

- Austin, 1967), vol. 1, pp. 179-260; J. R. Harlan, *Science* 174, 468 (1971).
3. For a general discussion of this problem, see T. C. Patterson, *America's Past: A New World Archaeology* (Scott, Foresman, Glenview, Ill., 1973), pp. 41-64; S. C. Jett, *Am. Antiquity* 38, 223 (1973). Although the idea that manioc came to Panamá from South America and maize from Middle America seems reasonable, it remains unsubstantiated.
 4. See, for example, M. D. Coe and K. V. Flannery, *Science* 143, 650 (1964); K. V. Flannery, A. V. T. Kirby, M. J. Kirby, A. W. Williams, Jr., *ibid.* 158, 445 (1967); R. Spores, *ibid.* 166, 557 (1969); W. A. Denevan, *ibid.* 169, 647 (1970); P. Armillas, *ibid.* 174, 653 (1971); R. E. Blanton, *ibid.* 175, 1317 (1972); K. V. Flannery, *Annu. Rev. Anthropol.* 2, 271 (1973).
 5. D. R. Harris, *Am. Sci.* 60, 180 (1972); in *Man, Settlement and Urbanism*, P. J. Ucko, R. Tringham, G. W. Dimbleby, Eds. (Duckworth, London, 1972), pp. 245-262; in *The Explanation of Culture Change: Models in Prehistory*, C. Renfrew, Ed. (Duckworth, London, 1973), pp. 391-417.
 6. G. Reichel-Dolmatoff [Am. *Antiquity* 22, 226 (1957); *Colombia* (Praeger, New York, 1965), pp. 61-79] presents the archeological evidence for the replacement of manioc by maize in Colombia; I. Rouse and J. M. Cruxent [Venezuelan *Archaeology* (Yale Univ. Press, New Haven, Conn., 1963), pp. 5-6, 53-54] discuss the replacement of manioc by maize in Venezuela; whereas A. Zucchi [Am. *Antiquity* 38, 182 (1973)] argues that in the dry western llanos of Venezuela maize preceded manioc. Recently, some doubt has been expressed concerning the archeological evidence for the priority of manioc cultivation in South America [W. DeBoer, paper read at the 39th annual meeting of the Society for American Archaeology, Washington, D.C. (1974)]. In Mexico, in the arid uplands of Tamaulipas and Tehuacan, maize apparently did precede manioc by several millennia, but in the lowlands of the Pacific coast in Chiapas, manioc may have been cultivated before maize [M. P. Weaver, *The Aztecs, Maya and Their Predecessors* (Seminar, New York, 1973), pp. 40-46]; this evidence is not widely accepted, however; see K. V. Flannery, *Annu. Rev. Anthropol.* 2, 273 (1973). In the Gatún Basin of the Panama Canal Zone there is some palynological indication that maize may have preceded manioc by several millennia [A. S. Bartlett, E. S. Barghoorn, R. Berger, *Science* 165, 389 (1969)].
 7. C. F. Baudez, *Central America* (Nagel, Geneva, 1970); D. Stone, *Pre-Columbian Man Finds Central America* (Peabody Museum Press, Cambridge, Mass., 1972).
 8. A basic source on Panamanian geology is R. A. Terry, *Occas. Pap. Calif. Acad. Sci.* No. 23 (1956). The reconstruction of events relevant to the human occupation of this area was done by R. E. Stewart (personal communication).
 9. C. Earle Smith has reconstructed the vegetation of these areas (personal communication).
 10. This meant walking the entire area, making a collection of surface artifacts, and plotting the distribution of occupation debris wherever it was encountered. Survey accuracy was greatly facilitated by having the area come recently under cultivation. But cultivation had not been practiced long enough—nor had plowing been deep enough—to alter the aboriginal distribution of cultural debris. In cases where exposure was poor—especially in the southwest region—we used a posthole digger to make numerous small soundings (sondages) to determine site boundaries and to record soil profiles. For the use of the posthole digger see R. E. Fry, *Am. Antiquity* 37, 259 (1972).
 11. Sites where the area of occupational debris was less than 200 m long were assigned a size class value of 1; between 200 and 300 m long, size 2; between 301 and 400 m long, size 3; between 401 and 700 m long, size 4; and more than 701 m long, size 5. The modal distribution indicates the size class in which most sites fall within each zone.
 12. M. W. Stirling, *Natl. Geogr. Mag.* 97 (No. 2), 227 (1950).
 13. For the view that maize agriculture was unimportant in neighboring Costa Rica see F. W. Lange, *Folk* 13, 43 (1971). Our finds accord better with the argument of M. Coe [Southwest. *J. Anthropol.* 18, 170 (1962)] that maize was an important subsistence item among these Panamanian-related groups.
 14. B. H. Dahlin first formulated the buffer zone idea.
 15. W. A. Galinat, in preparation.
 16. L. A. Kaplan, identified our beans (personal communication).
 17. P. D. Sheets, paper read at the 38th annual meeting of the Society for American Archaeology, San Francisco, California (1973); E. J. Rosenthal, unpublished manuscript (1972).
 18. C. E. Smith made a preliminary identification of the bulk of the botanical material.
 19. J. Stauder, *Southwest. J. Anthropol.* 28, 153 (1972).
 20. O. Linares and A. J. Ranere, *Archeology* 24 (No. 4), 346 (1971).
 21. G. R. Willey and C. W. McGimsey III, *Pap. Peabody Mus. Archaeol. Ethnol.* 49 (No. 2) (1954); C. W. McGimsey III, *Am. Antiquity* 22, 151 (1956); —, M. B. Collins, T. W. McKern, paper presented to the 37th Congress of Americanists, Mar del Plata, Argentina (1966).
 22. R. L. Carneiro [Völkerkundliche *Abh.* 1, 9 (1964)] contrasts riverine fishing with hinterland hunting adaptations among the Amahuaca; D. W. Lathrap [in *Man The Hunter*, R. B. Lee and I. DeVore, Eds. (Aldine, Chicago, 1968), pp. 23-29] discusses this problem with reference to several Peruvian Montaña groups; J. Bamberger [paper presented to the 38th Congress of Americanists, Munich, Germany (1968)] argues against the idea of "ill-adjustment" among Ge hunting groups of central Brazil.
 23. C. F. Bennett, *Ibero-Am.* 51, 27 (1968).
 24. A. J. Ranere, thesis, University of California, Davis (1972); in *Actas del Primer Simposio de Arqueología en Puerto Rico*, J. Geijel, Ed. (San Juan, Puerto Rico, in press).
 25. A. Leeds, in *The Evolution of Horticultural Systems in Native South America: Causes and Consequences*, J. Wilbert, Ed. (Sociedad de Ciencias Naturales, La Salle, Caracas, 1961), pp. 13-46; R. L. Carneiro, in *ibid.*, pp. 47-67; D. R. Harris, *Geogr. Rev.* 61, 475 (1971).
 26. O. Linares and A. J. Ranere, *Archeology* 24, 346 (1971).
 27. Compared to roughly equivalent species in the temperate zone, species in the tropics tend to have fewer young (compare peccaries with wild pigs, agouti and paca with rabbits, or curassows and guans with pheasants and quails). For a quantitative proof see J. Gliwicz [Bull. Acad. Pol. Sci. Cl. II Ser. Sci. Biol. 21, 413 (1973)], who discusses the characteristics of a natural *Proechimys* population in the Panama Canal Zone.
 28. O. Linares, *Smithson. Contrib. Anthropol.* 8, 1 (1968), figure 2.
 29. Dirección de Estadística y Censo, Contraloría General, *Estadística Panameña: Meteorología, Año 1971* (Panama, 1973).
 30. Our 1970-1973 project, "Archaeological investigations in western Panama," was sponsored by NSF grant 2846 to O.F.L. The participation of graduate students, including E.J.R., for all three seasons and of B. Dahlin, S. Dahlin, and J. Sweeney for the Volcán season was facilitated by Ford Foundation traineeship grants to the University of Pennsylvania Museum. M. Camargo, D. Figueroa, and P. Quirós also participated. P. D. Sheets was field supervisor. Additional staff members and research associates included: A. J. Ranere, C. E. Smith, J. West, and R. E. Stewart. We wish to thank R. Torres de Araúz and her staff at the Museo Nacional for official cooperation, and the director of the Smithsonian Tropical Research Institute and his staff for granting facilities. R. McNealy drew Fig. 6 and R. McCarty Fig. 3. F. M. Sheets took the photographs in Figs. 5, 7, and 8 and on the cover and managed the field laboratory during the last Volcán season.

NEWS AND COMMENT

National Institutes of Health: The Politics of Taste and Smell

Scientists at the National Institutes of Health (NIH) are forever complaining about politicians and government bureaucrats meddling in the institutes' scientific affairs, though specific examples of intrusion often elude them (*Science*, 10 January). The matter of Robert I. Henkin and his taste and smell clinic in the National Heart and Lung Institute (NHLI), currently a subject of considerable controversy, seems to be a valid example of political

interference. NIH wants to close the clinic. Political pressure has kept it open. In fact, the Senate has gone so far as to make the taste and smell clinic a line item in the appropriations bill.

On 10 July 1973, NHLI officials reached a decision to phase Henkin's clinic out of existence, setting 30 June 1974 as the date it would finally close. Even with the generally increased funds available for the war on heart and lung

diseases, money for intramural programs at NHLI was tight and there was pressure to favor those programs that most closely fit in with the institute's mission. It was hard to explain why the taste clinic was of primary importance. Henkin says NIH administrators felt "taste and smell problems were not significant."

Furthermore, the institute's scientific brass had doubts about the quality of Henkin's research, particularly that having to do with using zinc to cure persons who had lost their sense of taste. All in all, NIH officials agreed that Henkin's taste and smell program, which Henkin says cost about \$200,000 a year, could be sacrificed.

Nevertheless, a year and a half after that decision, Henkin is still at work, the doors of his taste clinic still open.

Publicity and political pressure generated by a small cadre of his patients have kept him in business, though it is by no means certain that he will win out in the end.

There is some dispute as to whether former NHLI officials Theodore Cooper and Donald S. Fredrickson* ever told Henkin of the 1973 decision to phase out his study—Henkin claims he did not receive, or even know about, an official memo on the decision until February 1974, although he says

* Cooper is now Deputy Assistant Secretary for Health in the Department of Health, Education, and Welfare. Fredrickson is president of the Institute of Medicine—National Academy of Sciences.

Fredrickson did talk to him in the summer of 1973 about closing the clinic. In any case, as late as spring of 1974, the patients who were coming to the taste clinic had not been told of its demise. Therefore, on 3 May NIH officials sent a letter to Henkin's 485 current patients. It said in part, "Since these studies have become so far removed from the primary mission of NHLI, the decision was made on July 10, 1973, to phase them out during the following year. . . . Therefore, all patients admissions and outpatient appointments after June 30, 1974, are cancelled. Unfortunately, we are aware of no physicians who are doing similar work in

this area to whom we could refer you."

It was a harsh-sounding and startling letter to Henkin's patients, many of whom had come to be devoted to him for his attention and concern even if his therapy did not always restore their lost taste. Chief among these was Valerie Bennett-Levy of Surrey, England, by appointment purveyor of nosegays to Her Majesty the Queen. Mrs. Bennett-Levy was incensed. She began writing letters and carrying her cause in person to individuals she thought could help. She saw NIH director Robert Stone. When she got no satisfaction from him, she went to the assistant secretary for health

Briefing

NIH: Help Wanted

The National Institutes of Health (NIH) needs some leaders. Not only is there a vacancy in the director's office because of the recent firing of Robert S. Stone, but there are vacancies in the top spots in the individual institutes as well. Experience from the last few months shows just how hard it is to get anyone to be an institute director.

When Theodore Cooper resigned as director of the National Heart and Lung Institute in April 1974, a search committee to find a successor was convened with dispatch. Now, 9 months later, that committee is meeting again. It had decided on three candidates. All three said no. So, the heart institute is back where it started.

Before Ruth Kirschstein was named director of the National Institute of General Medical Sciences last spring, the job was offered to others. They were all outside scientists; they all turned it down. Kirschstein came from within the ranks of NIH. Members of the search committee, who did not know her very well, said she was the most qualified of the candidates from within government. And she is a woman. Outgoing NIH director Stone said he was determined to appoint a woman or a black to the job if he could find a qualified one.

The new National Institute of Aging needs a director. It has for several months. Vacancies are expected in a couple of other institutes as present directors retire or decide to leave government.

The only outside scientist of national reputation to take an institute directorship recently is Norman Kretchmer, who left Stanford University after 15 years to head the National Institute of Child Health and Human Development.

The main obstacle to getting a good person to come to NIH is money. A director makes \$36,000 a year, which is invariably less than what candidates make elsewhere. According to Stone, anyone coming to NIH from a top medical school position will probably have to take a cut of at least \$15,000 to \$20,000. Often it is more. To compound the problem, an institute director gets none of the perks that his or her counterpart in a university receives, such as help with college tuition.

The present atmosphere at NIH and in Washington generally is not one to entice people away from university jobs either. Most people are not anxious to take a cut in pay in order to acquire monstrous bureaucratic problems. Until Richard Nixon resigned, his occupancy of the White House was yet another barrier to the recruitment of scientists who were, generally, anti-Nixon. And Robert Stone himself was not the sort of person who, by force of personality, could draw people away from their jobs. And now Charles C. Edwards has quit as assistant secretary for health, the person with whom the NIH director must work most directly in the Department of Health, Education, and Welfare. Uncertainty about who will fill his post makes recruiting at NIH just that much more difficult.

At the moment, things do not look too good. NIH needs help.—B.J.C.

Fusion Advocates Tell Off Teller

Edward Teller has often been criticized as a hawk and a hard-liner, but recently his critics have found new subjects to address. At several of Teller's public speeches, members of the U.S. Labor Party, a small socialist group, have denounced him for being a friend of Nelson Rockefeller and accused him of sabotaging fusion research. Labor Party members think that Teller is part of an AEC conspiracy to suppress the fusion program.

The charge is particularly curious, since Teller is usually seen as a strong advocate of controlled thermonuclear fusion research, and support for that research has approximately doubled in the last 2 years. But the Labor Party wants to see a plan styled after the Manhattan Project, which would expand the present AEC effort 50-fold and divert the emphasis at most, if not all, of the existing military, aeronautic, and space laboratories to fusion research. The party, which is a highly sectarian Marxist-Leninist group, predicts that ecological catastrophe will destroy human civilization by 1990 unless such a crash plan is pursued. "Fusion, at this point in history, is the cornerstone of the socialist program," the party newspaper, *New Solidarity*, said recently.

Another cornerstone of the Labor Party's ideology is that Nelson Rockefeller and Rockefeller interests direct U.S. policy on a fascist course. So

Charles E. Edwards, and to his deputy, Cooper, who had been involved in the initial decision to halt the study. HEW Secretary Caspar Weinberger heard from Mrs. Bennett-Levy, as did members of Congress. Soon Representative Paul G. Rogers (D-Fla.), Senator Warren G. Magnuson (D-Wash.), Senator William L. Scott (R-Va.), and others were in the act. She got other patients to write to their congressmen. In all, 40 patients wrote to 47 members of Congress, who wrote to Weinberger on Henkin's behalf. She took her troubles to the *New York Times* which aired them in print. So did the *Washington Post*.

Henkin's supporters characterized his clinic as the only one of its kind in the country and said he was the only person who offered them any hope. Henkin added to his own cause by telling people he was on the verge of discovering the basic mechanism of taste.

It soon became apparent that NIH was not going to get rid of Henkin easily. As a commissioned officer in the Public Health Service (PHS), Henkin could not be thrown out of the corps. But he could be reassigned, and he was—to the PHS hospital in Norfolk, Virginia, where he was to be a "ward physician." Then, on 19 June,

Edwards called for an investigation of the controversy and delayed the closing of the clinic and Henkin's banishment. Letters went out over Weinberger's signature assuring congressmen and others that the "scientific basis, clinical significance and statistical validity" of Henkin's work in taste and smell would be reviewed.

Thereupon, the NIH named three of its scientists who were neither associated with Henkin nor the heart institute to assess the quality of Henkin's work. David W. Alling, William Bunney, and Vincent T. DeVita, Jr., reviewed 50 of Henkin's papers, both published and unpublished. They talked

Briefing

Teller, who is a member of Rockefeller's private planning group, the Commission on Critical Choices for America, as well as a member of the original Manhattan Project, bears the brunt of both accusations.

But Teller isn't upset by the denunciations and still seems ebullient at age 66. "What a delight," he says, "no longer to be criticized for being the father of the H-bomb."—W.D.M.

House Committees Endorse Controlled Energy Growth

The national bandwagon for controlled energy growth has picked up two important passengers on Capitol Hill. In a report issued jointly on 21 December, the House committees on Science and Astronautics and on Government Operations urged the Ford Administration to set a goal of holding the nation's annual growth in gross energy demand to 2 percent a year, a target endorsed in recent months by a wide variety of policy studies, including the Federal Energy Administration's Project Independence report (*Science*, 1 November).

Cooperative activities of this sort between committees are unusual in Congress and suggest a measure of enlightened urgency.

The 133-page report provides a compact survey of views on possible means of achieving controlled energy growth (if or when the economy revives enough for growth to begin

again), and it also takes a swipe at the voluntary approach emphasized by the Nixon and—thus far—Ford administrations. Noting that since 1971 there have been at least five presidential messages and four executive orders exploring the energy situation and shuffling organization charts, the report says, "... the messages barely mentioned the idea of conserving energy, and none offered any meaningful program besides voluntary acts." Among a number of suggestions, the report calls for greater emphasis on R & D that would help reduce energy demand and a prompt review of tax and regulatory policies for their effects on energy consumption.

Entitled "Conservation and Efficient Use of Energy," the report is based on hearings held by the Science and Astronautics subcommittee on energy and the Government Operations subcommittee on conservation and natural resources, whose chairmen are, respectively, Representatives Mike McCormack (D-Wash.) and Henry S. Reuss (D-Wis.).—R.G.

RFF Gets a Big Financial Boost

Resources for the Future (RFF), a pioneer environmental research organization established in 1952 by the Ford Foundation, has recently been assured of adequate resources for its own future. On 31 December the Ford Foundation, which hitherto has supplied

about half the annual RFF budget of \$3 million, announced a \$12-million, 4-year grant to the organization. This is the largest grant the foundation has yet made for environmental studies, and it was made at a time that Ford has announced a severe retrenchment in its grant program in coming years because of a sharp decline in the value of its assets.

Charles J. Hitch, former comptroller at the Department of Defense under Robert McNamara and now president of the University of California, will become RFF's new president as of 1 July. He succeeds Joseph L. Fisher, who in November was elected to Congress from a northern Virginia district.

Accompanying the change in management and budget is RFF's intention to alter its course somewhat in the direction of research "focusing on the public policy implications" of resource and environmental problems—that is, it intends to become more "relevant." Up to now, RFF has concentrated mainly on factual analysis of resource issues, and some of its work has been regarded as too academically remote to weigh directly on environmental decisions. The staff of 30, now dominated by economists, will be expanded somewhat to include heavier representation from other disciplines.

RFF, however, prides itself for noticing problems before they have become widely recognized. Among future research projects it plans are examinations of problems in land management and food and ocean resources, as well as "a more sober look at neo-Malthusian limits-to-growth theory."—C.H.

with other scientists who could comment on various aspects of his research and interviewed Henkin himself for seven and a half hours. On 8 August they submitted a confidential report of their findings to the NIH director and other top officials. It was decidedly negative, particularly with respect to Henkin's long-standing studies of the use of zinc to treat taste loss.

Henkin had first become interested in taste problems when he was at Columbia University taking care of hepatitis patients. "They had altered zinc metabolism and complained that food tasted bad," he recalled in an interview. That observation prompted Henkin's research in taste. He then moved to NHLI and began clinical studies of zinc in taste loss. He conducted a single-blind[†] study of the effects of zinc sulfate, given in capsule form, and placebo in alleviating taste loss and found that zinc was distinctly better. He published his findings immediately.

Generally speaking, single-blind studies are not regarded as definitive, particularly when they involve something partially subjective, as an individual's sense of taste. Subsequently, Henkin conducted a double-blind study. That study gave no evidence that zinc is any better than placebo in treating taste loss. To this day the results of the study have not been published.

That double-blind study has proved to be a real source of trouble for Henkin. Its negative results certainly figured prominently in the review committee's finding that there is no justification for continuing experiments with zinc. And the fact that Henkin has not published it is one of the principal reasons certain NIH officials believe they are justified in wanting Henkin to leave NIH. "His early report that zinc therapy is valuable constitutes an error in the scientific literature," said one. "It must be corrected."

Henkin, at the insistence of his superiors, prepared a manuscript about the double-blind study but it satisfies neither the officials in the director's office nor the members of the review committee who were asked to look at it by NIH deputy director for science DeWitt Stetten. The problem seems to be that the retraction of the earlier positive zinc study is, as one reader put it, "buried in a mass of gobbledygook."

Henkin, for his part, now says that

the negative results of the double-blind study are explicable by new knowledge and do not prove that zinc has no role to play in taste therapy. "We now know that zinc is helpful only to those patients who are zinc-depleted. Among those patients in whom we can demonstrate zinc depletion, there is a correlation with successful zinc therapy," Henkin says, acknowledging that not all patients with taste loss respond to zinc and that zinc depletion is very difficult to identify.

Taste disorders, which usually come on suddenly, may follow from a variety of things including viral infections, blows to the head, and ingestion of certain drugs. Henkin says that taste loss is often a cause of severe psychological trauma for patients which is compounded by the fact that most physicians do not take it very seriously, leaving the patient feeling frustrated and helpless.

While Henkin agrees that zinc therapy is "not the total answer by a long shot" for persons with taste loss, he believes it is important to an understanding of the basic mechanism. He has hypothesized that there is a zinc-containing protein that is a constituent of normal saliva and that this protein plays a role in the growth and nutrition of taste buds. Now, he says he has successfully isolated and purified such a zinc-containing protein from saliva of the easily accessible parotid gland, one of three saliva-secreting organs in human beings. Although its function in taste remains to be established, Henkin says that a role is implied by the fact that patients with taste disorders have lower than normal levels of salivary zinc. His data will be published in the February *Proceedings of the National Academy of Sciences*.

Aware of Henkin's identification of a zinc-containing protein in saliva, the NIH committee that reviewed his work commented about it in its report, saying that it would be premature to assign the protein any major role in taste; there are as many as 75 zinc-containing proteins in the body and zinc levels are known to fluctuate with a number of different disorders. Henkin, however, says that identification of the protein, which he chooses to call "gustin," is a discovery of major importance.

The day after the review committee submitted its report, NIH sent a memo to Edwards at HEW recommending that the taste program be discontinued. On 22 August, Edwards got another memo from Stone's office, this one de-

tailing the plans for the phase out which was to be complete by 18 October. The plan was to have Henkin spend a week briefing NHLI clinical director Frederic C. Bartter about the patients still in the program. Bartter would then write to the patients and, if they wished, to their physicians. Physicians were to be informed what medication their patients had been taking and about the double-blind study. Furthermore, the letter was to explain that, if they wanted to give their patients zinc, they would do so simply by writing a prescription.

But 18 October came and went and the program survived. During the time that NIH was reviewing its decision to end the study, Congress was busy thinking about the NIH budget. On 11 September, the Senate Appropriations Subcommittee on Labor and Health, Education and Welfare, of which Magnuson is chairman, issued its report on the budget for fiscal 1975. To the dismay of many NIH officials, the committee "directed" that the taste and smell clinic be continued, saying: "This program, though small, is the only one of its type in the world."

Ever since then, NIH has not been quite sure what to do.

But now, it looks as though there may be a break in what has amounted to a stalemate between Henkin and NIH. Magnuson has sent a letter to Edwards explaining that the committee's interest in the taste program was with the welfare of the patients. Decisions about scientific research, he said, should be left up to "peer review." One interpretation of that is that NIH can close the clinic if it makes some provision for the patients.

But it remains possible that Henkin will challenge the judgment that the three-man committee that evaluated his work constitutes proper peer review. He says that he is certain the three reviewers were "entirely honest" but maintains that the panel was not "adequate," that it did not "look into enough material or talk to other trace metal authorities." He feels his rights have been violated "procedurally," and says, "If they want to throw me out, they have to do it in a reasonable and rational way. They did not have much luck the first time around."

Whether "they" will have luck the second time around is anybody's guess but it does seem apparent that, were it not for the intrusion of political pressures in the case, Henkin might be long gone.—BARBARA J. CULLITON

[†] In a single-blind study, the physician knows whether he is giving a patient drug or placebo but the patient does not know which he is receiving.