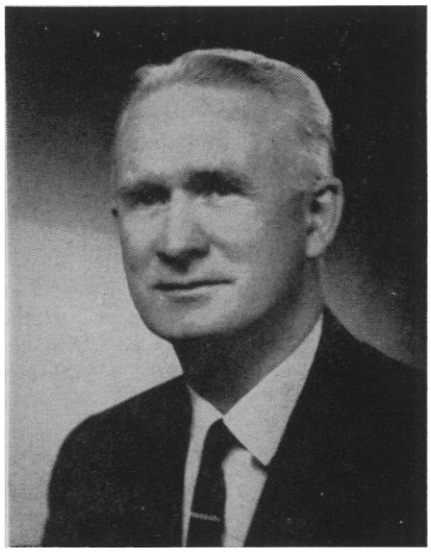

Walter H. Zinn

Alvin M. Weinberg

can help police disarmament." Then he suggested that atomic-weapon scientists of all countries be brought together to work on methods of detection. He proposed that they be offered a reward of $1 million for reporting any violation of a test ban.

Fourth Berkeley Symposium on Mathematical Statistics and Probability Announced

The Statistical Laboratory of the University of California, Berkeley, announces its fourth symposium, to be held over the 6-week period, 20 June–30 July. The Berkeley symposia, which began in 1945, are organized at 5-year intervals and are meant to present cross sections of contemporary research in probability and statistics and in various fields of application of these two disciplines. The proceedings of the first three symposia were published by the University of California Press. Reflecting the growth in the theory of statistics and of probability and also the unprecedented expansion of their applications, these proceedings increased in size from 505 pages for the first symposium to 1069 pages for the third. The proceedings of the fourth symposium are expected to be even more voluminous.

The program of the fourth symposium has been arranged with the active participation of an advisory committee composed of delegates of the American Mathematical Society and of the Institute of Mathematical Statistics. Financial support was obtained from the National Science Foundation, Office of Naval Research, Office of Ordnance Research, Air Force Office of Scientific Research, and National Institutes of Health.

The program lists 116 separate papers. The subject matter of these papers falls under four main headings: theory of probability, theory of statistics, applications to physical sciences, and applications to biology, including problems of health.

The emphasis is on theory. Papers on probability are mostly concerned with stochastic processes of various types. Briefly, these are mathematical models of chance phenomena developing in time or space, or in both, in which the occurrence of an event at one point affects the probabilities of occurrence of various possible events at other points. For example, John Doe, a sixth-grader in New York, and Michael Smith, a sixth-grader in San Francisco, are both exposed to the risk of contracting measles this summer; if John Doe gets measles in May, the chances that Michael Smith will get measles in June will be slightly increased. Thus, the mathematical model of epidemics is a stochastic process.

The main subject of papers on statistical theory is the determination of optimal rules of behavior, or of decision-making, under conditions of uncertainty.

The theoretical papers to be presented at the symposium are too specialized to be intelligible to the general public. In fact, some of the titles may appear bewildering. "Almost sure nonderivability everywhere of sample curves of Brownian motion" is one example. "Optimal stopping rules and semi-martingales" is another. However, abstruse as these titles may seem, the studies of the subjects concerned have a profound influence on a great number of domains of scientific research of general interest. These are reflected in papers dealing with the applications.

Applications to Biology and Health

The applications to biology and problems of health to be discussed at the symposium include applications in the study of carcinogenesis, population dynamics, epidemiology, mechanism of drug action, and cellular phenomena. In each of these phenomena there is unpredictability of single occurrences combined with certain regularities in frequencies. Whether John Doe or Michael Smith will actually be ill with measles this summer is unpredictable. On the other hand, the frequency of occurrence of cases of measles exhibits a regularity which is one of the subjects of probabilistic and statistical study of epidemics.

The common feature of probabilistic and statistical research in the various fields of application is that efforts are made to guess the structure of the chance mechanism of the phenomena studied. This structure is represented by a combination—occasionally a very complex combination—of several simple chance mechanisms, comparable to a toss of a coin.

If one takes under consideration only one or two manifestations of a biological phenomenon—such as, for example, the age-specific death rates from cancer—the problem of a hypothetical chance mechanism reproducing the observations may not be too difficult. Essentially, this particular problem reduces to the so-called problem of curve fitting. However, its solution need not be very interesting. The really interesting and important problem of carcinogenesis is the construction of a comprehensive chance mechanism, involving elements identifiable in biological studies. The consequences of this mechanism must agree with a great variety of different manifestations of the phenomenon.

With reference to carcinogenesis, to which a considerable number of papers will be devoted, these manifestations include not only the age-specific rates but also the dependence of these rates on doses and on the methods of administering various carcinogens, the

variability in size of tumors observed at different times, the speed of their growth, and so forth. The theories to be discussed range from one- and two-step mutation theories, to cumulative processes, to virus carcinogenesis. Since the development of cancer is essentially the process of growth of a population of cells of a particular kind, all theories of carcinogenesis tie in with population dynamics and with problems of epidemiology. Mathematically, all these problems are concerned with stochastic processes of a particular kind.

Applications to Physical Sciences

Physical-science applications of statistics and probability to be discussed at the symposium include certain occurrences in cloud chambers, stochastic theory of precipitation, and problems of astronomy. In the latter category, several papers originating in England deal with the chance mechanism of losses of comets. The mechanism contemplated is particularly interesting because it involves not only kinematical considerations, which are comparatively easy to deal with, but also dynamics. Other papers on astronomy deal with the realm of galaxies. Here, one of the problems treated consists in discriminating between two alternative hypotheses regarding the nature of systems of galaxies: double galaxies and clusters. According to one hypothesis these are stable dynamical systems. According to a more recent hypothesis, members of such systems fly apart, possibly as a result of a cataclysmic explosion.

Special Events Planned

Special events at the symposium will include a commemorative session for the recently deceased Russian probabilist A. Y. Khinchin, whose works exercised and still exercise a strong influence on research all over the world. The speakers at this session will be J. L. Doob and E. Montroll from this country and B. V. Gnedenko from the U.S.S.R.

Another special session is planned to honor Harold Hotelling, the Nestor of statisticians in the United States. A jubilee volume published by Hotelling's admirers will be presented to him.

In line with the rapidly spreading use of high-speed electronic computers in the course of statistical studies of natural phenomena, arrangements are being made by the International Business Machines Corporation for demonstrations of the effectiveness of two of its machines, the 701 and the 704, on the Berkeley campus of the University of California.

Symposium's International Character

The fourth Berkeley symposium will differ from its predecessors in its international character. The first symposium of 1945 was a purely American meeting. At the second symposium, 5 years later, there were eight contributions from abroad. At the third symposium, in 1955, this number grew to 12. Now the program lists 47 papers promised from abroad, 40 percent of the total. The geographical distribution is as follows: 11 papers from England; eight from the U.S.S.R.; four from Sweden; three each from Belgium, France, Hungary, and Poland; two each from Czechoslovakia, Denmark, and Japan; and one each from Australia, Canada, Germany, India, Israel, and Italy.

It is hoped that with this world-wide distribution of invited participants, the symposium will reflect adequately the current status of probability and statistics on this planet. Also, the interchange of ideas on common subjects of study, approached at different points of the globe and inevitably by different methods, holds excellent promise of speedier progress in research. Thus, unless the intricacies of the present political situation interfere, the organizers of the fourth symposium look forward to seeing useful and far-reaching results from this truly international effort at intellectual cooperation.

J. NEYMAN

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Nubian Archeological Expeditions

Froelich Rainey, director of the University of Pennsylvania Museum, has undertaken a special trip to the United Arab Republic and the Sudan to plan a joint archeological expedition with W. Kelly Simpson of the Peabody Museum at Yale University. The proposed expedition will be made under the auspices of UNESCO's project to preserve the archeological treasurers of Nubia which are threatened with inundation as a result of construction of the High Dam at Aswan.

Accompanying them is Mrs. H. Gates Lloyd, member of the U.S. National Commission for UNESCO and chairman of its special committee which explored the possibilities of U.S. support for the Nubian project. Rainey is a vice-chairman of the newly formed U.S. Committee for the Preservation of the Nubian Monuments. The party plans to visit Aswan and subsequently to ascend the Nile by boat to investigate archeological sites.

The Oriental Institute of the University of Chicago has also announced plans for a program of excavations and documentation in the area. A committee to administer a 5-year project has been formed under the directorship of Keith C. Steele, who is now in Egypt conferring with officials and inspecting sites.

Additive Report Released by Science Advisory Committee

The following excerpts (see page 1581) are the major recommendations from a recent report on the use of chemicals and drugs as food additives that was prepared by a special panel of experts convened by the President's Science Advisory Committee. Findings of the study were approved by the President's Special Assistant for Science and Technology, George B. Kistiakowsky.

. . . Under the Food Additives Amendment of the Federal Food, Drug, and Cosmetic Act, the Secretary of the Department of Health, Education, and Welfare may establish regulations prescribing, with respect to one or more proposed uses of the food additive involved, the conditions under which the additive can be used. The Act provides, however, that no such regulation shall be issued if a fair evaluation of the data before the Secretary fails to establish that the proposed use of the food additive, under the conditions of the use to be specified in the regulations, will be safe. Accordingly, the Food and Drug Administration has an area of administrative discretion in determining the safety of food additives under conditions of proposed use.

This area of administrative discretion has recently been greatly narrowed in those cases where a new food additive is a possible carcinogen. In 1958, Congress enacted the Food Additives Amendment of the Food, Drug, and Cosmetic Act. Section 409 (c) (3) . . . of the Amendment states that "no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is