

Columbia University Press  
*Publishers Since 1893*  
New York

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Library of Congress Cataloging-in-Publication Data

Doherty, P. C. (Peter C.)

The beginner's guide to winning the Nobel Prize : a life in science / Peter Doherty.

p. ; cm.

Includes bibliographical references and index.

ISBN 0-231-13896-2 (alk. paper)

1. Doherty, P. C. (Peter C.) 2. Immunologists—United States—Biography. 3. Nobel Prizes—Biography. 4. T-cells—Research—History. I. Title. [DNLM: 1. Doherty, P. C. (Peter C.) 2. Allergy and Immunology—Personal Narratives. 3. Biomedical Research—Personal Narratives. 4. Nobel Prize—Personal Narratives.]

WZ 100 D655b 2006]

QR180.72.D64A3 2006

616.07'9092—dc22

2005032326



Columbia University Press books are printed on permanent and durable acid-free paper.

Printed in the United States of America

c 10 9 8 7 6 5 4 3 2 1

# Introduction

We were living in Memphis, Tennessee, when the phone rang at 4.20 one cool October morning. My wife Penny picked it up, thinking there could be a problem with an elderly parent back in Australia. But the voice wasn't Australian. 'This is Nils Ringertz', she heard, 'from the Nobel Foundation'. Penny handed me the phone. 'This is for you', she said.

Down the line from Sweden, Nils told me that I was to share the 1996 Nobel Prize for Physiology or Medicine with my Swiss friend and colleague Rolf Zinkernagel, for a discovery we made more than twenty years previously. He also warned us we had ten minutes to call our family before he made the announcement to the press. The phone, he said with some understatement, would then be constantly busy. As I recall, we were in mild shock.

I had known for some time that I might be in the running for the Nobel, but those sorts of rumours had been circulating for years and I hadn't taken much notice of them until very recently. A year previously, Rolf and I had shared in the Lasker Basic science award, a prestigious American prize that tends to predict future Nobels. Some of my racier colleagues actually had me at 30 per cent odds for a trip to Stockholm, but I wasn't too excited. As much from the viewpoint of psychological self-preservation as anything

else, I had myself convinced that boys from the Australian backblocks don't win Nobel Prizes. That morning, though, there was no doubt. Within fifteen minutes we were fielding calls from Reuters, Belgium, talk-back radio in Bogota, Colombia, the *Sydney Morning Herald* and so forth. Our telephone records show that we got one call out at 4.27 am and the next we managed was at 5.32 am. This clearly wasn't going to be an average Monday. Life hasn't, in fact, been quite normal since.

Of course, everyone's idea of 'normal' is different. As a child growing up in the sub-tropical city of Brisbane, I may not have believed a life of science—spent mainly in laboratories, between three continents—was normal, either. Childhood in Queensland in the middle of the twentieth century was a fairly quiet and unintellectual affair. I had little idea of what the wider world was like and not a whole lot of information to go on. Looking back, it hardly seems the kind of springboard that would catapult anyone into the higher echelons of discovery.

I grew up in the outer working-class suburb of Oxley, where half the students at my local primary school left at the end of eighth grade to work in the local 'bacon factory'—a pig slaughterhouse—the cement factory, the brick works, or to take up apprenticeships. Though I was a bright kid, my school days moved slowly; I was often bored and under-performed. It didn't help that I was weedy, poorly co-ordinated, and a year younger than almost everyone else. I tried, but I was a liability for the side in any competitive sport.

Things improved a lot when, at age 13, I got to high school. It was a brand new facility that opened the year I entered, so there were no older students to provide an

example, no library to speak of and no student clubs. What saved me were university-educated teachers who were totally dedicated to the idea of public education. Streamed into an academic class, I got a good grounding in physics, chemistry and maths, and a love of history and the great books and plays of the English language. My first introduction to a foreign culture was high school French. Though my spoken French is terrible and I no longer read it too well, the exposure to French history and culture was an eye-opener. I take pride in the fact that, after the Nobel, I was elected as foreign associate of the French Academy of Medicine.

Back then, Brisbane was a rather isolated and parochial town in a country barely noticed by the rest of the world. My views as a youngster were formed by reading—though the only reference to the United States in my history book was a short chapter entitled ‘George III and the loss of the American colonies’—and movies. I ended up with a view of US history that was both Anglicised and influenced by John Wayne. That barely changed when, in 1956, the year before I started university, the first television transmissions began in Australia—more westerns, with Australian game shows thrown in. Television provided no more illumination about our nearer neighbours, either: the little we learned about the Asian countries to our north related to World War II and the European colonial experience.

Nor did my family background provide many hints about what was ahead for me, or what path I might follow. My parents had both left school at age 15 though, like many in their generation who had limited formal schooling, they spoke clear grammatical English and could write a lucid letter. My mother had continued with lessons to

become a piano teacher, and the house echoed to Debussy, Chopin and Mozart. My father took a variety of 'in service' courses in his job, initially as a telephone technician and later on the management side of telephone services. He was an avid reader of anything and everything. However, they had no understanding of higher education. In fact, very few people in the area had a university degree, except for the local doctor and dentist; there weren't too many obvious people to turn to for career advice. Oxley, with its weatherboard houses on stilts and a semi-rural feel, was one of Brisbane's peripheral 'struggle towns'.

I had two friends in an adjacent, more prosperous suburb whose fathers were in professional life, but it never occurred to me that I could discuss education and careers with them. Then there was my cousin, Ralph Doherty, who was thirteen years older and lived on the other side of the city's massive sprawl, was very bright and topped the state academically. He was the first in the extended family to go to university and he graduated with great distinction from the University of Queensland Medical School, eventually going into tropical public health and infectious disease research, and then on to Harvard for post-graduate study. I was vaguely aware of this, but don't recall ever having a serious conversation with him about science. Besides, it was assumed that Ralph was so super-smart that nobody could hope to emulate his example.

After high school, I had no clear idea of what I might try, though one possibility I did consider was becoming a cadet journalist on the local newspaper, the *Brisbane Courier-Mail*. I was reading avidly. Reading the French existentialist philosopher Jean-Paul Sartre introduced me to the age of reason. At the same time, Aldous Huxley's

novels, such as *Eyeless in Gaza* and *Point Counterpoint*, that interweave some of the scientific themes of his day (the 1920s and 30s) with the lives of his upper-class English characters also brought me into contact with a culture that looked to the Enlightenment and the evidence-based world of scientific research. Huxley used current thinking in developmental biology, for instance, to develop storylines that explore the tension between passion and the life of the mind. What normal 16-year-old is not interested in passion? I hadn't studied biology at school—it wasn't offered to boys for, I suspect, much the same reason that some religious conservatives now object to sex education—but the idea of doing research in some field of biology looked interesting. How should I go about this? I didn't want to train as a medical doctor because, so far as I knew, most of them spent their lives dealing with sick or neurotic people. This didn't sound like much fun to me.

What changed my life was going to an 'open day' at the University of Queensland School of Veterinary Science. At that time, the 'U of Q' was one of only two places where veterinarians could train in Australia and New Zealand. My interest was immediately piqued by the demonstrations in embryology, anatomy and pathology, and by the rather scatty, sexy, chain-smoking young laboratory technician who looked after the displays. In the hot Brisbane summer, she wore a white laboratory gown and not much else. This 'older woman'—she must have been all of twenty-two—certainly wasn't the self-important Dr Frankenstein of the movies in the carefully buttoned white coat. Even the diseased organs displayed around the walls and the permeating smell of hot embedding wax and formalin were intriguing. This was all so different from anything that I had ever

encountered in my sixteen years. It looked real and, above all, interesting and doable. From that moment I was hooked on pathology.

Pathology is clearly a turn-on for adolescents. Many young people elect to study forensics after watching those gruesome television programs with 'floaters', electric bone saws and hard-nosed characters who spend a good part of their lives in white plastic overalls, snipping off bits and putting them in bottles. I retain my fascination with disease and death even now: yes, it's true that many innovative research scientists are stuck in a state of perpetual adolescence. The 'disease detective' game constantly turns up surprises, and it certainly isn't boring.

Medicine, dentistry and veterinary medicine are post-graduate courses in the United States but, at least in those distant days, Australia, like Britain, started all young people into professional training straight out of high school. If I had gone first to a US four-year liberal arts college, I would probably now be both better educated and an historian. Even as a scientist, I always tend to develop explanations by beginning from a historical perspective and am fascinated by history and politics.

I began at the veterinary school at age 17 and graduated five years later in the bright, hot summer of December 1962. Exactly thirty-four years later, in December 1996, I found myself in bleak, wintry Stockholm receiving the Nobel Prize for Physiology or Medicine from the hand of King Carl XVI Gustaf of Sweden. What took me from a young, naïve vet student to immunology and the kind of discovery science that occasionally turns up results that win prizes? There weren't that many differences between my fellow students and me back then, but one was that I always

wanted, from the outset, to be a research scientist. I was altruistic enough to believe that improving the health of domestic animals, so important in the developing world, would be something worthwhile. After my graduation, rather than go into veterinary practice, I worked on infectious disease problems in cattle, pigs, chickens and sheep, first in Queensland and then in Scotland, where I completed my PhD on louping ill encephalitis, a tick-borne virus-induced brain inflammation in sheep.

My long-term aim after Edinburgh was to be a veterinary researcher with the large, national, applied research organisation, the CSIRO in Melbourne. First though, I diverted—I thought temporarily—to the John Curtin School of Medical Research (JCSMR) at the Australian National University to learn about cell-mediated immunity, so that I could better understand the host response to viruses. In Canberra, I started my experiments on virus infections in laboratory mice in 1972 and was introduced, for the first time, to a dynamic, intellectually driven, basic medical research environment. The story of what happened next in my science odyssey is told later in this book. Needless to say, I never made it back to work in the veterinary world.

I have since worked in both Australia and the United States, but won the Nobel Prize for a discovery made in Canberra, and for the intellectual framework Rolf Zinkernagel and I developed there during 1973–75 to explain our findings. Within a couple of years, we were both being recognised as significant figures in the world of immunology, a status that we have maintained. The Nobel, of course, moves that business of fame and reputation into a different league. The initial, intense global media attention

doesn't continue much beyond the award week in Sweden, but the recognition, I now realise, lasts much longer and permeates the rest of your life. 'Nobel Prize winner' is a permanent job description. The continued reputation rests, of course, as much in the status of the award as in the achievements of an individual Nobel laureate.

What would the naïve, unsophisticated Oxley school-boy have thought if he could have peered into a crystal ball and observed himself in Stockholm those years later, looking out from the Grand Hotel to the Royal Palace? What if someone had told him that an international career and one of the world's most prestigious prizes awaited him down the line? I'm not sure I was even aware of the status of the Nobel then, or the names of my countrymen who had received it. Winning a Nobel wasn't what I set out to do with my life, and as far as I was concerned, it was an extraordinarily improbable outcome. Why me?

My personal view of the prize is that, like many science laureates, I was recognised for my part in making a breakthrough discovery that changed the prevailing view, what the philosopher Thomas Kuhn calls a 'paradigm shift'. We did some rather simple experiments and advanced what was at that time a revolutionary explanation for our results. Many outstanding scientists then used technological advances in other fields to explain both what we had found and what came after. Their stories are no doubt just as interesting as mine, and every one will have been influenced by many factors, including people, places, opportunities and intellectual environments. Though few win Nobel Prizes, all who work at the forefront of discovery and problem-solving are part of that same tradition, whether they be scientists, writers or peace-makers.