



**1**



***Molecular  
Cloning***

**A LABORATORY MANUAL**

---

**SECOND EDITION**

---

**Sambrook • Fritsch • Maniatis**

# ***Molecular Cloning***



*Associate Author*

**Nina Irwin**

*Managing Editor*

**Nancy Ford**

*Editor*

**Chris Nolan**

*Associate Editor*

**Michele Ferguson**

*Illustrator*

**Michael Ockler**

**1**

# ***Molecular Cloning***

A LABORATORY MANUAL

---

**S E C O N D E D I T I O N**

---

**J. Sambrook**

UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER

**E.F. Fritsch**

GENETICS INSTITUTE

**T. Maniatis**

HARVARD UNIVERSITY



**Cold Spring Harbor Laboratory Press  
1989**

**Molecular  
Cloning**

A LABORATORY MANUAL  
SECOND EDITION

All rights reserved  
© 1989 by Cold Spring Harbor Laboratory Press  
Printed in the United States of America

9 8 7 6 5 4

*Book and cover design by Emily Harste*

*Cover:* The electron micrograph of bacteriophage  $\lambda$  particles stained with uranyl acetate was digitized and assigned false color by computer. (Thomas R. Broker, Louise T. Chow, and James I. Garrels)

*Cataloging in Publications data*

Sambrook, Joseph

Molecular cloning : a laboratory manual / E.F.

Fritsch, T. Maniatis—2nd ed.

p. cm.

Bibliography: p.

Includes index.

ISBN 0-87969-309-6

I. Molecular cloning—Laboratory manuals. 2. Eukaryotic cells—Laboratory manuals. I. Fritsch, Edward F. II. Maniatis, Thomas III. Title.

QH442.2.M26 1987

574.87'3224—dc19

87-35464

Researchers using the procedures of this manual do so at their own risk. Cold Spring Harbor Laboratory makes no representations or warranties with respect to the material set forth in this manual and has no liability in connection with the use of these materials.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Cold Spring Harbor Laboratory Press for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$0.10 per page is paid directly to CCC, 21 Congress St., Salem MA 01970. [0-87969-309-6/89 \$00 + \$0.10] This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.

All Cold Spring Harbor Laboratory Press publications may be ordered directly from Cold Spring Harbor Laboratory Press, 10 Skyline Drive, Plainview, New York 11803. Phone: 1-800-843-4388. In New York (516) 367-8423. FAX: (516) 367-8432.



# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.