Harrow, England) has aggregated NZB embryos (which have spontaneous autoimmunity as adults) with normal embryos. Preliminary data seems to indicate that the appearance of autoimmunity is postponed. One of the four mice tested eventually lost one parental cell line and subsequently rejected a skin graft genetically identical to the lost cell line. From these experiments and others reported by K. Bechtol (Stanford University) on the analysis of immune response genes in aggregation mosaic mice, it is clear that mosaicism continues to be a useful tool for analysis of the immune system.

The meeting was generally useful because it brought together investigators who use similar methods to ask similar questions on quite different organisms. Until now their respective literatures have remained relatively nonoverlapping, and the meeting was a promising beginning in correcting that deficiency. The Venetian atmosphere itself made a considerable contribution to the meeting's success in unexpected ways. R. Steward (U.S. Department of Agriculture, Beltsville, Maryland), who reported on plant mosaics, found a number of them growing in Venice, as well as a mosaic ivy accurately depicted by Leonardo da Vinci in his painting of the Annunciation hanging in nearby Florence. S. Benzer and D. Benzer, acting on a suggestion by M. Delbrück, found that the pigeons who come to the Piazza San Marco to get fed at 9:00 a.m. each day tell time by an internal clock. This experiment was possible because Venice went off daylight saving time during the meeting. The following morning the pigeons arrived an hour early according to people time. But the very next day they had reset their internal clocks and arrived on time. The Benzers were last seen looking for a mosaic pigeon.

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References

1. C. Stern, *Genetic Mosaics and Other Essays* (Harvard Univ. Press, Cambridge, Mass., 1968).

Amyotrophic Lateral Sclerosis: Summary of a Conference

Amyotrophic lateral sclerosis (motor neuron disease) is a rapidly progressive neurological disease. The disease accounts for 1/1000 of the adult deaths around the world, the same frequency as the more familiar neurological disease, multiple sclerosis. The disease appears between ages 50 and 60 years, with a duration of 3 to 5 years. The majority of the cases are sporadic. However, there are rare families in which a similar disease is inherited as a dominant condition. In addition, there are two geographic foci, Guam and the Kii Peninsula in Japan, where the incidence is many times the expected rate. A group of investigators representing the fields of epidemiology, neurovirology, neurochemistry, neuropathology, immunology, and clinical neurology met at Johns Hopkins University School of Medicine on 27 December 1972 to review the current state of research relative to this disease.

The conference started with a discussion of the clinical criteria for the diagnosis of amyotrophic lateral sclerosis. It became apparent that in a majority of the patients the disease fits the classical forms, such as progressive bulbar palsy, progressive muscular atrophy, and the combined form resulting in involvement of both upper and lower motor neuronal pathways. However, in a significant number of patients, perhaps as high as 20 to 25 percent, the illness does not fit the usual pattern and is aberrant either in manner of clinical presentation or in duration.

Jacob Brody (National Institute of Neurological Diseases and Stroke) reviewed the experience on Guam, where the incidence among the Chamorros is approximately 100 times the expected rate. Ten years of study of the Guamanian population have indicated that the disease process is not inherited in any known genetic pattern. In addition, attempts at linking the disease with any particular toxin, environmental factor, or infectious process have not been successful. In particular, the *Cycas circinalis* (cycad) nut is probably not the factor, because the incidence of the disease has not decreased even though the consumption of this nut as a staple in the diet has virtually disappeared. The high incidence of the disease on Guam is continuing despite changes in environment, standards of living, and diet. It is Brody's feeling that the disease on Guam is typical of amyotrophic lateral sclerosis as it is seen elsewhere, and that the Guamanian population may have genetic susceptibility to an exogenous factor such as an infectious agent. This population is a valuable one for study, particularly in terms of rapid evaluation of any therapeutic measures.

The high incidence of the disease on the Kii Peninsula in Japan was also briefly discussed. Studies of this population have not been as complete as those of the Guamanian population. It was pointed out that these two foci of amyotrophic lateral sclerosis are among the few foci of chronic neurological disease for which the environmental or etiological factors have not been demonstrated.

Richard Johnson (Johns Hopkins) and Clarence J. Gibbs, Jr. (National Institute of Neurological Diseases and Stroke) reviewed the current status of the neurovirological approaches to amyotrophic lateral sclerosis. In particular, the data obtained by Soviet scientists in the early 1960's and their recent follow-up studies were presented by Gibbs, as well as his unsuccessful attempts to confirm the Russian studies. He also reviewed the attempts to isolate an agent by means other than transmission to a primate. These newer methods include explants of human tissue obtained by biopsy or from recent autopsy, inoculation of involved brain into cultures of human fetal brain, and techniques for rescue of latent virus. It was the feeling of Gibbs and others that these techniques should be exploited fully in an attempt to further elucidate the possible infectious etiology of this disease.

Murray Gardner and Earle Officer (University of Southern California) presented a murine model for chronic motor system disease associated with C-type particle viruses. This disease occurs spontaneously in wild colonies of mice caught around farms outside the Los Angeles area. These mice develop lymphoma and also a peculiar form of paralysis, the incidence of both conditions increasing with age. A marked accumulation of viral particles is seen in the anterior horn cells of the animals with paralysis. This is not an exact model of amyotrophic lateral sclerosis, because the human disease has a specific age peak and viral particles are not found in the anterior horn cells of patients. Nevertheless, the murine disease is a slow virus infection that appears to be selectively affecting anterior horn cells, involving the lower part of the cord first.

Fred Wolfgram (University of California at Los Angeles) reviewed his studies of a factor that is found in the serum of patients with amyotrophic lateral sclerosis and causes the destruction of anterior horn cells in tissue culture (*1*). In these studies, slices from the ventral quadrant of the spinal cord in the mouse are cultured for 18 to 21 days, during which the neuronal processes grow out quite luxuriously. The cultures are then exposed to 30 percent serum from patients with amyotrophic lateral sclerosis or from patients with other neurological disease. Neurons die within 3 to 5 days in cultures treated with serum from patients with amyotrophic lateral sclerosis. Wolfgram has not obtained similar results with serum from patients with other neurological diseases. He is now working on further characterization of this cytolytic factor with the hope of devising a simpler assay system for the factor.

A discussion of therapy was initiated by Daniel Drachman (Johns Hopkins), Forbes Norris (Pacific Medical Center), and King Engel (National Institute of Neurological Diseases and Stroke). The many agents which have been tried unsuccessfully in amyotrophic lateral sclerosis were reviewed. Norris reviewed his studies with guanidine which suggest that the percentage of patients in whom the disease progression is slowed or temporarily halted is greater than previously reported for this agent. No claims were made that guanidine is a cure for the disease but only that it may slow the rapid progression. There was considerable discussion about the need for a double-blind study to evaluate guanidine.

The conference ended with a general discussion of potential approaches to therapy. These ranged from antiviral drugs, such as intrathecal interferon, to immune enhancement by means of transfer factor on the one hand and intensive immunosuppression on the other. These antithetic suggestions for therapy indicated to all the pressing need to develop further insight into the possible mechanisms of the disease by exploiting the recent virological and immunological clues.

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References

1. F. Wolfgram and L. Myers, *Science* **179**, 579 (1973).

Forthcoming Events

April

11–14. **Beta Kappa Chi**, scientific honor society with chapters in Black colleges and universities, 50th annual, Lincoln Univ., Oxford, Pa. (R. J. Bonner, Hampton Inst., Hampton, Va. 23368)

14–18. American **Psychiatric** Assoc., Montreal, P.Q., Canada. (B. W. Hogan, APA, 1700 18th S., NW, Washington, D.C. 20009)

15–20. American **Physiological** Soc., Atlantic City, N.J. (O. E. Reynolds, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

23–25. **East Coast Offshore** Symp., 2nd, American Assoc. of Petroleum Geologists, Atlantic City, N.J. (G. C. Grow, Jr., Transcontinental Gas Pipeline Corp., Suite 500, Gateway 1, Newark, N.J. 07102)

26–28. American **Philosophical** Assoc., Western Div., Chicago, Ill. (N. E. Bowie, Hamilton College, Clinton, N.Y. 13323)

26–28. **Sickle Cell Anemia** Symp., Baton Rouge, La. (J. M. Martin, Dept. of Chemistry, Southern Univ., Baton Rouge 70813)

May

1–3. **Industrial Waste**, 28th annual conf., West Lafayette, Ind. (D. W. Hawkins, Room 308, Civil Engineering Bldg., Purdue Univ., West Lafayete 47907)

3–4. **National Information Retrieval** Colloquium, 10th annual, Philadelphia, Pa. (M. Nussbaum, Computamation, 2955 Kensington Ave., Philadelphia 19134)

3–5. Society for American **Archaeology**, San Francisco, Calif. (R. E. W. Adams, Univ. of Texas, Suite 250, 4242 Piedras Dr., San Antonio 78228)

3–5. American Assoc. for the **History of Medicine**, Cincinnati, Ohio. (G. Miller, Howard Dittrick Museum of Historical Medicine, 11,000 Euclid Ave., Cleveland, Ohio 44106)

3–6. Association of **Clinical Scientists**, Tampa, Fla. (F. W. Sunderman, Jr., Univ. of Connecticut, School of Medicine, Box G, Farmington 06032)

3–6. National Assoc. of **Social Workers**, Atlanta, Ga. (C. A. Alexander, NASW, 600 Southern Bldg., 15th and H Sts., NW, Washington, D.C. 20005)

3–7. American **Psychoanalytic** Assoc., Honolulu, Hawaii. (S. Goodman, 3021 Telegraph Ave., Berkeley, Calif. 94705)

3–7. Association for Research in **Vision and Ophthalmology**, Sarasota, Fla. (R. D. Reinecke, Albany Medical College, Albany, N.Y. 12208)

4–6. American College of **Apothecaries**, St. Louis, Mo. (D. C. Huffman, Jr., 5291 Rock Ridge Rd., Memphis, Tenn. 38128)

4–6. **Drosophila Research** Conf., De Kalb, Ill. (S. Mittler, Dept. of Biological Science, Northern Illinois Univ., De Kalb 60115)

4–6. American Acad. of **Psychoanalysis**, Honolulu, Hawaii. (J. Barnett, AAP, 40 Gramercy Park North, New York 10024)

6–11. American Soc. for **Microbiology**, Miami Beach, Fla. (R. W. Sarber, ASM, 1913 I St., NW, Washington, D.C. 20006)

7–9. Rocky Mountain **Bioengineering**