Many functions of the Bell System communications toll network are simulated by a digital computer using the TOLLSIM program along with a traffic tape and punched cards. The traffic tape, which may be used for a number of traffic studies, specifies times, originating and terminating points, numbers, and durations of simulated telephone calls. The punched cards specify characteristics of real or theoretical offices and trunks.

The printed output, by recording and summarizing re-attempts, abandoned calls, and other "real life" traffic data, both for the entire network and for its component parts, enables engineers to judge performance under various operating conditions. Many variations are possible. The effect of rearranging switching equipment in an office, for example, can be studied by using a different punched card for that office.

**TRAFFIC ANALYSIS**

*Mathematics for good telephone service*

At Bell Laboratories simulated telephone calls are placed through a computer programmed to represent the Bell System nationwide Direct Distance Dialing network. The computer program, known as TOLLSIM for "Toll Network Simulator," is one of many tools used by traffic specialists in studying how well traffic is handled by the network and how certain design changes might improve telephone service.

For example, a long-standing problem within the telephone industry is that of coping with heavy overload conditions during relatively short periods. These overloads can occur because of storms or other disasters that result in unusually heavy telephone calling. Such conditions also occur during the Christmas season and on Mother's Day.

In conjunction with earlier theoretical work, a TOLLSIM simulation indicated that, during overload conditions, a greater number of customers could be served if the pattern of automatic alternate routing of telephone calls were changed. The change involved making fewer attempts to route the calls over long, roundabout alternate routes when shorter direct trunks were busy. The results were then confirmed by field tests performed during the 1963 Christmas period.

This work is an example of the way Bell Laboratories people advance traffic theory and practical applications. The goal: to tailor facilities closely to the needs of telephone customers.

*BELL TELEPHONE LABORATORIES...

Research and Development Unit of the Bell System.*
With Chromaflex, it's that simple!

So, to meet tomorrow's chromatographic needs, just add a column extender, select a new disc porosity, change the reservoir style, or the adapter type. "Tailor" basic columns to meet new needs without glass blowing.

We've tried to think of everything. Reservoir solvents run down column walls without disturbing adsorbent beds. Wetted connections are greaseless and of constant inside diameter. Below fritted discs, mixing volumes are minimal. Dualap stopcocks are an extra bonus; barrels are smooth enough to use with TEFLO\textregistered\* plugs, yet have sufficient texture to retain lubricants for glass plugs. Varibor plugs are still another option to provide semi-needle valve control and remember settings from run to run.

From top to bottom Chromaflex Columns are functional . . . flexible. They are now an important part of more than 11,000 standard items that make up the Kontes line of fine technical glassware. The complete Chromaflex story is told in Bulletin CA-1. Write today for your copy.

KONTES
GLASS COMPANY
Vineland, New Jersey

\*Trademark of E. I. Du Pont
From Mathematical Research: Automatic Approximations of Tables and Graphs

The search for unknown relationships is basic to science and engineering ... and results in a steady outpouring of new tables and graphs. To store this mass of data economically and retrieve it quickly from a computer, mathematicians suggest the use of formulas that closely approximate or “fit” the data.

Here at the General Motors Research Laboratories, one of our four mathematical science departments has taken the first giant stride toward making such formulas easy to obtain. Through pioneering work in approximation theory, our mathematicians have been able to develop automatic computer procedures—“black boxes” that can crank out very efficient approximation formulas.

The formulas might be weighted polynomials ... or the more flexible rational functions ... or the little known, highly versatile spline functions. But in any case, their generation by delicately tuned computer programs goes well beyond standard “curve-fitting” techniques. In using these programs, for example, our scientists and engineers may ignore such mathematical subtleties as the Tchebycheff norm and unisolvency. Just feed the table in, pull a formula out.

A practical result of mathematical research, automatic approximations, we believe, well illustrate the exciting work going on in General Motors to make the computer a more efficient, more useful problem-solving tool.

General Motors Research Laboratories
Warren, Michigan
The New Beckman DU®-2 Spectrophotometer is the successor to the renowned Beckman DU. The new, more convenient DU-2 has a sloped front panel and large easy-to-read controls. It has increased range: 190 to 1000 m\(\mu\). Its photometric scale is expanded at both ends. It uses micro cells without attachments. It retains all the reliable DU principles, and it uses every time-tested DU accessory.

It's available at the same low DU price. Ask your local Beckman Sales Engineer about the new DU-2 or write for Data File LUV-38-265.
The New Beckman Zeromatic® II pH Meter is an improved version of the time-tested Zeromatic. This new instrument has an easily-read 8.2” meter covering the full 0-14 pH range. It gives you relative accuracy of ±0.05 pH and repeatability to ±0.015 pH. It has push button convenience and is splash proofed in a die-cast aluminum case with reagent resistant finish. For more information or a demonstration of the Zeromatic II contact your local Beckman Sales Engineer or write for Data File LpH-38-165.
Phosphorous-containing compounds are one of the most recent groups to yield to a Packard Gas Chromatograph. The chromatogram which is shown above was made on a Packard Model 7611 dual system (dual column oven, dual detectors, dual electronics and dual recorders) and represents an important achievement in simultaneous determination of compounds of widely separated concentration.

A modified flame ionization detector with a sodium emission grid and termed a SODIUM THERMIONIC DETECTOR (STD) has been found to be nearly 1000 times more sensitive to phosphorous-containing pesticides than the standard flame ionization detector (FID). The sample was separated on a single column and passed through a 1:1 ratio stream splitter before simultaneous detection in the normally sensitive FID and the highly sensitive STD. In this manner, all the organic materials were detected in the FID (upper curve) while the trace amount of phosphorous compounds was readily detected in the STD unit (lower curve).

Packard Gas Chromatographs offer many significant advantages to research workers in the biochemical and biomedical disciplines. Fast, stable, highly sensitive determination, versatility and convenience of operation are some of the reasons why you should know more about these superb instruments. Your Packard Sales Engineer can provide complete details and performance criteria. Write for Bulletins and Specifications.

**EXPERIMENTAL CONDITIONS**

- 1 µg lindane
- 1 µg parathion
- 2 µg methyl stearate

**COLUMN:** 5 ft. x 4 mm all glass

**LIQUID PHASE:** 10% Dow Corning Silicone Fluid (DC200)

**SUBSTRATE:** 80-90 mesh Ana-crom ABS (acid and base washed, and silanized)

**CARRIER GAS FLOW RATES:**
- Nitrogen 60 cc/min
- Hydrogen FID 40 cc/min; STD 60 cc/min
- Air 300 cc/min

**TEMPERATURES:**
- Inlet Heater 225°C
- Column 205°C
- Detectors 200°C
- Outlet 200°C

**DETECTORS:** Standard Packard Hydrogen Flame Ionization (FID); Modified Packard Ionization Detector with sodium emission grid (STD)

**ELECTROMETER RANGES:**
- FID 1 x 10⁻¹ amperes full scale
- STD 3 x 10⁻⁷ amperes full scale

**DETECTOR VOLTAGE:** 300 volts

**NOISE LEVEL:** 1 x 10⁻¹ amperes full scale

**CHART SPEED:** 30 inches/hour

*L. Giuffrida, J.A.O.A.C., 47, No. 2, 293 (1964)
Raymond H. Thompson, professor of anthropology at the University of Arizona, has been appointed head of the department, and director of the Arizona State Museum at the university.

The American Society for Testing and Materials has elected Charles L. Kent president. He is assistant director, technical services, of Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

The new president of the American Veterinary Medical Association is Morton R. Clarkson, who retired in July as associate administrator of the Agricultural Research Service, in the U.S. Department of Agriculture.

Rudolph A. Marcus, physical chemistry professor at the Polytechnic Institute of Brooklyn, has been named professor of physical chemistry at the University of Illinois.

Maxwell M. Wintrobe, head of the University of Utah's department of medicine, has been elected president of the Association of American Physicians.

Jerome Spar, professor of meteorology and oceanography at New York University, has been appointed director of government weather research at the U.S. Weather Bureau.

Abraham Hyatt, former director of plans and program evaluation for NASA, has been appointed visiting professor of aeronautical engineering at M.I.T.

Amedeo S. Marrazzi, director of the Veterans Administration Research Laboratories in Neuropsychiatry and professor of physiology and pharmacology at the University of Pittsburgh school of medicine, has been appointed Hill professor of neuropharmacology at the University of Minnesota medical school.

Albert J. Kelley, director of the electronics and control division in NASA's Office of Advanced Research and Technology, has been appointed deputy director of the electronics research center, which is being established in the Boston area.

James L. Diebold, formerly at the University of Kansas, has joined Wyeth Laboratories, Radnor, Pennsylvania, as senior research chemist in the medicinal chemistry section.

Stanfield Rogers, research director at the University of Tennessee Research Center and Hospital, has been appointed to head a division of the recently established co-carcinogenesis program at Oak Ridge National Laboratory.

Leo T. Samuels, biochemistry professor at the University of Utah medical school, has been presented the F. C. Coch award for his contributions in endocrinology. The $3500 prize is the highest award of the Endocrine Society.

Louis Weinberg, former vice president for information processing at Condictron Corporation, Ann Arbor, Michigan, has been appointed visiting professor of electrical engineering at the University of Michigan.

Robert S. Stone, recently retired as director of the radiological laboratory in the University of California's medical school, San Francisco, has received the Atomic Energy Commission Citation. The award is presented by the AEC to nonemployees who have made meritorious contributions to the nuclear energy program.

Robert G. Breckenridge, formerly director of the Union Carbide Corporation Research Institute, has been named to direct the physics research program at Atomics International, Canoga Park, California.

L. Eugene Cronin has taken a 15-month leave of absence as research professor and director of the University of Maryland's Natural Resources Institute, to act as an overseas liaison scientist with the U.S. Office of Naval Research. His headquarters will be in London.

Robert F. Kruh, professor and chairman of the chemistry department at the University of Arkansas, has become dean of the college of arts and sciences at the university.

Louis L. Tureen, professor of clinical neurology and psychology, and chairman of the section of neurology at the St. Louis University medical school, has taken a year's leave of absence to serve as a visiting professor at the University of Göttingen, West Germany.

Grant T. Phipps, formerly professor of dental psychology at the University of Pittsburgh, has been appointed professor of behavioral science-dentistry at the State University of New York at Buffalo, school of dentistry.

Robert B. Voas, formerly assistant to the director of the NASA Manned Spacecraft Center, Houston, has been appointed director of the life sciences laboratory in Litton Industries' guidance and control systems division.

John S. Rinehart, formerly director of the mining research laboratory at Colorado School of Mines, has been appointed assistant director for research and development in the U.S. Coast and Geodetic Survey.

Curt Teichert, formerly at the U.S. Geological Survey, has been appointed regents professor of geology and director of the paleontological institute at the University of Kansas.

Recent Deaths

Alfred Blalock, 65; recently retired chairman of the surgery department at Johns Hopkins medical school and developer of the "blue-baby" operation on malformed hearts; 16 September.

Richard B. Cattell, 64; retired director of the Lahey Clinic, Boston; 16 September.

G. Miles Conrad, 53; director and trustee of Biological Abstracts, Philadelphia; 9 September.

Richard D. Fay, 73; retired associate professor of electrical engineering at M.I.T.; 9 September.

John Stuart Foster, 74; retired professor and first director of the McGill University Radiation Laboratory; 9 September.

Walter C. Jacob, 49; associate head of the department of agronomy at the University of Michigan; 4 September.

Leslie C. Jayne, 64; former professor of chemistry at Brooklyn College of Pharmacy; 21 September.

Paul D. Krynine, 63; professor of petrology and sedimentation at Pennsylvania State University; 12 September.

Erich Ulhmann, 63; director of the tumor clinic and the department of therapeutic radiology at Michael Reese Hospital and Medical Center; 14 September.

Erratum: In the report "Myosin substructure: isolation of a helical subunit from heavy meromyosin" by Susan Lowey (7 Aug. 1964), lines 5-7 of column 1, p. 599, should have read: "...an ionic strength of 0.1 and 0.03M. As expected, when S... was plotted..."
PHOTOCHEMISTRY
AND PHOTOBIOLOGY
An International Journal
Published by PERGAMON PRESS
Will contain, in its November-December issue, the proceedings of the Wakulla Springs Symposium on Molecular Mechanisms in Photochemistry, held in February, 1964 under the sponsorship of the Committee on Photobiology of the National Academy of Sciences, National Research Council.

This will be the most comprehensive statement on the status of photobiology in print. Papers by Jagge, Clayton, McGhyn, Hochstrasser, Gaffron, Zimmerman, Wacker, Rupert, Hastings, Haynes, Spikes Butler and others are included.

Annual subscription $40.00
Published bi-monthly
Place subscription orders now, to receive this valuable symposium, and regularly published issues of this important journal.

PERGAMON PRESS, INC.
44-01 21st Street,
Long Island City, N.Y. 11101

New AAAS Symposium Volumes
Spermatozoan Motility
Edited by David W. Bishop, 322 pages. 113 illustrations. References. Index. 28 tables. August 1962. $7.50 ($6.50 prepaid for AAAS members).

Great Lakes Basin

Fundamentals of Keratinization

Biophysics of Physiological and Pharmacological Actions

Order today from
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
1515 Mass. Ave. NW, Washington, D.C. 20005

under the direction of P. R. Gorham and D. C. Mortimer, and from the laboratory of G. Kroto and C. D. Nelson (Queen's University). Mortimer's results showed that downward translocation of products of photosynthesis takes place at greatly varying rates and intensities in different vascular bundles of a leaf. Thus each bundle has to be analyzed separately. The Queen's group showed that translocation is under hormonal control and that there is selective and preferential translocation of certain sugars.

The session on nitrogen included two papers from the laboratory of W. G. Boll (McGill University) on the ability of ethanolamine to replace vitamin B1 in the nutrition of excised tomato roots, and on the biochemical mechanisms associated with this ability. C. L. Mer (now visiting at Harvard from Imperial College, London) provided a nutrition hypothesis for growth responses in oat seedlings. The hypothesis precludes the necessity to postulate changes in auxin metabolism to account for various growth responses to changed environment.

A session on regulators was of general interest and included papers on light quality and periodicity, on the regulation of enzyme synthesis, photosynthesis, and nuclear activity by hormones, and on the mode of action of herbicides.

The sessions on metabolism covered a wide range of research interests. A growing interest in the phenolic substances in plants was evidenced by a group of papers from the Halifax, Nova Scotia, laboratories of the National Research Council. These included very interesting work on the pathways of lignin biosynthesis and the interrelations of soluble and insoluble derivatives of the many C6-C1 and C3-C5 phenolic acids in plants. Other papers included biosynthetic studies on indoles, carbohydrates, phosphatides, alkaloids, and chlorophylls. Various problems in plant metabolism, including organic acid metabolism, respiration, frost hardiness, and the influence of seasonal or environmental factors on plant metabolism were also discussed.

A report was made on the cytological and cytophysiological studies of tissue cultures of Jerusalem artichoke and oat coleoptiles. (G. Setterfield and F. Wightman, Carleton University, Ottawa). A number of synthetic auxins which promote cell expansion also promote cell division. Papers were presented on control mechanisms of amino acid synthesis, on chloroplast bleaching in Euglena, and on histochemical tests. Nelson's group from Queen's University presented work on the effect of auxin in controlling cellular permeability and on the electrosomotic transport of C14-labeled sugars in Nitella cells.

The nonscientific event at the meetings was a banquet in honor of D. L. Bailey (University of Toronto). Bailey is retiring from the editorship of the Canadian Journal of Botany, the official journal of the society, after a number of years of outstanding service. Special guests included Leo Marion, editor-in-chief of the Canadian Research Journals, and Pauline Snure, manager of the editorial office.

At the business meeting it was decided that next year's annual meeting will take place in early June at the University of New Brunswick, Fredericton. G. Setterfield was elected president of the society and A. R. A. Taylor (University of New Brunswick) was elected vice president. Other officers of the society are M. Shaw (University of Saskatchewan), past president; M. Cailloux (Université de Montréal), eastern director; and Mary Spencer (University of Alberta), western director.

R. G. S. BIDWELL
Botany Department, University of Toronto, Toronto, Ontario

Forthcoming Events

October

11–16. American Assoc. of Medical Record Librarians, annual, Miami Beach, Fla. (M. J. Waterstratt, RRL, 840 North Lake Shore Dr., Chicago, Ill. 60611)