

7/3/96

The New York Times

Radar Peeks at Structure Hidden Inside Tornado

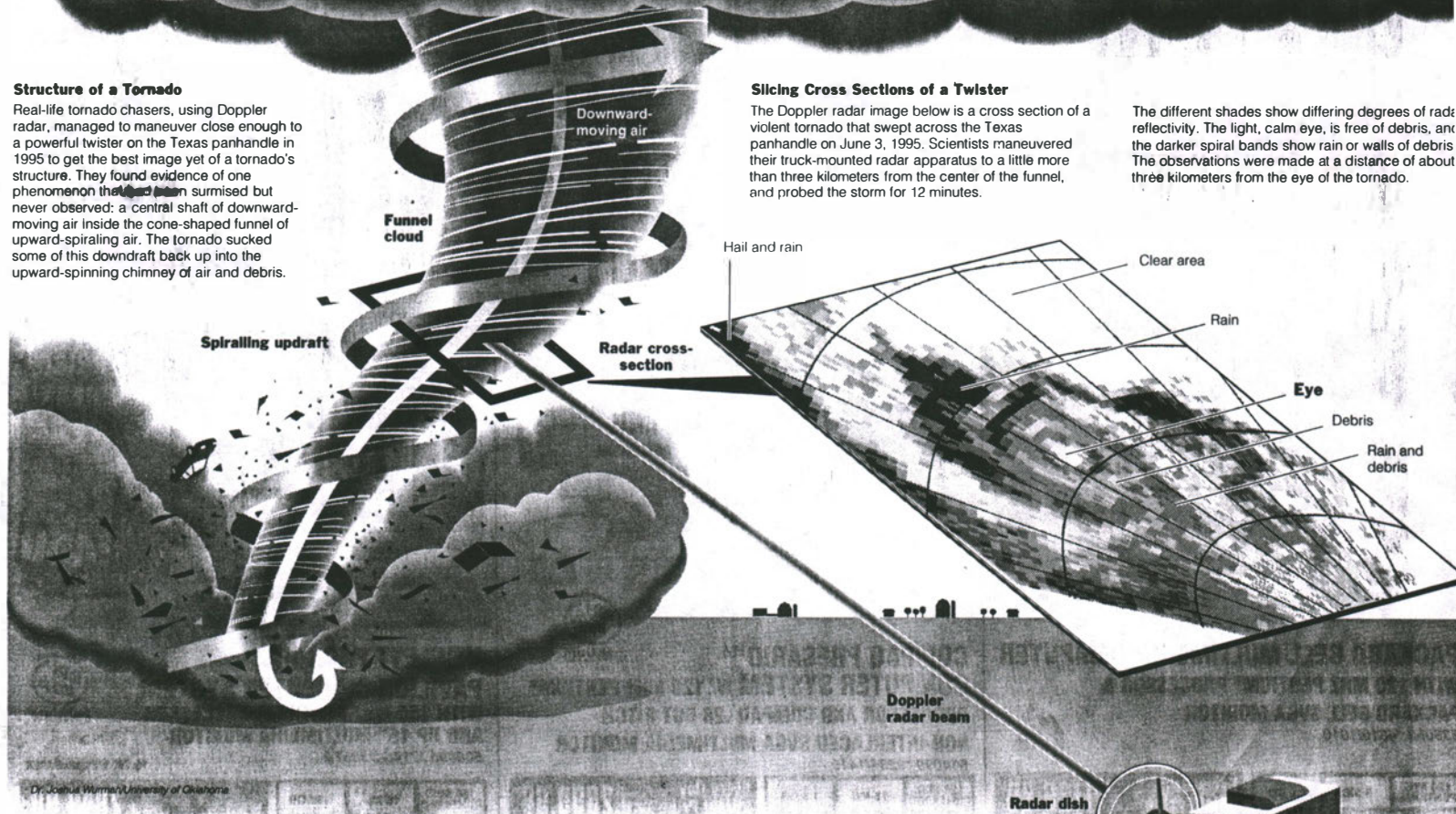
Structure of a Tornado

Real-life tornado chasers, using Doppler radar, managed to maneuver close enough to a powerful twister on the Texas panhandle in 1995 to get the best image yet of a tornado's structure. They found evidence of one phenomenon that had been surmised but never observed: a central shaft of downward-moving air inside the cone-shaped funnel of upward-spiraling air. The tornado sucked some of this downdraft back up into the upward-spinning chimney of air and debris.

Slicing Cross Sections of a Twister

The Doppler radar image below is a cross section of a violent tornado that swept across the Texas panhandle on June 3, 1995. Scientists maneuvered their truck-mounted radar apparatus to a little more than three kilometers from the center of the funnel, and probed the storm for 12 minutes.

The different shades show differing degrees of radar reflectivity. The light, calm eye, is free of debris, and the darker spiral bands show rain or walls of debris. The observations were made at a distance of about three kilometers from the eye of the tornado.



By MALCOLM W. BROWNE

THE terrifying sight of a twister funnel roaring down a highway and peeling off the asphalt pavement like so much dead skin is enough to send sensible drivers scurrying to safety.

But by driving their truck almost into the teeth of tornadoes and probing them with pencil-thin radar beams, a team of scientists has begun to reveal the complex air structures that control the behavior of these deadly storms.

These are not the fictional tornado chasers of

the movie, "Twister." Dr. Joshua Wurman and Dr. Jerry M. Straka of the University of Oklahoma and Dr. Erik N. Rasmussen of the National Severe Storms Laboratory in Norman, Okla., are genuine. And they claim to have recorded the closest fine-scale radar soundings ever made of a tornado. In a paper published in the current issue of the journal Science, they report their measurements of a violent tornado that swept across the Texas panhandle near Dimmitt on June 3, 1995.

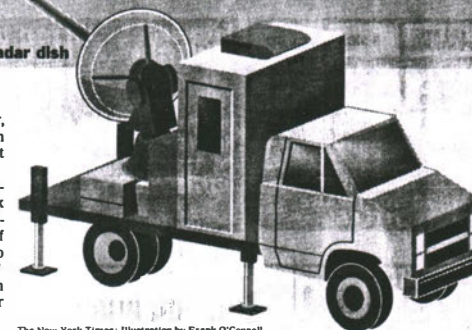
The scientists managed to maneuver their truck-mounted radar apparatus to a little less than two miles from the center of the funnel and probed the storm's winds for 12 minutes. As they did so, the

twister, with winds of more than 160 miles an hour, destroyed a house, picked up cars and hurled them 600 feet, and stripped the pavement from a 130-foot stretch of road as it crossed.

"We can always outrun a tornado," Dr. Wurman said in an interview, "and in case our old truck should stall at an inconvenient moment, we generally have a backup car behind us. The real danger is of traffic accidents caused by local tornado fans who often follow us when they spot our flashing lights."

Tornado research conducted by the Norman group has no immediate application to weather

Continued on Page C12



The New York Times; Illustration by Frank O'Connell

Radar Peeks Inside Tornado's Fierce Winds

Continued From Page C1

forecasting, and the scientists do not work with the National Weather Service. But ultimately they hope to gather enough data on the transition of certain types of thunderstorms into full-fledged tornadoes that people in the paths of such storms can be warned earlier than is now possible.

"At present no one understands why it is that the same type of thunderstorm sometimes spawns a tornado and sometimes does not," Dr. Wurman said. "But with greater knowledge, we may one day be able to lengthen warning times from, say, 5 minutes to 15 minutes. That margin could save lives by giving people a little more time to run to storm cellars."

The heart of the team's apparatus is a Doppler radar system assembled from a military-surplus parabolic antenna six feet in diameter and an old transmitter acquired from the National Center for Atmospheric Research in Boulder, Colo. The reflection of a thin Doppler radar beam reveals not only the position and shape of a target, but also the target's relative speed as it approaches or recedes. With a beam as thin as the one used by Dr. Wurman's group, it is possible to form images of the small-scale features of a tornado, including the paths of its swirling winds, its powerful up and down drafts, and the shearing of air moving at different speeds.

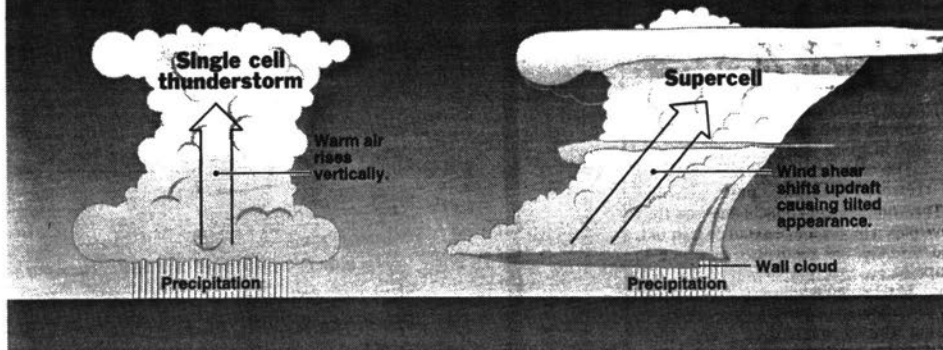
Dry air does not usually reflect enough radar to be detected, but within a tornado, churning air currents contain rain drops, hail and debris ranging in size from dust grains to entire houses; all of these objects reflect radar and can reveal the contours and behavior of the storm winds that carry them. Even relatively empty air masses may contain clouds of insects that provide reflective targets for radar beams.

Sometimes masses of dry air alone may contain discontinuities of temperature and density that slightly reflect radar, Dr. Wurman said, but such features are only weakly reflective and are difficult to detect.

The analysis Dr. Wurman and his colleagues made of radar data from the 1995 tornado near Dimmitt revealed a very complex structure that confirmed some of the models proposed by theorists. Features included unexpected spiraling bands of differing radar reflectivity, intense wind shear zones, debris "shields" corresponding to cylindrical layers

The Tilt That Makes a Tornado

In an ordinary thunderstorm warm air rises straight up. Rain then develops directly over the rising air, and as it falls through cools the air, halting the upward flow. But, in some other storms wind shear tilts the cell so rainfall misses the main body of rising air and allows an updraft to continue. Scientists say this air movement can give rise to a tornado.



The New York Times

of wind, the storm's calm "eye," and occasional protrusions of wind jets into the eye.

The group found evidence of a phenomenon that had been surmised but never demonstrated: that at least some tornadoes embody a central shaft of downward-moving air sheathed by a cone-shaped funnel spiraling upward. A tornado sucks

leave little time for observation and measurements; some tornadoes last up to an hour, but many others survive no longer than a few minutes.

"There are many theoretical models describing how tornadoes form, but predictions based on these models are often contradictory," Dr. Wurman said. "By getting close-up, high-resolution radar images of air circulation within the storms themselves, we may be able to remove some of the uncertainties."

Last week, Dr. Wurman said, the team came close. They spotted a tornado in Oklahoma just as it was forming and they were able to track its development as a large twister, one in which the 80-mile-an-hour winds around the funnel were as strong as the winds in the funnel itself.

It seems, Dr. Wurman said, that tornadoes are spawned by special storms called "super-cell thunderstorms," in which a peculiar hooked cloud often signals an incipient tornado. When a tornado forms, it develops from the tip of this hook.

In an ordinary thunderstorm, he said, warm air creates a convection cell that rises more or less vertically. Rain then develops directly over the cell, and as it falls through the cell it cools the air, halting the upward flow. But in some other storms, Dr. Wurman said, wind shear tilts the normally vertical cell so rain falling above its upper end misses the main body of the cell. This can give rise to a "super cell" that sometimes

spawns a tornado.

A surprise that the group encountered in the 1995 tornado was the discovery of a series of nested rings, or bands of radar reflectivity, surrounding the storm's eye. Their tentative explanation is that a tornado somehow sorts out particles of different masses — debris versus raindrops, for example — and arranges them in separate bands.

Since last year the group at the University of Oklahoma has acquired two trucks carrying radar equipment and plans to extend its operations. But the chances of finding and reaching a tornado before it dies are still small, and the scientists waste much time driving hundreds of miles in their daily searches.

They plan to augment their tornado-catching equipment with smaller devices capable of measuring air pressure, relative humidity and temperature. When a tornado has been spotted heading for a road, the team plans to drop 30 of these "ducks" at intervals along the road, so that the tornado must hit at least one of the little sensors.

"To give you an idea of the difficulty of tornado chasing," Dr. Wurman said, "we estimate that in Oklahoma's tornado belt, the probable frequency of a tornado passing within six miles of any given spot is only once in 100 years. We have to be very lucky and very fast to reach a tornado in time."

"But we're getting better all the time."

The big danger in chasing tornadoes: a traffic accident.

huge volumes of air and material from the ground surface and carries them aloft, and some of the air supplied to this spinning chimney apparently comes from a central downdraft.

The wind speeds in a tornado are highest a few hundred feet above the ground, not at ground level itself, Dr. Wurman said. The reason is that the ground offers frictional resistance to the winds in direct contact with it.

Although Dr. Wurman and his colleagues race around "Tornado Alley" in their truck searching for twisters in a region covering Oklahoma and parts of a half-dozen neighboring states, they have yet to catch a fetal tornado before it is born. Tornadoes are born suddenly and

Drive!*

Apple Power Macintosh® 8500/120

High-Performance Mini-Tower • 120-MHz 604 Processor, User-Upgradeable • 16MB of RAM, Exp. to 512MB • 2 GB Hard Drive • 4x CD-ROM • 256K Level 2 Cache • 2MB VRAM, Exp. to 4MB • 24-bit Video Input-Real-time Playthrough & More!

AST Advantage! 824 Multimedia MiniTower

Out-of-the-Box Ease of Use • 133MHz Pentium • 16MB of RAM, Exp. to 128 • 1.6GB HD • 3x CD ROM • 28.8 Fax/Modem • 3D Sound • MPEG Playback • Bundled with awesome assortment of software programs & More!

SyQuest EZ135 Drive

Compact 3.5" Cart • 135 MB/Cartridge • Portable • Totally Macintosh & PC Compatible • 13.5ms Seek Time • Fast Easy to Use • Affordable • 2 Year Warranty

TER SYSTEMS

• Toms River, NJ 08753
1 • FAX 908-286-6869
clink.apple.com
0-628-0046
ues/Thurs 9-7 • Sat 10-5

FULLY GRAPHIC! FREE Netscape

NSORED!

Pricing as of June 1996

LY WITH IDT

	AT&T™	IDT
5	\$19.95	\$15.95
0	\$19.95	\$15.95
20	\$19.95	\$15.95

ly national internet rate
ws 3.x/95 compatibility

24 hours a day
le in most cities

ATION CALL ANYTIME:
4-9438

on, call (201) 928-1000 x4640

please call (201) 928-4478

THE PRESIDENT HAS SEEN 7/3/96

Inquiry Lacking Due Process

By GINA KOLATA

AS scientists absorb the decision by a Federal appeals panel late last week dismissing all the charges of scientific misconduct against Dr. Theresa Imanishi-Kari, many are asking how the process for handling allegations of fraud in science could have got so badly off track.

The decadelong case has roused high passions among scientists, some of whom saw it as a barometer of the public's apparent hostility toward science, while others were alarmed at how the case had turned into a political confrontation with Congress.

One reason for the drawn-out and divisive nature of the case was the imperfect procedures of the new Federal office to investigate biomedical fraud. Another was the high-profile conflict between Representative John D. Dingell, a Michigan Democrat who was then a House committee chairman, and Dr. David Baltimore, a Nobel laureate and former colleague who defended Dr. Imanishi-Kari to the end. This tension politicized every stage of the long inquiry process.

The unanimous decision by the three-member adjudications panel of the Department of Health and Human Services is a complete exoneration for Dr. Imanishi-Kari, a scientist who immigrated from Brazil. It also vindicates the long and eventually lonely campaign waged in her defense by Dr. Baltimore, a struggle that forced him to relinquish the presidency of Rockefeller University, one of the leading posts in academic science. Still, several of Dr. Imanishi-Kari's critics say they continue to believe the discrepancies in the disputed experiment arose from concocted data.

The long dispute created rifts in the scientific community, pitting Nobel laureate against Nobel laureate. One scientist, Dr. Donald Kennedy of Stanford University, commented that the appeals board decision marked "the end of the sorriest chapter in American science that I can think of."

The accusations against Dr. Imanishi-Kari arose at a time when Congress had become impatient with the apparent inability of universities to handle cases of scientific fraud. Mr. Dingell, who headed the House Energy and Commerce Committee, took up the issue, treating scientists with the same forcefulness and disdain he had used with overcharging military contractors. He made the Imanishi-Kari affair a test case.

Although Dr. Baltimore, who is now at the Massachusetts Institute of Technology, was never accused of fraud, he was drawn into the case because he was a co-author of Dr. Imanishi-Kari's disputed paper. His standing up to Mr. Dingell in several public confrontations was a spectacle that both exasperated his fellow scientists, and terrified them, because of Mr. Dingell's power over the scientific budget. The outspoken campaign made Dr. Baltimore vulnerable to any crack in his adamant defense, and eventually a crack appeared.

After several reviews of the disputed article found nothing seriously wrong, the National Institutes of Health ordered Dr. Baltimore to publish a correction of a minor part of it, where information was not fully in accord with data in Dr. Imanishi-Kari's notebooks.

The question then arose whether these discrepancies were due to mere sloppiness or something worse. At Mr. Dingell's request, the Secret Service performed a forensic analysis of Dr. Imanishi-Kari's notebooks, concluding that crucial data had been falsified because certain records indicated they must have been created later than Dr. Imanishi-Kari said. Dr. Baltimore's campaign was dealt a considerable setback when this finding became known. His supporters wavered, and Dr. Baltimore, unable to step clear of festering controversy, eventually resigned from Rockefeller University.

A second major reason for the tortuous nature of the affair lay in the peculiar constitution of an office at the National Institutes of Health that was set up, at Mr. Dingell's insistence, to investigate Dr. Imanishi-Kari and other scientists accused of misconduct. Although the office was to serve the role of prosecutor in cases that could effectively banish scientists from their profession, it was designed by scientists who wanted to keep lawyers and legal procedure out of their affairs. Warnings of the hazard of leaving out due-process procedures were ignored.

"One thing we realized very quickly was that a panel of scientists doing the investigating and adjudicating was a recipe for disaster," said Robert Charrow, a lawyer who sat on the panel that helped establish the office. "While scientists may be very good at doing science, they are not very good at doing law."

Nonetheless, the office was set up in just the way he had feared, with scientists serving dual roles as investigators and judges. But Mr. Charrow did inadvertently give the office its title. Thinking of the ironically named ministries in George Orwell's novel "1984," he jokingly suggested it be called the "Office of Scientific Integrity." To his astonishment, the name was accepted. It was later changed to the Office of Research Integrity. The first head of the office

readily concedes he had no legal knowledge. "I had no idea what the legal issues were in terms of fair play and all that," Dr. Brian Kimes, now an administrator at the National Cancer Institute, said in an interview. "I just wasn't educated."

When the office opened for business, those it investigated had no right to see the evidence against them, to cross-examine witnesses, to bring their own witnesses or even to get a list of the charges against them, which tended to change as the investigation wound on. There was also no right of appeal. Dr. Kimes said he had no time to weigh the consequences of the organization of the office because there was enormous pressure to get it up and running.

In the Imanishi-Kari case and others, the office was also in competition with Mr. Dingell, who was simultaneously conducting his own inquiries. "The N.I.H. was trying to be separate from Dingell," Dr. Kimes said. "Our leadership wanted us to make our own independent decision. But that was almost an impossibility. It was an atmosphere highly tinged with emotions and politics and it was very stressful."

In March 1989, the Office of Scientific Integrity issued its draft report on Dr. Imanishi-Kari. She was guilty, the office said, of faking data and should be barred from receiving Federal funds for 10 years.

In 1992, the office was reconstituted in the Department of Health and Human Services and renamed the Office of Research Integrity. As part

And when the board examined the forensic evidence against Dr. Imanishi-Kari, it was not impressed. "At most these analyses identify some possible anomalies, but provided no independent or convincing evidence that the data or documents were not authentic or could not have been produced during the time in question," the board said.

The tone of the board's decision is given in an aside in which it notes that the Secret Service's own analysis contains the same sort of flaws that the service found so suspicious in Dr. Imanishi-Kari's notebooks. "For example," the board wrote, "although the Secret Service examiners knew at the time of their work that they were preparing for litigation (unlike Dr. Imanishi-Kari), their records contain alterations of the results and omissions of important information."

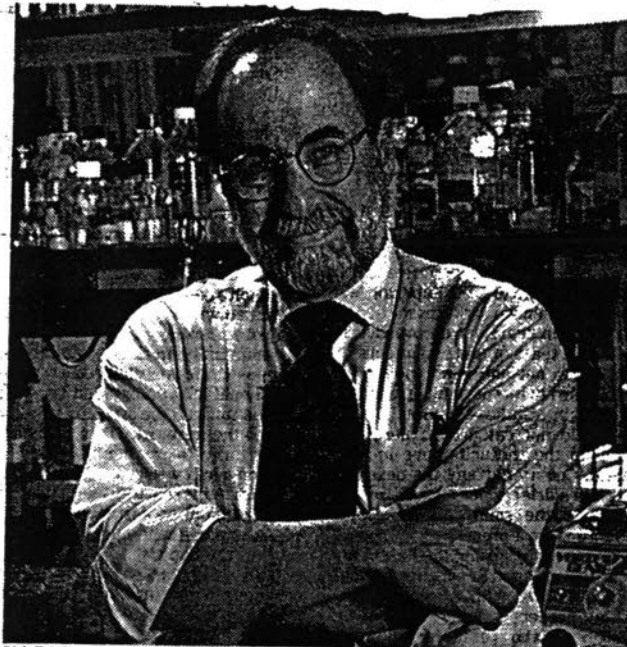
The appeals board's verdict will not convince all of Dr. Baltimore's opponents. One outspoken critic is Dr. Walter Gilbert, a Nobel laureate and professor at Harvard University. Interviewed earlier this month, Dr. Gilbert said he was persuaded by the Secret Service's evidence, no matter what the appeals board might rule. "I wouldn't be convinced if they exonerated Thereza Imanishi-Kari," he said.

Dr. Suzanne Hadley, the integrity office's chief investigator on the cases involving both Dr. Imanishi-Kari and Dr. Robert C. Gallo, co-discoverer of the AIDS virus, said the office's evidence against Dr. Imanishi-Kari and the others was damning. The ruling on the Imanishi-Kari case, she said, was "absolutely extraordinary."

But for others, the integrity office was a blight on the face of both law and science. Dr. Bernadine Healy, a former director of the National Institutes of Health who had insisted on formation of the appeals board, said she was horrified by the workings of the office. "I came full circle to

The fraud office is portrayed as a 'Star Chamber.'

of the reorganization, the office included an appeals board, which would, for the first time, give the accused their day in court. It was to this board that Dr. Imanishi-Kari appealed.



Rick Friedman for The New York Times
Dr. David Baltimore in his laboratory at M.I.T., a few days before review board's decision vindicated him and Dr. Tereza Imanishi-Kari

thinking that an adversarial system was necessary," Dr. Healy said. "I had become obvious that this was a totally polluted system where the scientists got behind closed doors and worked out their venom, taking down their colleagues. It was a chamber, a hideous travesty of justice."

The appeals board seems to have arrived at a similar opinion, to judge by the frequency with which it has reversed the office's findings and the scalding language in which it has sometimes done so. Of the four cases so far appealed, the board has dismissed three and upheld one. In addition, the office withdrew its case against Dr. Gallo after the board in 1993 threw out the charges against Dr. Gallo's associate, Dr. Mikulas Popovic.

Mr. Charrow, who is now in private practice defending scientists, said that such a record is surprising. "Most Federal agencies win most of their cases before hearing offices in their own agencies," he said. "In most cases, the batting average is over 70 or 80 percent," he added.

In its decision on Friday, the appeals board noted that the integrity office had made a "direct attack on Dr. Imanishi-Kari's honesty" and yet "much of the evidence in the record, and in particular some of the document examination evidence, corroborated her statements and directly contradicted representations made by O.R.I."

The long case has had a heavy impact on both Dr. Imanishi-Kari and her defender. "It was a nightmare," she said in an interview on Saturday. "It sounds tacky, but I'm going to say it: I felt like Joseph K," the main character in "The Trial," the Franz Kafka novel. Her scientific career has been virtually on hold for 10 years while one committee after another pored over her notes and the conflicting charges. After the integrity office accused her of concocting false data in an article published in 1986, she was barred from receiving Federal research funds. Her employer, Tufts University, warned that she would be dismissed if her appeal failed.

News of her vindication was of course exhilarating. She spent most of Friday evening talking on the telephone to her family in Brazil and then stayed up until 4 A.M. reading the appeals board's decision, triumphantly noting that every charge against her had been thrown out. She was up again at 7 A.M. on Saturday. "I'm so happy," she said.

The events have been grueling in a different way for her chief defender, Dr. Baltimore, one of the leading biologists of his generation. Dr. Baltimore said that the case had changed him. "I have never been able to forget it for 10 years, and probably for the rest of my life," he said. The victory is only "bittersweet," since, he added, "after 10 years taken out of her life and all the travail I've been through, I feel a sense of relief but no accomplishment."

Dr. Kennedy noted that although Dr. Baltimore continued to do research, because of the controversy surrounding him he had ceased to be active on science policy issues, like the direction of AIDS research, in which he had been a leading figure. "We did lose his voice in a lot of influential policy circles," Dr. Kennedy said, adding that it was "no small loss."

"A lot of people owe David an apology," he said.

For Dr. Healy, the issue now is to understand what went wrong and to make sure it will never happen again. With the Imanishi-Kari case added to others that were dismissed on appeal, "A lot of professional careers were ruined," Dr. Healy said. "That's their whole life, destroyed." And, she added, "there was a lot of cruelty and abusive behavior tolerated in the name of rooting out fraud."

"The ultimate truth does have a way of winning out," Dr. Healy said. But, she said, "It took a sad long time." In fact, she said, "the fraud, the abuse, the dishonesty was in the process." It was, she said, "the process that was contaminated."



E. R. ZUMWALT, JR.
ADMIRAL, U.S. NAVY (RET)

June 27, 1996

THE PRESIDENT HAS SEEN

7-3-96

*Tom
Lefebvre
How to Reply
R*

The President
The White House
1600 Pennsylvania Avenue, NW
Washington, DC 20500

Dear Mr. President:

The issue of bringing Mr. Karadzic and General Mladic to trial for their war crimes is of a degree of importance which cannot be overstated.

* If the current pressures being brought to bear on Milosevic do not in the very near future result in bringing these two to trial, I believe U.S. military action to seize them must be taken. I do not recommend this for its obvious political importance, but rather because of the greater need to re-establish the Nuremberg precedent that the free world will not tolerate ethnic holocaust.

I recognize the reluctance of the current military leadership to take on the assignment. I recognize that there is risk in the endeavor; but I believe that if ordered to do so, the military can come up with a plan which would have a very high probability of being successful. I recommend that you direct them to do so.

Respectfully,

Bud Zumwalt

E. R. Zumwalt, Jr.
Admiral, USN (Ret.)

1000 Wilson Boulevard, Suite 3105
Arlington, VA 22209-3901

Tel: (703) 527-5380
Fax: (703) 528-5795



E. R. ZUMWALT, JR.
ADMIRAL, U.S. NAVY (RET.)

FACSIMILE TRANSMISSION

From the Office of E. R. Zumwalt, Jr.
Admiral U.S. Navy (Ret.)

1000 Wilson Boulevard
Suite 3105
Arlington, VA 22209-3901

TEL: (703) 527-5380
FAX: (703) 528-5795
E-MAIL: 103737.1466@compuserve.com

DATE: June 28, 1996

TO: Ms. Nancy Hernreich

The White House

FAX NUMBER: 202-456-6703

FROM: Admiral Zumwalt

TOTAL NUMBER OF PAGES INCLUDING THIS COVER SHEET: 2
(Please call if all pages are not received.)

AN ORIGINAL HAS x HAS NOT BEEN SENT TO YOU.

7-3-96

THE WHITE HOUSE
WASHINGTON

June 24, 1996

✓
MR. PRESIDENT:

The attached Quinn memo: 1) updates you on Treasury's proposal on the equitable tolling of statutes of limitations governing recovery of IRS refunds; and, offers two options to meet your desired objective of expanding the proposal to include cases currently in litigation.

Jack recommends the narrower of the two options outlined, and George concurs. Leon's office OK'd the forwarding of the memo to you without expressing a viewpoint.

Helen Howell *HH*

*have Treasury
in letter - can
Be*



THE WHITE HOUSE
WASHINGTON

June 3, 1996

THE PRESIDENT HAS SEEN
7.3.96

96 JUN 3 4:10:50

MEMORANDUM TO THE PRESIDENT

FROM: JACK QUINN

RE: EQUITABLE TOLLING UPDATE

This memorandum updates you on developments related to the Department of Treasury's proposal on the equitable tolling of statutes of limitations governing recovery of IRS refunds. When you approved the outlines of Treasury's proposal for prospective relief, you indicated that it should be expanded to cover cases currently in litigation. In consultation with Treasury and the Department of Justice, we have identified the following two approaches to achieving this objective, and we seek your guidance concerning which one to pursue.

Option 1. The first, and narrower, method would be to make equitable tolling available for claims for which the statutory period during which the IRS is authorized to make a refund has expired (as of the effective date of the legislation) -- but only if the taxpayer had already filed, albeit tardily, with the IRS for a refund and (1) the time for pursuing judicial remedies beyond the IRS had not expired or (2) the claim was actually pending before the IRS or a reviewing court. This would meet your objective of addressing pending claims. Treasury projects that this approach would cost \$521 million over five years (as compared to \$362 million for its basic, "prospective only" proposal, which would not cover all pending claims).

Treasury is concerned that this approach would reward taxpayers who have pursued claims that are patently non-meritorious under current law, while failing to benefit taxpayers who, in conformity with current law, refrained from filing what might have been time-barred but otherwise meritorious claims. (Presumably, however, non-meritorious claims will not prevail.) The Solicitor General has expressed concern about this approach on the ground that it would moot the cases now pending in the Supreme Court, thereby eliminating the possibility of the adoption of a uniform rule of law. Of course affording relief to these litigants is exactly what you seek to do. The Solicitor General's preference would be for something in the nature of a private bill enacted after the Supreme Court renders its opinion. This is, as you know, highly unlikely to happen.

Option 2. A second -- and far more generous -- way to give existing litigants the benefit of equitable tolling would be a broad rule that allows taxpayers to file for a refund

within the three-year statute of limitations plus any disability period, even if the statutory period already has expired. For example, a taxpayer who paid his tax and filed his return on April 15, 1989 ordinarily could not seek a refund after April 15, 1992. If, however, he became incapacitated in 1991 and remained so until the effective date of the legislation, he would have the benefit of the new rule on equitable tolling under this option.

Treasury projects that this approach would lead to a revenue loss of \$1.1 billion over five years, largely because it would revive many otherwise expired claims, including potentially thousands of claims that are not currently the subject of administrative claims or litigation. (While the \$1.1 billion figure will be regarded by many as surprisingly large, Treasury defends it as the product of its usual revenue estimation techniques.)

Recommendation

I recommend that you authorize Option 1.

☐ Option 1

☐ Option 2

☐ Discuss

A handwritten signature in dark ink, appearing to be "J. H." or similar, written in a cursive style.

Fortress Yields Clues To Israel's Ancient Foe

The Edomites,
descendants of Esau,
fought those of Jacob.

By JOHN NOBLE WILFORD

THE familiar biblical story of sibling rivalry, foreshadowing strife in the Middle East then and to this day, began when the pregnant Rebecca, wife of Isaac, was told by the Lord:

*Two nations are in thy womb,
And two manner of people shall be
separated from thy bowels;
And the one people shall be stronger
than the other people;
And the elder shall serve the
younger.*
— Genesis 25:23

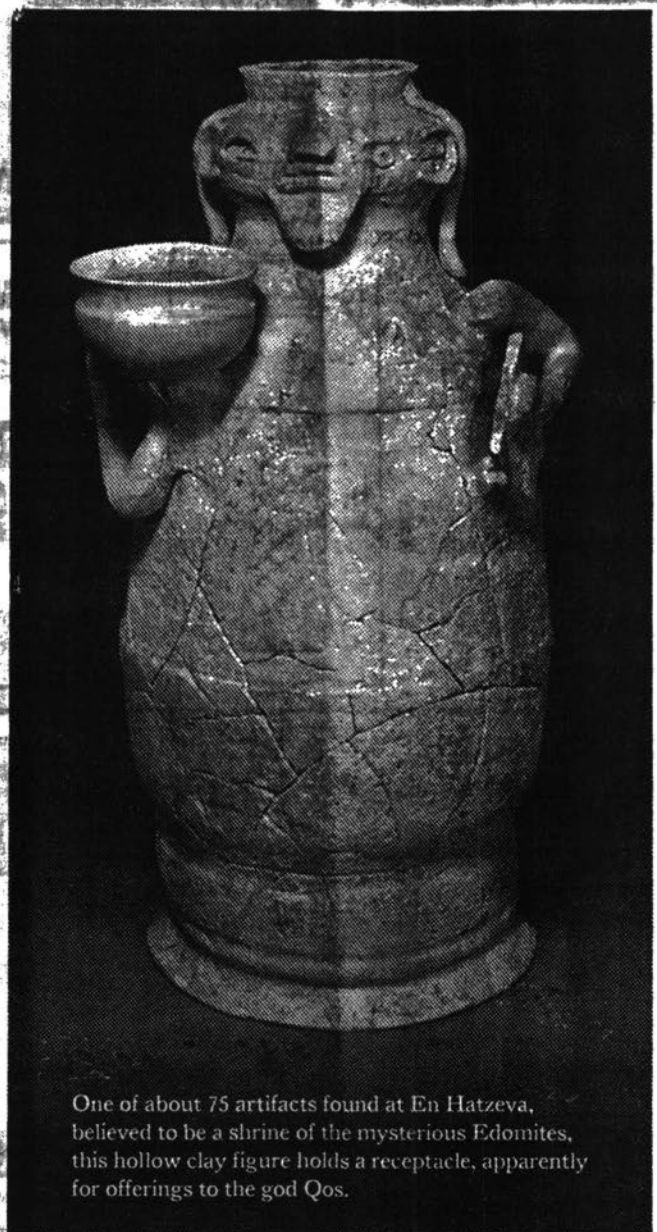
Rebecca gave birth to twin sons,
Esau and Jacob, whose lives fulfilled

the prophecy. Esau, the firstborn, became a hunter who sold his birthright for a mess of pottage, a stew. Jacob tricked their dying father into granting a blessing that made Jacob master over Esau. The brothers, an angry Esau and a fearful Jacob, went their separate, antagonistic ways as patriarchs of rival nations.

Esau took wives from among the Canaanites and settled his family in the hill country of Seir, which became known as the land of Edom. This land, east of the Negev desert of Israel, lies in present-day Jordan. Esau is called the father of the Edomites, about whom little is known except for the biblical accounts, which were colored by Israelite animosity.

New discoveries by archeologists are beginning to cast light on Edom's shadowy history. Digging at several sites in Edomite country, notably Tell el-Kheleifeh, they have uncovered distinctive pottery from the first millennium B.C. and seals bear-

Continued on Page C7



One of about 75 artifacts found at En Hatzeva, believed to be a shrine of the mysterious Edomites, this hollow clay figure holds a receptacle, apparently for offerings to the god Qos.

Israel Antiquities Authority/Biblical Archeological Society

A fraud case that evaporated:
How did it go so far? Page C3.

THE PRESIDENT HAS SEEN

7/3/96

To Rahm

THE PRESIDENT HAS SEEN

7/3/96

Fyl

Boe

ART

To be a young restless
painter in Rome around
1800. Page C13.



