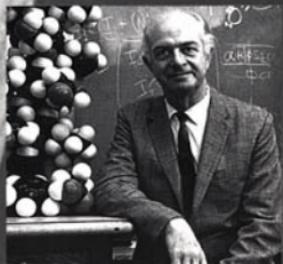


*Linus*

PAULING

**And the Chemistry  
of Life**

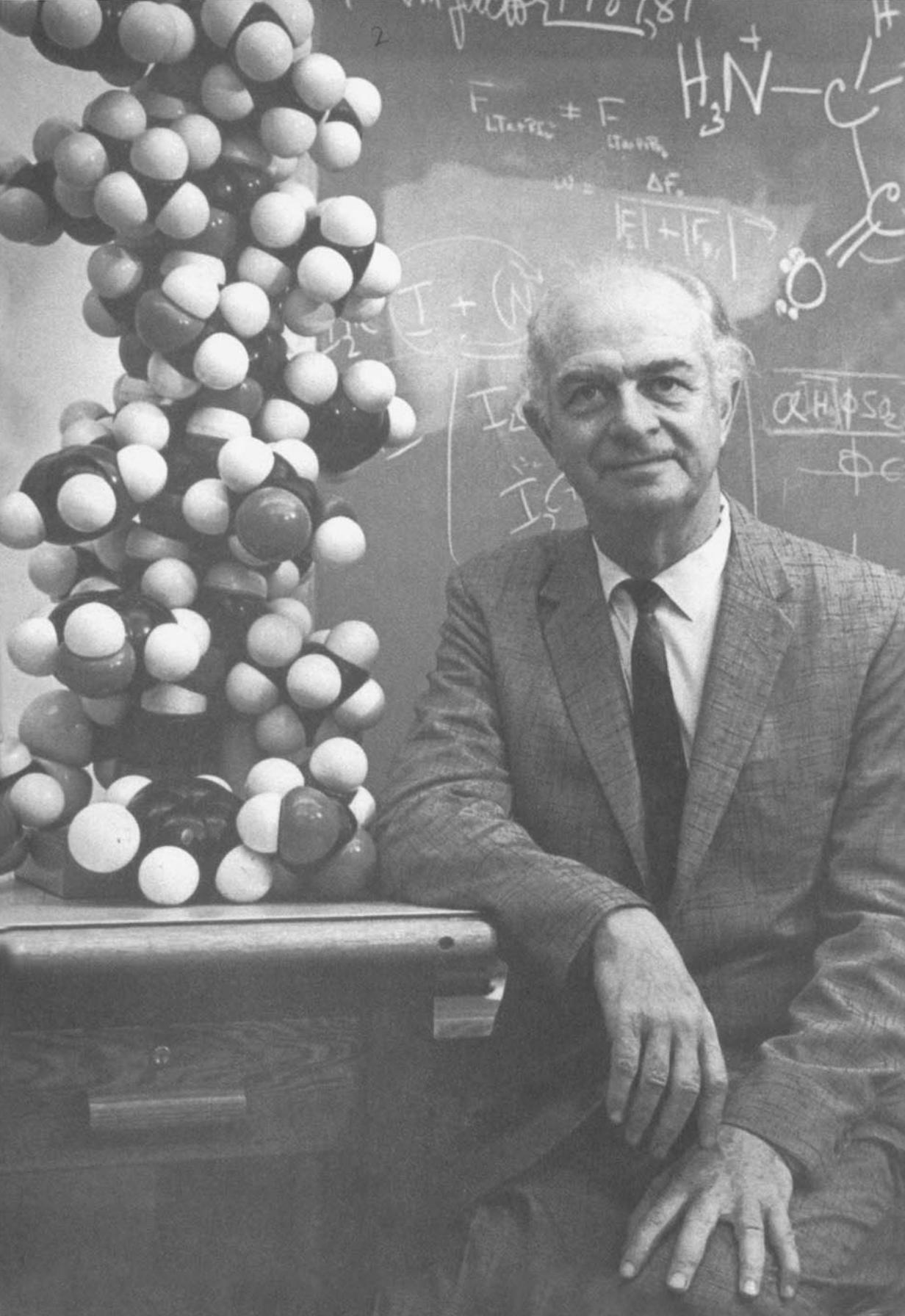
*Tom Hager*



# Linus Pauling

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*And the Chemistry of Life*





Owen Gingerich  
*General Editor*

# Linus Pauling

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*And the Chemistry of Life*

Tom Hager

Oxford University Press  
New York • Oxford

*Dedicated with love to Jackson, Zane, Elizabeth  
and, always, to Lauren*

Oxford University Press

Oxford New York  
Athens Auckland Bangkok Bogotá Bombay  
Buenos Aires Calcutta Cape Town Dar es Salaam  
Delhi Florence Hong Kong Istanbul Karachi  
Kuala Lumpur Madras Madrid Melbourne  
Mexico City Nairobi Paris Singapore  
Taipei Tokyo Toronto Warsaw  
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Published by Oxford University Press, Inc.  
198 Madison Avenue, New York, New York 10016  
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Design: Design Oasis  
Layout: Leonard Levitsky  
Picture research: Lisa Kirchner

Library of Congress Cataloging-in-Publication Data  
Hager, Tom.

Linus Pauling and the chemistry of life / Tom Hager  
p. cm. — (Oxford portraits in science)

Includes bibliographic references and index.

ISBN 0-19-510853-1 (library ed.); 0-19-513972-0 (paperback)

1. Pauling, Linus, 1901-1994—Juvenile literature.
  2. Biochemists—United States—Biography—Juvenile literature.
  3. Chemists—United States—Biography—Juvenile literature.
  4. Social reformers—United States—Biography—Juvenile literature.
- [1. Pauling, Linus, 1901-1994. 2. Chemists.] I. Title. II. Series.

QP511.8.P37H34 1998

540'.92—dc21

[B] 97-43403

CIP

9 8 7 6 5 4 3

Printed in the United States of America  
on acid-free paper

Cover: *Linus Pauling in the early 1970s*; Inset: *Linus Pauling with a model of a molecule  
in his Caltech classroom.*

Frontispiece: *Linus Pauling in his Caltech classroom.*



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**OXFORD  
PORTRAITS  
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SCIENCE**

Charles Babbage  
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Johannes Kepler  
Othniel Charles Marsh  
& Edward Drinker Cope  
Margaret Mead  
Gregor Mendel  
Isaac Newton  
Louis Pasteur  
Linus Pauling  
Ivan Pavlov  
Ernest Rutherford

# Introduction

Once, when he was 60 years old, Linus Pauling strode into a packed hall at the California Institute of Technology to deliver a guest lecture in freshman chemistry. He was followed by Jurg Waser, the class's regular teacher, loaded down with the molecular models and props Pauling liked to use in his talks. Pauling was famous for his teaching: lively and funny in front of students, fond of stunts and explosions, capable of calculating answers with six-figure precision using only a pocket slide rule, a man who filled several movable blackboards with illustrations of his points as he spoke.

Halfway through the lecture, Pauling moved aside one filled blackboard to get to a clean one behind it—and the class exploded in hoots and laughter. On the second board someone had chalked in large letters, “PAULING IS GOD, AND WASER IS HIS PROPHET.” Pauling smiled, looking from the laughing students to the board. He waited until the noise died down, then picked up an eraser and wiped off “AND WASER IS HIS PROPHET,” left the rest, and continued lecturing.

His students loved him. To them and many others, Linus Pauling was indeed a god of chemistry. By the time he gave the Caltech lecture, in the early 1960s, he had already described the nature of the chemical bond; pinned down the molecular structure of proteins; intuited the cause of sickle-cell anemia; engaged in the century's most famous scientific race, to determine the structure of DNA; won a

Presidential Medal of Merit for weapons research; made important discoveries in X-ray crystallography, electron diffraction, quantum mechanics, biochemistry, molecular psychiatry, nuclear physics, anesthesia, immunology, and evolution, written more than 400 articles, and created the century's most influential chemistry textbooks. He was the youngest person ever elected to the National Academy of Sciences and in 1954 had won the Nobel Prize in chemistry.

But these accomplishments were only part of his achievement. Influenced greatly by his wife, Ava Helen, Pauling had also used his scientific fame to help advance political causes, particularly the battle against the spread of nuclear weapons during the 1950s. His political activism got him into trouble, spurring a 24-year investigation by the FBI, the loss of his passport, attacks in the press, inquiries by government agencies—including threats of legal action and possible imprisonment by the U.S. Senate—and the cancellation of some of his research grants. Throughout it all, Pauling remained unmoved in his dedication to making the world a safer place. His perseverance was rewarded with a Nobel Peace Prize in 1963, making him the only person in history to win two unshared Nobels.

Pauling was a scientific giant, imaginative, bold, and unafraid of anyone and anything. He leaped over the boundaries of disciplines, from chemistry to physics to biology to medical research. He fizzed with ideas, which seemed to shoot off as fast as sparks from a pinwheel. He tied concepts and information together in ways no one had before and used his persuasive, outgoing personality to convince the world he was right. He was audacious, intuitive, stubborn, charming, irreverent, self-reliant, self-promoting—and, as it turned out, almost always correct.

Linus Pauling was the most important chemist, and arguably the most important American scientist, of the twentieth century.

And if his mother had had her way, he would have spent his life working in a machine shop.



# The Boy Professor

As the train rattled toward Portland, no one took much notice of the 15-year-old who kept to himself, looking out the window at the well-tended farms and patches of black-green fir forest of Oregon's Willamette River Valley. He was thin and gawky, with a full head of auburn hair and bright blue eyes. There was nothing unusual about him—except, perhaps, the large bottle of dark liquid carefully cradled between his feet.

Inside that bottle sloshed five gallons of concentrated nitric acid. If it spilled, it would eat away the carpet and floor of the train car. It would dissolve the shoes and socks and skin on the feet of the passengers. It would get the young boy, Linus Pauling, into a great deal of trouble. But he was careful and made certain the bottle stayed upright. This was, after all, not the first time he had smuggled chemicals.

Linus was on his way home after visiting his grandparents in the little river town of Oswego, a few miles south of Portland. He treasured these visits with his father's parents, a kind couple who still spoke with strong German accents. They had taken special care of their only grandson after his

*Linus Pauling stands with his mother, Belle, in 1902. Their difficult relationship helped to shape Pauling's growing sense of independence.*