $5.8 million item was the beginning of a $200 million program of "initial procurement." The eventual cost of replacing U.S. stockpile with binary munitions, Owens has said, would be from $1 billion to $2 billion.

Owens is one of a number of House