which may be of genetic origin. Much discussion was devoted to atherosclerosis (natural and experimental) in primates as well as other animals.

R. W. Wissler (Chicago) discussed experiments in which Rhesus monkeys on an average American diet exhibited higher levels of cholesterol and more atherosclerosis than monkeys on a "prudent" diet with decreased quantities of fat, carbohydrate and cholesterol and less saturated fat. Wissler has also been able to accelerate development of atherosclerosis in Rhesus monkeys by feeding them a commercial monkey ration supplemented with 25 percent fat consisting of a ratio of one to one mixture of coconut oil and butter oil and containing 2 percent cholesterol. S. B. Andrus (Boston) reported that spontaneous atherosclerosis is prevalent in the chimpanzee. T. B. Clarkson (Winston-Salem) reviewed the pathologic characteristics of atherosclerosis in New World monkeys and stated that squirrel (*Saimiri sciureus*) and spider (*Ateles sps*) monkeys exhibit spontaneous atherosclerosis. The latter breed of monkey seems especially well suited for experimental work because of size (8 kilograms at maturity) and a willingness to eat experimental diets.

The most striking report in the area of experimental atherosclerosis in nonprimates was that of H. Malmros (Lund, Sweden) who showed that it is possible to induce atherosclerosis in dogs by feeding them a semisynthetic diet free of thiouracil and containing cholesterol and hydrogenated coconut oil. Dogs had hitherto been considered resistant to atherosclerosis induced by cholesterol. Another major topic of discussion was the use of pharmaceutical agents for lowering levels of lipids and thus possibly reducing mortality from cardiovascular disease. G. Schettler (Heidelberg, Germany) and C. J. Miras (Athens, Greece) noted the pharmaceutical armamentarium available to the clinician. Drugs currently in use are nicotinic acid, β-pyridine carbinol, D-thyroxine, and p-chlorophenoxy isobutyric acid (CPIB). The two last named compounds may be used together since the former has a greater effect on serum levels of cholesterol and the latter on levels of triglyceride. It was stressed that all currently available drugs must be administered under strict medical supervision. Miras also suggested that diet may still be the best hypolipemic therapy. G. Schlierf (Heidelberg, Germany) advocated vigorous exercise as a means to lower levels of lipids, to improve cardiac performance, and to increase formation of collateral circulation.

T. Shimamoto (Tokyo, Japan) reported on the dramatic improvement observed in patients with Buerger's disease who were treated with pyridinol carbamate (1 gram daily). There was an increase in arterial pulsation and prolongation of claudication time within 2 weeks. In patients who were being treated for longer periods (1 to 10 months), there was evidence of the opening (partial or complete) of occluded arteries. This drug has also caused regression of preestablished atheromata in rabbits.

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Earthquake Prediction

An increasing interest in the subjects of earthquake mechanism and earthquake prediction was demonstrated by Japanese and U.S. geophysicists at the second Conference on Research Related to Earthquake Prediction held under the auspices of the U.S.–Japan Cooperative Science Program at the Lamont Geological Observatory of Columbia University in Palisades, New York, 6–10 June 1966. Although precise prediction of size, time of occurrence, and spatial location of earthquakes is not yet possible, the conference demonstrated that there are many topics for research which offer the hope of providing information of value for prediction.

At the opening session, T. Hagiwara (University of Tokyo) described the 5-year Japanese research program on earthquake prediction. This program is already under way and includes measurement of crustal strain through the use of tide gauges, geodetic surveying techniques, strain meters, and tiltmeters. Seismic activity is determined for shocks of all sizes including the ultramicroearthquake range, and observations are made of changes in seismic velocity, of heat flow, and of the geomagnetic field. Also included in the program are studies of relevant rock properties under laboratory conditions.

F. Press (MIT) described the proposed 10-year U.S. program which differs from the Japanese program more in emphasis than in content. The U.S. program focuses a massive instrumental and systems effort on an area of the country likely to experience a major destructive earthquake and one which is reasonable logistically, the San Andreas Fault zone of California. Some emphasis would also be placed upon the Alaskan and Nevadan seismic areas. The U.S. program had not been funded at the time of the meeting.

New seismograph systems described range in size from the 525-sensor, 125-mile diameter LASA installation in Montana (P. Green, MIT) to a high-frequency, high-gain, self-powered instrument (P. Pomeroy, Columbia University) suitable for backpacking into remote areas for study of microearthquakes. I. Iida (Nagoya University), T. Asada (Tokyo University), and D. Tocher (ESSA) described more elaborate multicomponent systems for precise location and for other types of investigations of microearthquakes. T. Rikitake (Tokyo University) and S. Breiner (Stanford University) reported on magnetometers for measuring differences in the geomagnetic field at two stations separated by a few kilometers. The purpose of such devices is to separate the locally induced portion of the geomagnetic field from the rapidly varying regional field. K. Kasahara (Tokyo University) and R. Hofmann (California Department of Water Resources) described electronic distance measuring devices and their application. In California such measurements indicate that fault creep of the order of several centimeters per year is occurring along the San Andreas fault system and agree with the geodetic results for that area reported by B. Meade (USC&GS) and with direct creep measurements described by D. Tocher (ESSA). Hofmann found some indication of a change in rate and sometimes sense of fault movement preceding California earthquakes.

Kasahara opened the discussion of the most unusual earthquake swarm at Matsushiro as he described measurements of earth strain which agree with the stress system deduced from seismic data. Strains as high as 20×10^{-6} per month were observed. Hagiwara presented information on the

seismicity of the Matsushiro swarm which began in August of 1965 and continued through the time of the meetings. During the period of highest activity, April-May 1966, hundreds of shocks were felt each day (seven hundred on two occasions) and many thousands of shocks per day were recorded instrumentally. The largest shocks are of magnitude about 5, but the total energy involved in the entire series of shocks is approximately equivalent to that of an earthquake of only magnitude 6. Observations of tilting in the area showed general agreement with the seismic activity and, in a few cases, a change in tilt prior to an earthquake of large magnitude was indicated. Local anomalous changes in the geomagnetic field of the order of 10 γ and in earth currents appear to be associated with the large earthquakes. There is as yet no conclusive evidence on the cause of the Matsushiro swarm. One hypothesis relates the observations to magmatic activity in the crust, the other to tectonic forces within the area. Although the activity during the meetings was less than it had been during April and May, it remained high and there was no indication of imminent conclusion or cessation.

T. Tsubokawa (Tokyo University) described crustal movements associated with large earthquakes and determined by leveling or from sea-level data. Some years before the destructive Niigata earthquake, anomalous changes in the rate of change of elevation of certain bench marks were observed. Hagiwara read a paper by C. Tsuboi (Tokyo University) which considered energy release in Japan as a function of time. Large earthquakes occurred when the stored energy was high and not when it was small.

Several speakers directed their attention to the Alaskan earthquake of 1964. G. Plafker (USGS) presented the geological setting and data on uplift (as much as 15 meters) and subsidence accompanying the earthquake. The available geologic evidence indicates areas of net long-term (over 1000 years) uplift or subsidence that broadly coincide with the areas in which uplift and subsidence occurred during the 1964 earthquake. In the uplifted area, vertical movements occurred as a series of several upward pulses that were separated by intervals of stability or subsidence. In Prince William Sound a period of subsidence preceded the earthquake of 1964. T. Matumoto (Columbia University) reported that microaftershock activity occurred mostly in the uplifted block and at depths less than 30 kilometers. Secondary aftershock sequences were rare. Meade reported large lateral displacements, possibly as much as 70 feet, determined by geodetic surveying of the Alaskan area.

The California-Nevada area, which includes most of the seismicity of the conterminous United States, was discussed by several speakers. L. Pakiser (USGS) described activities by the U.S. Geological Survey in that area. Such activities include geologic studies of the rocks of all ages, geomorphic studies of Recent features, engineering geology studies, and various geophysical studies. Emphasis is placed on the San Andreas fault zone. C. Allen (CIT) described the relation between seismicity and geologic structure in the area. While most large earthquakes have been associated with major faults, smaller earthquakes are spread more randomly through the region. A. Ryall (University of Nevada) presented maps of tectonic flux for the western United States for two intervals of time. These indicate that gaps in the seismicity pattern are filled in by large earthquakes and that areas of seismic activity shift with time. D. Slemmons (University of Nevada), in a study of fault scarps of prehistoric origin, found that seismic activity had occurred over a much wider area than recent data suggest. Tocher reported recent studies of fault creep in California, where new areas of creep are currently being discovered at an unexpectedly high rate.

M. Major (Colorado School of Mines) and Pakiser reported on the Denver earthquake swarm which is almost certainly related to the pumping of fluid into a deep hole. This occurrence is the only known case, except for those involving explosions, where substantial seismic disturbances are created artificially, at least in part. J. Eaton (USGS) described seismic and strain measurements on Kilauea volcano and their relation to prediction of eruptions. J. Rinehart (ESSA) noted the relation between local seismic activity and the eruptions of geysers in Yellowstone National Park. S. Suyehiro (Japan Meteorological Agency and DTM, Carnegie Institution) presented tests of his hypothesis for identification of the foreshock series for two cases. The slope of the frequency-magnitude curve was less during the foreshock series than at other times.

Special studies using statistical techniques and high-speed computers were described. E. Herrin (Southern Methodist University) spoke on improved epicentral locations, K. Kasahara on a model of seismic activity, and J. Kuo (Columbia University) on the application of extremal statistics to maximum magnitude earthquake prediction. L. Sykes (Columbia University) discussed the spatial distribution of shocks in island arcs, in Alaska, and along mid-oceanic ridges, and B. Isacks (Columbia University) reported on the temporal distribution and focal mechanism of shocks in the Tonga-Kermadec-Fiji area. C. Kisslinger (St. Louis University) emphasized the importance of studies in areas in which the seismicity is normally low but which might experience a very large shock, as was the case in the New Madrid area of Missouri.

Laboratory results of K. Mogi (Tokyo University and MIT) indicate that foreshocks and anomalous changes of strain will frequently precede large earthquakes. D. Griggs (UCLA) acknowledges the shear fracture or stick-slip mechanisms to depths of about 100 kilometers under the assumption of dehydration of hydrous minerals, and proposes a composite mechanism involving creep heating, water weakening, and shear melting for deep-focus shock. Experiments by W. Brace (MIT) show large changes in conductivity of rocks prior to fracture, changes far larger and hence probably easier to measure than the changes in the compressional velocity of rocks under high stress. Y. Kato (Tohoku University) discussed piezomagnetic effects on rocks under stress, including some field observations of changing fields during large earthquakes. Slemmons discussed possible applications of remote sensing to earthquake prediction, and O. L. Anderson (Columbia University) presented conditions for the existence of low-density zones in the mantle.

H. Miki (Kyoto University) discussed observations of microearthquake activity made by networks of stations in Japan. Three methods of location—P-arrival times, S-P intervals, and tripartite times—were used. There was

some indication that the S-P method was superior in at least some cases. J. Oliver (Columbia University) described a method for studying spatial variations in activity with very lightweight, portable, high-gain, high-frequency seismographs, and presented results for areas in Nevada, Tonga-Fiji, and Alaska. J. Brune (CIT) applied the same method in southern California to determine spatial variation in activity associated with the San Andreas Fault. Iida presented a formula for determining magnitudes of shallow near earthquakes and microearthquakes, and discussed the relationship between magnitude and frequency of occurrence for microearthquakes.

The meetings were followed by field trips for the Japanese delegation to the Ogdensburg (New Jersey) seismograph station of the Lamont Geological Observatory and to areas of Nevada and California exhibiting recent faulting and other geological features related to earthquake activity.

Summaries and discussions of papers will be available in more complete form in a publication currently in preparation.

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Pediatric Outpatient Department

Service to patients is, as it has always been, the primary function of pediatric outpatient departments. In recent years, however, it has become increasingly apparent that outpatient departments have a unique opportunity to identify significant trends and problems which need to be studied, to initiate research, and to apply in practice the findings of this research.

How the outpatient department can most effectively fulfill this new role was the focus of a conference on Conceptual and Methodological Approaches to Research in Pediatric Outpatient Departments, held in Washington, D.C., 13–14 December 1965. Pediatricians and behavioral scientists considered what these disciplines can contribute to and learn from each other.

Clinical observation, the group said, has led to most of the significant theories developed by behavioral scientists. Studies involving single cases and small groups can provide important knowledge about developmental psychology. The physician, trained in precise description of medical conditions, can apply the same approach to delineate the types of information needed in behavioral studies. One of the most important functions of the physician dealing with the outpatient is to make the "natural experiment," (for example, a blind infant) known to and available to behavioral scientists who must otherwise rely almost entirely on animal experiments for observation of certain types of variables.

The pediatric outpatient department is particularly well suited for two types of research—identifying the questions that need study while developing new ways to improve the clinic's effectiveness in dealing with problems frequently encountered, and notifying other disciplines and research facilities about problems that need study but are too complex to be pursued in the outpatient department. Efforts should be made to utilize more fully the potential of outpatient department research in training medical students.

Several participants reported on recent or current studies in outpatient departments. Pediatricians Morris Green (University of Indiana Medical Center) and Sally Provence (Child Study Center, Yale University) reported a "clinical hunch" based on symptoms observed in 25 children whose mothers reported having experienced moderate to severe depression after childbirth. Their clinical findings suggest that possible correlations between maternal depression periods after childbirth and certain psychological and behavioral problems in their children should be explored further. Among questions needing clarification, the conference group suggested, are how the mother's manner of caring for the child supports or impedes the child's development; how particular kinds of children influence parental care; what more effective forms of support can be given the mother during the crucial period after birth; how depressed mothers and their children interact at various stages; and what effects these interactions have on subsequent behavioral development.

Studies suggest that a baby born out of wedlock is sociologically and psychologically handicapped. The child is born at high risk from the standpoint of morbidity and mortality (Loren MacKinney, pediatrician, and Robert Wilson, sociologist, of the Memorial Hospital of North Carolina). Joint medical, social, and psychological studies are essential to identify the variables most closely associated with illegitimacy, to test hypothetical causal chains, and to develop controlled prospective experimental programs of intervention to reduce the high risk factors.

Reporting on a comparative developmental study of blind and sighted twins, Arthur Parmalee (Medical Center, University of California) and Peter Wolff (Judge Baker Guidance Center, Boston) suggested numerous areas of cognitive development of the visually handicapped which have been inadequately explored. They recommended investigations of the ways that normal and blind babies communicate with their mothers during the first 4 or 5 months of life, and of the kinds of touch, sound, and movement stimulation that are most effective in encouraging development and independence. The group raised many provocative questions about how the blind child generates an abstract concept of far space versus near space; what his understanding of object and constancy is and how this affects his ability to differentiate between self and non-self; and how the blind child initiates social relationships since he has no way of knowing who is approaching.

Barbara Korsch (Children's Hospital, Los Angeles) described a study now under way to determine what elements of interaction between physician and patient in the outpatient setting significantly affect outcome. The high level of noncompliance with medical instruction appears to indicate a breakdown in doctor-patient communication in individual, nonsustained encounters. A central question, the group suggested, is what factors modify the patient's perception of the information and advice he has received to the point that it becomes defective.

Research in the outpatient department is not only important in advancing general scientific knowledge but it also has many direct implications for better service in the outpatient department. Both financial and administrative support are needed for creative interdisciplinary studies in the unique laboratory setting provided by the outpatient department.

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