

California Institute of Technology



Fifty-ninth Annual
COMMENCEMENT
EXERCISES

*Friday afternoon,
June twelfth, nineteen fifty-three
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.

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 HONORABLE ARTHUR SHERWOOD FLEMMING

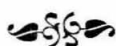
HIS EMINENCE, JAMES FRANCIS CARDINAL MCINTYRE

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

PROGRAM

Presiding: JAMES R. PAGE, LL.D.

Chairman of the Board of Trustees



PRELUDE AND PROCESSIONAL MARCH

THE CALIFORNIA INSTITUTE BRASS ENSEMBLE

INVOCATION AND CHAPLAIN'S ADDRESS

HIS EMINENCE, JAMES FRANCIS CARDINAL MCINTYRE

Archbishop of Los Angeles

COMMENCEMENT ADDRESS

THE HONORABLE ARTHUR SHERWOOD FLEMMING, LL.D.

Director, Office of Defense Mobilization

CONFERRING OF DEGREES

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

President of the California Institute of Technology

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

HIS EMINENCE, THE CARDINAL

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

RECESSIONAL MARCH

THE CALIFORNIA INSTITUTE BRASS ENSEMBLE

Candidates for Degrees

BACHELOR OF SCIENCE IN SCIENCE

Carl Albin Anderson, Jr.	David James MacDonald, Jr.
Daniel E. Appleman	William Devlin McCormick
Thomas Hood Applewhite*	Douglas C. McLean
Russell Keith Bardin*	Alberto Mishaan Pinto
John Charles Behnke†	Eugene Bruce Muehlberger†
Charles Ephraim Benjamins†	Hajimu Ogawa*
Swaroop Chandra BhanjDeo	Gilbert Belden Peppin
Robert Lewis Bixler	Walter Lee Pilant
William Grinnell Blodgett	Oliver R. Price
Andrew Conrad Boush	Morris Abraham Robkin
Richard Craig Brown	Irwin M. Rubenstein
John William Cagle, Jr.	Carl Gregory Sauer, Jr.
David Joseph Clark	Bruce Laurence Scott
Neal Hart Cosand	Theodore Dwight Sheldon
Manuel Jesús Crespo*	Howard Alan Shugart*
Donald Arthur Darms	Thomas Raymond Slodowski
John Nelson Delcamp	Robert Le Roy Smith
Stanton Lea Eilenberg	Donald Philip Snowden*
Theodore Harry Einwohner	Robert James Stanton, Jr.*
Donald Orville Emerson	Lawrence Davidson Starr
Thomas Fred Emery	Arthur Jordan Stasney*
Patrick Joseph Fazio, Jr.†	Neil Joseph Stefanides
Alan Howard Habert†	David Frank Stevens*
Richard George Ham*	George Secor Stranahan
Kimball Lee Hamberger	Alfred Henry Sturtevant III
Richard Oldham Ireland	Nicholas S. Szabó
Earl Donald Jacobs	Nobuyoshi Takahashi
Richard Miller Jaffe	Terry Neal Thomas
Thomas Jean Janssens	Walter Rollier Thorson*
David Johnston	David Seagrave Twining
James Russell Kliegel	Harry Lester Vincent
David E. Knapp	Norman Patrick Wilburn
Richard Alfred Knapp	Ronald Howard Willens
James Thomas LaTourrette*†	John Coe Wilson
Michael Ernst Lourié	John Seymour Winslow
Frank Arno Ludwig	Robert Hemsley Wood*
Kenneth Dale Lunan†	James Harschel Wyman†

*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.

BACHELOR OF SCIENCE IN ENGINEERING

Takeo Asakawa	Robert Alfred Koster
William V. Avere	Paul Eugene Langdon, Jr.
Philip Knight Bates, Jr.	Budd Webster LeTourneau*
Arthur Edward Britt	Duane Marshall
Coy Richard Cantrell, Jr.	Leon Charles Michaelson†
Robert Dysart CoNine	Clarence Edward Miller, Jr.
George B. Cooke, Jr.	George Harold Moore†
Charles Alfred Davies	Kenneth F. Nicholson*
Edward Harlow Daw*	John Morgan Ogilvie, II†
Walter James Eager	William Albert Peterson
Lester Donald Earnest	Marshall Clarke Pond
Robert L. Easton*	Carl Alan Rambow*
Kenneth Edward French II	Noel Edward Reed
William D. Gardner	Gerald Howard Ross
George Gartner	Sheldon Rubin*
John Dabney Geet†	Norman Milton Schroeder
Robert Edward Gillingham	Herbert Shear*
Raymond Henry Greutert	Robert Luton Spencer
Gordon Lloyd Gwinn	Thomas Charles Stockebrand
Alan Marshall Haire*	Edwin Jule Stofel*
Walter Herbert Hartung	Dee Wyant Swayze
Rolf Constantin Hastrup*	Charles Robert Tallman
Ronald Paul Helin	Perry Hatch Vartanian, Jr.*
James Arnold Hendrickson	Clair C. Veazey
Herbert Edward Henrikson	Leon Leroy Vickmant†
Lyle N. Hoag, Jr.	Jean Leon Vidal
Ronald Joesph Hruby	Jack Douglas Walkert†
Robert Douglas Inglis	Rolf David Weglein
Alfred LeRoy Johnson, Jr.*	Richard Daniel Welsh
Gene Morrison Jordan, Jr.	Stanley Gene Wilkes
Kenneth Robert King*	

*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.

MASTER OF SCIENCE IN SCIENCE

Chemical Engineering

- William Louis Burris, B.S., *California Institute of Technology*, 1950.
Robert Stephen Davis, B.S., *California Institute of Technology*, 1952.
William A. Kemmel, Jr., B.S., *California Institute of Technology*, 1952.
Stanley R. Rawn, Jr., B.S., *California Institute of Technology*, 1952.
Wallace Walter Short, B.S., *University of Missouri*, 1951.
Donald Edward Stewart, B.S., *California Institute of Technology*, 1952.
William Taylor Webber, B.S., *California Institute of Technology*, 1952.

Geological Sciences

- Robert Houston Alexander, B.S., *Iowa State College*, 1950.
C. Wayne Burnham, B.A., *Pomona College*, 1951.
Gordon Pryor Eaton, B.A., *Wesleyan University*, 1951.
Dallas Lynn Peck, B.S., *California Institute of Technology*, 1952.
Jesús Ruiz Elizondo, B.S., *University of Mexico*, 1948.
John Richard Woodcock, B.A., *University of British Columbia*, 1951.

Geophysics

- John Lincoln Howell, B.S., *California Institute of Technology*, 1952.
Harold Robert Hunt, B.A., *Williams College*, 1951.
Robert Hyde Morrison, B.S., *Western Reserve University*, 1950.

Physics

- John Hubert Atkinson, B.A., *College of Wooster*, 1951.
Bert Elwood Brown, B.S., *State College of Washington*, 1949; M.S., 1950.
James Lorenz Cass, B.S., *California Institute of Technology*, 1950.
David Duncan Elliot, III, B.S., *Stanford University*, 1951.
Eugene Yu-Cheng Loh, B.S., *National Tung-Chi University*, 1944; M.S., *Purdue University*, 1949.
Forrest S. Mozer, B.S., *University of Nebraska*, 1951.
Daniel Robert Muss, B.S., *Massachusetts Institute of Technology*, 1948.
John William Reeds, B.S., *California Institute of Technology*, 1950.
Carl Albert Rouse, B.S., *Case Institute of Technology*, 1951.
Malcolm Earl Scharer, B.S., *University of Southern California*, 1951.
Arnold Adolph Strassenburg, B.S., *Illinois Institute of Technology*, 1951.
Thomas Tallott Taylor, B.S., *Purdue University*, 1942.
Robert McNally Walp, B.S., *California Institute of Technology*, 1951.
David Beryle Wittry, B.S., *University of Wisconsin*, 1951.

MASTER OF SCIENCE IN ENGINEERING

Aeronautics

- David Maurice Benenson, B.S., *Massachusetts Institute of Technology*, 1950.
Herman Jerry Carpenter, 2nd Lt. U.S.A.F., B.S., *Louisiana State University*, 1952.
Luther Henry Cassler, 1st Lt., U.S.A.F., B.S., *United States Military Academy*, 1949.
Gerald Graziani, B.S.E., *University of Michigan*, 1952.
Edward Joseph Heesacker, 1st Lt., U.S.A.F., B.S., *United States Military Academy*, 1949.
Henry Rife Jex, B.S., *Massachusetts Institute of Technology*, 1951.
Stuart Gordon Lennox, B.S., *University of London*, 1951.
Stanley Joel Minton, B.Ae.E., *New York University*, 1944.
Ronald LeRoy Richmond, B.S., *University of California*, 1952.
Alexander Martin Rodriguez, B.S., *University of Pittsburgh*, 1948.

Civil Engineering

- Levi Aloysius Brown, Capt., U.S.A., B.S., *United States Military Academy*, 1946.
Guerin E. Carlson, B.C.E., *Polytechnic Institute of Brooklyn*, 1950.
George Bernard Fink, Capt. U.S.A., B.S., *United States Military Academy*, 1946.
Robert Elwood Graf, 1st Lt., U.S.A., B.S., *United States Military Academy*, 1948.
Kenneth Martin Hatch, Capt., U.S.A., B.S., *United States Military Academy*, 1947.
Pierre J. C. A. Marien, C.E., *University of Brussels*, 1952.
Milum Davis Perry, Jr., Capt., U.S.A., B.S., *United States Military Academy*, 1947.
Fred Wharton Rankin, Jr., Capt., U.S.A., B.S., *United States Military Academy*, 1945.
Joseph John Rochefort, Jr., Capt., U.S.A., B.S., *United States Military Academy*, 1945.
Brij Mohan Seoni, C.E., *Thomason College of Civil Engineering*, Roorkee, India, 1946.
William Melbury Smith, Jr., B.A., *Colorado College*, 1951; B.S., 1952.
Augusto Luis Soux, B.S., *California Institute of Technology*, 1952.
Freddy Percy Storrer, C.E., *University of Ghent*, 1952.
Edgar Yuen Wong, B.S., *California Institute of Technology*, 1952.

Electrical Engineering

- Daniel Ellis Carney, B.S., *California Institute of Technology*, 1952.
Edward Farnum Davis, B.S., *California Institute of Technology*, 1952.
Forrest William Davis, B.S., *California Institute of Technology*, 1952.
Raymond Fernand Destabelle, B.S., *California Institute of Technology*, 1952.
Luiz Harold Dirickson, E. and M.E., *University of Sao Paulo*, 1948.
Leon Fred Edelson, B.S., *California Institute of Technology*, 1952.
Joseph David Gleckler, B.S., *United States Naval Academy*, 1946.
Raymond LeRoy Heacock, B.S., *California Institute of Technology*, 1952.
James Gay Helmuth, B.S., *California Institute of Technology*, 1952.

Electrical Engineering—continued

- Boyd Parker Israelsen, B.S., *California Institute of Technology*, 1952.
John Edwin Leib, B.S.E., *University of Michigan*, 1951.
Naoji Morishita, B.S., *Tokyo Institute of Technology*, 1951.
William Clarence Pilkington, Jr., B.S., *California Institute of Technology*, 1952.
James A. Ross, Jr., B.S., *California Institute of Technology*, 1952 .
Bruce Richard Weinert, B.S.E., *University of Michigan*, 1950.

Mechanical Engineering

- Moses Arens, B.S., *Massachusetts Institute of Technology*, 1947.
William Taylor Beale, B.S., *State College of Washington*, 1950.
John Anthony Boppart, Jr., B.S., *California Institute of Technology*, 1952.
Francis Lacey Carlisle, B.S., *California Institute of Technology*, 1939.
Gerald Allen Cohen, B.S., *Purdue University*, 1952.
Thomas Lee Curkendall, 1st Lt., U.S.A.F., B.S., *University of Washington*, 1946.
Richard Wilson Flygare, B.S., *University of Utah*, 1949.
Frederick Clay Harshbarger, A.B., *Oberlin College*, 1952.
Robert Alway Haskell, B.S., *University of California at Los Angeles*, 1952.
Walter E. Holtz, B.S., *Illinois Institute of Technology*, 1949.
Irvin Raymond Kobsa, 2nd Lt., U.S.A.F., B.S., *Purdue University*, 1952.
James Crawford Noll, B.S., *California Institute of Technology*, 1952.
Alphonse Philip Peters, B.A., *University of Connecticut*, 1952.
Thomas Lee Russell, B.S., *California Institute of Technology*, 1952.
Koichi Sadashige, M.E., *University of Chiba, Japan*, 1947.
Leon Scrydloff, B.S., *West Coast University*, 1951.
George Walter Sutton, B.M.E., *Cornell University*, 1952.
Thomas Fletcher Talbot, 2nd Lt., B.M.E., *Alabama Polytechnic Institute*, 1952.
Donald Kenneth Tautz, B.S., *California Institute of Technology*, 1952.
Leino Arthur Warmanen, B.S., *West Coast University*, 1951.
Ronald Watson, B.S., *Illinois Institute of Technology*, 1952.

ENGINEER'S DEGREES

Aeronautical Engineer

- David Dean Beyer, B.S., *Parks College of Aeronautical Technology of St. Louis University*, 1951; M.S., *California Institute of Technology*, 1952.
- Donald Charles Curran, Lt., U.S.N., B.S., *United States Naval Academy*, 1944; M.S., *United States Naval Postgraduate School*, 1952.
- Bain Dayman, Jr., B.S., *California Institute of Technology*, 1950; M.S., 1951.
- Benton Holford Elliott, Lt. Col., U.S.M.C., B.S., *Agricultural and Mechanical College of Texas*, 1941; B.S., *United States Naval Postgraduate School*, 1952.
- Raymond Caesar Fernández, Lt. Comdr., U.S.N., B.S. (Ae.E.), *United States Naval Postgraduate School*, 1952.
- Jack Nathan Lindsley, Lt., U.S.N., B.S., *Parks Air College*, 1940; B.S., *United States Naval Postgraduate School*, 1952.
- Douglas Severance Mackay, Lt. U.S.N., B.S., *United States Naval Academy*, 1944; B.S., *United States Naval Postgraduate School*, 1952.
- Wilbur Francis Offtermatt, Lt., U.S.N., B.S., *United States Naval Postgraduate School*, 1952.
- William McKnight Pardee, Lt. Comdr., U.S.N., B.S., *United States Naval Academy*, 1942; B.S., *United States Naval Postgraduate School*, 1952.
- Herbert R. Poorman, Lt., U.S.N., B.S., *United States Naval Academy*, 1944; B.S., *United States Naval Postgraduate School*, 1952.
- Darrell Lloyd Ritter, Major, U.S.M.C., A.B. (Engr.) *Stanford University*, 1943; B.S. (Ae.E.), *United States Naval Postgraduate School*, 1952.
- Winthrop Pratt Robinson, Lt., U.S.N., B.S., *United States Naval Postgraduate School*, 1952.
- William Clay Robison, Lt., U.S.A.F., B.S., *United States Military Academy*, 1949; M.S., *California Institute of Technology*, 1952.
- John Solon Saxon, Lt., U.S.N., B.S., *United States Naval Academy*, 1943; B.S., *United States Naval Postgraduate School*, 1952.

Chemical Engineer

- Glenn David Robertson, Jr., B.S., *The Rice Institute*, 1949; M.S., *California Institute of Technology*, 1950.

Civil Engineer

- Richard George Merritt, B. of Eng., *Yale University*, 1950; M.S., *California Institute of Technology*, 1951.

Mechanical Engineer

- Marc Kampé de Fériet, Dipl. Eng., *Ecole Centrale des Arts et Manufactures (Paris)*, 1950; M.S., *California Institute of Technology*, 1951.
- Thorbjorn Karlsson, B.S., *Illinois Institute of Technology*, 1950; M.S., *California Institute of Technology*, 1951.
- Gordon John MacLeod, B.S., *University of California*, 1949; M.S., *California Institute of Technology*, 1951.

DOCTOR OF PHILOSOPHY

- William Lumpkin Alford. (Physics and Mathematics), B.A., *Vanderbilt University*, 1948; M.S., *California Institute of Technology*, 1949. Thesis: *The Mean Lifetime of V-Particles*.
- Bruce Nathan Ames. (Biochemistry and Chemistry), B.A., *Cornell University*, 1950. Thesis: *The Biosynthesis of Histidine in Neurospora crassa*.
- Jack Steele Anderson. (Electrical Engineering and Physics), B.S., *University of Texas*, 1946; M.S., *California Institute of Technology*, 1948. Thesis: *Analysis of Non-Linear Servomechanisms*.
- Roger Alan Anderson. (Mechanical Engineering and Physics), B.S., *California Institute of Technology*, 1948; M.S., 1950. Thesis: *Transient Response of Uniform Beams*.
- Halton Christian Arp. (Astronomy and Physics), A.B., *Harvard College*, 1949. Thesis: *Variable Stars of Period Greater than One Day in Globular Clusters*.
- Howard James Boroughs. (Plant Physiology and Immunology), B.A., *University of Southern California*, 1949. Thesis: I. *Studies on the Acid Phosphatases of Green Leaves*. II. *Studies on the Role of Indoleacetic Acid on Cell Elongation*.
- George Hamilton Bowen, Jr. (Biophysics and Genetics), B.S., *California Institute of Technology*, 1949. Thesis: *Kinetic Studies on the Mechanism of Photo-reactivation of Bacteriophage T2 Inactivated by Ultraviolet Light*.
- Paul Richard Carter. (Chemistry and Physics), B.S., *Brooklyn College*, 1949. Thesis: *Kinetics of the Oxidation of Iron (II) by Bromine*.
- Raymond Lu-Po Chuan. (Aeronautics, Physics and Mathematics), B.A., *Pomona College*, 1944; M.S., *California Institute of Technology*, 1945; Ae.E., 1948. Thesis: *An Investigation of Viscous Effects in Supersonic Flow at Low Reynolds Numbers*.
- Donald Earl Coles. (Aeronautics and Mathematics), B.S., *University of Minnesota*, 1947; M.S., *California Institute of Technology*, 1948. Thesis: *Measurements in the Boundary Layer on a Smooth Flat Plate in Supersonic Flow*.
- Richard Daniel DeLauer, Lt., U.S.N. (Aeronautics and Mathematics), A.B., *Stanford University*, 1940; B.S. (Ae.E.), *United States Naval Postgraduate School*, 1949; Ae.E., *California Institute of Technology*, 1950. Thesis: *Heat Transfer at Hypersonic Mach Numbers*.
- Jerome King Delson. (Electrical Engineering, Physics and Mathematics), B.S., *Illinois Institute of Technology*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Networks Involving Ideal Transformers*.
- George Richard Dubes. (Genetics and Biochemistry), B.S., *Iowa State College*, 1949. Thesis: *Investigations of Some "Unknown" Mutants of Neurospora crassa*.
- William Charles Duysterhoef, Jr. (Electrical Engineering and Physics), B.S., *University of Texas*, 1943; M.S., 1948. Thesis: *Temperature Measurements of Large Power Arcs and the Relation of Temperature to Dielectric Recovery*.
- Luther William Eggman. (Biochemistry, Plant Physiology and Chemistry), B.S., *Iowa State College*, 1944. Thesis: *Characterization of a Soluble Cytoplasmic Protein Component of Green Leaves*.
- Manfred Eimer. (Aeronautics and Mathematics), B.S., *California Institute of Technology*, 1947; M.S., 1948. Thesis: I. *Bodies in a Flow Field with Parabolic Velocity Distribution*. II. *Skin Friction at Hypersonic Speeds*.

DOCTOR OF PHILOSOPHY

- Max Edmund Ellion. (Mechanical Engineering and Physics), S.B., *Northeastern University*, 1944; S.M., *Harvard University*, 1947. Thesis: *A Study of Boiling Heat Transfer*.
- Albert Tromly Ellis. (Mechanical Engineering and Physics), B.S., *California Institute of Technology*, 1943; M.S., 1947. Thesis: *Observations on Cavitation Bubble Collapse*.
- Robert Donald Forester. (Geophysics and Structural Geology), B.S., *California Institute of Technology*, 1949; M.S., 1950. Thesis: I. *Studies of the Travel Times, Periods, and Energy of Seismic Waves SKP and Related Phases*. II. *The Iron-Rich Breccia Masses at Iron-Mountain, Silver Lake District, San Bernardino County, California*.
- Peter Lionel Goldacre. (Biochemistry and Genetics), B.Sc., *University of Sydney*, 1946; M.Sc., 1951. Thesis: *Studies on the Destruction of Indole-3-Acetic Acid by Plant Tissues*.
- George Kenneth Helmkamp. (Chemistry and Plant Physiology), B.A., *Wartburg College*, 1942; M.A., *Claremont Graduate School*, 1950. Thesis: I. *Stereochemistry of the Reaction of Alcohols with D(+)-2, 3-Epoxybutane*. II. *The Coordination of Silver Ion with Alkynes*. III. *The Effect of Steroids on the Growth of Pea Embryos*.
- Burton Henke. (Physics and Electrical Engineering), A.B., *Miami University*, 1944; M.S., *California Institute of Technology*, 1945. Thesis: *Soft X-Ray, Low-Angle Diffraction Using a High Intensity, Point-Focusing Unit*.
- David Swenson Hogness. (Chemistry and Biology), B.S., *California Institute of Technology*, 1949. Thesis: I. *The Kinetics of the Alpha-Chymotrypsin Catalysed Hydrolysis of Acetyl-L-Tyrosinhydroxamide*. II. *Genetic Factors Influencing the Activity of Tryptophane Desmolase in Neurospora crassa*.
- Bruce William Holloway. (Genetics and Plant Physiology), B.Sc. (Hons.), *University of Adelaide*, 1948. Thesis: *Heterocaryosis in Neurospora crassa*.
- Carl Oreal Holmquist, Lt. Comdr., U.S.N. (Aeronautics and Mathematics), B.S. (E.E.), *United States Naval Academy*, 1942; B.S. (Ae.E.), *United States Naval Postgraduate School*, 1950; Ae.E., *California Institute of Technology*, 1951. Thesis: *An Approximate Method of Calculating Three-Dimensional Compressible Flow in Axial Turbo-machines*.
- Robert Charles Howard. (Electrical Engineering and Physics), B.A., *Whitman College*, 1944; M.S., *California Institute of Technology*, 1950. Thesis: *A Special Purpose Electric Analog Computer and Its Application to the Solution of Certain Problems of Non-Linear Mechanics*.
- Toru Iura. (Mechanical Engineering and Physics), B.S., *University of Wisconsin*, 1948; M.S., *California Institute of Technology*, 1949. Thesis: *Experimental Investigations of Stall Propagation in Axial-Flow Compressors*.
- Leonard Leroy Jansen. (Plant Physiology and Biochemistry), B.S., *Texas Technological College*, 1943; M.S., 1948. Thesis: *Studies in Fruit Growth and in Vernalization*.
- Wilmer Atkinson Jenkins II. (Chemistry and Physics), B.A., *Swarthmore College*, 1949. Thesis: I. *The Kinetics of the Exchange of Radioactive Hydrogen between Hypophosphorous Acid and Water*. II. *An Investigation of Some Aspects of the Chemistry of Hypophosphorous Acid and Thallous Hypophosphite*. III. *A New Assay Method for Tritiated Water*.
- James Edgar Johnson. (Mechanical Engineering and Electrical Engineering), B.S., *California Institute of Technology*, 1949; M.S., 1950. Thesis: *The Dynamic Stress-Strain Relation of Annealed 2S Aluminum under Compression Impact*.

DOCTOR OF PHILOSOPHY

- Morton Edward Jones. (Chemistry and Physics), B.S., *University of California*, 1949. Thesis: I. *The Structures of Some Compounds of Boron*. II. *Some Other Structural Studies*.
- Alfred Andrew Kraus, Jr. (Physics and Mathematics), B.Sc., *Massachusetts Institute of Technology*, 1949. Thesis: *Angular Correlation of Successive Nuclear Radiations*.
- Robert James Mackin, Jr. (Physics and Mathematics), B.E., *Yale University*, 1949; M.S., *California Institute of Technology*, 1951. Thesis: *Gamma Ray Investigations with a Magnetic Lens Spectrometer*.
- Artur Mager. (Aeronautics and Physics), B.S. (A.E.), *University of Michigan*, 1943; M.S. (M.E.), *Case Institute of Technology*, 1951. Thesis: *Three-Dimensional Laminar Boundary Layers with Small Pressure Gradients*.
- Warren Edward Mathews. (Physics and Mathematics), B.A., *Ohio Wesleyan University*, 1942; M.S., *Massachusetts Institute of Technology*, 1944. Thesis: *The Collapse and Rebound of a Cavitation Bubble*.
- Dougal Harold McRae. (Plant Physiology and Chemistry), B.A., *University of British Columbia*, 1948; M.A., 1950. Thesis: *Studies on the Kinetics of Auxin-Induced Growth*.
- Robert Vartan Meghreblian. (Aeronautics and Mathematics), B.Ae.E., *Rensselaer Polytechnic Institute*, 1943; M.S., *California Institute of Technology*, 1950. Thesis: *Thermodynamic Functions of Polyelectronic Atoms at Very High Temperatures*.
- Edmund Alexander Milne. (Physics and Mathematics), B.A., *Oregon State College*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Elastic Scattering of Protons from Carbon 12 and Carbon 13*.
- Donald Kring Norris. (Structural Geology and Invertebrate Paleontology), B.A., *Trinity College, University of Toronto*, 1947; M.A., 1949. Thesis: *Structural Conditions and Violent Stress Relief in Coal Mines of the Southern Canadian Cordillera*.
- Walter Thomas Ogier. (Physics and Mathematics), B.S., *California Institute of Technology*, 1947. Thesis: *A Direct Velocity Measurement Apparatus to Determine the Specific Electronic Charge*.
- Robert Edward Phillips. (Chemistry and Genetics), B.S. (Engrg.), *California Institute of Technology*, 1945; B.S. (Sci.), 1948. Thesis: I. *Structural Studies on Febrifugine and Isofebrifugine*. II. *Alkaloids from Dichroa Febrifuga*. III. *Studies on 4-Quinazolones*. IV. *Synthesis of Some 8-Aminoquinolines*.
- Henry Thomas Ponsford. (Aeronautics and Mathematics), A.B., *Stanford University*, 1944; M.S., *California Institute of Technology*, 1946; Ae.E., 1947. Thesis: *The Effects of Stiffness on the Buckling of Cylinders with Moderate Wall Thickness*.
- William James Ramsey. (Chemistry and Physics), B.S., *California Institute of Technology*, 1949. Thesis: I. *Praseodymium and Neodymium Complexes with 8-Quinolinol-5-Sulfonic Acid*. II. *Some Reactions of Nitrosyl Disulfonate Ion*.
- Irving Rappaport. (Immunology and Biochemistry), A.B., *Cornell University*, 1948. Thesis: *An Immunological Study of Chicken Serum Albumin and Related Organ Antigens*.
- Harlan Kendall Reynolds. (Physics and Mathematics), B.S., *Denison University*, 1949; M.S., *California Institute of Technology*, 1951. Thesis: *Stopping Cross-Section of Gases for Low Energy Protons*.

DOCTOR OF PHILOSOPHY

- George Pierce Rigsby. (Glaciology and Mineralogy), B.S., *California Institute of Technology*, 1948; M.S., 1950. Thesis: *Studies of Crystal Fabrics and Structures in Glaciers*.
- Sherman Harvey Ripley. (Animal Physiology and Immunology), B.Sc., *University of South Africa*, 1947; B.Sc. (Hons.), *University of Natal*, 1948; M.Sc., 1949. Thesis: *Studies of Myo-Neural Mechanisms in Arthropoda*.
- Pierre St. Amand. (General Geophysics and Physical Geology), B.S., *University of Alaska*, 1948; M.S., *California Institute of Technology*, 1951. Thesis: *An Attempt to Relate the Light of the Night Sky to Certain Ionospheric Parameters*.
- Paul David Saltman. (Biochemistry and Chemistry), B.S., *California Institute of Technology*, 1949. Thesis: *Enzymatic Phosphate Transfer in Plant Systems*.
- Allan Rex Sandage. (Astronomy and Physics), A.B., *University of Illinois*, 1948. Thesis: *A Study of the Globular Cluster Messier 3*.
- Clement Joseph Savant, Jr. (Electrical Engineering and Engineering Science), B.S., *California Institute of Technology*, 1949; M.S., 1950. Thesis: *A Non-Linear Computer for the Solution of Servomechanism Problems*.
- Frank Harvey Shelton. (Physics and Mathematics), B.S., *California Institute of Technology*, 1949; M.S., 1950. Thesis: *Production Processes for the V-Particle*.
- Lars Skjelbreia. (Civil Engineering and Mathematics), B.S., *Bucknell University*, 1948; M.S., *University of Washington*, 1949. Thesis: *Stress Analysis of Prismatic and Cylindrical Shells*.
- George Edward Solomon. (Aeronautics and Physics), B.S., *University of Washington*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *Transonic Flow Past Cone-Cylinder Sections*.
- Robert Richard Solverson. (Aeronautics and Mathematics), S.B., *Harvard College*, 1944; M.S., *California Institute of Technology*, 1948. Thesis: *Stress Concentrations in Propeller Hubs*.
- Leo Stoolman. (Aeronautics and Mathematics), B.S., *Illinois Institute of Technology (Armour College)*, 1941; M.S., *California Institute of Technology*, 1942. Thesis: *Stability of Supersonic Diffusers*.
- Lawrence Wallcave. (Chemistry and Physics), B.S., *California Institute of Technology*, 1948. Thesis: I. *The Stereochemistry of Dehydro-Beta-Carotene*. II. *Studies on the Interaction of Some Carotenoids with Boron Trifluoride and N-Bromosuccinimide*. III. *Provitamin A Activity of a C₄₂-Carotenoid*.
- Sylvan Dean Wanlass. (Physics and Mathematics), B.S., *California Institute of Technology*, 1948. Thesis: *The Mass of the V-Particle*.
- William Dennis Wartens. (Physics and Mathematics), A.B., *Harvard College*, 1949; M.S., *California Institute of Technology*, 1950. Thesis: *The Elastic Scattering of Protons by Li⁷*.
- John Stewart Waugh. (Chemistry and Physics), B.A., *Dartmouth College*, 1949. Thesis: *Line Profiles in Nuclear Magnetic Resonance Absorption*.
- Calvin Wong. (Physics and Mathematics), B.S., *Massachusetts Institute of Technology*, 1948; M.S., *California Institute of Technology*, 1950. Thesis: *An Experimental Study of Beta Decay in the Light Elements*.
- Henry Hugh Woodbury. (Physics and Chemistry), B.S., *California Institute of Technology*, 1949. Thesis: *Scintillation Spectrometer Studies of the Gamma-Radiation from Carbon plus Proton Reactions*.

Prizes and Awards

CONGER PEACE PRIZE ORATION

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

FIRST PRIZE

Bob Lee Ryle

SECOND PRIZE

John Edward Young

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

Irwin M. Rubinstein

SECOND PRIZE

William E. Dibble

FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

Established in 1948 by the Trustees of the Institute in memory of Frederic W. Hinrichs, Jr., member of the Institute Faculty and Dean, 1921 to 1944. The award is made annually to "the senior who, in the opinion of the undergraduate Deans, has throughout his years at the Institute made the greatest contribution to the welfare of the student body and whose qualities of leadership, character, and responsibility have been outstanding."

The recipient of the award is announced each year at Commencement

THOMAS HUNT MORGAN MEMORIAL AWARD

Established in 1951 by friends of the late Thomas Hunt Morgan, Nobel Laureate and first Chairman of the Division of Biology. The award is made annually on recommendation of the Division of Biology to "an outstanding graduate student" in biology receiving the degree of Doctor of Philosophy during the year.

The recipient of the award is announced each year at Commencement

