Scientific Meetings

Biometric Techniques in Biology

An international symposium on "The role of biometric techniques in biological research" met in Campinas, Brazil, 4–9 July. The Biometric Society, which forms the Biometric Section of the International Union of Biological Sciences, sponsored the symposium; an organization committee under the chairmanship of W. G. Cochran planned the program; the Seminario de Estatistica da Universidade de São Paulo, of which C. G. Fraga is secretary, handled local arrangements; and the University of São Paulo was host. Registration totaled 98, with 62 from Brazil, 8 from other Latin American countries, 14 from the United States, 12 from Europe and the United Kingdom, and 1 each from India and Japan.

Following an address of welcome by R. Cruz Martins, secretary of agriculture for the State of São Paulo, the scientific program opened with the presidential address by W. G. Cochran (Johns Hopkins) on the 1954 poliomyelitis trial of the Salk vaccine in the United States. Cochran compared the relative incidence of paralytic poliomyelitis among second-grade children in the placebo areas, where those receiving the vaccine were matched by controls receiving a similar injection of a placebo, with the results in observed areas where the controls were not inoculated but attended the same schools in the first and third grades. The vaccinated children showed nearly the same case rate in both types of area. The case rate was higher in the placebo children, however, than it was among the controls in the observed areas, a difference that he attributed to more hygienic home surroundings and hence a lower natural immunity among the placebo children, where the parents' consent was required, than there were in the observed areas, where this was a selective factor in the vaccinated children but not in their controls.

The afternoon program offered four papers on biometrical genetics. In the first, on the role of biometrics in plant improvement, Ronald A. Fisher (Cambridge) listed the contributions of biometrics under three headings: (i) experimental design, especially the art of carrying out field trials with accuracy, (ii) biometrical genetics in the sense of K. Mather, in which large numbers of Mendelian factors are involved that cannot be displayed individually, and (iii) biometrical applications to classical Mendelian genetics. The second paper, by B. R. Dempster (California), concerned the use of genetic models in relation to animal breeding. F. G. Brieger (Piracicaba) discussed the behavior in plant genetics of autogamic populations and heterotic genes, proposing a model for the proportions in panmictic and in autogamic populations of neutral, recessive subviable, and heterotic genes. The concluding paper by H. Kalmus concerned some genetical consequences of cyclomorphosis.

Experimental design was the subject of both sessions on 5 July. The opening paper by S. C. Pearce (East Malling) concerned the design of experiments on perennial crops, where adequate replication is impossible. This lack can be partially balanced by recording many concomitant measures and studying their interrelationships. In experiments on tree crops that are shorter in duration than the life of the tree, later treatments must be balanced in reference to earlier ones. In the nursery, variations may arise from so many different sources, genetic and positional, and may be so influenced by biennial bearing habits, the species, and locality that only the simplest designs are manageable. Pearce's review of general principles was followed by three reports on how these problems have been handled in Brazil—one by E. Amaral on the estimation of missing plots in experiments on sugar cane, one by A. Conagin on the design and analysis of coffee experiments, and one by F. Pimentel Gomes on perennial crops involving graded levels of fertilizers.

The discussion of experimental design continued with a review by G. M. Cox (North Carolina) of recent advances, with particular reference to estimating the response to rates of application and the use of change-over trials, incomplete block designs with double and partial balance, and paired rotatable designs. In the closing paper, W. J. Youden (National Bureau of Standards, U.S.) described how designs developed initially by biologists have been adapted for physical experiments; in cases in which the block size was determined by the apparatus, there were two or fewer replications, the experiment was to be performed in sections, treatments were shifted in midcourse, and instrumental drift was a factor. As illustrations, he described chain-block and linked-block designs and an application to the calibration of thermometers.

The following day the symposium moved to Piracicaba for a panel discussion on experimental designs at the Agricultural College and excursions in the neighborhood; it reassembled on 7 July at Campinas for a morning program on the statistics of animal feeding experiments. In his opening paper, P. G. Homeyer (Iowa State) considered the technique and the sources of variation in experiments with chicks, Holstein cattle, and hogs, comparing the efficiency of different designs and the variance components associated with pens with outcome groups and other factors. G. L. Rocha then described experiments with pastures in the State of São Paulo and G. L. Mott (Indiana) discussed the grazing trial for measuring the output of pastures. The concluding paper by A. Linder (Geneva) described an experiment in Switzerland in which the grazing of two cows was timed on each of six differently treated plots, all freely accessible to each cow. The more nearly complete the fertilizer, the longer the cows grazed on the herbage.

The afternoon program on sampling techniques opened with a paper by M. H. Hansen (U.S. Bureau of the Census) on controlling the response errors in surveys, which may arise in the definition of the problem, in the sampling, in the conduct of the field interview, and in the handling of the data. Sampling techniques for estimating the catch of sea fish in India was the subject of the next paper by P. V. Sukhatme (FAO). Following a report by J. Nieto de Pascual on the national morbidity survey in Mexico, W. L. Stevens (São Paulo) described a collaborative project on the sampling of coffee for forecasting harvests, with special reference to the complications imposed by the 2-year cyclic character of coffee yields. In the concluding paper, Enrique Cansado (CIEF, Santiago) reviewed the mathematics of probability sampling from a finite population.

On the morning of 8 July, the Instituto Agronomico of the State of São Paulo was host to the symposium at its experiment station, the oldest agricultural experiment station in Latin America. In the afternoon, a session on bioassay opened with a paper by C. I. Bliss (Connecticut Agricultural Experiment Station) on confidence intervals for

measuring the precision of bioassays, with illustrations from the *U.S. Pharmacopoeia XV*. In the following paper, D. J. Finney (Aberdeen) developed five different models for crossover and single-subject assays with two dosage levels of the standard and two of an unknown. The author considered possible correlations between components of residual error, residual effects of past doses, and the influence of one response on its successors in assays on a single test subject. P. Mello Freire (Instituto Biologico, São Paulo) then described a bioassay for complement fixation with two doses each of the standard and of the unknown in three replicate tests. A panel discussion closed the session. Later, members of the Biometric Society in Brazil completed the formation of a Brazilian Region of the society.

The symposium closed on the morning of 9 July with a session on medical statistics. The opening paper by J. O. Irwin (London School of Hygiene and Tropical Medicine) on the physiological effects of hot climate concerned an experiment by a tropical research unit in Singapore on the 4-hour sweat rate as modified by air movement, temperature, clothing, humidity, and other factors. J. A. Manceau (Belém, Brazil) then described a comparative study of two anthelmintics on 74 children, all infected with nematode parasites. Two drugs, hexylresorcinol and Aralen, were compared on the basis of the number of nematode eggs per centigram of feces after treatment; adjustment was made by covariance for variations in the numbers before treatment in the same individuals. The following paper by A. E. Brandt concerned the design of a clinical comparison of cobalt-60 therapy (1.3 Mev) and 22-Mev betatron therapy in the treatment of cancer. Brandt described the problems that arose in assigning patients at random to the two treatments within the limits imposed by medical ethics and how the conditions essential for a controlled experiment led to its restriction to squamous cell carcinoma of the cervix. The final speaker in the symposium was A. Vessereau, who reported an application of the discriminant function for differentiating medical cases of hepatitis from surgical cases of calculus or cancer by an electrophoretic analysis of the serum proteins.

Following the adoption of resolutions thanking the hosts, the symposium adjourned. Members who were able to remain visited a dairy and coffee farm in the afternoon. The proceedings of the symposium, abstracts, and a number of the papers will appear in forthcoming issues of *Biometrics*.

C. I. BLISS

New Haven, Connecticut

Physiological Triggers

The tenth annual meeting of the Society of General Physiologists was held at the Marine Biological Laboratory, Woods Hole, Mass., 9–10 September. The 208 registrants and participants included members of the American Physiological Society, which met earlier in Medford. The first day was devoted to short research papers and the business meeting and the second to an extensive symposium on "Physiological triggers," arranged by Theodore H. Bullock.

The symposium on "Physiological triggers" described many instances in the plant and animal world of mechanisms designed for the rapid liberation or utilization of stored energy reserves in response to suitable conditions. The following summary of the papers was kindly submitted by the organizing chairman, T. H. Bullock.

Recent findings on the process of infection by tobacco mosaic virus were described by Irving Rappaport. These indicate that one particle may initiate this process and that the replicating unit may differ from the *in vitro* rods. Lawrence Blinks illustrated striking cases of chemical, electric, and light trigger action in unicellular plants.

The discovery of a new substance, *kinetin* (6-furfurylaminopurine), which is required for cell division, was reported by Folke Skoog. It permits continuous growth of various higher plant tissues *in vitro* and acts in concentrations down to 1 microgram per liter.

The evidence and theories for control of luminescence, especially in fireflies, were summarized by W. D. McElroy. These lead to a picture of pyrophosphate release by nerve impulses that splits the complex of oxygenated intermediate and protein, in particular inorganic pyrophosphatase, thereby producing the flash.

C. B. Metz reviewed current knowledge of mechanisms in fertilization, including the dependence of the mating reaction and nuclear cycle of paramecium conjugation on the interaction of specific, superficial, mating-type substances. The striking requirement of a "fertilization" of the spermatozoan before it can participate in fertilization of the egg was also documented.

The shifts in metabolic pattern under hormonal and environmental controls at the onset and termination of diapause in insect development were described by Howard Schneiderman. The diapausing pupa loses the cytochrome *c* oxidase system present in both larva and adult. Cold renders the neurosecretory cells of the brain competent to produce a substance terminating diapause; this synthesis requires oxidative metabolism but not cytochrome *c* oxidase.

Excitable tissues were represented by three contributions. The distinction between electrically excitable and electrically inexcitable stages in the response of the postjunctional membrane of cells was emphasized by Harry Grundfest. Attention was drawn to the differences between the inner and outer faces of excitable membranes. Thus, a large alteration in internal K^+ by microinjection may not affect the resting potential. The reality of graded responses as large and brief as spikes but propagated decrementally was demonstrated in several cases. Hallowell Davis analyzed the evidence for and the difficulties facing his theory of initiation of cochlear nerve impulses, and E. G. Boettiger presented tension-length diagrams of passive and active insect fibrillar muscle during myogenic rhythms of high-frequency contraction in which the nerve impulse is necessary several times per second but does not determine the frequency.

The last two papers concerned endocrine mechanisms, first at the level of the primary mechcanisms of action on target cells (Clara M. Szego) and then at the level of the central nervous concomitants of the triggering of the pituitary in phasic events such as ovulation (C. H. Sawyer). Szego distinguished a small number of primary loci from the large variety of biochemical reactions that are influenced, especially in reproductive target organs, by steroid hormones. The primary trigger seems to be a competitive binding of hormone to receptor proteins at the cell surface that acts to alter permeability selectively. Sawyer has been able to delimit the sites of electric activity involved in ovulation by suitable recording under conditions of stimulation and damage of the central nervous system with and without the aid of neuropharmacological agents. Estrogen facilitates the neurogenic activity. Blocking drugs reveal that the pituitary activation in the rat takes 20 to 35 minutes during a critical period between 2 and 4 P.M. on the day of proestrus and is accompanied by characteristic electric events in the lateral preoptic region.

At the business meeting the council reported its decision to hold the 1956 meeting with the AIBS at Storrs, Conn., and its approval of the new AIBS constitution. It also recommended institution of honorary memberships for those who have retired and several constitutional changes, the chief of which were separation of the duties of the secretary and treasurer and restriction of the vote on prospective new members to those attending the annual meeting. The following announcements were made: (i) abstracts of papers given at annual meetings are appearing regularly as a supplement of the *Journal of Cellular and*

Comparative Physiology—the October 1954 issue of the journal contained the first such supplement; (ii) last year's symposium, "Electrolytes in biological systems," organized and edited by A. M. Shanes, was recently published by the American Physiological Society; (iii) names of officers and councilors who were elected by mail balloting.

This year's symposium will be published as a monograph similar to the volume based on last year's session.

ABRAHAM M. SHANES
National Institutes of Health, Bethesda, Maryland

Meeting Notes

■ The fourth annual meeting of the American Society of Tropical Medicine and Hygiene was held at the Somerset Hotel in Boston, Mass., 2–5 Nov. Sixty-two papers were presented. Included among these were seven dealing with a symposium on "Newer knowledge of viral and rickettsial diseases," which was moderated by E. H. Lennette, California State Department of Public Health, Berkeley.

The 20th annual Charles Franklin Craig lecture on "The confusing epidemiology of malaria in California" was delivered by Harold F. Gray of Oroville, Calif. William H. Taliaferro of the University of Chicago presented as his presidential address "The functions of the spleen in immunity."

■ At the conclusion of a 3-day scientific meeting last month of leaders in Air Force psychological research, the chairman of the meeting, Harry F. Harlow, said "I believe the high quality of fundamental research reported shows the Air Force has a well-rounded scientific program designed to improve the efficiency of the human component in the Air Force mission." Harlow, Comstock research professor at the University of Wisconsin, added "This has been the first time in many years that people from all phases of Air Force research programs—from recruit classification to survival training—have been gathered in one meeting."

The meeting, which took place at the National Academy of Sciences–National Research Council, 14–16 Nov., was arranged by the NAS–NRC Division of Anthropology and Psychology, at the request of the Air Research and Development Command. Harlow is chairman of this division and was chairman of the meeting, which was attended by approximately 150 persons.

Detlev Bronk, president of the academy, opened the sessions with a review of the relationship to one another of the sciences, the academy, and military research. He reminded his audience that the academy was originally formed in Civil War days, at the request of President Lincoln, in order to coordinate scientific information useful to the Federal war effort.

The research papers presented were grouped under three topics—training, personnel research, and human engineering; and Harlow pointed out that "Significant advances were reported from Air Force laboratories in all three fields, showing continued recognition by the military that the human component is a critical and often the key factor in modern weapons systems."

In presiding over a session of the symposium, Leonard Carmichael, secretary of the Smithsonian Institution, said "A meeting of this kind to me exemplifies the growing interchange of information between the various sciences and the research programs of the Government. . . . To produce a forum of this sort where new ideas are exhanged seems to me exactly the purpose for which the academy was founded."

A study of the effects of loss of sleep on the ability of Air Force officers to perform a complex mental task was presented by Walter D. Chiles of the Aero Medical Laboratory, Wright Air Development Center, Dayton, Ohio. Six subjects were deprived of 30 hours' sleep and then confronted with a complicated task. Persons who had had a normal amount of sleep learned this task fairly rapidly, but those who had been sleepless showed marked decreases in learning ability.

Raymond J. Christman, of the Human Factor Laboratory, Rome Air Development Center, Rome, N.Y., reported on basic measurements of the way in which a person judges the direction from which a sound is coming. Christman's experiments detailed the nature of the time difference in sound arrival between one ear and the other and the size of the difference in loudness.

Walter R. Borg and Michael A. Zaccaria of the Lackland Air Force Base, San Antonio, Tex., reported on tests that are helpful in predicting which men will make good recruiters for the Air Force. They reported that persons who test high on participation in civic affairs, gregariousness, initiative, and so forth, later turned out to be good salesmen for the Air Force.

W. J. White and M. B. Riley of the Aero Medical Laboratory discussed the effect of G on pilots' ability to read airplane control dials under various conditions of cockpit illumination. White and Riley tested men in a human centrifuge at Wright Field. They found the effect of increased G "as being equivalent to putting an optical filter before the subjects' eyes." Changes in blood circulation and an actual downward pull on the lens of the eye were given as factors in the dimming of vision under increased G.

Techniques for studying individual and group adaptations in survival conditions, as when a crew is forced down or is escaping from an enemy prison camp, were described by E. Paul Torrance of the Air Force Personnel and Training Research Center, Stead Air Force Base, Nev. Based on interviews with escapees, in which psychological analysis was made of the events which happened and the personality change or lack of change of the men involved, Torrance said he believed such extreme experiences could be studied by certain techniques, so that useful information could be given to Air Force personnel who might some day face crash landings in a jungle or hazardous escape journeys from enemy territory.

Society Elections

■ American Society of Tropical Medicine and Hygiene: pres., Asa C. Chandler; pres.-elect, Justin M. Andrews, U.S. Public Health Service, Washington, D.C.; v. pres., Willard H. Wright, National Institutes of Health, Bethesda, Md.; sec.-treas., John E. Larsh, Jr., University of North Carolina.

■ Institute of Radio Engineers: pres., Arthur V. Loughren, Hazeltine Corp.; v. pres., Herre Rinia, Philips Research Laboratories, Eindhoven, Netherlands.

■ Potato Association of America: pres., C. W. Frutchey, Colorado A. & M. College; v. pres., R. W. Hougas; sec., W. J. Hooker, Michigan State University; treas., J. C. Campbell.

■ American Astronautical Federation: pres., John Burton, North American Aviation, Inc., Los Angeles, Calif.; v. pres., Wayne Proell, Chicago; sec., Rinehart S. Potts, 210 E. Courtland St., Philadelphia 20, Pa.; treas., James C. Keith, Massachusetts Institute of Technology.

■ American Dairy Science Association: pres., I. A. Gould; v. pres., C. F. Huffman; sec.-treas., H. F. Judkins, 32 Ridgeway Circle, White Plains, N.Y. Representative to the AAAS Council is George H. Wise.

Forthcoming Events

December

28–30. **American Economic Assoc., New York, N.Y. (J. W. Bell, Northwestern Univ., Evanston, Ill.)**

28–30. **American Historical Assoc., Washington, D.C. (B. C. Shafer, Study Room 274, Library of Congress Annex, Washington 25.)**

28–30. **American Philological Assoc., Chicago, Ill. (J. P. MacKendrick, Bascom Hall, Univ. of Wisconsin, Madison 6.)**

28–30. American Philosophical Assoc., Eastern Div., Boston, Mass. (W. H. Hay, Dept. of Philosophy, Univ. of Wisconsin, Madison.)

28–30. American Physical Soc., winter meeting, Los Angeles, Calif. (K. K. Darrow, Columbia Univ., New York 27.)

28–30. Econometric Soc., New York, N.Y. (R. Ruggles, Box 1264, Yale Station, Yale Univ., New Haven, Conn.)

28–30. Low Temperature Physics and Chemistry, Baton Rouge, La. (J. G. Daunt, Dept. of Physics, Ohio State Univ., Columbus 10.)

28–30. Western Soc. of Naturalists, Davis, Calif. (D. Davenport, Univ. of California, Santa Barbara.)

29. Metric Assoc., Inc., annual, Washington, D.C. (V. G. Shinkle, 1916 Eye St., NW, Washington 6.)

29–30. American Folklore Soc., Washington, D.C. (M. Leach, Bennett Hall, Univ. of Pennsylvania, Philadelphia 4.)

29–30. History of Science Soc., Washington, D.C. (T. S. Kuhn, 74 Buckingham St., Cambridge 38, Mass.)

30. Mathematical Assoc. of America, 39th annual, Houston, Tex. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

January

9–10. National Symposium on Reliability and Quality Control in Electronics, 2nd, Washington, D.C. (J. W. Greer, Bureau of Ships, Navy Dept. Code 815, Washington 25.)

9–10. Operations Research Soc. of America, 8th national, Ottawa, Ont., Canada. (J. Abrams, Dept. of National Defense, Ottawa.)

9–14. Pan American Cong. of Ophthalmology, 5th, Santiago, Chile. (T. D. Allen, 575 Lincoln St., Winnetka, Ill.)

10. American Ethnological Soc., New York, N. Y. (A. G. James, 695 Park Ave., New York 21.)

10–11. Calcium and Phosphorous Metabolism in Man and Animals with Special Reference to Pregnancy and Lactation, New York, N.Y. (R. R. Marshak, Craigue Hill Rd., Springfield, Vt.)

12. American Genetic Assoc., Washington, D.C. (S. L. Emsweller, Plant Industry Sta., Beltsville, Md.)

12–14. Use of Isotopes in Agriculture, East Lansing, Mich. (E. W. Phelan, Argonne National Lab., Lemont, Ill.)

16–18. Documentation Conf., Cleveland, Ohio. (J. H. Shera, School of Library Science, Western Reserve Univ., Cleveland 6.)

17–20. American Pomological Soc., Rochester, N.Y. (R. B. Tukey, Horticulture Dept., Purdue Univ., Lafayette, Ind.)

20–27. Pan American Cong. of Gastro-Enterology, 5th, Havana, Cuba. (N. M. Stapler, 1267 J. E. Uriburu, Buenos Aires, Argentina.)

23–26. American Soc. of Heating and Air-Conditioning Engineers, Cincinnati, Ohio. (A. V. Hutchinson, ASHAE, 62 Worth St., New York 13.)

23–27. Inst. of Aeronautical Sciences, New York, N.Y. (S. P. Johnston, IAS, 2 E. 64 St., New York 21.)

26–27. Western Spectroscopy Assoc. 3rd annual, Berkeley, Calif. (J. W. Otvos, Shell Development Co., Emeryville, Calif.)

30–1. International Conf. on Fatigue in Aircraft Structures, New York, N.Y. (A. M. Freudenthal, 716 Engineering, Columbia Univ., New York 27.)

30–3. American Inst. of Electrical Engineers, New York, N.Y. (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

31–3. American Soc. of Sugar Beet Technologists, 9th biennial conf., San Francisco, Calif. (Western Beet Sugar Producers, Inc., 461 Market St., San Francisco 5.)

31–4. American Physical Soc., New York, N.Y. (K. K. Darrow, Columbia Univ., New York 27.)

February

1–2. Armour Research Foundation Midwest Welding Conf., Chicago, Ill. (H. Schwartzbart, Armour Research Foundation, Illinois Inst. of Technology, Chicago.)

1–3. Case Studies in Operations Research, Cleveland, Ohio. (Operations Research Group, Dept. of Engineering Administration, Case Inst. of Technology, 10900 Euclid Ave., Cleveland 6.)

2–3. National Symposium on Microwave Techniques, Philadelphia, Pa. (S. M. King, Inst. of Radio Engineers, 1 E. 79 St., New York 21.)

(See 18 Nov. issue for comprehensive list)