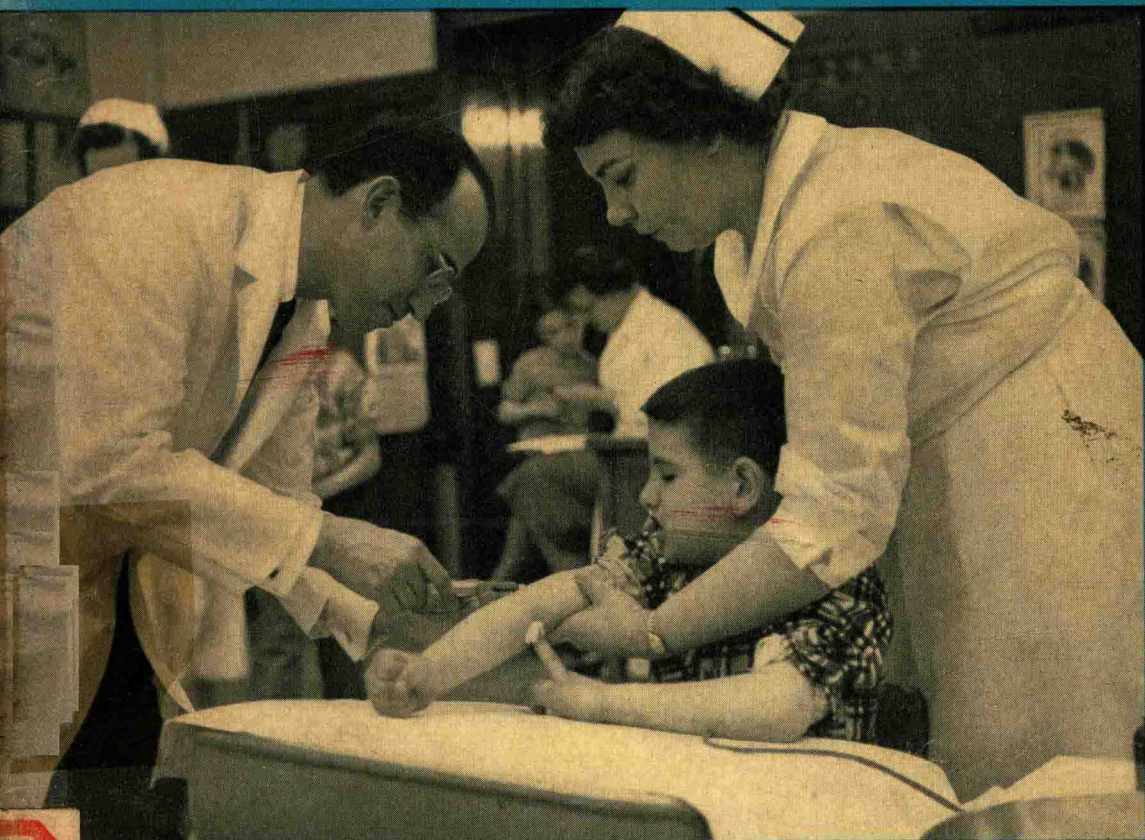


POLIO AND THE SALK VACCINE

**WHAT YOU SHOULD KNOW
ABOUT IT**



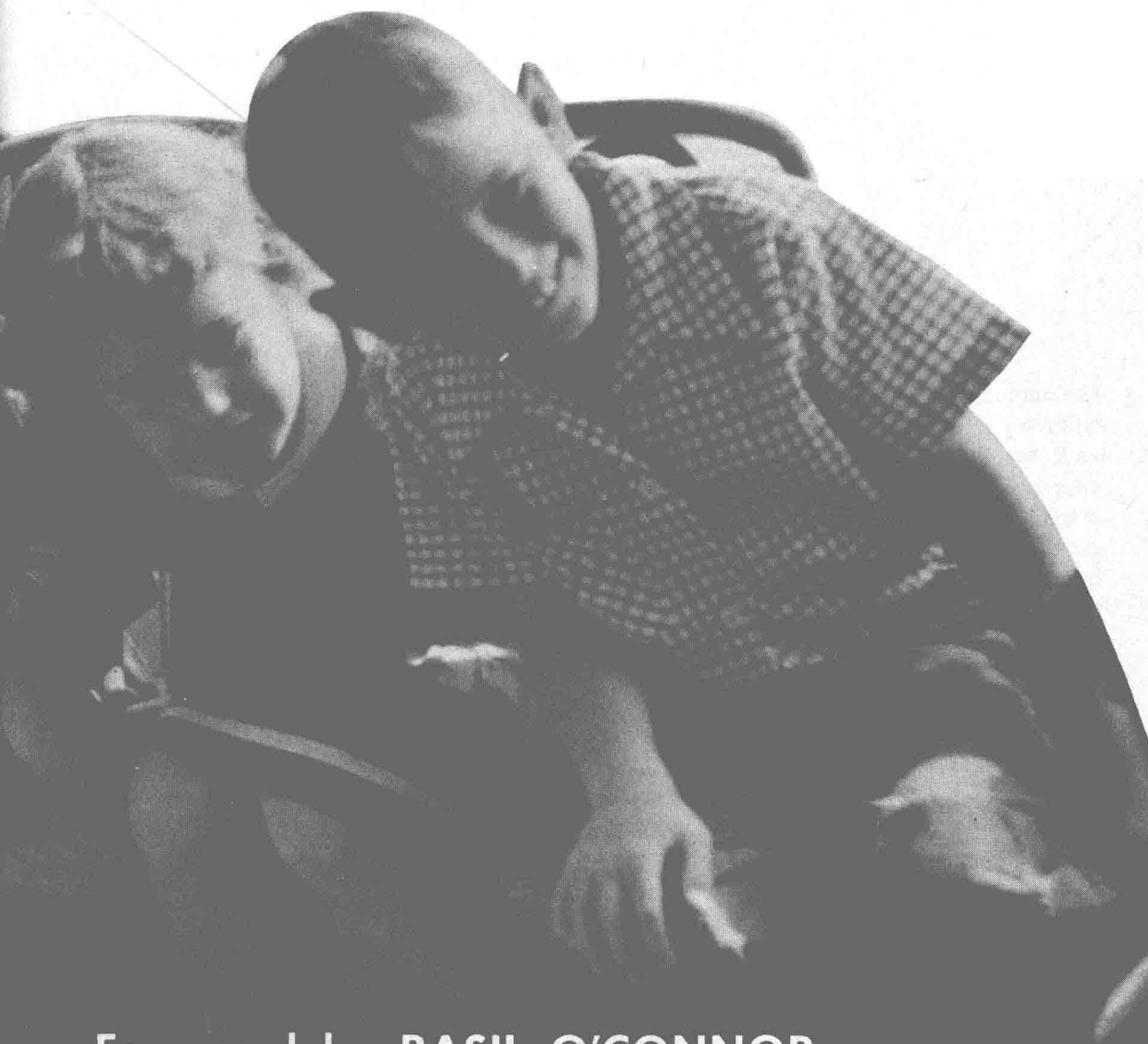
Foreword by BASIL O'CONNOR
PRESIDENT, THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS

By ALTON L. BLAKESLEE
SCIENCE EDITOR, THE ASSOCIATED PRESS

SALK VACCINE:

WHAT YOU SHOULD KNOW ABOUT IT

By ALTON L. BLAKESLEE



Foreword by BASIL O'CONNOR

GROSSET & DUNLAP • PUBLISHERS • NEW YORK

ACKNOWLEDGMENTS

The author wants to acknowledge the close cooperation which the National Foundation for Infantile Paralysis has given him at every stage in the development of this book. Mr. David R. Preston and his staff at the New York office provided needed information, willingly advised him, checked the manuscript and proofs, and helped in innumerable small ways to make this as accurate and as thorough a book on the subject as possible. Most of the photographs on the succeeding pages were obtained from the National Foundation's files.

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Contents

| | |
|--|-----|
| vii Foreword by Basil O'Connor | vii |
| 1. A Killer Unmasked | 9 |
| 2. A Safe Vaccine | 11 |
| 3. The Little Dot | 13 |
| 4. Some Polio History | 17 |
| 5. On the Vaccine Trail | 19 |
| 6. Temporary Protection | 21 |
| 7. The Salk Vaccine | 23 |
| 8. Monkeys and Children | 27 |
| 9. The Great Human Test | 31 |
| 10. The Victory | 35 |
| 11. The Accident | 39 |
| 12. The Summer | 42 |
| 13. Polio Detectives | 44 |
| 14. The Big Verdict | 47 |
| 15. Meeting the Need | 49 |
| 16. How to Obtain Vaccine | 51 |
| 17. Adults and Polio | 53 |
| 18. The Salk Vaccine Today | 57 |
| 19. Live-Virus Vaccines | 59 |
| 20. Drugs Against Polio | 62 |
| 21. Quick Polio Test | 65 |
| 22. How Polio Is Treated | 68 |
| 23. Polio Tomorrow | 70 |
| 24. Questions and Answers | 73 |
| Index | 77 |

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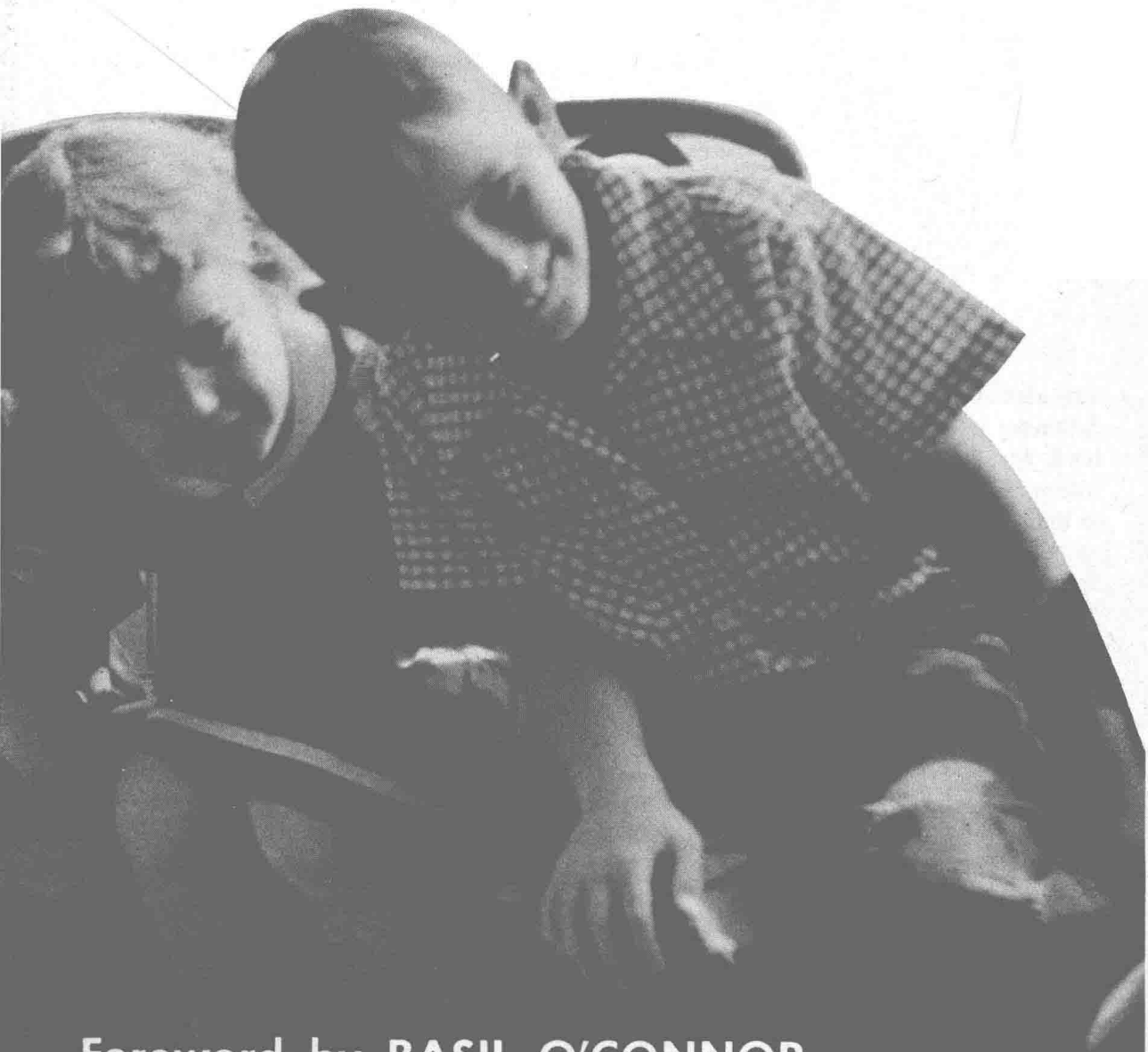
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Contents

| | | |
|-----|--------------------------------------|-----|
| vii | Foreword by Basil O'Connor | vii |
| 1. | A Killer Unmasked | 9 |
| 2. | A Safe Vaccine | 11 |
| 3. | The Little Dot | 13 |
| 4. | Some Polio History | 17 |
| 5. | On the Vaccine Trail | 19 |
| 6. | Temporary Protection | 21 |
| 7. | The Salk Vaccine | 23 |
| 8. | Monkeys and Children | 27 |
| 9. | The Great Human Test | 31 |
| 10. | The Victory | 35 |
| 11. | The Accident | 39 |
| 12. | The Summer | 42 |
| 13. | Polio Detectives | 44 |
| 14. | The Big Verdict | 47 |
| 15. | Meeting the Need | 49 |
| 16. | How to Obtain Vaccine | 51 |
| 17. | Adults and Polio | 53 |
| 18. | The Salk Vaccine Today | 57 |
| 19. | Live-Virus Vaccines | 59 |
| 20. | Drugs Against Polio | 62 |
| 21. | Quick Polio Test | 65 |
| 22. | How Polio Is Treated | 68 |
| 23. | Polio Tomorrow | 70 |
| 24. | Questions and Answers | 73 |
| | Index | 77 |

Foreword

Never have so many people learned as much about one disease in so short a time as they have about polio. One reason for this is that as contributors and workers in the fight against polio through the March of Dimes, the people have rightly felt that they were shareholders in the battle and have been eager to know how it was going.

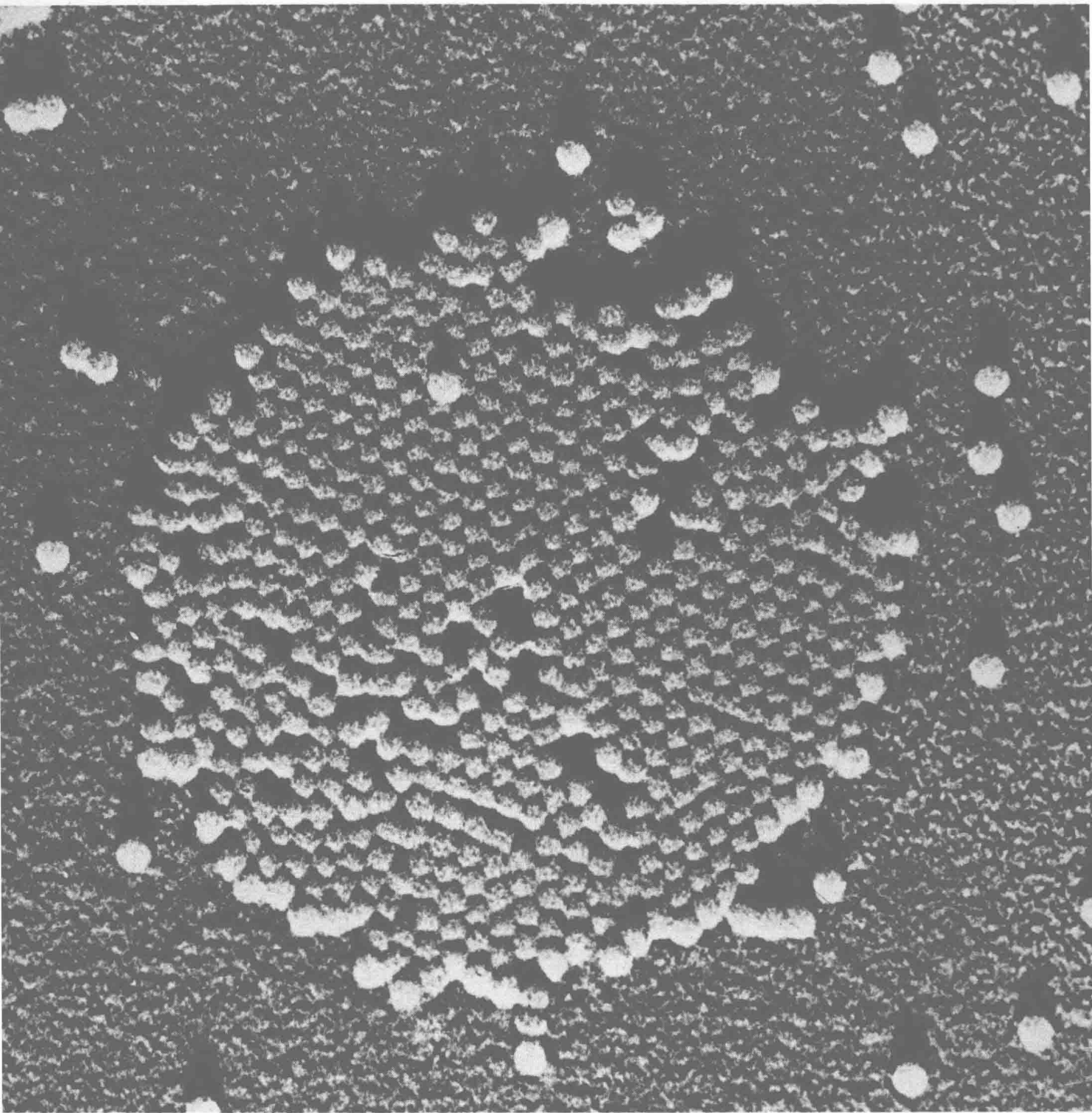
We at the National Foundation for Infantile Paralysis have tried to keep the public informed. Success in this effort has been made possible by many individuals—particularly those who operate in the increasingly important field of science writing. These men and women—working for newspapers, magazines, radio and television—have interpreted for the American people the findings of our scientists.

One of the most effective of the country's science writers and reporters is Alton Blakeslee of the Associated Press, author of this book. Mr. Blakeslee knows his subject. He covered Dr. Jonas E. Salk's early work on experimental vaccines. He reported the nationwide field trials of 1954, and he was on hand in Ann Arbor, Michigan, last April, when we finally learned that the vaccine had been scientifically evaluated as safe and effective.

This book sums up what we now know about polio. It tells where we stand in our effort to control the disease. As you read it, I am sure you will realize, as we do, that while the fight is not yet over, it is now unmistakably a winning fight.

We have a successful vaccine for polio. The technical problems of its production have been largely overcome. Improvements unquestionably will be made in its effectiveness and dosage schedules. But the present vaccine, if given on a mass scale, in the near future can virtually eliminate paralytic polio as a menace to the health of our people.

BASIL O'CONNOR



Magnified 180,000 times, this is a cluster of one strain of Type II polio virus. This electron microscope picture was made by Dr. Robley C. Williams of the University of California.

CHAPTER ONE

A Killer Unmasked

The story of polio begins with a tiny round dot of mystery.

The dot is the virus of poliomyelitis—a dot so tiny that 1,000,000 in a row equal one inch. A dot so near to being nothing that it takes nearly three thousand million billion of them to weigh one ounce.

But it is fearfully big. A few of them can seize upon a healthy child or adult, paralyze and twist his limbs, or shut off his breathing muscles, or act as the quick messengers of death.

Sooner or later it *infects* almost every person, but it is usually quite harmless. Only some does it mark cruelly with paralysis or permanent affliction.

It is anguishingly unpredictable, obedient only to the strange and often brutal laws that govern viruses. It has been with humanity for ages, only recently flaring up into epidemics. It is fearsome; it has terrorized millions of human beings, mainly because they knew not the slightest defense against it.

Now at last there is a defense, an excellent defense, in the Salk polio vaccine. Perhaps it is the final answer—although it is probably too soon yet to say.

The Salk vaccine brought the first great victory, the first major breakthrough to curb the redoubtable polio virus. In its first summer alone, with only limited and partial use, it was

reliably estimated to have saved 1,250 children from paralysis.

Polio is not defeated yet. Its complete defeat will take time, effort, and the aid of informed citizens who can look at polio with facts, not fear. The Salk vaccine is the first step toward the day when paralysis can be completely prevented.

There are still questions to be answered. Not questions about the *safety* of the Salk vaccine. There are questions of its supply, its long-term effects, questions about the polio virus itself, and about peculiar “echo” viruses, as they are nicknamed, which can masquerade as polio viruses.

There are immediate prospects for an improved, more efficient Salk vaccine. And there are prospects for entirely different kinds of polio vaccines, tablets made out of living but weakened viruses rather than the killed viruses used in the Salk vaccine. Good prospects are held out for drugs which can prevent or break the grip of paralytic polio, and prospects for quick tests to tell you whether a feverish, aching child or adult has polio or some unimportant and harmless infection.

The Salk vaccine, and what happens next, make up an absorbing and dramatic tale. It is a story in which parents even offered their own children as the volunteers to find a defense against the tiny dot of polio virus.



CHAPTER TWO

A Safe Vaccine

On April 12, 1955, a careful scientific verdict was announced to an eager, electrified world: the Salk polio vaccine is "safe, potent, effective . . ."

The news struck with an end-of-a-war impact. Mass tests upon children showed the vaccine 60 to 90 per cent effective in preventing paralytic polio. Over all, it was 80 to 90 per cent effective, said the scientific judge, the meticulous and highly regarded Dr. Thomas Francis, Jr., of the University of Michigan.

And it was *safe*. Not a single case of polio was *caused* by the vaccine; no significant reactions from the shots.

It was sensational. Indeed, events of that day have since been criticized as being too sensational, even intentionally over-sensationalized, as being too optimistic, as a great hullabaloo over a fairly minor disease propagandized far above its actual importance in the roster of human afflictions.

It would have been sensational news had one person merely whispered it calmly to another. Pressures of at least forty years of human dread over a stealthy, horrid disease had exploded into relief that an answer had been found.

It was *an* answer; perhaps *the* answer. In the unbounded enthusiasm of the moment, many took it as the full answer.

Parents clamored for vaccine for their children. Some adults selfishly asked doctors for shots for themselves.

Vaccine already stockpiled in expectation of a favorable verdict was quickly released,

mostly to clinics for children, only a little at first to doctors' offices.

The public was happy, excited. But many doctors, overwhelmed by requests for scarce vaccine, were less happy. Some objected that they had not had time to study the results and decide, as the physician must in his responsibility for his patient's health, whether to use it.

By and large, the mass vaccination program jumped ahead, smoothly, joyfully, as fast as vaccine was available. Until late April brought the second bombshell—this time of tragedy.

Tainted with live virus, some lots of vaccine from one manufacturer were apparently causing paralysis. The vaccination program sputtered, then completely halted, while experts sought reasons for the terrible accident.

Soon, new safety tests were installed, changes made, and the vaccine began to flow again to the public with official assurance of its safety. But, by the hundreds of thousands, parents and doctors shied from it. The potent seed of doubt had been planted. It took root; it was slow to die.

There was soon solid, sound evidence to sway intelligent opinion from doubt to trust. There were abundant reasons for confidence by the time the vaccine was officially just a year old.

Not since May, 1955, when safety tests were tightened on mass production, has any single injection of Salk vaccine *caused* a single case of polio, the U. S. Public Health Service reported.

In one of the rigorous tests for safety of the Salk vaccine, technicians at a manufacturing firm put chemically-treated virus into tubes containing living cells. If any virus particles had escaped being killed by the chemical treatment, they would invade and kill or damage the test cells.

Nor since that time has any case of polio within a family been attributed to the possibility that any child received a faulty shot.

So strict are the safety regulations today that the Public Health Service makes this requirement:

If any lot of vaccine should be found, or even suspected, during safety testing to contain live virus, then the manufacturer must produce *five straight lots* of vaccine proven safe before any of his vaccine can be released. The reason for any possible error, or the appearance of it, has to be tracked down before any of his vaccine is approved.

"The vaccine is as safe as we can humanly guarantee is possible," declares Dr. Leonard Scheele, surgeon-general of the Public Health Service (PHS).

"It is as safe as any biological product can possibly be," says Dr. Hart E. Van Riper, medical director of the National Foundation for Infantile Paralysis. "It is doubtful if any other therapeutic or prophylactic agent in common use is surrounded by as many safeguards as the present Salk vaccine."

Among vaccinated children (most of whom received only one dose, instead of the recommended three), it prevented three out of four attacks of *paralytic polio*, giving them 75 per cent protection compared with unvaccinated children, a special polio surveillance unit found.

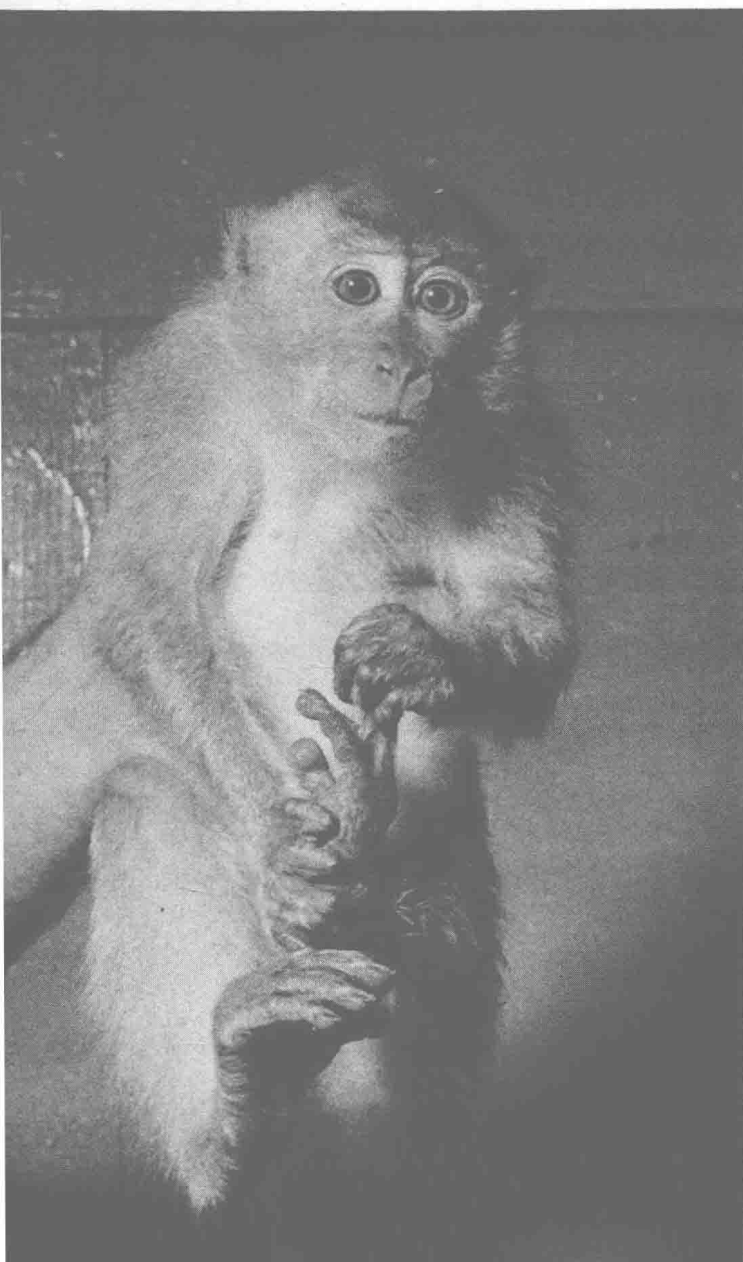
Soon after the tragic incident of the tainted vaccine, the executive board of the American Academy of Pediatrics recommended that vaccinations be stopped because of "uncertainties." But four months later, in October, 1955, it reversed that decision, and recommended that vaccination continue.

Massachusetts was hit by a terrible epidemic in the summer of 1955, and there were rumors that the vaccine might have initiated it. Authorities in that state had urged a halt to vaccinations. But early in 1956 a special 19-man expert committee after long study gave the vaccine a go-ahead. The state health department scotched the rumors of vaccinations starting and spreading polio. Instead, it said, even single shots given to children had been 60 per cent effective in preventing paralytic polio.

In November, polio experts of the World Health Organization endorsed Salk vaccine as safe for mass use by various nations.

It all added to this: The Salk vaccine is safe, and it is preventing much polio.

From safety the question changed to one of supply. As with all other questions, the answers were bound up within the peculiar nature of the dot known as the virus of poliomyelitis.



A Rhesus monkey . . . which in extremely sensitive tests is the final proving ground of the safety of the polio vaccine. Vaccine ready for distribution is injected into the monkeys' arms, spinal cords, even into the brain.

CHAPTER THREE

The Little Dot

The polio virus has been captured, in photographs. It looks like a fuzzy white sphere in pictures taken with the powerful electron microscope.

Scientists have long known how to kill it, to make a safe and yet potent vaccine. But there is much in its nature that is still mysterious, because it is a virus, like the viruses that also cause the common cold, "flu," and smallpox.

Viruses are quite different from ordinary germs. For one thing, they are far tinier. And they operate differently. Ordinary bacteria are complete living agents, able to reproduce themselves when they find a happy—for them—environment in body fluids or tissues. They usually cause their harm through the poisons or toxins which they produce.

But viruses cannot reproduce themselves or cause you any harm until and unless they *enter inside* living cells of some particular kind. Outside the living cell, the virus appears inert, lifeless. But once it enters the cell, it sabotages and commandeers it, forcing it to produce and spew out dozens or hundreds of new viruses. In the process, the invaded cell is usually damaged or destroyed. Polio does its harm because it damages or kills nerve cells, for which it has an especial affinity or liking. If enough nerve cells are damaged or killed, paralysis or death results.

Ordinary drugs, even the wonder drugs like penicillin, cannot touch the polio virus when it is operating inside the living cells. To be effective, a drug has to halt the virus before it in-

vades cells, or else stop its sabotage inside the cell without injuring the very delicate and complex chemical mechanism of the cell itself.

A major fact about polio is that almost everyone gets it, some time. But in most of us it never causes any real sickness, or even recognizable signs of the disease. Most of us easily throw it off and create antibodies—protective substances within the bloodstream—that fight the type of polio virus that invaded us.

By age 18, most Americans have become immune to one, two, or all three of the types of polio virus that cause human paralysis. Perhaps we weren't even aware of the infection. Or perhaps we had had a little achy feeling, or intestinal upset, or something we thought was a symptom of a summer cold. Actually it was a "silent" invasion by the polio virus.

Even among those who get sick enough to be classed as "reported polio cases," half recover with no after-effects at all, 30 per cent are left with some muscular weakness or handicap, 14 per cent are seriously disabled, and fewer than six per cent die.

Then is not polio an over-rated disease? Yes, perhaps, in cold comparison to other diseases.

But not in terms of those whom it strikes, and in its behavior. For it strikes mainly children. It often comes in mysterious epidemics. It is completely unpredictable, and it leaves visible effects, unlike a rheumatic heart or lungs attacked by tuberculosis. It has been growing more dangerous, felling 35,000 to 50,000 victims a year, and laying a heavier hand lately