

have shown little or no awareness of these facts.

Frost (Henry Ford Hospital, Detroit) described his quantitative ("morphometric") studies of the internal and external growth and regression of bone under various conditions, emphasizing measurement of the products of cellular activity rather than the osteoblastic and osteoclastic cells themselves; conditions studied included thyrotoxicosis, hyperparathyroidism, Cushing's syndrome, hypophosphatasia, and many others. Frost also tried to elucidate the biochemical relations between physical loads and the internal remodeling of cortical bone.

The papers of Moseley and Frost were discussed by Blumberg (Armed Forces Institute of Pathology) and Simon (Mt. Sinai Hospital), who showed slides illustrating the preservation of bone structure in prehistoric humans and animals under normal and pathological conditions. Simon showed roentgen films of a prehistoric human skeleton from the collection of the Museum of Northern Arizona, in which there were sclerotic lesions in the pelvis that were roentgenographically indistinguishable from lesions in a person now under treatment for Hodgkin's disease.

In closing, the chairman announced that the establishment of a central Registry of Human Paleopathology is now being planned at a major eastern university. The symposium attendance was 91; the proceedings will be published in the *Journal of the History of Medicine*.

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### **Sensory Research Discussion: "Sonar" and Electronic Reading for the Blind**

Problems encountered by the blind since the beginning of time have included difficulty in navigation and inability to read. To a degree these have been overcome by dog guides, the "long cane," braille, and Talking Book. That sophisticated electronic aids may be on the way is indicated by the proceedings of Sensory Research Discussion No. 53 (Massachusetts Institute of Technology, Cambridge, 10 November 1964), where progress in British research on sensory aids for the blind was reported. American and other efforts were reviewed in prior discussions.

John Hancock Davis continues his work at Bradford Institute of Technology to develop a recognition reading machine for the blind which will react audibly to the optical scanning of ordinary ink-print on paper; he hopes to accommodate several type fonts with his machine.

Patrick W. Nye (National Physical Laboratory) is working on a reading process for the blind wherein lines of ordinary print are scanned optically and certain features of the writing are extracted. The processor detects the presence of ascenders, descenders, "x"-height verticals, horizontal line segments, and diagonally inclined segments. These feature-analysis data are used to control a "resonance vocoder" or "parametric artificial talker" (PAT) which emits an audible output that can be learned.

Don Liddle (University of London) is trying to determine human capability in ferreting out an audible, comprehensible signal buried in noise and the speed with which this can be done. The temporal factor in discriminating a signal in noise is relevant to the mobility of blind travelers because more prompt corrective action after sensing faint sounds, echoes, or sound shadows of dangerous objects increases safety.

In regard to the ultrasonic aid for the blind developed by Leslie Kay (Lanchester College of Technology) and being produced by Ultra Electronics, Ltd., J. K. Dupress (M.I.T.) indicated that six metal prototypes are complete. These hand-held, torch-like devices are about 20 cm long and weigh 340 g. Probing the environment with swept-frequency ultrasonic pulses, these "torches" receive energy returned by reflecting objects and produce a signal which communicates information regarding such objects to the blind user. Kay hopes to develop a miniaturized binaural version of his unit.

J. Alfred Leonard (Applied Psychology Research Unit, Cambridge) is compiling data on the abilities of blind persons to steer straight courses. He is also studying ability to balance on a narrow rail, comparing performance by sighted and blind individuals. Leonard hopes to develop an understanding of the contribution of various degrees of partial vision to performance of such tasks and to capability in mobility. He is also working with auditory means for indicating the course for blind students running on an

athletic track. A social survey of the mobility of blind persons in England is also a current project which Leonard hopes will lead to a good base for a long-range research program on mobility of the blind.

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### **Education in Chemistry: United States and Japan**

A United States-Japan conference on chemistry education took place in Oiso, Japan, 16-20 November 1964; the meeting was financed in part by the NSF and the Japan Society for the Promotion of Science. Six Americans and 11 Japanese attended.

The teaching of chemistry at the college undergraduate level was discussed. College chemistry curricula in the two countries were surveyed, with reference to the nature of high school chemistry courses. In Japan, high school chemistry is uniformly controlled by the Ministry of Education, but college curricula vary according to various circumstances; such conditions contrast markedly with those in the United States.

The meeting went on to discuss introductory college chemistry courses; common problems such as teaching techniques in handling large numbers of students and methods of instruction in the laboratory were dealt with. Discussion of the introduction of physical principles such as thermodynamics and quantum mechanics into introductory chemistry courses was especially stimulating; there was common agreement that better ways of uniting the two principles of energy and structure should be sought. Advanced courses in analytical, organic, and physical chemistry were described; suggestions for their rearrangement were made by both Americans and Japanese.

Lastly, the problem of teaching chemistry to nonscience students was dealt with. Reports on experiments were made by both teams; there was universal agreement that such courses should be limited in breadth and greater in depth and perception, rather than the reverse. Various specific recommendations were made to agencies of both governments.

The American delegation consisted