

and development of an infrared spectrometer for rocket gas analysis. . . .

This year has seen the formation of a unified Computing Center to meet the needs of the whole University. Local stations on the Homewood Campus and at the Medical School, each provided with its own staff and necessary equipment, will

be connected by telephone lines to the main equipment nucleus at the Applied Physics Laboratory by July 1962. . . .

During the past year three new buildings have been completed or are nearing completion at the Howard County site. The Computing Center building was occupied in February

1961, and the Experimental Radar Building, begun in June 1960, was occupied in May 1961. Work is progressing well on the new Propulsion Research Laboratory and it is expected to be ready for occupancy by the end of September. . . .

R. E. GIBSON  
Director

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## JOURNAL PUBLICATIONS

A, compilation of recently published books and technical articles written by APL staff members.

- A. A. Westenberg and N. de Haas, "High Temperature Gas Thermal Conductivity Measurement with the Line Source Technique," in "Progress in International Research on Thermodynamic and Transport Properties," Academic Press, N. Y., 1961, 412-417.
- E. L. Cochran and F. J. Adrian, "Electron Spin Resonance Identifies Radio Chemical Species," *Nucleonics* **19**, 12, Dec. 1961, 47-50.
- W. Liben and L. A. Twigg, Jr., "A Variable Ultrasonic Electro-Optical Delay Line and a New Ultrasonic Optical Effect in Fused Quartz" (Letter), *J. Appl. Phys.* **33**, 1, Jan. 1962, 249.
- R. R. Newton, "Ellipticity of the Equator Deduced from the Motion of Transit 4A," *J. Geophys. Research*, **67**, 1, Jan. 1962, 415-416.
- W. R. Wendt, "Nuclear Ship Traffic in World Seaports," U. S. Naval Institute *Proceedings*, No. 707, **88**, 1, Jan. 1962, 42-53.
- S. M. Blinder, M. L. Peller, N. W. Lord, L. C. Aamodt, and N. S. Ivanchukov, "Electron Spin Resonance of Tetraphenylpyrrol Radical," *J. Chem. Phys.*, **36**, 2, Jan. 15, 1962, 540-544.
- I. F. Wagner, "The Design of Experiments in War Gaming" pp. 55-66A-G;
- and
- A. Pennington, "History of War Gaming," pp. 2-5, Washington Operations Research Council *First War Gaming Symposium Proceedings*, Feb. 1962.

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## ADDRESSES

Principal recent addresses made by APL staff members to groups and organizations outside the Laboratory.

- H. W. Woolard, "Theoretical Analysis of the Flow and Drag of Surface Irregularities Immersed in a Wall-Layer Stream in a Supersonic Main Stream,"
- and
- H. H. Hart, "High Angle of Attack Phenomena Associated with the Supersonic Planar Configurations," *Fifth U. S. Navy Symposium on Aeroballistics*, U. S. Naval Ordnance Laboratory, White Oak, Md., Oct. 16-18, 1961.
- G. F. Pieper, "Research Aspects of the Transit Program," *American Nuclear Society*, Iowa State University, Dec. 5, 1961.
- W. Liben, "Microelectronics," *U. S. Naval Academy Advanced Science and Mathematics Seminar*, Dec. 15, 1961.
- W. H. Guier, "Some Special Problems in Statistical Inference Associated with Satellite Tracking," *American Statistical Society*, N. Y., Dec. 27-30, 1961.
- G. L. Seielstad, "Communications Between Scientists" (Panel), *American Association for the Advancement of Science*, Denver, Colo., Dec. 26-30, 1961.
- A. Pennington, "Computer War Gaming Techniques," *Navy War College Command and Staff Course*, Newport, R. I., Jan. 3, 1962.
- D. W. Juergens, "APL Satellites," *American Institute of Electrical Engineers—IRE Student Branch*, University of Colorado, Jan. 9, 1962.
- J. O. Artman, "Electric Field Effects on Ruby ESR," *Magnetic Resonance Seminar*, Washington, D.C., Jan. 18, 1962.
- A. A. Westenberg and N. de Haas, "High Temperature Gas Thermal Conductivity Measurement with the Line Source Technique," *Thermophysical Properties Symposium*, Princeton, N. J., Jan. 25, 1962.
- J. O. Artman and J. C. Murphy, "Splitting of the Ground State Levels of Ruby by an External Electric Field,"
- and
- E. P. Gray, "Numerical Trajectory Analysis of Charged Particle Confinement in Superposed Steady and Rotary Magnetic Fields,"
- and
- G. F. Pieper, C. O. Bostrom, and A. J. Zmuda, and B. J. O'Brien (State University of Iowa), "Detection of Solar and Van Allen Belt Protons by Injun Satellite," *American Physical Society*, N. Y., Jan. 26, 1962.
- A. A. Westenberg, "Complex Reaction Kinetics in Nozzle Flow," *Institute for Defense Analysis*, Washington, D. C., Jan. 29, 1962.
- R. M. Fristrom, "The Experimental Determination of Radical Concentrations in High Temperature Systems," *New York University Department of Chemistry Colloquium*, Feb. 2, 1962.
- W. Liben, "Microelectronics," *Naval Medical Research Institute*, Bethesda, Md., Feb. 20, 1962.

## APL COLLOQUIA SUMMARIES

Dr. F. J. Weyl of the Office of Naval Research spoke at the Colloquium on Dec. 15, 1961, on the subject, "A Mathematician Looks at Memory."

The Director of the Carnegie Geophysical Laboratory in Washington, D. C., Dr. Philip Abelson, spoke at the Jan. 5 Colloquium on some current research relevant to the origin of life. His remarks were directed to a critique of one theory of life's origins which has received much attention. This theory is based on experiments which consisted of using a mixture of ammonia, carbon dioxide, and water vapor, and subjecting it to repeated heavy electrical discharges simulating lightning. After several of these electrical attacks, the investigators found in the liquid some amino acids, the so-called building blocks of life. They then theorized that this mechanism was a model for the origin of life on our planet. Dr. Abelson gave many detailed technical reasons why it is not likely that this theory represents the initial life-creating process. Chief among them was that ammonia would probably not have been present in sufficient quantity or have had

sufficient lifetime to permit this reaction. In the final analysis, according to the speaker there is yet no single theory of the origin of life that appears to be free from all objections.

Dr. J. E. Kunzler of the Bell Telephone Laboratories addressed the Jan. 12 Colloquium. His subject was concerned with recent successes in making materials which retain their superconducting properties in very high magnetic fields.

The Deputy Director of the M.I.T. Department of Aeronautics and Astronautics, R. L. Bisplinghoff, spoke at the Jan. 19 Colloquium on the problems inherent in aerothermoelastic effects on supersonic flight vehicles. He mentioned the role of the X-15 aircraft as the most important current effort to study such effects, and showed by diagrammatic representation the entire field of interacting aerothermoelastic factors that must be taken into account in this research. Normal and aborted reentries of space vehicles were cited as characterizing the design problems now being studied. Panel flutter—

instability of aircraft panels in supersonic vehicles—was emphasized as a major problem, while divergence margins under many conditions constitute another large area of study. Dr. Bisplinghoff concluded with a brief discussion of how the many factors in aerothermoelasticity can be tested, by means of careful model simulation, at such test facilities as those at NASA Langley Field, Va.

Dr. Marshall Nirenberg of the National Institutes of Health presented at the Feb. 16 Colloquium a discussion of current progress toward breaking the genetic code. The important problems tackled in his laboratory (and throughout the biochemical world) are the relationships between the nucleic acid sequence in the RNA "template" (coming from the genes of the cell chromosomes) and the corresponding protein synthesis from single amino acids; the coding length and punctuation of this nucleic acid sequence; and the introduction of "nonsense" into the protein via mutations. His demonstration that a "template" of polyuridylic acid will produce only poly-L-phenylalanine in the test tube represents a very noteworthy advance.

### PATENTS

- A. J. Bell et al—*Rocket Propelled Missile*, Patent No. 3,000,597.
- G. B. Bush—*Roll Stabilization System*, Patent No. 3,000,598.
- F. A. Dean—*Ramjet Diffuser*, Patent No. 3,008,667.
- J. W. Follin, Jr.—*Electronic Multiplier*, Patent No. 3,019,982.
- E. J. Hardgrave, Jr.—*Subsonic-Supersonic Streamlined Leading Edge or Cowl Lip*, Patent No. 3,008,291.
- F. K. Hill—*Rocket Excited Wind Tunnel*, Patent No. 3,011,341.
- G. W. Luke, Jr.—*Microwave Phase Shifter*, Patent No. 3,001,153.
- G. E. Moul, Jr.—*Aerodynamic Surface Attaching Structure*, Patent No. 3,004,645.
- D. H. Sloan—*Ramjet Device*, Patent No. 3,002,351.

### WITH THE AUTHORS

R. E. Fischell, author of "The TRAAC Satellite," received his B.S. degree in mechanical engineering from Duke University and, in 1953, his M.A. in physics from the University of Maryland. Born in New York City, he was first employed as a physicist at the Naval Ordnance Laboratory and later as Principal Physicist and Project Engineer at Emerson Research Laboratory, Silver Spring, Maryland. He joined the APL staff in 1954 as a specialist in magnetics, satellite power systems, and measurement and instrumentation. Mr. Fischell is a physicist in the APL Space Development Division where he is Project Supervisor of Power Systems and Attitude Control. He is a member of the



American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

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American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

*R. M. Fristrom*, a native of Portland, Oregon, is co-author of "Fundamental Processes and Laminar Flame Structure." He received a B.A. degree in chemistry from Reed College, an M.A. degree from the University of Oregon, and his Ph.D. degree in chemistry from Stanford University in 1948. He was a Research Fellow at Harvard University and Parsons Fellow of APL at The



Johns Hopkins University. Dr. Fristrom joined the APL staff as a specialist in nonaqueous electrochemistry and microwave spectroscopy. He is a physical chemist in the High Temperature Physics and Chemistry Project of the Bumblebee Flight Research Group. During 1961 he served as a lecturer in chemical engineering at The Johns Hopkins University. He is a member of the American Physical Society and the American Chemical Society.

Co-author of "Fundamental Processes and Laminar Flame Structure," *A. A. Westenberg* came to APL in 1952 after serving as Assistant Professor of Chemistry at Lafayette College. He was born in Menominee, Wisconsin. His education included a B.A. degree in chemistry at Carleton College and M. A. and Ph.D. degrees in chemistry at Harvard University in 1948 and 1950. He is a specialist in high-temperature physical chemistry of gases, reaction kinetics, transport properties, and combustion, and is Supervisor of High Temperature



Physics and Chemistry Research in the Bumblebee Flight Research Group. Dr. Westenberg also directs the Advanced Research Projects Agency program at APL on basic studies related to behavior of materials at high temperatures. He received the Professional Achievement Award of the Washington, D. C. Engineering Council in 1956, and is a member of the American Chemical Society, the American Physical Society, and the Combustion Institute.

*A. J. Zmuda*, author of "Solar-Terrestrial Disturbances and Solar Protons in July 1961," was born in Shenandoah, Pennsylvania. He received a B.S. degree in mathematics from St. Francis College, Pennsylvania, and his Ph.D. in physics in 1951 from Catholic University, where he was a graduate assistant for three years. Dr. Zmuda, currently a mem-



ber of the Research Center, joined APL in 1951 and is a specialist in geomagnetism and ionospheric physics. His work has also included studies in missile guidance. He is a panel member of the World Magnetic Survey of the Geophysics Research Board of the National Academy of Sciences, consultant to the Geophysics Panel of the Scientific Advisory Board of the U.S. Air Force, and is a member of the American Physical Society, Washington Academy of Science, American Geophysical Union, and The Philosophical Society of Washington.

*G. H. Mowbray*, psychologist at APL since 1953, is the author of "Some Human Perceptual Limits." He was born in Taylorsville, Maryland, and received his B. A. and M.A. degrees in psychology from The Johns Hopkins University. His Ph.D. in experimental psychology was received from Cambridge University in 1953. Dr. Mowbray is a specialist in experimental psychology, psychophysics, and engineering psychology. He is a research psychologist in the Engineering Psychology Research Group, where his work is primarily in studies of basic sensory capacities of humans. Dr. Mowbray is a member of the American Association for the Advancement of Science, the American Psychological Association, Eastern Psychological Association, the Psychonomic Society, and the Experimental Psychology Society.

