

*California Institute of Technology*



*Sixtieth Annual*  
**COMMENCEMENT**  
**EXERCISES**

*Friday afternoon,  
June eleventh, nineteen fifty-four  
at four-thirty o'clock*

# *Academic Procession*

*Chief Marshal:* HARVEY EAGLESON, Ph.D.

*Assistant Marshals:* MELVIN D. BROCKIE, Ph.D.

DONALD S. CLARK, Ph.D.

RODMAN W. PAUL, Ph.D.

## *Division I*

CANDIDATES FOR THE DEGREE OF BACHELOR OF SCIENCE

CANDIDATES FOR THE DEGREE OF  
MASTER OF SCIENCE IN SCIENCE

CANDIDATES FOR THE DEGREE OF  
MASTER OF SCIENCE IN ENGINEERING

CANDIDATES FOR THE ENGINEER'S DEGREE

CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

## *Division II*

THE FACULTY OF THE CALIFORNIA INSTITUTE

CHAIRMEN OF DIVISIONS  
AND DIRECTORS OF LABORATORIES

THE TRUSTEES OF THE CALIFORNIA INSTITUTE

THE COMMENCEMENT SPEAKER

THE COMMENCEMENT CHAPLAIN

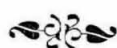
THE CHAIRMAN OF THE BOARD OF TRUSTEES  
THE PRESIDENT OF THE CALIFORNIA INSTITUTE

# PROGRAM

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*Presiding:* JAMES R. PAGE, LL.D.

*Chairman of the Board of Trustees*



## PRELUDE AND PROCESSIONAL MARCH

*Organist:* JAMES H. SHEARER, A.R.C.M., A.R.C.O.

## INVOCATION AND CHAPLAIN'S ADDRESS

THE REVEREND CURTIS BEACH, A.B., B.D.

*The Neighborhood Church, Pasadena*

## COMMENCEMENT ADDRESS

I. I. RABI, Ph.D., D.Sc., Nobel Laureate

*Professor of Physics, Columbia University*

## CONFERRING OF DEGREES

LEE A. DuBRIDGE, Ph.D., Sc.D., LL.D.

*President of the California Institute of Technology*

## PROGRAM—*continued*

### PRESENTATION OF CANDIDATES FOR DEGREES

*For the degree of Bachelor of Science, by*

PAUL CONANT EATON, A.M.

*Dean of Students*

*For the degree of Master of Science in Science, by*

WILLIAM R. SMYTHE, Ph.D.

*Chairman of the Committee on the Course in Science*

*For the degree of Master of Science in Engineering, by*

WILLIAM W. MICHAEL, B.S.

*Chairman of the Committee on the Course in Engineering*

*For the engineer's degree, by*

WILLIAM N. LACEY, Ph.D.

*Dean of Graduate Studies*

*For the degree of Doctor of Philosophy, by*

DEAN LACEY

### CHARGE TO THE GRADUATING CLASS AND ANNOUNCEMENTS

PRESIDENT DuBRIDGE

### BENEDICTION

THE REVEREND MR. BEACH

*The audience is requested to remain seated after the Benediction  
until the end of the Recessional March*

### RECESSIONAL MARCH

## *Candidates for Degrees*

### BACHELOR OF SCIENCE IN SCIENCE

Fred Colvig Anson*	Ronald Alexander Korsak
George Allen Baker, Jr.*	Walter W. Lee, Jr.*
Sidney Baldwin Bellinger, Jr.	Arthur E. Miller, Jr.
Mark Cher*	Philip D. Miller
Chin-Kuang Jack Chow	Jerry Charles Mitchell*
Paul Concus*	Gordon Bruce Munn*
George William Corporales	Ray Leon Newburn, Jr.
Glen Russell Crabbs	Robert W. Olsen
Ward Benjamin Davis	George William Patraw
John Carlton Day	James Niles Pinkerton*
William Edwin Dibble*	Philip Davis Potter
Richard Fred Dondanville	Ronald Steven Ratney
Gerald Dudek*	Lorenzo Willard Richards*
Earl Mansfield Evleth, Jr.	Robert Dean Ryan*
Terrell Wallace Feistel	Francis Falcon Scott
Ronald Fuchs*	Gordon Duane Seele*
Alexander Nicholas Gansa	Leon Shameson
Edward John Gauss	Garson Phillip Shulman
Melvin Leonard Goldberg*	Neale E. Smith
Ralph Donnelly Handen, Jr.	Richard Clifton Smith
Donald Lewis Hook†	Robert C. Speiser*
Robin Neal Huntley	Hugh Pettingill Taylor, Jr.*
George Robert Jaffray, Jr.	James Clifton Townsend*
George Lawrence Johnston*†	Gerard Charles Van Hoven†
Bruce Arthur Kaiser†	Samuel Norman Vodopia
John Newell Kidder	

*\*Graduated with scholastic honor in accordance with a vote of the Faculty.*

*†Awarded the Honor Key by the Associated Students, CIT, for participation in student activities.*

## *Candidates for Degrees*

### BACHELOR OF SCIENCE IN ENGINEERING

John Lynn Abbott	Francis Walter Joyce
Samuel Wayne Autrey*†	Eugene Alvin Kaiser
John Thurston Billings	William Elder Kerr
Philip Wessel Birkeland	Moses Lerner
John James Bondra*	John Thomas Lloyd*†
Gary Delane Boyd*	Robert William Lynam†
Lawrence Bruce Brown	Roland Seba Miller
George Edward Bryant†	Hans Cornelis Mol
Stuart Allen Cameron	Manuel Morden
Robert Keith Campbell	Thomas Frederick Movius
Otto Cardinale	Robert Edward Pechacek
James Calhoun Collins	John Jerrauld Peyton
James Colbath Crosby*†	Albert Rae Pitton
Howard Linn Croswhite	Benjamin Maurice Rosen
Franklin Dale Dryden†	Ronald Samuel Saliba
Charlton Dunn III	Takeshi Sato
Alfred Harvey Gale	Howard Everett Shanks
Frederick William Garrison	Robert Louis Smith
John Gerold Goetten	Cornelius Vickers Sundt
Roger Morse Golden*	Simon Tamny*
Reinaldo Vicente Gutierrez	Donald Lawson Turcotte*
Lee Alan Henderson†	Thomas Janney Tyson
Richard Reeve Hodges	George Wada*
Richard Eldon Hyde	John Kliewer Wall*†
Weldon Hampton Jackson	Bruce James Watkins
Curtis Carl Johnson	Gordon Lee Zentner
Harvey Edward Johnson	

*\*Graduated with scholastic honor in accordance with a vote of the Faculty.*

*†Awarded the Honor Key by the Associated Students, CIT, for participation in student activities.*

# *Candidates for Degrees*

## MASTER OF SCIENCE IN SCIENCE

### *Astronomy*

Hugo Donald Wahlquist, B.S., *University of Minnesota*, 1953.  
George Wallerstein, A.B., *Brown University*, 1951.

### *Chemical Engineering*

John Nelson Delcamp, B.S., *California Institute of Technology*, 1953.  
David Allen Heiser, B.S., *University of Wisconsin*, 1950.  
David James MacDonald, Jr., B.S., *California Institute of Technology*, 1953.  
William Burt Nichols, B.S., *Massachusetts Institute of Technology*, 1950.  
André Antoine Van Haute, *Dipl. Civil Chemical Eng., University of Louvain*, 1953.  
Norman Patrick Wilburn, B.S., *California Institute of Technology*, 1953.

### *Chemistry*

Jerome Marshall Hershman, B.S., *Northwestern University*, 1952.  
Quayton Ray Stottlemeyer, B.S., *Juniata College*, 1951.

### *Geological Sciences*

John Wing Allingham, B.S., *California Institute of Technology*, 1948.  
Roger David Judson, Ge.E., *Colorado School of Mines*, 1949.  
Berdine Harold Rogers, B.S., *San Diego State College*, 1950.  
John Christian Ruckmick, B.A., *Amherst College*, 1952.  
Neil Joseph Stefanides, B.S., *California Institute of Technology*, 1953.  
Herbert Harris Winters, B.S., *University of Florida*, 1950.

### *Geophysics*

John Tsung Fen Kuo, B.S., *University of Redlands*, 1952.  
Allan Robert Sanford, B.A., *Pomona College*, 1949.  
Rolf Christian Vold, *Dipl. Civil Eng., Norwegian Institute of Technology*, 1948.

### *Mathematics*

Wesley Ramon Guebert, B.A., *Southern Methodist University*, 1952.

### *Physics*

Charles William Cook, A.B., *University of South Dakota*, 1951.  
Jassim Mohammed El-Hussaini, B.S., *Higher Teachers College (Baghdad)*, 1950.  
Franklin Eugene Gillespie, B.S., *University of Chattanooga*, 1952.  
James Edward Guinane, A.B., *Brown University*, 1953.  
Paul Kenneth Henney, B.S., *Ball State Teachers College*, 1952.  
Irvin George Henry, B.S., *University of California*, 1951.

# Candidates for Degrees

## MASTER OF SCIENCE IN SCIENCE

### *Physics—continued*

- James Lee Hieatt, B.S., *University of Redlands*, 1952.  
Earl Donald Jacobs, B.S., *California Institute of Technology*, 1953.  
Marvin Ashton LeGette, Jr., B.S., *Clemson Agricultural College of South Carolina*, 1952.  
Bruce Harry Morgan, A.B., *Harvard College*, 1953.  
Robert Gemmill Morris, B.S., *Iowa State College*, 1951.  
Joe Hill Mullins, B.S., *Agricultural and Mechanical College of Texas*, 1950.  
Kenneth Harold Olsen, B.S., *Idaho State College*, 1952.  
Bradley Downes Rising, B.S., *University of Maine*, 1952.  
Allan Woodburn Scott, B.S., *Stanford University*, 1952.  
Arthur Jordan Stasney, B.S., *California Institute of Technology*, 1953.

## MASTER OF SCIENCE IN ENGINEERING

### *Aeronautics*

- Coy Richard Cantrell, Jr., B.S., *California Institute of Technology*, 1953.  
Patrick Colin Carroll, B.S., *Purdue University*, 1951.  
Mell Duncan Cassidy, B.S., *California Institute of Technology*, 1952.  
Robert L. Forbes, B.S., *Indiana Technical College*, 1952.  
Richard Bancroft Harty, B.S., *Southern Methodist University*, 1953.  
Kay Duane Jefferson, 1st Lt., U.S.A.F., B.S. *University of Illinois*, 1951.  
Kenneth F. Nicholson, B.S., *California Institute of Technology*, 1953.  
Robert Earl Oliver, B.S., *California Institute of Technology*, 1952.  
Josef Rabinowicz, B.S., *Illinois Institute of Technology*, 1954.  
Pehr Harald B. Schalin, B.S., *Finland Institute of Technology*, 1946.  
Andrew B. Sergejevsky, B.S., *University of California*, 1953.  
Paul Frederik Robert Weyers, B.S., *University of Sydney*, 1950; B.Eng., 1952.

### *Civil Engineering*

- William Floyd Anderson, B.S., *Lafayette College*, 1948.  
Shelton Brant Biles, Capt., U.S.A., B.S., *United States Military Academy*, 1947.  
Allan Conrad, B.C.E., *Rensselaer Polytechnic Institute*, 1952.  
John T. Coughlin II, Capt., U.S.A., B.S., *United States Military Academy*, 1944.  
Robert Daniel Darragh, Jr., B.C.E., *Rensselaer Polytechnic Institute*, 1950.  
Robert Dean Dikkers, B.S., *Northwestern University*, 1953.  
Francis George Gosling, Jr., Capt., U.S.A., B.S., *United States Military Academy*, 1946.  
Heberto Jimenez, Dipl. Civil Eng., *National University of Colombia*, 1952.  
Paul E. Langdon, Jr., B.S., *California Institute of Technology*, 1953.  
Sam Moskowitz, B.C.E., *Polytechnic Institute of Brooklyn*, 1953.  
William Albert Peterson, B.S., *California Institute of Technology*, 1953.  
Robert Martin Rufsvold, Capt., U.S.A., B.S., *United States Military Academy*, 1946.  
Howard Leroy Sargent, Jr., Capt., U.S.A., B.S., *United States Military Academy*, 1947.  
David Halstead Smith, Maj., U.S.A., B.S., *United States Military Academy*, 1946.  
Fred Brenning Waters, Jr., Maj., U.S.A., B.S., *United States Military Academy*, 1943.

# Candidates for Degrees

## MASTER OF SCIENCE IN ENGINEERING

### *Electrical Engineering*

Lawrence Bruce Brown, *B.S., California Institute of Technology, 1954.*  
Thomas Emanuel Feuchtwang, *B. of E.E., Georgia Institute of Technology, 1953.*  
Claude Hamel, *Dipl. Eng., École Centrale des Arts de Manufactures (Paris), 1953.*  
Leonard R. Hawn, Jr., *B.S., University of Oklahoma, 1949.*  
Richard Charles Heyser, *B.S., University of Arizona, 1953.*  
John Sterling Jackson, Jr., *B.S., California Institute of Technology, 1945.*  
Gerald Richard Little, *B.S., Washington University, 1951.*  
Gregory Alfred Loew, *Licence-ès-Sciences, University of Paris, 1951.*  
Clarence Eugene Peterson, *B.S., University of Southern California, 1953.*  
Herbert Shear, *B.S., California Institute of Technology, 1953.*  
Rolf David Weglein, *B.S., California Institute of Technology, 1953.*  
Mih Yin, *B.S., Chiao Tung University, 1949.*

### *Mechanical Engineering*

Calvin LaRue Barker, *B.S., University of Texas, 1953.*  
Pierre Caron, *Dipl. Eng., École Centrale des Arts et Manufactures (Paris), 1953.*  
Stephen Jones Chamberlin, Jr., *B.S., Massachusetts Institute of Technology, 1951.*  
Robert Dysart CoNine, *B.S., California Institute of Technology, 1953.*  
Christian Pierre Dambrine, *Dipl. Eng., École Polytechnique (Paris), 1951; Dipl. Naval Arch., École Génie Maritime (Paris), 1953.*  
Robert L. Easton, *B.S., California Institute of Technology, 1953.*  
LaVerne Gene Eklund, *B.S., Purdue University, 1953.*  
Edward William Forman, Jr., *B. of M.E., Pratt Institute, 1953.*  
Alan Marshall Haire, *B.S., California Institute of Technology, 1953.*  
Kenneth Leroy Hanson, *B.S., Kansas State College of Agriculture and Applied Science, 1950.*  
Rolf Constantin Hastrup, *B.S., California Institute of Technology, 1953.*  
James Arnold Hendrickson, *B.S., California Institute of Technology, 1953.*  
Alfred LeRoy Johnson, Jr., *B.S., California Institute of Technology, 1953.*  
Robert Katz, *B.S., University of Colorado, 1948.*  
Kenneth Robert King, *B.S., California Institute of Technology, 1953.*  
George Harold Moore, *B.S., California Institute of Technology, 1953.*  
James Donald Richey, *B.S., State University of Iowa, 1950.*  
Sheldon Rubin, *B.S., California Institute of Technology, 1953.*  
Edwin Jule Stofel, *B.S., California Institute of Technology, 1953.*  
Jean Armand Vandenkerckhove, *Dipl. Civil and Mech. Eng., Université Libre de Bruxelles, 1952.*  
Stuart Harry Wemple, *B.S., Northwestern University, 1953.*  
Ronald Howard Willens, *B.S., California Institute of Technology, 1953.*

# Candidates for Degrees

## ENGINEER'S DEGREES

### *Aeronautical Engineer*

- Gaynor Jefferson Adams, B.S., *Stanford University*, 1948; M.S., 1949.  
John Morrison Charles, Lt., U.S.N., B.S., *United States Naval Academy*, 1944; B.S., *United States Naval Postgraduate School*, 1953.  
Chester Wright Gates, Jr., Lt. Comdr., U.S.N., B.S., *United States Naval Academy*, 1942; B.S., *United States Naval Postgraduate School*, 1953.  
Jack Carl Graves, Lt., U.S.N., B.S., *University of Washington*, 1945; B.S., *United States Naval Postgraduate School*, 1953.  
William Douglas Harkins, Lt., U.S.N., B.S., *United States Naval Academy*, 1947; B.S., *United States Naval Postgraduate School*, 1953.  
Charles Mertz III, Lt. (jg), U.S.N., B.S., *United States Naval Academy*, 1948; B.S., *United States Naval Postgraduate School*, 1953.  
Donald Francis Miles, Capt., U.S.M.C., B.A., *Bowdoin College*, 1942; B.S., *Massachusetts Institute of Technology*, 1948; B.S., *U.S. Naval Postgraduate School*, 1953.  
Hampton Emanuel Mulligan, Lt. Comdr., U.S.N., B.S., *University of Pittsburgh*, 1943; B.S., *United States Naval Postgraduate School*, 1953.  
Harmon Charles Penny, Lt., U.S.N., B.S., *United States Naval Academy*, 1945; B.S., *United States Naval Postgraduate School*, 1953.  
Carlton Kay Perkins, Major, U.S.M.C., B.S., *United States Naval Academy*, 1943; B.S., *United States Naval Postgraduate School*, 1953.  
Norwald Richard Quiel, Lt., U.S.N., B.S., *United States Naval Postgraduate School*, 1953.  
Don Easterday Rogers, B.S.Ae., *University of Michigan*, 1948; M.S.Ae., 1950.  
Torstein Strand, B.A., *Trondheim Katedralskole (Norway)*, 1939; B.S., *Massachusetts Institute of Technology*, 1947; M.S., *California Institute of Technology*, 1948.  
Robert Louis von Gerichten, Lt., U.S.N., B.S., *United States Naval Academy*, 1946; B.S., *United States Naval Postgraduate School*, 1953.

### *Chemical Engineer*

- Bert Henry Golding, B.S., *California Institute of Technology*, 1944; M.S., 1948.  
William Louis Burriss, B.S., *California Institute of Technology*, 1950; M.S., 1953.

### *Electrical Engineer*

- Carl William Bergman, Jr., B.S., *Worcester Polytechnic Institute*, 1945; M.S., *California Institute of Technology*, 1948.

### *Geological Engineer*

- Jesús Ruiz-Elizondo, B.S., *University of Mexico*, 1949; M.S., *California Institute of Technology*, 1953.

### *Mechanical Engineer*

- Paul Hideo Hayashi, B.S., *Massachusetts Institute of Technology*, 1951; M.S., *California Institute of Technology*, 1952.

## Candidates for Degrees

### DOCTOR OF PHILOSOPHY

- Thomas Charles Adamson, Jr. (Aeronautics and Mathematics). B.S., *Purdue University*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Ignition and Combustion in a Laminar Mixing Zone*.
- Clarence Roderic Allen (Structural Geology and Applied Geophysics). B.A., *Reed College*, 1949; M.S., *California Institute of Technology*, 1951. Thesis: *The San Andreas Fault Zone in San Geronimo Pass, California*.
- Fred Barker (Geology and Mechanical Engineering). B.S., *Massachusetts Institute of Technology*, 1950; M.S., *California Institute of Technology*, 1952. Thesis: *Pre-Cambrian and Tertiary Geology of the Las Tablas Quadrangle, New Mexico*.
- Michael Abram Basin (Electrical Engineering and Physics). B.S., *California Institute of Technology*, 1951; M.S., 1952. Thesis: *Electric Analog Computer Study of Supersonic Flutter of Elastic Delta Wings*.
- Howard Martin Berger (Aeronautics and Mathematics). B.S., *University of Michigan*, 1948; M.S., *California Institute of Technology*, 1949. Thesis: *A New Approach to the Analysis of Large Deflections of Plates*.
- Norman Herrick Brooks (Civil Engineering and Physics). A.B., *Harvard College*, 1949; M.S., *Harvard University*, 1950. Thesis: *Laboratory Studies of the Mechanics of Streams Flowing over a Movable Bed of Fine Sand*.
- Thomas Kirk Caughey (Engineering Science and Electrical Engineering). B.Sc. (Hons. E.E.), *Glasgow University*, 1948; M.M.E., *Cornell University*, 1952. Thesis: *The Existence and Stability of Periodic Motions in Forced Non-Linear Oscillations*.
- Donald Gibson Crosby (Chemistry and Plant Physiology). B.A., *Pomona College*, 1950. Thesis: I. *The Structures of Phytotoxic Compounds from *Thamnosma montana* and Their Effects on Plants*. II. *Preparation and Reactions of S-Phenylthiolcarbamates*. III. *Studies on the Synthesis of Actidione*.
- Charles Lee Dailey (Aeronautics and Mathematics). B.S., *California Institute of Technology*, 1941; M.S., 1942. Thesis: *Supersonic Diffuser Instability*.
- Robert John Dickson, Jr. (Mathematics and Aeronautics). B.S., *Stanford University*, 1949. Thesis: *Bounds for Solutions of Some Non-linear Parabolic Problems*.
- Franklin Wolfgang Diederich (Aeronautics and Mathematics). B.M.E., *The Cooper Union*, 1943; M.Aero.E., *New York University*, 1944; M.E., *The Cooper Union*, 1951. Thesis: *The Response of an Airplane to Random Atmospheric Disturbances*.
- Don Elton Edmondson (Mathematics and Aeronautics). B.S., *Southern Methodist University*, 1945; M.S., 1948. Thesis: *Homomorphisms of a Modular Lattice*.
- Erdem I. Ergin (Mechanical Engineering and Physics). B.S., *Montana State College*, 1950; M.S., *California Institute of Technology*, 1951. Thesis: *Transient Response of Non-Linear Spring-Mass Systems*.
- Glenn Albert Fischer (Genetics and Biochemistry). B.A., *University of Colorado*, 1949; M.S., *California Institute of Technology*, 1951. Thesis: *Genetic and Biochemical Studies of the Cystine-Methionine Series of Mutants in *Neurospora crassa**.

# Candidates for Degrees

## DOCTOR OF PHILOSOPHY

- Acey LeeRoy Floyd, Jr. (Physics and Mathematics). B.S., *Georgia Institute of Technology*, 1947; M.S., 1949. Thesis: *Relative Transition Probabilities of the CN Violet Band System from Band Head Data.*
- Henry Gershowitz (Genetics and Immunology). B.A., *Brooklyn College*, 1949. Thesis: *Immunogenetic Studies of the Pigeon, Columba livia.*
- Ronald Crundon Greene (Biochemistry and Chemistry). B.S., *California Institute of Technology*, 1949. Thesis: *Studies on Uricase from Neurospora crassa.*
- Raimo Jaakko Hakkinen (Aeronautics and Physics). Eng., *Technical University of Finland*, 1948; M.S., *California Institute of Technology*, 1950. Thesis: *Measurements of Skin Friction in Turbulent Boundary Layers at Transonic Speeds.*
- Walter Clark Hamilton (Chemistry and Mathematics). B.S., *Oklahoma Agricultural and Mechanical College*, 1950. Thesis: I. *The Crystal Structure of Dimethyl Phosphinoborine Trimer.* II. *The Method of Least Squares in Electron Diffraction.* III. *Some Structural Studies by the Electron Diffraction by Gas Molecules.*
- James Paul Heppner (Geophysics and Physics). B.Ph., *University of Minnesota*, 1948; M.S., *California Institute of Technology*, 1950. Thesis: *A Study of the Relationships between the Aurora Borealis and the Geomagnetic Disturbances Caused by Atmospheric Electric Currents.*
- Claude Willey Hinton (Genetics and Embryology). A.B., *University of North Carolina*, 1948; M.A., 1950. Thesis: *The Behavior of an Unstable Ring Chromosome in Drosophila melanogaster.*
- George Elmer Hlavka (Mechanical Engineering and Mathematics). B.S., *University of Wisconsin*, 1946; M.S., *California Institute of Technology*, 1948. Thesis: *An Approximate Theory for Potential Flow through Cascades of Airfoils.*
- Stanley Parlett Hughart (Mathematics and Physics). B.S., *Whitworth College*, 1940. Thesis: *Representations for Dicategories.*
- James Arthur Ibers (Chemistry and Mathematics). B.S., *California Institute of Technology*, 1951. Thesis: I. *The Structure of Oxygen Fluoride.* II. *The Failure of the Born Approximation—The Calculation of Complex Atomic Scattering Amplitudes for Electron Diffraction.* III. *Some Calculations of Atomic Form Factors.* IV. *Structural Studies by X-ray Diffraction.*
- Lionel Francis Jaffe (Embryology and Plant Physiology). B.S., *Harvard College*, 1948. Thesis: *On a Carbon Dioxide Gradient in the Fucles Egg.*
- Kenneth Delford Johnson (Chemistry and Chemical Engineering). B.S., *Emmanuel Missionary College*, 1932. Thesis: I. *The Inclusion of Monohaptenic Substances in Immune Aggregates.* II. *Heterologating Antibody in Anti-arsanilic Acid Sera.*
- Burke Haycock Judd (Genetics and Immunology). B.S., *University of Utah*, 1950; M.S., 1951. Thesis: *Studies of Rearrangements Involving Heterochromatin in Drosophila melanogaster.* I. *A Proof of the Variegated-Type Position Effect at the White Locus.* II. *A Study of the Heterochromatin of Chromosome IV.*

# Candidates for Degrees

## DOCTOR OF PHILOSOPHY

- Abner Kaplan (Aeronautics and Mathematics). B.S., *California Institute of Technology*, 1948; M.S., 1949. Thesis: *Finite Deflections and Buckling of Slightly Curved Beams and Shallow Spherical Shells under Lateral Loads.*
- Saul Kaplun (Aeronautics and Mathematics). B.S., *California Institute of Technology*, 1948; M.S., 1949; Ae.E., 1951. Thesis: *The Role of Coordinate Systems in Boundary Layer Theory.*
- Martin Karplus (Chemistry and Biology). B.A., *Harvard College*, 1950. Thesis: *A Quantum-Mechanical Discussion of the Bifluoride Ion.*
- Maurice Kennedy (Mathematics and Physics). B.Sc., *National University of Ireland*, 1945; M.Sc., 1946. Thesis: *Ergodic Theorems for a Certain Class of Markoff Processes.*
- Eldon Luverne Knuth (Aeronautics and Mathematics). B.S., *Purdue University*, 1949; M.S., 1950. Thesis: *The Mechanics of Film Cooling.*
- Robert Eugene Kofahl (Chemistry and Physics). B.S., *California Institute of Technology*, 1949. Thesis: I. *Exploratory Investigation of the Autoxidation and Hydration of 3-Hexyne Catalyzed by Mercuric Sulfate and Sulfuric Acid.* II. *The Effect of Mercuric Nitrate and Other Electrolytes upon the Aqueous Solubility of Benzene.* III. *Coordination of Polycyclic Aromatic Hydrocarbons with Silver Ion; Correlation of Equilibrium Constants with Relative Carcinogenic Potencies.*
- Robert Hani Korkegi (Aeronautics and Mathematics). B.S. *Lehigh University*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Transition Studies and Skin Friction Measurements on an Insulated Flat Plate at a Hypersonic Mach Number.*
- Joseph Kraut (Chemistry and Physics). B.S., *Bucknell University*, 1950. Thesis: *A Study of the Molecular Properties of Rat-Tail Tendon Collagen and an Investigation of the Structure of Feather Keratin.*
- Seymour Lampert (Aeronautics and Mathematics). B.S., *Georgia School of Technology*, 1943; M.S., *California Institute of Technology*, 1947; Ae.E., 1948. Thesis: *Homogeneous Flow Fields of Degree Greater than Zero.*
- Eugene Yu-Cheng Loh (Mechanical Engineering and Mathematics). B.S., *National Tung-Chi University*, 1944; M.S., *Purdue University*, 1949; M.S., *California Institute of Technology*, 1953. Thesis: *Study of the Kinetics of the Order-Disorder Transformation in the Alloy MnNi<sub>3</sub>.*
- Scott Lynn (Chemical Engineering and Chemistry). B.S., *California Institute of Technology*, 1950; M.S., 1951. Thesis: I. *Radial Diffusion in a Turbulent Air Stream.* II.A. *Absorption of Light by the System Nitric Acid-Nitrogen Dioxide-Water.* II.B. *Ionization in Solutions of Nitrogen Dioxide in Nitric Acid from Optical Absorbance Measurements.* III. *Kinetics of the Decomposition of Sodium Dithionite.* IV. *The Determination of Chromium by Oxidation in the Presence of Silver Nitrate.*
- Robert Smith Macmillan (Electrical Engineering and Physics). B.S., *California Institute of Technology*, 1948; M.S., 1949. Thesis: *Some Properties of the Ionosphere at Low Radio Frequencies.*

## Candidates for Degrees

### DOCTOR OF PHILOSOPHY

- Richard Muin Mark (Aeronautics and Mathematics). B.S., *University of Washington*, 1947; M.S., 1950. Thesis: *Laminar Boundary Layers on Slender Bodies of Revolution in Axial Flow*.
- Bernard Walter Marschner, Lt. Col., U.S.A.F. (Aeronautics and Mathematics). B.S., *University of Minnesota*, 1942; M.S., *California Institute of Technology*, 1947; Ae.E., 1948. Thesis: *The Flow over a Body in a Choked Wind Tunnel and in a Sonic Free-Jet*.
- James Oeland McCaldin (Mechanical Engineering and Physics). B.A., *University of Texas*, 1944; B.S., *California Institute of Technology*, 1950; M.S., 1951. Thesis: *The Influence of Isotopic Mass on Some Physical Properties of Iron*.
- James Lewin McGregor (Mathematics and Aeronautics). B.A., *University of British Columbia*, 1949; M.A., 1951. Thesis: *Generalized Translation Operators*.
- Gordon Earle Moore (Chemistry and Physics). B.S., *University of California*, 1950. Thesis: I. *Infra-Red Studies of Nitrous Acid, the Chloramines and Nitrogen Dioxide*. II. *Observations Concerning the Photochemical Decomposition of Nitric Oxide*.
- Merle Loren Morgan (Electrical Engineering and Physics). B.S., *California Institute of Technology*, 1949; M.S., 1950. Thesis: *A Computer for Algebraic Functions of a Complex Variable*.
- William Rudolf Muchlberger (Geology and Vertebrate Paleontology). B.S., *California Institute of Technology*, 1948; M.S., 1949. Thesis: *Deposition and Deformation in the Soledad Basin, Los Angeles County, California*.
- Joseph Jackson Murray (Physics and Mathematics). B.S., *Southern Methodist University*, 1944; M.S., 1951. Thesis: *The Decay of Ta<sup>183</sup>*.
- Robert South Neiswander (Electrical Engineering and Aeronautics). B.S., *California Institute of Technology*, 1940; M.S., 1946. Thesis: *Techniques in Treating Nonlinear Closed-cycle Systems*.
- William Albert Nevill (Chemistry and Biology). B.S., *Butler University*, 1951. Thesis: *Studies Relating to the Free Radical Chlorination of Cyclobutanecarboxylic Acids*.
- John Burton Opfell (Chemical Engineering and Mathematics). B.S., *University of Wisconsin*, 1945; M.S., *California Institute of Technology*, 1947. Thesis: *A Detailed Study in the Application of the Benedict Equation to One-Component Systems*.
- Carel Otte, Jr. (Stratigraphy and Applied Geophysics). B.S., *Amsterdam University*, 1943; M.S., *California Institute of Technology*, 1950. Thesis: *Late Pennsylvanian and Early Permian Stratigraphy of the Northern Sacramento Mountains, Otero County, New Mexico*.
- James Mervin Parker (Astronomy and Physics). B.A., *Pomona College*, 1948. Thesis: *Profiles and Wave-Lengths of Spectrum Lines in the Solar Chromosphere*.
- Robert Williams Peterson (Physics and Mathematics). B.S., *Rutgers University*, 1950. Thesis: *A Study of the Fluorine Plus Proton Reactions*.
- Donald Brandreth Potter (Petrology and Geomorphology). B.A., *Williams College*, 1947; M.S., *Brown University*, 1949. Thesis: *High-alumina Metamorphic Rocks of the Kings Mountain District, North Carolina and South Carolina*.

# Candidates for Degrees

## DOCTOR OF PHILOSOPHY

- Dean Arthur Rains (Mechanical Engineering and Mathematics). B.S., *California Institute of Technology*, 1950; M.S., 1951. Thesis: *Tip Clearance Flows in Axial Flow Compressors and Pumps*.
- John Keith Rowley (Chemistry and Physics). B.A. *Grinnell College*, 1950. Thesis: *Coulometric and Amperometric Studies*.
- Robert Herman Shennum (Electrical Engineering and Physics). B.S., *Montana State College*, 1944; M.S., 1948. Thesis: *The Dielectric Recovery of Parallel Arcs*.
- George G. Shor, Jr. (Seismology, Engineering Science and Physical Geology). B.S., *California Institute of Technology*, 1944; M.S., 1948. Thesis: *Crustal Structure and Reflections from the Mohorovicic Discontinuity in Southern California*.
- John Albert Stallkamp (Electrical Engineering and Physics). B.S., *Columbia University*, 1946; M.S., *California Institute of Technology*, 1947. Thesis: *Hydrodynamic Forces on Prolate Ellipsoidal Bodies*.
- Harry Nelson Upthegrove (Electrical Engineering and Physics). B.S., *United States Naval Academy*, 1945; B.S., *Massachusetts Institute of Technology*, 1948. Thesis: *An Investigation of the Influence of Fuselage Elasticity on the Pitching Motion of a Controlled Missile*.
- Sitaram Rao Valluri (Aeronautics and Mathematics). B.S., *Indian Institute of Science*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Studies of the Fundamental Parameters of Fatigue*.
- Victor Anton Jacobus van Lint (Physics and Mathematics). B.S., *California Institute of Technology*, 1950. Thesis: *Observations of Neutral V-Particle Decays with the 48" Magnet Cloud Chambers*.
- Thomas Vrebalovich (Aeronautics and Mathematics). B.S., *California Institute of Technology*, 1948; M.S., 1949. Thesis: *The Development of Direct and Alternating Current Glow Discharge Anemometers for the Study of Turbulence Phenomena in Supersonic Flow*.
- William Walter Willmarth (Aeronautics and Physics). B.S., *Purdue University*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *The Lift of Thin Airfoils at High Subsonic Speeds*.
- Hans Emil Wohlwill (Electrical Engineering and Physics). B.S., *Massachusetts Institute of Technology*, 1943. Thesis: *A Resonant Cavity Method of Measuring the Velocity of Light*.
- Yusuf Amon Yoler (Aeronautics and Mathematics). B.S., *Robert College (Turkey)*, 1949; M.S., *California Institute of Technology*, 1951. Thesis: *The Hypersonic Shock-Tube*.
- Edward Edom Zukoski (Aeronautics and Physics). B.S., *Harvard College*, 1950; M.S., *California Institute of Technology*, 1951. Thesis: *Flame Stabilization on Bluff Bodies at Low and Intermediate Reynolds Numbers*.

# *Prizes and Awards*

## CONGER PEACE PRIZE ORATION

*Established in 1912 by the late Everett D. Conger, D.D.*

### FIRST PRIZE

Raymond L. Orbach

### SECOND PRIZE

Marvin L. Bienstock

## MARY A. EARLE MCKINNEY PRIZE IN ENGLISH

*Established in 1946 by the late Samuel P. McKinney, M.D.,  
as a memorial to his mother*

### FIRST PRIZE

Alexander N. Gansa

### SECOND PRIZE

Charles V. Brokaw

### THIRD PRIZE

George Baker

Walter Lee

## SIGMA XI AWARD

*Established in 1954 by the California Institute chapter of the Society of Sigma Xi, the national honorary scientific society. This award was established to recognize and encourage outstanding young research workers whose careers will be in pure and applied science; it will be made in recognition of research work of exceptional quality by a graduate student. The award will be rotated annually among the five scientific and engineering divisions of the California Institute. The nomination for the 1954 award is made by the Division of Biology.*

*The recipient of the award is announced each year at Commencement.*