for the movement of water and solutes and for the observed electrical potentials. The movement of water and of large and small molecular solutes of the corneal stroma was discussed by David Maurice of London, England. The high degree of reversible swelling of the cornea was shown by birefringence studies to be mainly confined to the ground substance. The ensuing discussion tangibly demonstrated the interest and the challenge presented by these reports.

In the last session, on pathology and aging, Leon Sokoloff presented an erudite analysis of aging of cartilage in osteoarthritis of various joints, illustrated by ingenious experimentation on the mechanics of compression of cartilage. This was followed by a presentation on the chemical changes in the mucopolysaccharides of cartilage and other tissues by Karl Meyer. The discussion of these papers brought forward many valuable suggestions and critiques.

It may be said in summary that the conference was successful. It neither exhausted the problems nor proposed final solutions of the many perplexing phenomena discussed, but the exchange of ideas which took place was an important accomplishment.

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Nuclear Medicine

Rapid growth and change in the use of radiopharmaceuticals have taken place over the last 5 years. In his opening lecture at the symposium on clinical applications of nuclear medicine (Shaker Heights, Ohio, 30–31 October 1964), Paul Numerof, of Squibb Institute, attributed this growth to the search for isotopes which will give maximum information to the physician and reduce radiation to the patient.

Short-lived isotopes were discussed at the symposium by William Myers (Ohio State University). Emphasis was placed on these isotopes primarily because with their use patients will receive less radiation. Secondly, scanning can be done in a shorter length of time and can be repeated at frequent intervals to study rapidly changing physiological functions. Also, because greater quantities of a short-lived isotope can be safely administered, counting accuracy will be improved.

George Taplin (University of California, Los Angeles) presented work done with macroaggregates of labeled albumin for lung scanning. The radioactive particles are temporarily retained in the lung capillaries. The scan image of the lung represents the pattern of the arterial blood flow. Tumor, embolus, pneumonia, emphysema, and infarct have been successfully diagnosed by scanning. Chest x-rays are essential in order to interpret correctly the lung scan.

N. David Charkes (Albert Einstein Medical Center) pointed out that scanning offers certain advantages in diagnosing renal disease. It is especially essential in patients suspected of having a renal disease who are allergic to iodides. This procedure was first demonstrated in 1960 with chlormerodrin-Hg^{203}. The iodinated agents which had been used prior to this were not retained long enough to give good results. The renal scan can confirm the presence of some common renal anomalies, such as space-occupying lesions, cysts, and tumors. Cysts and tumors, generally, are difficult to differentiate. Slight irregularity in outline and lower isotopic concentration indicate tumor.

Brain scanning has been studied for 17 years. Recent applications of this procedure were presented by Bertram Selverstone (New England Center Hospital). A frequent problem in brain scanning is that of locating tumors below the surface. An accuracy of 100 percent has been established in the diagnosis of meningiomas, as well as of astrocytomas, by the use of radioisotopes. When there is question of infarct, scanning should be repeated for confirmation.

D. Bruce Sodee (Doctors Hospital) discussed pancreatic scanning in which the Se^{75}-labeled selenium analog of methionine was used. With this agent and proper technique, excellent information on the pancreas has been obtained. The pancreas was visible in 90 percent of the patients scanned. Uptake of Se^{75}-labeled SeMe in damaged tissue is decreased much in the same way as that of I^{131} in cases of thyroiditis. In tumors this compound is not concentrated as it is in normal tissue. Therefore the tumor appears as an irregular area which has no radioactivity. Of tests on 185 patients, two were falsely positives and one was falsely negative.

Study of the parathyroid gland by means of radioisotopes is limited because of the small size and the variable anatomical location of the gland. E. James Potchen (Peter Bent Brigham Hospital) presented in the final lecture his experience in developing a technique of examining this organ. The tracer used is Se^{75}-labeled SeMe. For this technique to be successful, the activity of the thyroid gland must be suppressed. This is accomplished by administering cytomel 4 days prior to scanning. For proper interpretation of the results, four successive scans should be made and then integrated by superimposition. The results of this procedure have been encouraging.

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Bioclimatology

Eight American and 11 Japanese physiologists, meeting at Sapporo, Japan, 4–7 November 1964, discussed bioclimatology and the possibility of joint investigations of some of its problems. The seminar was sponsored by the U.S.–Japan Cooperative Science Program and accommodated by the Hokkaido University School of Medicine.

In the first session, on fundamental concepts, F. Sargent (University of Illinois) discussed the thesis that bioclimatological theory as applied to humans must be developed from the ecological viewpoint; the fundamental concept is that of fitness of the ecosystem, an extension of L. J. Henderson's "fitness of the environment." He suggested that circadian and seasonal variations of human physiology are instances of biological fitness. Examining the problems of seasonal variation in illness, he advanced the hypothesis that there is a "normative ecosystem"; departures from this system explain seasonal variation of illness and elucidate problems of "environmental health." Sargent suggested that racial variation in physiological adaptations likewise accord with this ecological concept.

D. H. K. Lee (U.S. Public Health Service) developed the ecological

theme further. According to him the problems of environmental health are ecological problems, the consequences of an interplay of environmental stresses acting on man. To attack these problems an interdisciplinary approach is demanded, ranging from analysis of environmental variables, through physiological reactions to the incident stresses, to potential pathological and clinical results. Health and illness were viewed as a continuum of events in the life sequence. Lee pointed out that bioclimatology emphasizes the role of weather and climate in determining the stress pattern and the reactivity of the individual.

In a session devoted to functional and biochemical changes provoked by exposure to heat and cold, E. J. Masoro (University of Washington) discussed energy and intermediary metabolic events in cold-induced thermogenesis in which shivering does not occur, concluding that there is no simple biochemical explanation of the phenomenon. Alternatives considered were an increased electron transport related to a decreased phosphorylative efficiency, and an increased utilization of adenosine triphosphate without a rise in net work-yield. Neither mechanism accounts for all the facts. R. E. Smith (University of California, Los Angeles) presented evidence that the multilocular brown adipose tissue of mammals contributes significantly to thermoregulation as a thermal multiplier with positive feedback. S. Itoh (Hokkaido University) reported that administration of hypertonic saline to rats impairs their capacity to make appropriate physiological adjustments when exposed to cold. Because this effect did not appear to occur in neurohypophysectomized rats, studies were made of vasopressin, injections of which also impair cold acclimation. Activity of the adrenal cortex and of the thyroid is likewise impaired by hypertonic saline. A. Arimura (Hokkaido University) discussed the role of the neurohypophysis in thyroidal activation during exposure to cold. At physiological levels, vasopressin appears to suppress rather than increase the output of thyroid-stimulating hormone (TSH). Normal rats exposed to cold exhibit a biphasic response with respect to production of serum TSH; that is, an initial rapid increase and a slow fall in production of TSH is followed by a prolonged increase. In neurohypophysectomized rats the initial burst of TSH secretion is suppressed.

Of methods of collecting sweat for determining the rate of sweating and the chemical composition of sweat, the deposition of sweat capsules on filter paper is the most reliable, according to K. Ohara (Nagoyo City University Medical School), who spoke during the third session that dealt with eccrine sweating and insensible perspiration. He demonstrated marked differences in sweat rate and in chloride content of sweat from persons from different regions. He had discovered persistent and distinctive individual differences, and could identify four types according to latency of sweating, maximal sweat rate, and chloride concentration. In general, there is an inverse relation between chloride concentration in sweat and tolerance for cold as defined by H. Yoshimura. K. Takagi (Nagoya University) described the relation between thermal sweating and depth of sleep; his results suggested that thermal sweating during sleep depends on the excitability of cortical inhibitory centers and of diencephalic excitatory centers. Because the electroencephalogram (EEG) may not reveal the true depth of sleep, simultaneous recordings of cortical EEG and sweating may serve as a useful index of the excitatory state of the diencephalon.

S. Robinson (Indiana University) reported observations on the relations between sweating, cutaneous blood flow, and body temperature during work; continuous measurements were made on working men of temperature in femoral vein, long saphenous vein, and gastrocnemius muscle, of rectal, tympanic, and skin temperatures, and of the sweat rate. The onset of sweating, its rate of increase, and the decline during recovery more closely paralleled the temperature of the femoral vein than of the other sites. In experiments in which the work metabolism and rectal temperature were constant and ambient temperature changed, the sweat rate, skin temperature, and mean body temperature varied directly and the gradient between core and surface varied inversely with the increments of ambient temperature. When the ambient temperature was constant, the central temperatures and the sweat rate varied directly with the work rate. The observations suggest that the regulation of the sweat rate involves the integration of a number of factors; no single thermal transducer can account for the response measured.

K. Ogata (Kumamoto University), who spoke at the session on body temperature regulation and the nervous system, developed an engineering model which may explain the central mechanisms of thermoregulation in hot and cold environments. L. Irving (University of Alaska) reviewed the heterothermous operations of mammals living in cold climate. The conduction velocity of peripheral nerves was measured both *in situ* and after excision; conduction persisted to 5°C, but the velocity was reduced 20- to 30-fold. In spite of the fact that signaling by frequency modulation from cold extremities was much reduced, the heterothermous tissues appeared to be normally integrated with the warm remainder of the organism.

In the fifth session, devoted to acclimatization, F. Sargent reported that, although females sweat at lower rates than males, they develop rectal temperatures during work in moist heat which are not significantly different from those of males. Metabolic rates of the two sexes are also comparable. He suggested that such facts support the working hypothesis that females exhibit greater precision of physiological regulation than do males. D. B. Dill (Indiana University) presented observations that suggest that age influences such physiological processes as changes in hemoglobin concentration and blood volume with altitude, the course of physiological events during the early period at a new altitude, the concentration of chloride in sweat, and the relation between chloride concentration and sweat rate; between 10 and 70 years of age, for example, there is progressive increase in the chloride content of sweat. H. Yoshimura (Kyoto Prefectural University of Medicine) reviewed the major problems relating to metabolic changes that occur during exposure to seasonal heat and to hot atmospheres and discussed work in progress that may elucidate the neuroendocrine mechanisms involved. H. Tatai (Institute of Public Health) presented evidence supporting the view that acute exposure to cold stimulates both pituitary-adrenocortical and sympathetic adrenomedullary systems, whereas acute exposure to heat does not effect either system. L. D. Carlson (University of Kentucky) discussed the need for

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standardization of tests, measurements, and criteria used in studying cold acclimatization. T. Sasaki (Kumamoto University) analyzed the conflicting data on seasonal variation in basal metabolism. Japanese investigators concur that metabolism is higher in winter than in summer; American investigators report less or no seasonal change. Composition of the diet was shown to play a major role in these differences: as the intake of carbohydrate decreases and that of fat increases, the annual range of metabolism narrows.

As for the planning of cooperative research (the sixth session), the most significant feature of the seminar was the unanimous desire to explore problems identified through joint investigations. It was agreed that bioclimatologists must study the adaptability of living organisms in an ecological context, for the environment of the organism includes much more than the atmosphere. The adaptability of man is the result of biological processes as much as of cultural ones.

Broad areas in which there was deep interest in developing specific joint research proposals included: (i) adaptability of the Ainu of Hokkaido, and (ii) bioclimatological studies of problems in human ecology, such as physiological regulations in various population groups, the impact of changing culture on biological processes, and medical aspects of human ecology (air pollution and seasonal and regional variation of disease). Investigations of comparative animal physiology and of plant environmental physiology will also be invaluable.

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Forthcoming Events

February

17–19. American Acad. of **Occupational Medicine**, annual, Columbus, Ohio. (G. M. Hemmett, AAOM, Eastman Kodak Co., 343 State Street, Rochester 4, N.Y.)

17–19. **Solid State Circuits**, intern. conf., Inst. of Electrical and Electronics Engineers, Philadelphia, Pa. (R. Emberson, IEEE, Box A, Lenox Hill Station, New York. N.Y. 10021)

17–21. American College of **Cardiology**, annual, Boston, Mass. (Executive Director of the College, Empire State Building, New York, N.Y. 10001)

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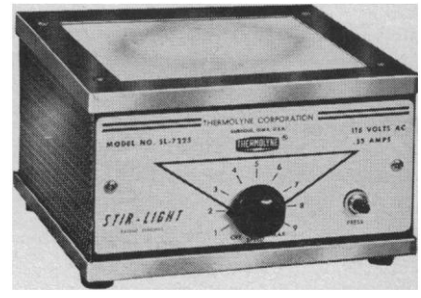

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