

WARNING

THE MATERIALS AND WORKS MADE AVAILABLE BY C&M ONLINE MEDIA INC. THROUGH BOSON BOOKS ARE COPYRIGHTED.

YOU ARE PERMITTED TO DOWNLOAD LOCALLY MATERIALS AND WORKS FROM BOSON BOOKS AND TO MAKE ONE (1) HARD COPY OF SUCH MATERIALS AND WORKS FOR YOUR PERSONAL USE.

FEDERAL COPYRIGHT LAWS, HOWEVER, PROHIBIT ANY FURTHER COPYING OR REPRODUCTION OF SUCH MATERIALS AND WORKS, OR ANY REPUBLICATION OF ANY KIND.

ILLEGAL COPYING OR DISTRIBUTION OF MATERIALS AND WORKS OBTAINED FROM BOSON BOOKS CONSTITUTES COPYRIGHT INFRINGEMENT. ILLEGAL COPIES OF SUCH MATERIAL AND WORKS CAN BE SEIZED AND DESTROYED. FURTHERMORE, MATERIALS AND WORKS CREATED BY YOU OR OTHERS USING COPYRIGHTED MATERIALS OBTAINED FROM BOSON BOOKS WITHOUT THE WRITTEN AUTHORIZATION OF C&M ONLINE MEDIA, INC. ALSO CAN BE SEIZED AND DESTROYED. COPYRIGHT INFRINGEMENT CAN BE INVESTIGATED BY THE FBI. CRIMINAL CONVICTIONS MAY RESULT IN IMPRISONMENT OR A FINE OF UP TO \$250,000, OR BOTH.

Published by **Boson Books**
3905 Meadow Field Lane
Raleigh, NC 27606

ISBN 0-917990-25-0

An imprint of **C&M Online Media Inc.**

Copyright 2001 by Erasmus Harland, Richard Lynn,
Margaret Harland Millard and Max Millard
All rights reserved

For information contact
C&M Online Media Inc.
3905 Meadow Field Lane
Raleigh, NC 27606
Tel: (919) 233-8164;
Fax: (919) 233-8578;
e-mail: boson@cmonline.com
URL: <http://www.bosonbooks.com/>

NINE LIVES:
THE AUTOBIOGRAPHY OF A YORKSHIRE SCIENTIST

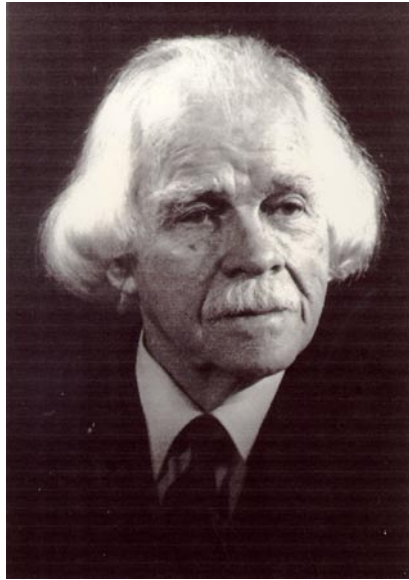
By

Sydney Cross Harland

Edited by

Max Millard





Sydney Cross Harland, 1891-1982

ABOUT THE AUTHOR

This is the story of a scientist who was very eccentric—in his own words, "almost to the point of lunacy." He was a botanist of great creative ability, whose work helped form the basis of the Green Revolution, which increased crop yields and averted famine in the Third World. He received few honours and little acknowledgement from the Establishment, but this was not surprising, as he went his own way and cared for nothing so much as his independence.

Sydney Harland was a scientist to his fingertips, with an overwhelming love for plants. He describes how he organised research in the West Indies and became the leading cotton expert of the world. He tells of his dismissal because of his marriage to his Chinese research assistant. The marriage brought happiness, but the price was high because the old men with power could not tolerate his stand against racism.

Harland and Nikolai Vavilov, widely regarded as the premier biologist the Soviets ever produced, were great friends. Harland said of Vavilov, "He was the best man I ever knew." They were together on an expedition in the USSR in 1933-34. In 1943, Vavilov died in a Stalin concentration camp of starvation.

During the last decade of his life, Harland worked intermittently on his autobiography. He never completed it to his satisfaction or tried to get it published. When he died in 1982 at the age of 91, the manuscript was found among his papers. His children assembled it, typed it, and published 106 copies in 1992 for members of the family. It is now available to the public for the first time.

FORWARD

By Sydney C. Harland

I call my autobiography *Nine Lives*, as I have had nine different careers, in St Croix, Canada, Scotland, St Vincent, England, Trinidad, Brazil, Peru and England again.

I am writing my autobiography mostly perhaps as a warning about what not to do. What I lacked in my young days was advice from somebody whose opinion I could respect. I never got it. But I mustn't preach: Swift advised the old never to advise the young, unless they ask for advice.

I used to tell my son Erasmus that if you want to burn a hole in a piece of paper, you have to concentrate a beam of light on it with a lens, and focus accurately. It is the same with a career. I owe whatever success I have achieved to the fact that I made it my business to know more about cotton than anybody else. I think I still do, although I am out of touch with the literature.

It is curious that when one is old—and old age comes on with the velocity of a tropical night—certain things, trivial in themselves, are often remembered. There are some scents of 70 or more years ago that I can recall in all their original freshness, especially cowslips, primroses and violets.

Beauty is what I live by in my old age. I cultivate it deliberately because it is a very great good which is free for all to enjoy. I have nothing in my bedroom except my typewriter and a few books. I have a vase on a small table with one perfect flower, changed every morning. Even in a world like this, we require beautiful flowers.

There is a bird which sings beautifully at 6.00 a.m. I am usually awake listening to it. I guess it may be some time before I hand in my knife and fork.

Although I have spent most of my working life abroad, I still feel completely at home only in Yorkshire, and it is to the North Riding that I have finally returned. It is here, in the village in which I was born and among my own people, that I write these words, and among whom I shall spend my last years. I shall die, as I was born, a Yorkshireman of the North Riding.

TABLE OF CONTENTS

CHAPTER 1: THE HARLANDS OF THE NORTH RIDING

CHAPTER 2: CHILDHOOD, 1891-1902

CHAPTER 3: SCARBOROUGH MUNICIPAL SECONDARY SCHOOL, 1903-1909

CHAPTER 4: KING'S COLLEGE, LONDON, 1909-1912

CHAPTER 5: ST CROIX, 1913-1914

CHAPTER 6: CANADA AND SCOTLAND, 1914-1915

CHAPTER 7: EARLY WORK ON GENETICS IN ST VINCENT, 1915-1920

CHAPTER 8: MANCHESTER, 1920-1923

CHAPTER 9: IMPERIAL COLLEGE OF TROPICAL AGRICULTURE, 1923-25

CHAPTER 10: IN QUEST OF THE *GROS MICHEL* BANANA, 1925-1926

CHAPTER 11: THE EMPIRE COTTON GROWING RESEARCH STATION, 1926-1934

CHAPTER 12: AFRICA AND BRAZIL, 1930

CHAPTER 13: A VISIT TO THE SOVIET UNION, 1933

CHAPTER 14: HARLAND VERSUS THE EMPIRE COTTON GROWING CORPORATION, 1935-39

CHAPTER 15: COTTON BREEDING IN PERU, 1939-1949

CHAPTER 16: MANCHESTER UNIVERSITY, 1950-1958

CHAPTER 17: LAST YEARS, 1958-1982

GENETICS AND THE WORLD'S FOOD: AN ESSAY

AFTERWORD

CHAPTER 1

THE HARLANDS OF THE NORTH RIDING

From time immemorial my forbears have lived in the North Riding of Yorkshire. Four or five miles above the small market town of Kirbymoorside lies Harland Moor, and it was there that the Harlands acquired their name in medieval times. For many centuries they lived as small farmers and craftsmen in the villages that lie in valleys leading up to the moors. It was in one of these, the village of Snainton, that I was born one evening on 19 July 1891.

At the time of my birth, my father worked as an assistant tailor to my grandfather Thomas Harland, a master tailor who made clothes for the village people and the farmhands for miles around. Grandfather Thomas was quite well off, as village people went. He employed a couple of journeymen tailors and had five or six apprentices.

My paternal grandmother, Anne Caroline Cross, had six sons and five daughters. All the boys were raised to be tailors. Edwin and Herbert, my father's two eldest brothers, rebelled and emigrated to the United States in the 1880s.

My grandfather was a devout Methodist. His own father, William Harland, had been converted by the great evangelist John Wesley himself. Wesley stayed a night at my great-grandfather's house when he came to preach in the district, on one of his itinerant tours. He made many converts in the surrounding villages, and a majority of the inhabitants became Wesleyan Methodists. Later the Methodists fell out over some unimportant bit of dogma.



John Wesley (1703-91), who founded the Methodist Church in the face of intense opposition, was a preacher of extraordinary power and an organiser of genius.

My grandfather belonged to the Primitive Methodists. His whole life revolved around the Methodist Chapel; it took up all his spare time, and a good part of his income. He was a local preacher and Superintendent of the Sunday School for more than 60 years.

His appearance was mild and unworldly, and like my father, he said little. But when his sense of duty was aroused, he was immovable. After my Uncle John died at the age of 26, leaving a wife and five children, his widow speedily got rid of the little money he left, and disappeared. My grandfather thereupon announced to my grandmother and their three daughters that they would now have to take care of the children, whose ages ranged from two to ten. His daughters protested violently, but he would not budge. The children came into the household, were brought up, and were sent out into the world at the age of 14.

The Education Act of 1904 provided for financial support for Church of England Schools out of the rates (property taxes). To my grandfather, the Church of England was a heathen sect, and he was bitterly opposed to this legislation. He therefore held back a part of his rates. Many Methodists did likewise; they were called "passive resisters."

Every year the Local Authority recovered the withheld portion of the rates by seizing an article of my grandfather's furniture and holding an auction sale in front of his house. The villagers promptly bought back the furniture and returned it to him. This practise went on for several years. It is curious to reflect that he saw no inconsistency in sending his children to the Church of England Village School.

My grandmother brewed wines—ginger wine, cowslip wine, elderberry wine and others. The alcoholic content of these was apt to be pretty high, but she used to say, "Nay, it wean't hurt ye. There's nowt in't but what ah put in misen." After a few glasses, the faces of visitors would take on a slightly glazed appearance, and they would say, "Ay, missus, it's grand stuff this." My grandfather was fussy about his food and drink, and refused to drink these potent brews.

My paternal grandmother was a brisk little woman with a sharp tongue. She preferred to speak the North Riding dialect in its purest form, a practise much disapproved of by my aunts, who thought it "common." She would say that the United States was inhabited by rogues, vagabonds and "them 'at ran away fra chance childer."

When a girl in the village gave birth to an illegitimate baby, my grandfather said that if he were her father, he would rather see her dead than disgraced. My grandmother said, "Dean't be daft, Thomas; if they come, they come." Regarding "chance childer"—for which emigration provided a convenient escape from responsibility—she did not know that one of her brothers, Erasmus Cross, had fled to America around 1865 for that selfsame reason.

My grandmother was a great believer in work. She worked hard herself and was accustomed to say, "Ah browt all mah lasses oop ti work. Them can allus leave it bud they can't tak tiv it." When she was in her eighties I chatted with her about a holiday I had just taken in Belgium,

where, I told her, dogs were used for pulling milk carts. She was much interested to hear this, and approved strongly of the custom. "There are," she said, "a lot of great idle dogs in this country. They should be made to work."

Every day she cooked dinner for nearly 20 people and never complained. It was her job. All the cooking was done on the open fire with pots and pans hanging from hooks; there was a big oven was at the side of the fireplace. She made bread and many varieties of cakes and pies. There was no running water and no sink; the dishes had to be washed in a large washbowl placed on the table, with water that was fetched from a spring half a mile away. Illumination was by kerosene lamps.

My grandmother was proud of being a Cross, and often quoted the family motto, "Crosses niver say can't." Her uncle Matthew Burnett was an evangelist who emigrated to Australia. A book was written about him and his labours. It stated that he induced 60,000 Australians to sign the pledge of total abstinence. Those who know the ways of Australians will tell you that this was a remarkable feat.

The North Riding dialect is quite different from that spoken in the West Riding, which is regarded by us as queer and not authentic. Our dialect begins in North Lincolnshire, goes over the Humber through the East Riding, sweeps across the North Riding and the Dales, and finishes in Cumberland. It resembles very much that used by Tennyson in his poem *The Northern Farmer*. Somewhere between York and Leeds, there is a sharp line of demarcation between the North and West Riding dialects. On the North Riding side, boots is "beeats"; on the West Riding side it is "boots."

Both dialects in their pure form have almost disappeared. The desire to talk "well off" has resulted in a debased type of BBC English. Almost the last thing I heard my grandmother say was a remark to her husband. He was standing hesitantly at the door, and she said, "What's thee stannin there for, Thomas, genning like a splettin dish?" Genning, I think, is girning (snarling), not grinning. She would say to a child who was making a face of dissatisfaction mixed with discomfort: "Deean't gen, bairn." I also heard her say, of a small child who had just stood up straight for the first time, "He steead up as brant as a hoose end." Brant is Swedish for perpendicular, and probably entered the North Riding dialect through the Vikings.

My father, Erasmus Harland, left school at the age of 14. In his early twenties he was Parish Clerk of Snainton, and there still exist some parish records of that time written in his beautiful copperplate handwriting.

In 1888, at the age of 21, Erasmus was married to my mother. About the same time, he grew dissatisfied with the tailoring trade and took up a number of different occupations. He sold pills, and the fame of Rassie Harland's pills spread over the whole district. He began a bicycle business. Bicycles changed the lives of the farm lads, who, up to this time, were practically confined to the village for the whole year. With a bicycle, they were able to ride to Scarborough and join in the activities of a wider environment, perhaps getting up to no good.

My father became an agent for the Prudential Insurance Company and was at first so successful that he was promoted in 1895 to be an Assistant Superintendent, causing the whole family to move to Huddersfield in the West Riding of Yorkshire. He was less successful in his new district. He did well in Snainton because everybody knew him, and because he understood the ways and attitudes of the local people. The psychology of West Riding folk is very different from that of the people of the North Riding. Yorkshiremen cannot be lumped together. Ways are different, dialect is different, and customs are different. A further problem was that my father did not take orders readily, a defect which I and certain other members of the family have inherited.

My father was tall and thin, and had a ginger moustache. He was fond of walking. Late in life he walked in the country on Sunday mornings, always by himself. He played the concertina, the banjo and the piano by ear. He said he liked music with "a bit of a tune." He was not a great reader, confining himself to the newspaper and abstruse works on theology. From these books he made copious notes, with what object I do not know.

When the clamour, argument and quarrelling of his three young sons irritated him beyond endurance, he would launch out with his feet and kick us—not very hard, but merely as a deterrent. He smoked a pipe continuously. He had little sense of fun, although he would laugh out loud at some bizarre statement which nobody else thought particularly funny. He liked to be praised. He used to bring home things he had bought at sales, and display them to the family. "There, look at that!" he would say. Usually his family thought he had wasted his money and was quite unresponsive.

For some years he went to the Scarborough Adult School on Sunday morning, to take part in discussions of social questions. His habits were quite fixed. He got up early and made his own breakfast. He went to bed promptly at ten o'clock after consuming a glass of milk and a piece of pie.

Was he a good father? Thinking this over, I really don't know. The only time he was openly affectionate was an evening when I was about seven years old, and he took us all to a fireworks display in Beaumont Park, perhaps two miles away. When we began to walk home, I said I could not go on. He thereupon carried me all the way home. I remember the smell of his coat, a nice tobaccoish smell, and the warm feeling of his arms around me. It was one of those small but unforgettable experiences.

Although he was undemonstrative, I always had confidence in him and knew that if I was in a jam he would help me if he could. Together with my mother he formed a stable background. They got on well together, at least when we were there.

In August 1918 he was called up for military service in the First World War. He refused to go, and had to appear before a Military Tribunal. "Are you a conscientious objector?" they asked. "No," he said. "Then why don't you want to go?" they went on.

"Because," he said, "I think it is a lot of *daftness*." The Chairman was highly amused, and they let him off. He would have been 51 in November 1918, so there was not much point in him going anyway.

An oil painting of my father in his sixties hangs in the kitchen of Cliff Grange, our house in Snainton. He has a rather sad and brooding expression, and his moustache droops over his upper lip. He died at 79 of carcinoma of the stomach.

I know little about the family of my mother, Eliza Fitzgerald. She was born in 1867 in Friar's Entry, a slum property in the old part of Scarborough near the harbour. She was the illegitimate daughter of Ellen Fitzgerald and John Petch.

Ellen was the young widow of John Fitzgerald, an Irish labourer who was killed about the year 1866 when working on the building of the Grand Hotel in Scarborough. With young children and no resources, my grandmother became the mistress of John Petch, an architect and an alderman in the Scarborough Borough Council. He was a great traveler and linguist, who was responsible for many of the fine buildings on the Crescent and the South Cliff.

When my mother was an infant, my grandmother Ellen either died or simply disappeared. My mother was put into the workhouse in Scarborough, then was taken into foster care by Harker and Mary Ann Summersgill of Snainton. Harker Summersgill was a small tenant farmer with about 50 acres from which he made a good living. He employed a man who looked after the horses, a general servant, and a boy who was in charge of the cows. They were highly respectable Primitive Methodists and were good foster parents.

John Petch contributed to my mother's support and came to see her from time to time. She was brought up to work very hard. She scrubbed, baked, washed, ironed, milked cows, fed pigs, calves and hens, and worked in the field. She learned to make shirts and clothes, and to knit so rapidly that she could read a book at the same time. In short, she had to do all the things expected of a Yorkshire farmhouse lass.

She went to school at Ebberston, walking the four miles a day until she was 14, when she left school. In contrast to my father, she read greedily whatever books she could lay her hands on. Her memory was remarkable. When she was over 90 she correctly recited much of Gray's *Elegy in a Country Churchyard* in a strong Yorkshire accent.

When she was 21, she married my father, and they went to live in a tiny cottage, a two-up and two-down, in the main street of Snainton. My father then earned 12 shillings and sixpence a week. It is difficult to imagine how they managed, but my mother was extraordinarily thrifty, economical and efficient.

She hardly bought any clothes for herself, but always managed to look well-dressed. She was beautiful, with a delicate aquiline nose, rather high cheek bones, tiny feet and a clear complexion.

My mother was the most unselfish woman I have ever met. She was tiny; I am five feet seven inches, and when I stood over her, I could just rest my chin on the top of her head. She had a passion for education, and all her thoughts centered around her children. My father, who at first

did not see any sense in further education, wanted me to leave school at 14 and work as a clerk in a shipping office. Usually she let him have his own way, but not in a vital matter such as education.

She suffered much from migraine, and I was often sent to buy a penny headache powder. But headache or no headache, she never stopped work. When we lived in Scarborough and we boys were expensive to maintain at school, she took in summer visitors to make a little extra money. Each visitor paid two shillings a night for bed and attendance. Attendance meant preparing four meals a day, finishing with supper at 11.00 p.m. The visitors brought their own food, and she cooked it. There were four visitors at a time, so she could expect to earn three pounds ten shillings a week for a colossal amount of work, while looking after a husband and five children.

My mother did not attend chapel or church, although she sent us to Sunday School until we refused to go. I have been an atheist since I was about 15. In my view Christianity has done more harm than good. I much prefer the *Bhagavad Gita* and Zen Buddhism.

I think my mother was not very happy in her first years of marriage. My father got tired of being in the house and often went out, returning home late at night. I learned from hearsay that there were quarrels about his goings-on. Although she agreed with my father about most things, she was capable of bouts of fury that completely quelled him.

My mother was a convinced Republican (in the English sense), and did not hold at all with royalty. Nor did she have any time for the upper classes. If Winston Churchill was speaking on the radio, she promptly turned him off. "That man," she said, "is no friend to our kind of people." While giving him credit for what he did, she thought he was as anachronistic as war itself, and I agreed with her.

Her adoptive parents, the Summersgills, had the care of my elder brother Stanley for long periods. They doted on him, and let him have his own way in almost everything. When he wouldn't eat, Grandmother Summersgill would take him into the dairy to see if there was anything he fancied. It is no wonder he was something of a problem when he came back home. The Summersgills indulged him so much that his life was largely a failure.

My father got into the wretched habit of teasing him. My mother told him to stop. He did not stop. Mother got up, went over to him and gave him a terrific slap in the face. He never teased Stanley again.

Was she an affectionate woman? We always felt that she cared, but with so much work, mothers of her class had no time to pet their children or read to them or tell them stories. She never went to bed until the last spark of the fire was extinguished.

When we moved to Huddersfield, she entered an exciting new environment: she could get books from the public library. She began to read novels by Hall Caine and Marie Corelli, and whatever she read, I read. I was much impressed by Corelli's novel *The Mighty Atom*. Later, when I went to the Scarborough Municipal School, I was greatly mortified when my Headmaster dismissed her works as "hogwash."

My mother died in 1963 at the age of 96, and was buried beside my father in the churchyard at Snainton.

I was conscious as a child that the Harlands were capable of greater things than village tailoring and selling insurance and secondhand furniture. My great-grandfather William was the cousin of Edward Harland, the founder of the Belfast shipbuilders Harland and Wolff. Edward had been brought up in Scarborough and had gone to work as an apprentice with George Stephenson at his engineering works at Newcastle. He had gone over to Belfast, set up Harland and Wolff, and built it up into the largest shipbuilders in the world. To some degree Edward Harland served for me as what is nowadays called a role model. I knew that if Edward could make it in the wide world beyond the North Riding, so could I.

CHAPTER 2

CHILDHOOD, 1891-1902

I was the second of three boys who were born in close succession. My elder brother Stanley was born in 1890, I was born in 1891 and my younger brother Oswald in 1892. Some eight years later my parents had two more children, Bernard and Winifred.

When Oswald was born, I was sent to stay with my grandmother Harland, to be out of the way I suppose. In her kitchen there was a hot plate about a foot wide on which all pans were put, for cooking on the fire. One day when I was about 19 months old, I sat on the hot plate and got badly burned. This is the earliest thing I remember.

I had the great misfortune to be born with an abnormal right foot, a form of talipes. I was operated on in infancy at Leeds Infirmary. The surgeon cut the tendons so that the foot could be straightened out. I wore an iron support for the right leg for several years, but the calf muscle was permanently atrophied, and though I could put my foot flat on the ground and walk fairly normally, I could not play games very well nor run very fast.

After the operation I remained for a considerable time in the hospital. It is well known that a separation from the affirmative action of one's parents can cause serious psychological damage, which might manifest itself in rebelliousness, vandalism, fire-setting, lying or stealing. In my case it certainly happened.

The rate and volume of affection also determine the level at which the instinct for gregariousness operates, or the attitude of the individual towards society. It seems to me that the theory of limiting, which was first applied to the analysis of plant growth, can also be applied to psychological development. This theory states that if a biological end result is governed by the united action of several factors, any one of them can be limiting. Thus, plant growth is affected by water supply, a series of nutrients, light and carbon dioxide. Growth is limited by the least efficient of these.

Perhaps the affection component in human beings (and animals) can be likened to water supply in plants: it must be available in optimum amounts when wanted, and just as a plant may be stunted by failure of water supply or a chemical element, a human being can be irreversibly stunted psychologically by failure of the affection component at some critical period. Such psychologically stunted individuals are cut off permanently from the main currents of society, although they may incorporate themselves into sub-groups of likewise stunted fellows. I have always disliked nightclubs and the noise of people escaping from themselves to indulge in gregariousness.

Mentally I was very precocious, and talked at 18 months. I used to go around singing in an exceptionally clear and high treble, but at the age of 13, when my voice was breaking, I did a tremendous amount of useless shouting in the 1905 Election, and ruined my voice for the rest of my life.

I went to the village school while still in frocks. In those days, boys wore frocks until they were three. The boy's urinal was separated from the girls' lavatory by a high wall. It was our custom to try to direct our stream over the top. This could be done by nipping the foreskin, causing it to balloon out with urine, and then squeezing the balloon suddenly. In this way it was possible to send the stream over a wall six feet or so high.

I learned to read at about the age of four. Several times at school I was punished for not knowing the place when my turn came around. But I had already finished the book, and it bored me intensely to hear boy after boy reading a paragraph at a time.

A growing child is exposed to a whole complex of environmental stimuli from which he extracts material appropriate to his genetical constitution. In some cases, he may never encounter what is necessary for his mental development. The environmental spectrum widens enormously in a house where there are many books, and where the parents read a lot. From this point of view, my childhood environment was impoverished.

As far as I remember, the only books in the house were *The Pilgrim's Progress* with a fearful picture of Christian plunging his sword into the abdomen of Apollyon; d'Aulnoy's *Fairy Tales*; *David Copperfield*; and a large book about Red Indians sent by one of my uncles from America. Before I was seven I had read all these books several times. In my grandfather's house there were a few semi-religious books. My parents took a newspaper called *The Northern Weekly Gazette*, from which at the age of seven I won a prize of five shillings for an essay on the daisy.

My mother would read if there were any books, and if she were not perpetually tired. The whole village environment was against reading, and a reading woman was considered to be a lazy woman. How could my mother sit down and read a book when there was sewing or knitting to be done? I never saw my Grandmother Harland read at all. She would scornfully describe a musically inclined girl as "yan o' them piano lasses."

The period of 1898 to 1901, when we were living in Huddersfield, was marked by the Queen's Jubilee, a great celebration. I remember going to a huge gathering of schoolchildren in Greenhead Park and being given a bag of buns and a Jubilee mug. The deaths of the Queen and of William Ewart Gladstone, which soon followed, were marked by the tolling of bells and the playing of *The Dead March in Saul*. Many children studying the piano were compelled to memorise this lugubrious composition.

We lived in an appalling slum house at number 66 Halifax Old Road. The lavatory was an outside privy shared by neighbours. There was no bathroom, and the lighting was by the old bat's wing gas burners. I collected football cards, played marbles, fished in the pond for sticklebacks, kept caterpillars and played games such as pig and stick (also known as knur and spell), rigamajig and ducky.

I was always very fond of gardening and plants. The woman next door, Mrs Heller, had a duck house with a flat roof. I got some bricks and made a tiny garden plot there, filled it with soil, and transplanted a fern and an onion. This satisfied my instinct for growing plants for the time being.

My father was not happy in the insurance business, so in 1901 he left Huddersfield and moved to Scarborough, where he began a second-hand furniture business. He went to auction sales and bought furniture for resale. He also bought books. With little money coming in, and with an infant and three hungry boys, life was very difficult. Bernard, who was about two years old, got bowlegged through rickets. Little was known about it in those days. I think it was partly due to father's idea of economising by using margarine instead of butter, causing a lack of vitamin D. Father also dealt in Canary bananas, which were kept in a warehouse across the street. We ate a lot of bananas.

The furniture business ultimately crashed. My father's partner disappeared and left him to face the creditors. We were very poor, and the furniture was put in mother's name, doubtless to prevent seizure.

I went to Falsgrave Board School in Scarborough at the age of ten. In my second year, my teacher was a remarkable man called Robert Leeson. He was an original and brilliant teacher, and on Saturday mornings he often took the class on geology excursions. This aroused my interest in geology and natural history. He offered a prize for the best collection of pressed leaves, and I entered the competition with great enthusiasm. I thought the leaves had to be perfect, and when the time came to hand them in, I only had one leaf gummed to a bit of drawing paper. I was mortified to see a nondescript lot of chewed and bitten leaves awarded the prize.

I used to raise my hand in the middle of a lesson and ask a question about some totally unrelated subject. Mr Leeson would say, "Do you want to know the answer or are you just testing my knowledge?" It was usually the latter, because he would then ask, "How did you get to know this?" My reply was, "Please sir, I read it in one of my books." I read everything I could get hold of.

Up to this time I never had any money to spend, but one day my mother called us together and said she thought we ought to have some pocket money. So from then on we were given tuppence each per week. In summer I supplemented this by fielding tennis balls, the payment being tuppence for about three hours. Every week I bought the *Boy's Own Paper*, and sometimes *Cage Birds*. I knew all about exotic birds like Java sparrows.

The lavatory at school consisted of a long trough of slowly running water over which there were seats. One time I got a piece of wood about three inches square and mounted a lighted candle on it. I put this at the top end of the trough, and it floated with the current while several boys were sitting on the seats. I thought the results quite amusing, but got caned severely.

One teacher, Mr Rothery, was a sadist of the worst type. You could get caned for an ink blot, for a spelling mistake, for not knowing the answer to a question, even for moving your foot.

For several months before my 12th birthday, I, with two other boys, was specially coached by the Headmaster, Robert Underwood, for the Scholarship Examination for entrance to the Scarborough Municipal Secondary School. He gave us a terrific grinding in English grammar, arithmetic, history and geography, and we all three got scholarships.



Left to right: Sydney Harland's sister Winifred, brother Oswald, mother Eliza and father Erasmus Harland in Yorkshire, England.

CHAPTER 3

SCARBOROUGH MUNICIPAL SECONDARY SCHOOL, 1903-1909

I entered the Scarborough Municipal Secondary School in September 1903 and left in July 1909. The school was built in 1899; it was planned by the Rt Hon A.H.D. Acland, Secretary of the Board of Education at the end of the last century. His idea was to provide secondary education for children of the working and middle classes who would normally leave school at the age of 14. At the beginning of the century there was practically no higher education in Scarborough. Acland's scheme was to teach a lot of science, and in this he was greatly influenced by his friend Richard Burdon Haldane, the Scottish statesman and philosopher, and the uncle of J.B.S. Haldane, whom I would later befriend.

The architect, Sir Edwin Cooper, incorporated Acland's idea of what a school should look like, and designed a beautiful building with first-rate laboratories for chemistry and physics, and workshops for woodwork and metalwork, and for the girls, cookery and laundry. The school was co-educational, and could accommodate not more than 250 pupils.

This is just the right size for a school. Two or three boys or girls from each elementary school in the town were given scholarships. If you didn't get a scholarship, you left school at 14 and joined the working classes, to swell the ranks of clerks, shop assistants, artisans, mechanics or labourers.

When I entered the school in September 1903, I was put into Form 2. My Form Master was William R. Grist, who was himself only 21, and had just left the Borough Road Training College, probably the best college in the country for elementary school teachers. Years later he told me that the average IQ of the class was about 130. "It was marvelous to teach them," he said. "They never forgot anything you told them, and when you taught them you had to watch your step, as they were apt to catch you out."

Billy Grist, as we called him, was as inspiring a teacher as Robert Leeson. He would stop in the middle of a history lesson and talk about H.G. Wells's *The Time Machine*, *The First Men in the Moon* and *The Invisible Man*. It was from that time that I determined to be a scientist.

A.H.D. Acland was a little man with a monocle and a red waistcoat. He used to visit the school occasionally. Once he came into the Chemistry Lab and chatted with me for some time. I must have told him about my discovery of magnetic iron particles in the Scarborough sands. He sent his daughter Mamie to the school for a few months, but she was too aristocratic to mix with us, so she sat by herself at a desk in the Assembly Hall, and was taught by the Head himself.

In the first 15 years of the school's existence, it turned out more than its share of outstanding people. There were writers such as Storm Jameson, my brother Oswald Harland, and Leo Walmsley; and colonial civil servants such as Arthur Wilson, who became Auditor General of the Malay States. Another ex-pupil, Sir Henry King, became Commercial Minister of the British Embassy in Brazil. There were also a great number of university lecturers.

From the first day, I developed an enormous affection for the school. There was a library, a Debating Society, mock elections, singing, a Rambling Club and a Natural History Society. The Headmaster was Arthur Samuel Tetley M.A., a graduate in History from South Wales. All who were under his influence knew that he was a great Headmaster.

He was not tall, but when he strode through the school with his gown flowing behind him he looked very imposing. The school had an atmosphere of great freedom, and, best of all, there was practically no corporal punishment. Perhaps twice a year the Head would cane a boy for some grave offence.

Most of the teachers had no university degree, but some of them were studying for an External London Degree. They had been to teachers training colleges, and knew well the art and science of teaching.

The school did not organise any games. We formed our own teams of cricket, football and hockey, and elected captains. Masters took an interest in the games, but we ran them ourselves.

In the first-term examination I came fourth, being first or nearly first in chemistry, English and history, and near the bottom in mathematics. Ever since then I have been poor in mathematics. The trouble was that problems had to be solved rapidly, and I could seldom do this.

Chemistry was my favourite subject, and I had the idea when I was 12 of taking a degree in Chemistry at Leeds University. My idea of a career was to be a Borough Analyst.

In the Fourth Form the Master was A.E. (Fatty) Saunders, an extremely poor and lazy teacher. If he could possibly avoid teaching, he did so. In geography we did little but draw maps. The girls sat on one side of the room and the boys on the other. In the examinations, the top half-dozen places were headed by girls, and this discouraged us. The reason is, of course, that girls are much more advanced around the age of 14. When we reached 17, the situation was reversed.

I was also influenced by Albert Strange, the Art Master. He took an interest in me and guided my reading for many years. The Library of the Mechanics Institute in Vernon Place was, for the time, very good. I began with John Ruskin's *The Stones of Venice*, *Modern Painters* and *Sesame and Lilies*. From the age of 15 I read up to four books a week, sometimes more, and continued this to beyond the age of 80. I read the English classics and a lot of modern novels and biographies. I also used the Reading Room a lot. This had most of the current periodicals.

To enter the room, one was supposed to put a penny in a box hung near the door. A whole penny was beyond my means, so I put in a halfpenny. I read all the magazines—*Strand*, *Pearsons*, *Century*, *Harpers*, *Atlantic Monthly*, *Contemporary Review*, *Nineteenth Century*, and the *Fortnightly Review*. I spent at least two evenings a week in the Reading Room, and on my own I began to study Italian and Esperanto.

The French Master, a Swiss named Ulysse Detoit, was a tall man with a huge black beard reaching down to the bottom button of his waistcoat. He hated his pupils. On one occasion he set for homework a long passage of Moliere's *Le Bourgeois Gentilhomme* to be learned by heart. This

was a good way to learn French, but I thought it unjust to give such a heavy task, considering the amount of homework given by other Masters. I told him I wouldn't do it.

"Very well," he said, "you must then copy the passage ten times in good handwriting." Feeling that I had gained a victory, I consented to do this, but discovered that after copying the passage seven times, I knew it by heart. This led to some research on my part. How many times do you have to write out a passage in English or a foreign language to memorize it? Some things have to be learned by heart, and I still think this is a sure and admirable technique. I used it a lot in later studies of Spanish and Portuguese, as well as English poetry, of which I learned a considerable amount.

We had a woodwork class once a week. From the beginning, I was discouraged. The first thing we had to make was a simple box, which had to be perfect. The Master tolerated no crudities. Whenever I finished my box and showed it to him, he was very scornful. "Simple box, hey," he would say, "I'll show you what I do with this sort of box." Taking up a hammer, he would smash it into little bits. I then had to make another simple box, which suffered the same fate as its predecessors. I never got beyond the simple box, and never made one that was acceptable.

Outside of school I made a small greenhouse, glazing it with old glass photographic negatives. I used to go around to all the photographers in town and beg for them. They got tired of seeing me. The greenhouse was very small—about five feet square—and I never put any plants into it. It was the place where for several months I kept a pet owl called Samson. I had raised Samson from the time he was just ready to leave the nest, and the raw meat he consumed took all my pocket money. I brought him to school and kept him in my desk. He got very tame, and at night used to fly around the neighbouring houses, hooting. The neighbours complained, so while I was away for the summer holidays, Dad let him go in a distant wood and I never saw him again.

For three years I went in for photography. I made a pinhole camera and my own printing paper, and took some excellent photographs. One summer I got a job as an assistant to a professional photographer. We used to sell three picture-postcard size photographs for a shilling. I learned a lot from him.

At the school, I worked hard and played hard. In spite of my lameness, I played full left back at hockey, and got my school colours. I joined enthusiastically in everything, and was very successful in the Debating Society. I went on all the rambles and even joined the Sketching Club.

At the same time I was very outspoken and difficult to control. I told Saunders, who taught us geography, that the continuous drawing of maps was a complete waste of time. He once threw a book at me and hit me on the ear. Furious, I threw an inkpot at him. He began to hit me, so I kicked him on the shin. He said, "Don't let us lose our tempers."

I put pellets of calcium carbide into the inkpots one morning before school, which generated acetylene and produced great bubbles of ink which flowed down the desks and on to the floor. During the whole of my boyhood I was, in fact, a delinquent, and I must have been very trying for my teachers.

A factor which intensified my anti-social behaviour was my lameness, which exposed me to the mockery of other boys and made me unduly sensitive. They shouted "Limpy" after me in the street when I was about 12 years old. I was consumed with rage, and hated the world and all its inhabitants. I think that if part of the body is crippled, part of the mind can be also. Lord Byron may be an example of this.

Another contributing cause of my stupid conduct at school was reading about school life in boarding schools. Round about the age of 12 I read a great many school stories, ranging from *Eric or Little by Little: A Tale of Roslyn School* and *Tom Brown's School Days* to *The Fifth Form at St. Dominic's*, *The Master of the Shell*, and to that pernicious weekly called *The Marvel*, which dealt with the doings of Harry Wharton, Billy Bunter et al. I did not realise that these books gave an entirely false picture of boarding school life, which they showed as consisting chiefly in perpetrating crude practical jokes and in thinking up schemes to annoy their natural enemies, the Masters.

I shall now tell of two episodes which were landmarks in my school career. One afternoon when I was about 15, I spent the afternoon in the Chemistry Laboratory making stink bombs of carbon disulfide, a substance which smells strongly of rotten eggs. That night, three other boys and I went to a political meeting (Conservative, of course) at Londesborough Theatre. I walked down the aisle dropping the bombs, and the boys followed me, stepping on them.

The putrid smell caused alarm, confusion and great uproar. Unfortunately I was seen by the Headmaster. If I did not concoct a plausible story, I would probably be expelled, and that would be the end of any hope I had of going to the university.

I spent several hours thinking hard. The first thing the Head would do would be to discuss the matter with the Chemistry Master, who would tell him that a considerable quantity of carbon disulfide was missing from the storeroom. I therefore had to account for this, so I read up a number of experiments involving its use. The next question was: If I didn't get the chemical from the school, where did I get it? The answer was simple. I got it from my friend Harry Holt, whose father was a doctor in Malton, and could be presumed to have some in his surgery.

Harry came every day from Malton, arriving about 8.30 a.m. I met him at the station next morning and told him the story. He willingly agreed to back me. At school, the Headmaster strode in at ten o'clock and said, "Harland, did you throw down stink bombs in the Conservative meeting last night?" "Yes, sir," I said. He went out, returning a few minutes later. "The Chemistry Master tells me that a lot of this chemical is missing from the storeroom. How do you account for this?" I rapidly enumerated a number of experiments involving the use of carbon disulfide, and said that we were all using it the previous afternoon. My three friends confirmed this. "If you did not get the chemical from the school, where did you get it?" "From Holt, sir," I said. "Is this true, Holt?" he asked. "Yes, sir, I got it from my father's surgery."

The Headmaster looked puzzled. He went out to talk once more to the Chemistry Master. He came back some minutes later, and looking at me very sternly said, "Harland, you are an extremely clever boy."

My only punishment was to forbid me to attend the evening classes in Chemistry, thus depriving me of the chance to do three hours more Practical Chemistry a week.

The second episode happened in August 1906, when I was staying with my grandmother in Snainton for the summer holidays. I got up very early one Saturday to go for a long walk on the moors. What possessed me I don't know, but I had a sudden impulse to set fire to the heather. I lit a match. There was a high wind, and in less than a minute it was impossible to extinguish the fire.

A young plantation of 100 acres of fir trees was completely destroyed, as well as a large area of moorland. The village policeman came to my grandmother's house the next evening. He said they had traced me by various calls I had made at farmhouses on the moor. I admitted having set the fire but protested that it was only a small one, and that I had put it out before I left. Of course this was not true.

He took me to the Police Station in Scarborough. I was charged with maliciously, feloniously, and unlawfully setting fire to the moor. "Certainly not maliciously," I said. I was allowed to go home. Next day my father went to a solicitor, who advised him to get as many important witnesses as possible to testify as to my high personal character. The Headmaster, Mr Tetley, readily testified to my exceedingly good behaviour and school record, likewise Mr Underwood, my former Headmaster, now the Education Officer in the town. I was both astonished and gratified at what they said. Asked about the fire, I told my story clearly and convincingly, and was bound over to be of good behaviour for 12 months.

In those days I was almost devoid of conscience. If I did anything wrong, I was only concerned with not being found out.

One morning in September 1907, the Headmaster came in, accompanied by a girl. She looked about 16, gauche, shy and uncomfortable, but there was something about her—I can't describe it; I can only say she shone. She sat down, put her books on the desk and began to work rapidly and with great concentration. She was Margaret Storm Jameson from Whitby. She had come to the school to work for a County Major Scholarship, which she was quite sure of getting, so she said.



Margaret Storm Jameson (1891-1986), the noted writer, feminist and pacifist, published her first novel in 1919, and went on to write poetry, essays, biographies and several volumes of autobiography, many of them based in her native Yorkshire.

Oswald and I took her in hand to educate her privately—that is, to put revolutionary ideas into her head. As Form 5B was mostly left to itself, with practically no organised teaching, there was plenty of time and opportunity for long conversations. Oswald and I were red-hot socialists. She listened, but said very little. Out of school we hardly saw her. Most nights we were too busy working to go gallivanting about. Nevertheless, we became close friends, and I confided in her about the girls I was interested in. She advised me about them in a friendship entirely without passion. Regarding one of them, she said, "You just can't go around with creatures like that. Why don't you get rid of the lot?"

Margaret-Daisy, as we called her, was a remarkable combination of innocence and common sense. We have now been friends for 67 years. Correspondence has been sporadic. Often for months or years there has been no contact, then suddenly we meet and it is as if there had been no break. She has had a brilliant career as a writer of great distinction. I am glad to be her friend.

I have mentioned my great love of gardening and flowers, which dates back to my infancy. When I was about 14 years old, I did get a garden. Farsighted as Acland was, he had incorporated into the school plan a stretch of land below the girls' playground, divided into small plots for the use of the girls. Boys were not supposed to be interested in gardens, and botany was purely a girl's

subject. I went to the Headmaster and told him that as I was lame, I couldn't play the summer games. I was very persuasive.

"Please sir," I said, "may I have a garden? There are three that are full of weeds that nobody wants." He came with me down to the gardens, looked at the one I had picked out, stroked his moustache and consented. I was boundlessly delighted.

For two years this garden was my passion and my life. The only drawback was that to get to the garden, I had to walk through the girls' playground, and to be exposed to the stares of a throng of girls was agony to me. I worked at the garden all through the long summer evenings and on Saturday mornings. I carried sand from the beach to lighten the heavy clay soil. I used all my pocket money to buy seeds and plants. My most treasured possession was a Mamam Cochet tea rose which I bought for sixpence. It is a white rose with perfect form and delicate scent. I remember how surprised I was when it flowered.

On the strength of this rose, I wrote an article for *Amateur Gardening* titled "How I Grow Roses" and won a year's subscription as a first prize. It came by post every Saturday morning, and I devoured it eagerly from cover to cover. I also read all the books on horticulture in the Mechanics Institute Library and that good old standby, the *Gardener's Chronicle*, in the Reading Room.

I taught myself how to hybridize, to bud and to graft. Nobody showed me; I just looked at a diagram and did it. Once I budded a rose with my fingernails. One of my friends was Mr James Lawrence, who had a fine nursery. He let me help the gardeners transplant seedlings, propagate from cuttings, make a hot bed, mix compost, and take care of greenhouse plants. All flowers were a delight to me except some double ones, which I regarded as monstrosities. Form and line were what attracted me.

One morning I found a gang of Corporation workmen destroying all the gardens. My garden was a blaze of colour. It had many prized plants. Weeping at the injustice, I went to the house of the Alderman, Meredith Thompson Whitaker, who was Chairman of the School Governors, and told him what had happened. He listened carefully, then said, "What are the plants in your garden worth?" "Oh, quite a lot," I said. He put his hand into his pocket, took out his purse and gave me a half sovereign. I looked at it, my tears dripping on to the carpet. I thanked him and went home.

Whitaker was the owner and Editor of the *Scarborough Mercury*. He was a notable figure in the town—a kind man, public-spirited, and a great liberal. Oswald and I used to imitate his public speaking. "I have risen from a sick bed," I would begin. "To repudiate the foul calumnies," went on Oswald. "Which my political opponents have levelled against me," I concluded. We then roared with laughter. Nevertheless, we admired him and were pleased when he was knighted some years later.

Albert Strange, the Art Master, introduced me to Richard Jefferies, who wrote *The Story of My Heart*. Like Jefferies, I would lie for hours in a meadow or wood, just looking and looking.

Strange also advised me to read William Wordsworth. Wordsworth was a scenery man, and scenery men bore me. I suspect that I got more out of a country walk than he did. I knew of a hawthorn hedge in which the bushes came into leaf in a definite sequence. I could tell you which would burgeon first and which last.

I knew a nettle bed with six types of nettles, that differed in leaf shape, leaf colour and other characters. I could tell you where to find clover plants with red leaves, and I studied all the leaf patterns. Wordsworth would never bother with that sort of thing. He was a scenery man. Not that I was unaffected by scenery. My emotions on seeing a wide stretch of moorland with the heather ablaze were deep. I was, in fact, sensitive to all kinds of beauty.

In my last year at school, Wordsworth's *Prelude* was one of the set books for matriculation. It bored me, and I don't think I ever finished it. I was greatly moved by his sonnets, and learned them by heart. In my old age, when physical frailty put an end to field work, I returned to poetry and the classics. Again I tried to read the *Prelude*, and again I could not get through it.

Lately I came across the engaging opinion of Dylan Thomas. He said: "Old Father William was a human nanny goat with a pantheistic obsession. He hadn't a spark of mysticism in him. He writes about mysticism but he is not a mystic; he describes what mystics have been known to feel, but he himself does not feel anything."

At this period I was an avowed socialist. A book by Robert Blatchford called *Merrie England* converted me, as it converted many others. There was also a widely read pamphlet by H.G. Wells titled *The Misery of Boots*. I was acutely conscious of social injustice, but was not hostile to people who had money. With no feeling of envy, I used to watch the Sitwell children—Robert, Edith and Sacheverell—riding their ponies on the beach on Saturday mornings. Edith had long yellow hair.

In the summer of 1908, I was told by the Headmaster that I had been awarded a Student Teacher's Bursary of a pound a week. I would spend Monday to Thursday at the Elementary School. I was quite proud of this, as I thought I had been chosen for special merit. This was not so: it was a device for getting help in the school at a small salary. As I only had one day a week at school for study, and was usually tired out by the four days teaching, I fell behind in my work. But I did get a King's Scholarship worth 30 pounds a year, tenable at a training college or at a university with an Education Department.

One was trained as an elementary school teacher and had to agree to teach for two years after taking the Teacher's Certificate of the Board of Education. I was also given a 20-pound grant from the Scarborough United Scholarship Foundation. I was mortified that my brother Oswald, although 18 months younger, got a 60-pound scholarship. He was too young to enter a university, so his scholarship was deferred for a year.

In the Matriculation Examination, I took Natural History, which was not taught at the school. I taught myself both zoology and botany from books, and set up a small laboratory for practical work.

I held the bursary for a whole school year at the Friar age Elementary School, which was in the old part of town, not far from the harbour. As I was only 17, I liked being called "Mr Harland."

Clean, tidily dressed boys in this school were quite uncommon. Some of the boys wore thick-knitted blue guernseys; they came from families who had been fishermen for many generations. But most of the pupils were slum children from incredibly poor homes. Harold Wilson said that when he was a young man, many children had no shoes, even in winter. He was accused of not speaking the truth, but what he said was correct.

I had to teach reading to a class of about a dozen urchins of seven or eight years old. I and the pupils stood up for the lesson in an unheated corridor. Several of them wore thin canvas gym shoes, called sand shoes in Scarborough. Three had no shoes at all, and this was in January. All of them were filthy, lousy and ragged. There were about 60 boys, and the smell when one came in from outside was indescribable.

When I looked at my pupils, I thought that the whole social system had to be changed. I had already noted the statement made by Colonel Richard Rumbold as he mounted the scaffold in 1685, and quoted by Macaulay: "I never could believe that Providence had sent a few men into the world, ready booted and spurred, to ride, and millions more ready saddled and bridled, to be ridden."

I was first attached to John Constable, a tall, solemn man who really could teach. Many boys were extraordinarily good at mental arithmetic. When John asked, "What is the cost of five gross of shoelaces at one and sixpence farthing a gross?" a few hands would go up almost as soon as he got the words out.

I had to stand at the side, either watching or going round marking sums or handwriting. John began an English lesson by dictating a passage of about 200 words, which the boys would write down. Then John or I would write the passage on the blackboard, so the boys could correct their mistakes. If a word was spelled wrongly, it had to be written correctly ten times. If another mistake was made, the boy got the cane, and then had to copy the word 20 times. This method may be unimaginative, but it got results.

Every morning the boys had to recite the multiplication tables. An innovation was to include the 13, 14 and 15 times tables. Knowing these has since been very useful to me. Handwriting of the visiting card copperplate variety was taught ferociously and efficiently. The unfortunate boy who failed to write a word with all the letters just touching the line was severely dealt with. The pen had to point over the right shoulder, and could not be lifted from the paper until the word was finished.

I had to be at the school by 8.30 a.m., and spent the first half hour sharpening 150 pencils. I am still one of the best pencil sharpeners of the Western World. I used my first pay to buy a hideous brown ready-made suit. My father burst out laughing when he saw it.

The Headmaster was Mr Brewin, a rather delicate-looking little man with a carefully trimmed beard. He was gentle and spoke with a soft voice. One of his tasks was to cane every boy who came late in the morning. He caned them adequately and effectively; no excuses availed.

Some of the boys used to spit on their hands before being caned. Whether this helped I do not know. His salary was six pounds a week, or six times more than mine. I used to wonder what he did with it all.

I got very fond of Mr Brewin. When I left, he gave me a magnificent testimonial, "To whom it may concern." It described me as punctual, well-mannered and liked by my colleagues, and said I would make a first-rate teacher.

Although the exacting work and deoxygenated air of the school lowered my vitality and decreased my chance of winning a university scholarship, I greatly enjoyed my first entry into the salaried world, and discovered that I had a real aptitude for teaching young children. Later I invented a system that enabled me to teach almost any child of four to read in less than three months.

I left the Municipal School in July 1909. As part of my application to King's College, London, I had to enclose a form signed by my Headmaster, Arthur Tetley, which contained the question: "Is the candidate truthful, honest and reliable?" I handed the form to him with some hesitation. A faint smile crossed his lips. Characteristically, he stroked his moustache, looked at me quizzically, and said, "Can I sign this?"

"Yes, sir," I said firmly. Tetley signed the form, and as he handed it back to me he said, "Harland, you have been the most troublesome boy I have ever had in this school. If you hadn't been lame I should have caned you. Do keep out of trouble, won't you?" So there it was: my main job was to keep out of trouble. In this I would not be successful.

What had I gained from six years of school life? Certainly a great deal. In English literature and history, I had read almost everything of importance from Chaucer to Conan Doyle. I had memorised much poetry and prose. I had gained a feeling for words, and could express myself with both imagination and versatility. I could read and write French with considerable ease. I knew that I wanted to be a research scientist, although I had only a nebulous idea of what this meant.

But had I gained wisdom? The answer was clear: an unequivocal negative. At 18 I was a socialist, a revolutionary and an agnostic. This combination was displeasing to the Establishment. I did not realise that wherever you were and whatever work you were doing, there were always people with whom you would have to get on. Neither did I realise, as I came to realise much later in life, that the conventions and traditions of the men around me had to come into existence to preserve the "norm", and always worked towards the suppression or obliteration of the single-minded, resolute, imaginative, and creative individual that I knew myself to be.

Anybody who had followed my life to the age of 18 could have predicted that my career would be troubled and stormy. If I were to survive, it was because I could learn from experience, and because my basic instincts always leaned towards the good and never to evil.

CHAPTER 4

KING'S COLLEGE, LONDON, 1909-1912

I went to London at the beginning of October 1909, as a King's Scholar in the Day Training Department of King's College. This meant that I could work for a university degree and take the Teacher's Certificate of the Board of Education at the same time. I did not particularly want to teach, but it was the only way to get a university education, which I was determined to achieve at all costs.

The YMCA found lodgings for me at Richmond Road, Bayswater, with a Miss Parry. I had read many novels about London, and had an idea that Bayswater was a very aristocratic place in which to live. I paid 15 shillings a week for bedroom, breakfast and supper, with full board on Saturday and Sunday. That first night after getting settled, I walked down Oxford Street, delighted with the lights and sounds of London. It was the first time I had been out of Yorkshire.

I had to be at College at 10.00 a.m. the next day, and I got up very early to take the Tube to Holborn, from whence I walked to the Strand. King's College lies between the Strand and the Embankment.

That morning, all who were doing the Teacher's Training course and degree course were interviewed by the Professor of Education and by the professors in the Science Faculty. I took chemistry, physics, botany and geology. All four subjects involved a great deal of laboratory work. Saturday morning was taken up with the Education course, which included music, art, elocution and physical training. During the week there were lectures at various hours on the history of education, the theory and practise of teaching, and logic, ethics and psychology.

Naturally, we did not like turning out all Saturday morning for the above-mentioned courses, and we were in the habit, while waiting for the professor, of singing: "We're here because we're here because we're here because we're here." He once came in unexpectedly, and in his dry voice said, "Gentlemen, you are not here because you are here. You are here because the Board of Education demands that you shall be here."

My three years at King's College were almost unmitigated delight. My friends were students of medicine, arts, science, engineering, and even theology. I often went to the Friends' Meeting House in St Martin's Lane, for although I had thrown religion overboard, I still liked to hear a good preacher. My favourite was R.J. Campbell at the City Temple.

A few times I went over to the London School of Economics, where the classes were very large, and just slipped in and sat with the other students. In this way I heard lectures by Leonard Hobhouse and Graham Wallace.

Wallace was the finest lecturer I ever heard. He determined to master the art of lecturing with the dedication of an actor preparing for a career on the stage. He wrote out his lectures line by line and phrase by phrase, committed them to memory, then practised in front of a mirror. Of him it was written: "Here was a man whom we regarded as the finest lecturer of his time, commanding the

whole gamut of expository mode, with a technique as seemingly effortless as a pattern of leaves falling spontaneously in autumn; and now it appeared that at least some of this enviable power had come by deliberately taking pains."

I immersed myself in the life of the University and in the rich cultural life of London. I joined the London University Fabian Society, and spoke from a box on Socialism on Sunday mornings in Brockwell Park.

With only 50 pounds a year to pay for board and lodging, clothes, books, London transport, and everything else. I could not afford to take lunch at the Refectory, although it only cost tenpence. I usually went to an ABC Tea Shop in the Strand, where for tuppence I had a glass of hot milk and a slab of cake. I never had a fresh egg in London. Many of the students were as poor as I was.

I bought myself a college cap and allowed myself one ounce of tobacco a week. I had been smoking a pipe since I was 16; I used to help myself from my father's tobacco pouch whenever I got the chance.

I used sometimes to stand in the hall and watch the professors come in. All were formally dressed in top hats and frock coats, and all were enormously dignified. Most of them had no contact with the students at all.

The Professor of Botany, W.B. Bottomly, was a tubby little man with a cheerful manner. He always hummed when he went up several flights of stairs to his laboratory, and said good morning to all the charwomen. He was a good lecturer, and drew brilliant diagrams in coloured chalk on the blackboard. He once said: "Gentlemen, there are three kinds of bacteria—billiard balls, cigarettes and corkscrews." This classification stuck to me for the rest of my life.

The Geology Department was headed by T. Franklin Sibley, a brilliant paleontologist of 29. The Lecturer in Petrology and Mineralogy was A. Hubert Cox, who had a Ph.D. from a German university. At that time there was some controversy about whether Ph.D.'s should be called Doctor or Mister. He read all his lectures from the *Memoirs of the Geological Society* and was the worst lecturer I ever came across.

The Principal of the College was Arthur Cayley Headlam, who was also Professor of Dogmatic Theology, whatever that may mean. I only saw him twice. At the end of my first year I wanted to go home a day or two earlier, so I wrote to him for permission. He asked me to go and see him.

"Good morning," he said. "You are Harland." I agreed that I was. "Well," he said, "you have addressed me wrongly in your note. You began your letter with the words Dear Principal. I am not Dear Principal. I am Dear Mr Principal. Will you, on your journey to the north two days ahead of time, remember this?" I remembered.

During my second year I was reported to him for not attending the lessons in organic chemistry. He asked me my reason. I told him that Professor Kirkaldy read the lectures straight out

of a book. As I had the same book, I did not see the sense of listening to him repeating what I had read.

"Without admitting that you have a point," said Headlam, "I must remind you that unless you attend the lectures you cannot be allowed to sit for the examination. In the circumstances, I advise you to attend the lectures, sit as far away from the lecturer as you can, and get on with your correspondence." I came away thinking that for a parson he was not a bad old chap.

Reading a biography of him some years later, I realised that his job was a tough one, in that he had to try to understand what the scientists were up to. In this he succeeded, when many others with his background would have failed. In summer he always went north to his native place in County Durham, refusing to wash his hands before tea on the grounds that he was on holiday. He finally became Regius Professor of Divinity at Oxford and then Bishop of Gloucester.

In the First Terminal Examination I came top in chemistry. One question was: "Describe all the methods you know of making oxygen." I must have got full marks for this question, as I wrote down at least 30 different ways.

But just as I behaved stupidly at school, I behaved similarly at the University. After lunch I used to go to the Common Room to play solo whist, chess or pingpong, or just to talk. Practicals were every afternoon from two to five. When two o'clock came, I often remained in the Common Room, neglecting to go to the practical classes.

What I didn't realise was that science wasn't just something you read about: you had to do it. Practicals were as important as lectures or reading. In spite of my wrong attitude, I passed the Inter B.Sc. quite easily, doing well in everything except physics, which had too much mathematics.

In October 1910 I was joined at King's College by my brother Oswald. He decided to read arts, as he was outstanding in English and history. I was almost as good as he was in these subjects, and had it not been for my strong leaning towards science, I might have read arts myself, and thus condemned myself to the life of a schoolmaster.

I was not so poor as in my first year. The Scarborough Authorities had given me another small grant. Oswald, with his 60 pounds a year, was comparatively rich, and often shared his riches with me. London with all its excitement, museums, libraries, lectures and meetings was at our disposal. Oswald was with me in almost all activities. Having joined the Young Fabians and gone to their meetings, I was familiar with the faces of Ramsay MacDonald, Philip Snowden, Bruce Glasier, Hubert Bland, the Webbs and George Bernard Shaw.

My lodgings in Tennyson Street, Waterloo Road, to which I moved from Bayswater, were not satisfactory. The house belonged to a policeman who had to live within sound of Bow Bells. It was the only respectable house in the street. On all sides were prostitution and drunkenness. I never took alcohol; for one thing, I disliked the smell of public houses.

One advantage was that I could walk over Waterloo Bridge to the College in ten minutes. If I was in a hurry I could take the horse bus which conveyed businessmen from Waterloo Station to

Somerset House for a ha'penny. The great disadvantage was that I had to share the large bed sitting room with two others, one of whom was the landlady's son. I could hardly work at all during the evening. My stay was suddenly brought to an end by a fight with the landlady's son, during which a gas bracket was torn from the wall.

So in the summer term of 1910 I found new lodgings in Milton Road, Brixton. Here I had a nice bedroom with full use of the sitting room in which to study, and much better food. I paid 15 shillings a week and went to College by tram from Brixton to the Embankment. There was still no bathroom, but for thruppence, I got a good hot bath every week at the Lambeth Public Baths, including a large clean rough towel.

In my first year I could not afford much amusement, but I frequently went to the London Coliseum on Saturday afternoon, where for sixpence I saw Sarah Bernhardt in her prime, and Anna Pavlova, the most famous ballerina of them all. I browsed extensively in the bookshops of Charing Cross Road, went to the National and Tate Galleries, and to concerts in the Albert and Queen's Halls. There was a first-rate public library in Brixton and a cinema with depressing Swedish films. However, I mostly worked on Saturday afternoons at the Science Library in South Kensington or at the Patent Office Library in Chancery Lane.

In the summer vacations of 1910 and 1911 there was geological field work in North Wales to study the Cambrian and Ordovician formations. I had no money for the railway fares or the hotel, so, pleading illness, I did not go.

I entered the Honours Chemistry course in October 1910, with geology as my subsidiary subject. Botany was regarded as a woman's subject. However, my examination results in chemistry were very bad indeed, while they were good in geology.

For my third year, I followed Franklin Sibley's advice and switched over to Honours Geology, with chemistry as my subsidiary subject. I was perpetually frustrated in Chemistry because there wasn't a single accurate chemical balance in the whole department. In my geology course I specialised in petrology and mineralogy, which I found invaluable much later, when I worked on tropical soils.

At the College was a Yorkshireman from Boroughbridge called Archie White. When Oswald came, I found some new lodgings, and Archie shared rooms with us. He held the proud record of having worn the same pair of boots during three years of College without ever having cleaned them. Archie got a poor degree, but made up for it by a spectacular Army career. In the First World War he won the Victoria Cross, became a Fellow of King's College, and finished by being Principal of the City of London College.

My great friend was George Lee, who came from a large, miserably poor working-class family in the East End of London. George was perhaps the most brilliant intelligence I have ever met. He read philosophy, graduated with First-Class Honours, and was given the Jelf Medal for being the best arts graduate of his year. He argued in a uniquely logical fashion, thinking carefully about what somebody said, skilfully picking out all of the logical fallacies, and proceeding to demolish the arguments. George remained my friend through life until he died at the age of 70.

In my third year I became Secretary of the University Fabian Society and of the United Common Room. One meeting at the University Fabian Society was a debate between Shaw and G.K. Chesterton on the proposition: "A democrat who is not a socialist is not a gentleman." The chair was taken by Hilaire Belloc. There were lots of witty remarks and verbal fireworks.

As the Secretary, I once had to take Shaw out to tea. While addressing a meeting about education, he attacked something which no longer existed, and he seemed to think that the educational system had not changed since he was a boy. I corrected him. In response, he said very blandly: "My young friend may be quite right, but as I was saying when he interrupted me..." I was always rather bolder than Oswald, who could never bring himself to speak in public.

As students, we played the usual sort of jokes. We seized a piano from the Theological Classroom, took it up several flights of stairs, and chained it to the fireplace of the Common Room. In my second and third year, the suffragettes were on the rampage. Their headquarters were in Adam Street, not far from the College. When they came into the Quadrangle of King's, the hose was turned on them. I once helped Adela Pankhurst in a meeting when the crowd turned hostile. I brought a half brick in my briefcase and hurled it through the big plate glass window. In the smashing of glass there is great joy.

The courses for would-be teachers included practical teaching at a London elementary school for the whole month of July. One had to prepare and give a model lesson to a class of about 40. The lecturer and fellow students sat at the back and took notes about how one taught—if one connected the subject of the lesson with what the children knew previously, if one put questions skilfully, if one put clear summaries on the blackboard from time to time, and most of all, if the children's attention was maintained at a high level throughout the lesson.

Afterwards, the lecturer and students had a discussion about one's teaching—the good points and the bad—and finally the lecturer received a mark, from A-plus downwards. I usually got a B or B-plus.

There was a literary weekly in 1910 called *T.P.'s Weekly*. T.P. Literary Circles were formed. I joined one, and met several women and men much older than myself, who filled an important gap in my life. In particular, there was Elizabeth Goddard, a schoolteacher about eight years older than I was, who was lively, well-educated and warmhearted. She has been a good friend all my life.

Others were Frances McCallum and her sister. They were the daughters of McCallum of the music hall stage, who used to sing *The Man Who Broke the Bank at Monte Carlo*. He often sang it for us. The Society used to meet for literary discussions, but it was really a means of making friends. Oswald and Archie later joined this circle.

I graduated with Second-Class Honours in geology in the autumn of 1912. Sibley told me that I missed a first by only a few marks. My theory papers were excellent, but I did very badly in the practicals: I wasn't able to identify some of the commonest rocks, and I knew nothing of crystallography. I could not use a clinometer. It was thus possible to get an Honours Degree in

geology without knowing any geology at all. I knew the theories about the origin of the Earth, and the theoretical aspects of volcanic eruptions, but this would not help me to become a field geologist.

My degree was, for all practical purposes, useless. It did not qualify me for a job in the Geological Survey, or for a lectureship in a university. It was a qualification for teaching geology in a grammar school, a career upon which I had no intention of embarking.

And yet, by reading research papers in the geological journals, I had come to learn something of the intense dedication of the scientist. I had also profited by seeing Sibley work. He stayed on in the laboratory till late at night, working on his fossils, and drawing incredibly beautiful diagrams for his next paper. The research spirit had become part of me. Sibley recognised this. The testimonial he gave me on leaving said: "Harland is a man with the right point of view." Not, mind you, Harland knows his rocks, but simply, Harland has the right point of view. This is perhaps the wisest and kindest thing which has ever been said about me.

It was my idea to stay on at King's to work for an M.Sc. and I was given a grant for this purpose by the Scarborough Authorities, who were very pleased with my degree. I went back to King's in October 1912.

By this time, Margaret Storm Jameson had come to London to do a thesis on Modern European Drama. The four of us—Oswald and I and Archie and Margaret—shared some rooms in Herne Hill. From October to December we walked about London, worked and talked. Margaret had begun her long career as a writer. In her second novel, *The Happy Highways*, she describes her life with us as a student.

I worked for my M.Sc. degree during the summer of 1912. The examination was held in September, and when I did get the degree, I thought it could only lead to teaching, and not to any job of abiding interest and satisfaction.

I did not realise for some time that in spite of my alleged gargoyle countenance, I was quite attractive. This was perhaps because I was eccentric to the point of lunacy. All women liked me, and, being perhaps a little feminine in my makeup, I could interest most women if I set my mind to it. In London I had no feminine society of my own age, so when I went back to Scarborough for holidays, I went out with girls a lot.

The one I thought I was in love with was D.W., a small and dumpy girl with bowlegs and a biting tongue, who was often ill with tonsillitis. From age 15 to 18, she had permitted me to walk with her on Sunday mornings, all very discrete and proper. The conversation was almost always about my defects and shortcomings, of which I seemed to have more than my share. Another girl, E.S., was a really nice girl but with absolutely nothing in the shop window. I treated her very badly. She got over it, emigrated to Canada and married there.

About Christmas 1912 I was seriously disillusioned about the whole female sex. D.W. made the mistake of thinking that however badly she treated me, I would always come back to her. This was a blunder on her part. Secretly I planned to dispense with the lot of them. This course of

action was strongly approved of by Daisy Jameson, my adviser in amatory affairs, who could never understand why I took up with any of them.

I began to doubt whether there was any future for me in England, and at last I determined to go abroad. Just where did not seem to matter. I applied for three jobs. The first was as a teacher of English at the Berlitz School of Languages in Warsaw. The second was as geologist to an oil company operating in Central Asia. The third was a teaching post in a private school in Christiansted, on the island of St Croix in the Danish West Indies.

I was offered the two teaching jobs at the same time, and I chose to go to the West Indies. My mother was strongly opposed to this, thinking that it was full of tropical diseases.

CHAPTER 5

ST CROIX, 1913-1914

I left England in January 1913 in a small steamer of the Danish East Atlantic Line. To see me off at the docks were Oswald, Archie and Daisy. I wore a long overcoat reaching down to my heels, and a bowler hat too big for me. It was a sad and uneasy parting. For me it was the beginning of the first of nine new lives.

For dinner on the first night there was roast goose, but I took little interest in food for the first week, being confined to my cabin with seasickness. I had a deck cabin, and the steward had to bring me meals through waves which swept the deck at intervals. More than once he nearly got washed overboard. By the time we reached the Azores the sea was calm, the sun was out, and the temperature was agreeable. I quickly recovered my spirits. The cost of the passage was 22 pounds ten, and my salary at the Richmond School was going to be 120 pounds a year.

In 17 days we arrived in St Croix. I went ashore with no formalities. In those days there were no passports, except, I believe, for Russia and Turkey. There was no luggage examination. Accommodation had been arranged for me at the house of Mr Quin, a tiny old Englishman who was formerly Inspector of Schools under the Danish Government. The house was above a store where Alexander Hamilton used to work. Mr Quin had three unmarried daughters, Miss Alice, Miss Eliza and Miss Emily.

For my board I paid 25 dollars a month, or about five pounds. The food was excellent, and I had a good bedroom next to the one shared by Miss Alice and Miss Emily. Mr Quin was the Editor of the local newspaper, the *St Croix Avis*. He was also a good amateur geologist—a much better one than I was—and had written a book on the geology of St Croix.

The Richmond School, where I was to teach, was about a mile away in the main house of an estate. It was subsidised by the parents—Danish, Irish, Scottish and English families who had been there for a long time, and the native children. Besides myself, there were two women teachers, both Danish, and a Headmaster named Wulf-Hansen, a short, broad man who appeared to live principally on salt herrings and beer. There were about 50 pupils in the school, both boys and girls, from age seven to 16. I had to teach English, religious knowledge, nature study, arithmetic and geography five days a week.

They wanted me to teach on Saturday also, but I refused. I found 28 hours a week of teaching, with lots of homework to correct, very trying. I liked teaching the tots. The little ones could not read, but I taught them very rapidly by importing a collection of fairy tales, William Stead's *Books for the Bairns* which cost a penny each, and the children passed them around until they dropped to bits.

Wulf-Hansen was called Wulfy by the children. He used to smoke cigars during class, and I did likewise. He had a curious way of maintaining discipline: he held a boy by the back of his coat collar and suspended him out of the second-story window until the boy howled that he would behave.

The children were of all shades of colour. About half were white and the rest were either coloured or black. So far as I could judge, intelligence was pretty well distributed among them.

The Danes were nice to me, and invited me to their homes. My special friend was John Levo, whom I succeeded at the School. He was a remarkable English scholar and an eloquent preacher, but was in poor health, suffering from gallstones. He had resigned to read for Holy Orders, and he lived with Canon Watson at the Rectory.

Two of the Watson children were pupils of mine at the school. Canon Watson was a jovial man whom I liked very much. His wife Edith was a remarkable woman—efficient and hospitable, and a brilliant pianist. Her maiden name was Hutson, and she was a member of the well-known Hutson family of Barbados, which had produced able clergymen and administrators. I used to go to the Rectory for tea almost every afternoon, and was practically a member of the family.

The British Vice-Consul, Mr Armstrong, had four boys. The Armstrong family invited me to picnics on the beach, and sometimes we slept out with no covering, under the deliciously warm night air.

When I first went to St Croix, I did not realise that there was any colour problem. I ran into it in this way:

One of my senior pupils was Nellie Richardson, who lived next door, and was coloured. I offered to give her lessons in English and German, so she came at my invitation to the Quin house. I was extremely foolish not to have asked permission from Miss Alice, who pulled me up rather sharply, saying that they did not have coloured people in their house.

After that, I would go to the Richardson house sometimes, and they made a great fuss of me, which was very flattering. It is highly probable that they saw in me a potential husband for one of their daughters. I associated more and more with the coloured element, and for this reason the Danish and British families began to give me the cold shoulder.

One afternoon I heard that a Russian coal boat was in. Being desperately bored with the Quin household, I went to the saloon where the sailors were drinking, and joined them. Hitherto I had never touched alcohol, but that night I drank several bottles of Danish Tuborg beer, and got thoroughly drunk. I don't know where I went that night. It seemed to me that at one time I was rowing a boat in the harbour, and at another I was at a Negro dance. I returned home in the early hours of the morning and found it difficult to get to my bedroom. I first had to unlock the street door, then lock it behind me, go up a flight of steps, unlock another door to get into the house, lock it, and go along the gallery past the Misses Quins' bedrooms to reach my own.

As I was undressing, I hurled a shoe at the flimsy partition which separated my room from that of Miss Eliza. Then I fell unconscious on the bed. The next day was a bad day for me. I woke to find the bed thoroughly soaked, and the three sisters very upset. Mr Quin called me up and explained that such goings-on could not be tolerated in his house, and it would be necessary for me to find fresh accommodation. At the same time, he quite understood that youth was youth and so

on, and would I please dine with them every Sunday evening. I was very moved by this, and apologised for my behaviour.

As time went on, I mixed less and less with the white community. A group of us formed a society called the Young Men's Mutual Improvement Association. The president was Dr Canegata, a black doctor who had graduated from McGill University in Montreal. One active member was Hannibal Jackson, a black schoolteacher who had a craze for taking correspondence courses from the United States. I also took Spanish lessons.

For a short time, I lodged with a colored family. Then I rented a small house and acquired a cook, who did all the cleaning and washing. I had chicken every night, with cornmeal made into a sort of thick mess, and sweet potatoes. I sent to America for some vegetable seeds and attempted to grow lettuce and tomatoes, without much success.

In the summer of 1913 I became friendly with Dr Longfield Smith, the Director of the St Croix Agricultural Experiment Station. Much to my surprise, he offered me a job. This was to prove one of the great turning points of my life. It opened up the prospect of working with plants, and I was greatly tempted by it.

Finally I informed Wulfy that I would be leaving him. He said that it was very wrong of me to leave the school. But all he could do was to confiscate my last month's salary to help pay the passage of the new teacher. Looking back, it seems to me that I was very ungracious. At the same time, the teaching load was heavy, the climate was tropical, and I was very homesick.

I was suddenly stricken with a severe obscure tropical fever. I wrote home and asked my father to send money for my passage home. He sent 20 pounds by return of post. I did not know it then, but he had to borrow it from his father. It was a long time before I was able to pay him back.

When I recovered from the fever, I took up the new job at the Experiment Station. I thus became an employee of the Danish Government, and my official title was Kontorist, a sort of clerk. The Station Chemist, Alder, called for me every morning with his horse and buggy, and we drove to the Station, which was about five miles away in the country. Longfield Smith told me that I was to help with the experimental work, and I was just called "Biologist." From the first day, I knew that after all these years I had found the kind of work I wanted to do.

The experiments were principally with sugarcane and cotton. Some time previously, the Imperial Department of Agriculture for the West Indies had introduced Sea Island cotton from the United States. This was the world's longest and finest cotton. Experiments had shown that it was well adapted to the West Indies, and could give profitable yields. In several of the islands it was attacked by the leaf blister mite (*Eriophyes gossypii Banks*), which had the effect of curling and distorting the leaves and crippling the growing points so that growth virtually ceased, resulting in an almost total loss of crop. At first this pest was a major one, but it was found that it could be controlled by a "close season"—a period of several weeks during which there were no living cotton plants in the island. The planters were compelled to destroy their cotton by a certain date, and burn the bushes.

All the islands had a native cotton, which grew into a large perennial shrub. This belonged to a different species. It was called Bourbon cotton, and was closely related to American Upland cotton (*Gossypium hirsutum* L.). These cottons possessed complete immunity from blister mites, and Longfield Smith had made the hybrid St Croix Native X Sea Island with the object of producing an immune Sea Island. At the time of my appointment, there was a plot of the second generation from this hybrid containing about 200 plants. I was asked to study all the characteristics of this hybrid population.

There was a good working library of botany, genetics, entomology and various other branches of agricultural science. I began at the top left-hand corner of the bookshelf and plodded through the lot.

At first, I had no knowledge of genetics at all, but William Bateson's book, *Mendel's Principles of Heredity*, was available, and I read it several times from cover to cover. I spent long hours describing and classifying my plants, and soon found that simple segregation according to Mendel's Law did not occur. Segregation there was, but it took the form of a series of minute graduations covering the range from one parent to the other, and often exceeding the values of the parents in either direction.

We know now that this type of "blending" or fractionation of the characters is frequent in species crosses, but at this time (1913-1914) there was practically nothing in the literature about this phenomenon. It must be remembered that the rediscovery of Mendel's work was only 13 years old. It was possible at this time to read every published paper on genetics, and this I almost succeeded in doing.



Gregor Johann Mendel (1822-1884), an Austrian Augustinian monk, experimented for nine years on varieties of the common pea plant, and discovered the basic rules of inheritance. He published his findings in a lengthy paper in 1866, but the importance of his work was not initially recognized, and he died in obscurity. His paper was rediscovered in 1900, and formed the foundation of modern genetics.

Regarding leaf blister mite, I established that the F1 (first generation hybrid) was highly resistant but not immune, and that in the F2 (second generation) immunes occurred, with imperceptible graduations to susceptibility. This, I think, was the first time that segregation of resistance to an animal pest had been reported, though Sir Rowland Biffen of Cambridge had found some time previously that resistance to rust in wheat followed the ordinary Mendel's Law.

Socialism, to me, remained a vital and living thing, and I believed in it wholeheartedly. At King's College I had heard speeches by most of the leading socialists of the day, and been the socialist candidate at a mock election. Now I was to sow the seeds of socialism in the West Indies.

At historic meeting at the Young Men's Mutual Improvement Association I gave a lecture on socialism. After the lecture, Hamilton Jackson asked me what I would do to bring about socialism in the island. I invited him to my house to talk, and worked out a rough plan which used the strike as its principal weapon. The only large-scale industry in the island was sugarcane, so I suggested that the labourers should go on strike in the middle of the cane-grinding season for four

times the existing daily wage, which was about 25 cents a day. I left the island a few months later, and only heard what happened several years afterwards.

Hamilton Jackson did form a blackleg-proof union of the sugarcane workers, and they did go on strike in the middle of the grinding season, getting a large increase in wages. Hereafter, on the slightest disagreement with the planters or the Government, he either brought the union out on strike or threatened to do so. He went to Denmark, which then had a radical Socialist Government in power. He was well received, and given a decoration. When he returned, he boasted that he had the Governor in his pocket, and he became virtually the uncrowned King of the island.

In these circumstances, the sugar industry ran into financial difficulties, and when in 1917 the United States offered to buy the three Danish islands—St Croix, St Thomas, and St John—for 25 million dollars, the Danish Government gladly accepted. That is the story of how I sold the Danish West Indies to the United States. Its name was changed to the US Virgin Islands.

I do not know how the Americans handled the situation, but Hamilton Jackson went to the United States, studied law, returned to St Croix and became a judge. He was notorious for inflicting hell on evildoers.

In June 1914, my year as Biological Assistant came to an end. I wrote a detailed account of my work, which was afterwards published in the Annual Report of the St Croix Experiment Station.

I wrote to Sir Francis Watts, the Head of the Imperial Department of Agriculture for the West Indies, in Barbados, and asked if he could find me a job. I was offered a teaching job in Puerto Rico, but did not take it. I decided to try my luck in Canada.

CHAPTER 6

CANADA AND SCOTLAND, 1914-1915

I left St Croix and went to Canada on the Chaleur, a Canadian steamer. The voyage was wretchedly uncomfortable. I landed in St John, New Brunswick. There were no formalities, no customs, no immigration officer, and I had no passport. I just went ashore and caught the train to Truro, Nova Scotia, where there was an Agricultural College. The next day I found lodgings at the house of a Scottish Nova Scotian, a very kind woman and a wonderful cook.

I lost no time in looking for a job, and went to see Mr Cumming, the Principal of the Agricultural College. He asked me a lot of questions. I told him what I'd done, and swanked about my B.Sc. He asked if I could do analytic chemistry, and of course I said yes. Finally he gave me the job of Assistant to the Soil Chemist, Professor Harlow, who was engaged in a survey of the soils of Nova Scotia.

Harlow had a degree from Cornell University in America. He had worked his way through the University by getting up at four o'clock in the morning to stoke the furnaces. He was not a pleasant man, and I think he didn't like the way I had been foisted on him. He told me what I had to do, and thereafter he said very little.

The chemical analysis of the samples was done according to the official method of the United States Department of Agriculture. I had to analyse 12 soils at a time, so there were 12 flasks, 12 beakers, 12 filler funnels, etc. My salary was fifty dollars a month, exactly the same as in St Croix.

What I did not realise at the time was the importance of clothes and one's appearance. I must have looked very down at heel. My tweed hat, which I was quite proud of, had a hole in the top. My shoes were of the ordinary English pattern, whereas the Canadians had shoes with a large bulge in the toes, almost the size of a tennis ball, called ball-toed shoes. Everybody laughed at my shoes and hat.

Although I spent long hours in the laboratory, Harlow was not satisfied with my work. We were doing the soil samples in duplicate, and our results were not the same. He said my results were inaccurate, and I did not agree. We had arguments from time to time. I felt my job wouldn't last long, so I began to look out for another. I also thought—and was unwise enough to say so—that the soil analyses were of no practical use. The one real test of a soil was that plants would grow in it.

Summer in Truro was delightful. The days were warm and there was plenty of sunshine. There was a summer school for teachers at the Normal College, and there were plenty of pretty girls. After having been in the West Indies without female society for so long, it was not surprising that I made friends with some of the girls. My special friend was Emily Cameron, who was very good-looking, with bronzy red hair, a brilliant complexion and a pointed determined chin. I became engaged to her after about a month, and she invited me to her home in Advocate Harbour on the Bay of Fundy, 30 miles from Parrsboro, the nearest railway station. Her father, Joshua Cameron,

was a small farmer, growing principally potatoes and hay. I don't think I made a good impression, as I did not help on the farm. All visitors were expected to pitch in.



**Emily Cameron as a young woman
in Nova Scotia, circa 1914**

Meanwhile, the First World War had begun. I myself was medically unfit, so did not go. My brother Oswald served in the Intelligence Service in Egypt.

In Nova Scotia it all seemed very far away. I wanted to be in England, and yet could not make up my mind to leave. I was trying to get my English qualifications accepted by the various provinces so that I could get a teaching job. Nova Scotia would not accept them, but British Columbia gave me an Academic Certificate on payment of five dollars.

Then, very suddenly, in September 1914, I was fired. Harlow came into the lab one morning and said, "I need a new platinum crucible which will cost 50 dollars. I would rather have the platinum crucible than you, so you can leave at the end of the month."

I decided to go back to England, and without much difficulty I got a steerage passage for Glasgow. To raise a little money, I sold my books, which I had brought all the way from the West Indies. I spent my last night in Canada lying on the top of a big packing case on the wharf at Halifax. At the beginning of October the nights were very cold, and I had no overcoat.

I got on board—again, no formalities. I shared a cabin with five others. One young man from the West Riding of Yorkshire carried gold nuggets sewn into his waistcoat, which he wore night and day. Most of the passengers were coal miners from Scotland and Wales who were going

home to enlist. During the voyage they fought incessantly, throwing butter at each other across the dining table. I got on pretty well with everybody, and I was called the Professor.

The voyage to Glasgow took eight days, but it seemed a lifetime. When I landed, I had been out of England only a year and nine months, but so much had happened to me that I felt changed all over. By selling my watch, I had just enough to pay my railway fare to Scarborough. I had not written home to say I was coming, or sent a telegram. Our family did not do that sort of thing. We just came and went. I am tamer now, and usually send telegrams and write bread-and-butter letters.

I was glad to be home again. My mother only once upbraided me slightly for not having written while I was away. She had worried about me, and to the end of her life she thought that the West Indies was the White Man's Grave.

Oswald had completed his studies at King's College, and had a temporary job at our old school. I got a job pretty easily in Scotland, as Junior Science Master at the Arbroath High School. Arbroath was the Aberbrothock of Robert Southey's famous poem *Inchcape Rock*. The salary was the same as before—120 pounds a year.



Arbroath Abbey, founded in 1178, where the Declaration of Scottish Independence was signed in April 1320. Today it houses a museum.

At the first house where I lodged, there was a piano. I was given permission to practise on it, so I took lessons and practised for hours and hours. The noise was more than the landlady could stand, and matters came to a head when I found that she had been reading my letters, in which I bitterly criticised her establishment. So I was told to go. This was the fourth time I had been asked to leave my lodgings since first going away to London.

At my new lodgings, there were two others—Armstrong, a fellow Yorkshireman who taught at the school, and McKercher, a Scot who was articled to a solicitor. Even in the middle of winter, we had to eat breakfast in an unheated room. Breakfast consisted of a big bowl of scalding hot porridge, with haddock or bacon, and musty old eggs.

My life in Scotland was very pleasant to look back on. I had to teach chemistry to the Sixth Form, and physics and algebra to the juniors. The Senior Science Master, Fred L'Amie, had the traditional Scottish instrument of punishment, the tawse. This was a leather strap with the end split into three thongs. He said that he could make a dent in the edge of a desk with it, and that a boy needed only one lick of his tawse to last him throughout his schooldays. But I never heard of him using it. I once said to him, "Fred, can't we do something to make these lessons more interesting?" He said, "Man, that's just what I'm trying to avoid."

One of my chemistry classes ended disastrously. I was supposed to adhere strictly to the experiments of the textbook, but instead I devised an experiment to make sulphurated hydrogen. Six boys began to pass hydrogen over red-hot sulphur. Suddenly one apparatus blew up with a loud report, and showers of glass flew all over the room. The boy began to bleed from a cut on his cheek. I went to get the first-aid box, and while I was bringing it, another apparatus blew up, then another and another, until everybody's apparatus had shattered and showered broken glass all over the room. Fortunately, nobody was badly hurt, but everybody had a few minor cuts. The Rector, Mr Drysdale, called me into his room and gave me a good talking to. He advised me to stick to the book and not do any fancy experiments.

One day in February 1915, I received a letter from the Colonial Office offering me the position of Assistant Agricultural Superintendent in the West Indian island of St Vincent, at a salary of 150 pounds a year, with free quarters and 25 pounds a year horse allowance. My duties were quite numerous: Officer in Charge of the Experiment Station, and Manager of the Government Stock Farm. I was also expected to teach six agricultural pupils, to be Agricultural Instructor to the Grenadines, to be part-time Science Master in the Grammar School, and to perform the duties—whatever they were—of Government Petroleum Officer. I accepted enthusiastically. One of my colleagues at the school said acidly and accurately, "A lot he knows about running a stock farm."

I was sorry to leave Arbroath, as I had got quite attached to my pupils. A small gang came to the railway station to see me off. One small boy brought a packet of tobacco as a parting gift and wept when he handed it to me. Months afterwards, I got letters from some of them signed "your loving friend." Need any teacher ask more?

CHAPTER 7

EARLY WORK ON GENETICS IN ST VINCENT, 1915-1920

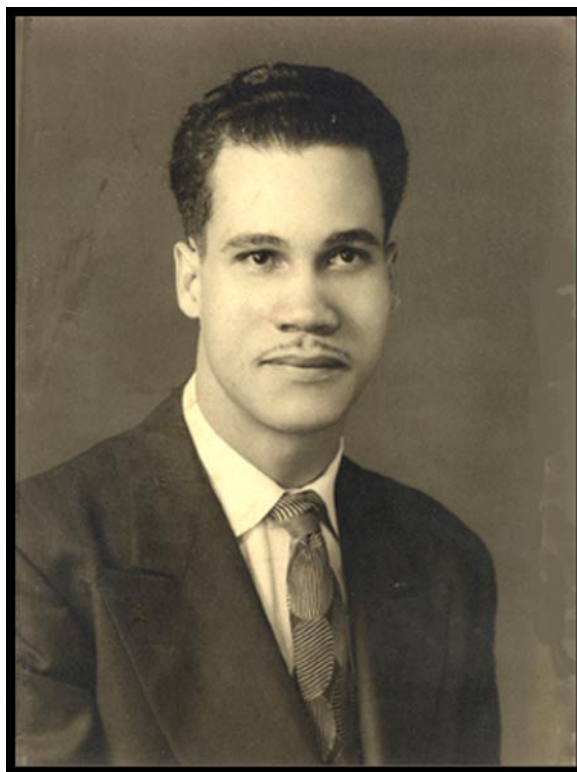
I left for the West Indies in the steamer Orissa in early March 1915. My father had bought me a wicker cabin trunk before leaving. He said it was the last time he was going to spend any money on me.

In 12 days we arrived in Barbados, and I was invited to lunch with Sir Francis Watts, the Commissioner, and his wife. He seemed to like my enthusiasm. I thought he was a man to be looked up to, as he had a D.Sc. Birmingham. He was only about 5 foot 4 inches tall, with a well-trimmed short white beard and a little moustache waxed at the ends. He had on dark trousers, waistcoat, and a black alpaca jacket. I never saw him without his coat and waistcoat, even in the hottest weather.

I took the small Royal Mail island steamer, which went north from Barbados and called at all the islands as far as St Kitts. Next morning we arrived at St Vincent, which was to be my home for the next five years.

My bungalow in Kingstown had four rooms and was very comfortable. My predecessor was a man called Birkinshaw, who had gone to Malaya and left behind all his furniture, cutlery, and what the West Indians called "wares"—plates and dishes. I think I paid for these ultimately, but not without some acrimonious letters from him. I had to employ a cook and a groom, and buy a horse and some white suits. There was not much left over. I began to subscribe to numerous scientific periodicals from a firm in Barbados, and in a few months was in debt to the extent of 20 pounds.

Sir Francis Watts looked after me well. In addition to providing a bungalow, he appointed a guide, Ann DeLairre, to show me the ropes and generally provide for my needs. She was an attractive mulatto in her mid-thirties. Her father was a prominent wine merchant of French origin, and her mother was black. She proved assiduous in her duties, and in due course came to provide for more of my needs than I imagine Sir Francis had envisaged. In a word, it was from her that, at the age of 23, I received my education sentimentale in the classical French manner. She became pregnant, and this put an end to our relationship. In 1916 she gave birth to a son, whom she called George. I saw George from time to time during the remainder of the time I spent in St Vincent. Later his mother sent him to the United States, where he settled, married and raised a family.



**George DeLairre, Sydney Harland's first son,
in the 1940s**

I plunged into work with great energy and enthusiasm, and began numerous genetical experiments with cotton, cowpeas, castor oil, bougainvillea, sweet potatoes, tomato and cassava. I had a good assistant, who was Foreman of the Station, and five agriculture pupils, boys of about 15, to whom I gave daily morning lessons in English, arithmetic and elementary agriculture. They spent the rest of the day in the field doing practical work and helping me with experiments.

The Grammar School was in the grounds of the Experiment Station. I spent about four hours a week teaching botany and physics. I once took the boys up a nearby mountain to observe the lower temperature at which water boiled. The Headmaster of the Grammar School was a Barbadian, Frederick William Reeves. He was the first educated black man I had met at close quarters, and I liked him.

In every way he was a brilliant man, a good teacher and administrator, and liked by the boys, both coloured and white. When necessary, he caned both, without discrimination. He spent his spare time doing mathematical puzzles. In addition to being Headmaster, Reeves was Inspector of Schools, and he travelled to all parts of the island in his buggy, examining schools. Every morning at five o'clock I could hear the sound of his shower bath. At half past five he was at his

desk working. He told me that his colour impelled him to behave better than most people. He said that he had no trouble with his colour at Cambridge. He would go up to a group of students sitting at a table and say, "Do you mind if a damn nigger sits here?" Then they would all start to laugh and make room for him. In that way he made many friends.

The Government Stock Farm consisted of a half-bred Holstein bull and a Kentucky Jack Donkey that were kept for servicing the animals of the peasants. I went round and collected data on the milk yield of the progeny of the half-bred Holstein bull, and found that it was very low. I sent a memorandum to the Commissioner stating this disagreeable news, and he was very annoyed. Shortly after, the bull found its way to the butcher, and was not replaced.

The Sea Island cotton crop was in a bad way. The yield was going down every year, and I set myself to analyse the causes. I selected a number of plants and examined them daily, recording the fate of every bud, flower, and boll (fruit). Buds should produce flowers and flowers, fruits. Instead, many buds were shed at an early stage and failed to produce flowers. In spite of this, an adequate number of flowers were produced and formed fruits, but most of these were shed when a few days old. If the fruits stayed on the plant, most were attacked by either the bacillus of external boll disease, or by various organisms causing the internal boll disease. The latter caused the contents of the boll, seeds and lint, to be rotted and destroyed.

Many workers in the West Indies had long suspected that the internal boll disease was caused by an insect called the cotton stainer, *Dysdercus spp.* Therefore I constructed cages with wire gauze sides, and demonstrated that if stainers were excluded, there would be no internal boll disease. Meanwhile, J.M. Robson in Montserrat had also made cages, and got the same results. I do not know which of us was first.

Finally William Nowell, the Mycologist to the Imperial Department of Agriculture for the West Indies, was sent to St Vincent to study the disease, and stayed with me for some weeks. An extra servant's room was converted into a laboratory, and he proceeded to carry out a series of classical experiments which showed conclusively that when cotton stainers punctured the bolls to feed, they introduced the spores of certain primitive yeastlike fungi. These developed and involved the interior of the boll in a complete rot. Nowell also found the same types of disease in tomatoes, castor-oil fruits, and cowpeas; other species of bugs (hemiptera) were then the agents of transmission.

The cotton stainer of St Vincent had two host plants on which to multiply in large numbers, the great silk cotton tree (*Eiroadendron*) and the John Bull tree (*Thespesia Populnea*) which had a flower strongly resembling that of cotton. Nowell and I began a great agitation to get the Government to employ men to destroy all the silk cotton and John Bull trees on the island. My chief, W.N. Sands, had meanwhile worked out in great detail the life history of *Dysdercus*, and joined in the agitation.

Finally the Government provided funds for the campaign of destruction. Over 8,000 silk cotton trees were destroyed, and most of the John Bull trees. As a result, the Sea Island crop of the next few years was largely free of the terrible disease. If the host trees had not been destroyed, the Sea Island cotton industry would probably have come to an end.

During this period, I carried out a tremendous amount of research and published numerous papers in the *West Indian Bulletin*. I learnt genetics by analysing the results of my experiments as I went along. I wrote to other workers and asked for reprints of their papers. I looked at the way good papers were constructed in sections: (1) introduction, materials and methods; (2) experimental results; (3) discussion; and (4) summary. My school training in English was good, so that it was almost second nature for me to use the right word.

I crossed the native tomato with a large American one and got valuable segregates in the second generation that were immune from blossom end rot. The hybrid itself was vigorous and productive, and was grown in Grenada for many years afterwards from cuttings. I raised sweet potatoes from seeds for the first time, and also cassava and bougainvillea.

My great chance came in 1917, when a cotton conference was held in St Kitts, about 300 miles to the north. Sands, my chief, declined to go, as he got seasick very badly. So he sent me in his place. I set off in a small sloop, which ran into a terrific storm and nearly sank. We were then becalmed for 24 hours off the coast of St Lucia, before finally landing 20 miles down the coast from Castries, the capital. I completed the journey to Castries in a dugout canoe, fortifying myself with a strong rum cocktail, and got there just in time to catch a Canadian boat to St Kitts.

From my point of view, the conference was a great success. It is almost true to say that I ran it. I took part, volubly, in all discussions. I must have seemed a bright and very brash young man.

At this time I was careless and irresponsible about everything except my work. Sir Francis Watts once came into my office in St Vincent, where I had a set of volumes of the *West Indian Bulletin*, all out of order. He commented on this, and said, "Now if you suddenly wanted Volume 9 you would have a lot of trouble finding it." "Not at all, sir," I said, "Here it is." It happened to be just near my hand. "Pshaw," he said.

I was married in December 1915 to my fiancée Emily Wilson Cameron in the Anglican Church. She transferred from a busy Canadian university, Mount Allison in New Brunswick, in the middle of her degree course, and it is not very surprising that she did not fit into my kind of life, which to her was dull in the extreme. She got pregnant immediately, and our first child, Kathleen Margaret Agnete, was born in September 1916.

During the whole of 1916 and up to the middle of 1917, Emily was ill, anaemic and listless. She tried hard to find things to do, but beyond reading, she had no internal resources. We became alienated, and I buried myself in my work. Owing to my lame leg, I could not dance, and she was passionately fond of dancing. She got so ill that I had to apply for leave.

We went to Canada about June 1917, having to borrow money for the passage. I returned to St Vincent in September 1917, leaving Emily again pregnant. In November 1917 I got a cable: "Girl well." This was our second child, Jane Elizabeth Cross.

Emily returned to St Vincent in June 1918 with the two children, but was again very unhappy. I sent her and Margaret to England to stay with my parents in May 1919, and was left with 18-month-old Jane Elizabeth to look after.

Soon afterwards, Jane Elizabeth (we called her Betty) got dysentery and nearly died. I had taken her and her nurse with me to the northern islands. We stayed at a small hotel in St Kitts, where there was an enormous number of flies. Her milk must have got infected, and uncontrollable diarrhoea set in. We then went to Montserrat, where the Government Medical Officer, Dr Heath, tried everything he knew. Finally, in desperation, I worked out a remedy myself—whey made from goat's milk. This worked, and Betty slowly recovered. This was my first medical discovery.

In spite of all these happenings, I went on with my work, and published so much that I told Sir Francis I should have to resign unless I got more money. He got me a grant of 350 pounds a year from the Department of Scientific and Industrial Research, with the title of Assistant for Cotton Research to the Imperial Department of Agriculture for the West Indies.

I was now rich, being one of the best-paid officials on the island. The Attorney General only got 50 pounds a year more than I did. I actually began to save money.

During this time in St Vincent I did little but work. I played bridge occasionally with the Administrator, and took French lessons from Dom Carlos Verbeke, Head of the Benedictine Order in the island.

The Chief Justice, Anthony de Freitas, lived next door to the Experiment Station. He used to come to his office every morning through a gap in the dividing fence. I did not like this, but he was accustomed to do it, so I could not very well object.

Quite a lot of damage was being done to my experiments by people passing through the grounds, so at length I sent him what must have seemed a very cheeky letter from a young man. I said that while I had no objection to the transit of himself and his family, I could not extend this permission to his servants and those who visited him.

Two things happened which brought matters to a head. We had a ferocious old gander loose in the grounds, and one day I saw the Chief Justice trying to defend himself against the gander by rapidly opening and shutting his umbrella. Meanwhile, some of the Grammar School boys stood by, cheering. We also had the half-bred Holstein bull that I mentioned earlier. This bull was exercised every morning around the grounds. The day after the gander episode, the keeper tied the bull to a palm tree just opposite the gap through which the Chief Justice passed every morning. When he came through and almost went headlong into the bull, he was furious.

He went to his office the long way round and wrote a letter of complaint to the Administrator, who sent for me next day. As I went in, the Administrator smiled—rather wolfishly, I thought. "The old gentleman seems to be rather upset," he said. "He complains about you on two counts. The first is that you, as a Junior Officer, wrote to him directly instead of through your Head of Department. The second is that you had the bull tied to that particular tree on purpose to annoy him."

"Well, sir," I said, "I wrote the letter to him about his servants and visitors to protect some very important experiments. I did not think we should have a public highway through the Station. And about the bull, I know nothing about where it was tied, as I was asleep at the time."

"Quite so," said the Administrator. "I think you might try to pacify the Chief Justice by writing him a letter—through your Head of Department, of course—expressing your regret that ignorance of official procedure caused you to act at variance therewith." I thanked him for his advice, wrote the letter, and heard no more about it. I treasured this classical form of apology, and used it effectively in another connection many years afterwards.

Later, when the Chief Justice was Acting Administrator, and I had to apply for special leave and a loan to take my ailing wife to Canada, he was very kind and sympathetic. I was sorry we hadn't got on because I admired him very much, but one could not go up to a Chief Justice and say, "Look here, I think you are a splendid man." He had a son, a little red-haired boy, whom his nurse took to play in the grounds every afternoon. Years later, this boy became eminent as a Labour politician, Sir Geoffrey de Freitas.

In late 1919 I entered for the D.Sc. London, submitting all my published work. I was successful, and received my degree in Applied Botany and Genetics. I felt very proud that I could now call myself Doctor. I was 28 years of age, and it had taken me just five years of solid work.

CHAPTER 8

MANCHESTER, 1920-1923

It was time for two-year-old Betty and me to go to England. Passages were hard to get, but in April 1920 I managed to catch a ship from Barbados. The fare was 45 pounds, double what it was in 1915. We had a three-berth cabin shared with a cantankerous old gentleman for whom nothing was right. He insisted on having the lower bunk. I put Betty in the upper bunk and I slept on the couch. In the middle of the night a warm trickle descended on him, and he stormed out. Ten minutes later the night steward came to remove his belongings, and I saw him no more.

Betty was apt to do unexpected things, but on the whole was a very good child. She was just at the toddling stage. When I went for meals to the dining room, I gave her a large tin of mixed seeds of various sizes and colours to separate. This at first took her about the duration of a meal. But she got so expert that she finished quickly, got out of the cabin and went exploring. After that I had to persuade one of the kind women on board to look after her; there were quite a number of them.

I was glad to be home again. I got bawled out for not sending a telegram with the time of my arrival—by my wife, not my parents. They did not bother about such trifles.

The parental home was cramped. Besides that, Emily had made herself a sore trial to one and all. She quarrelled violently with my mother, who was not usually quarrelsome, and reduced her to tears. Emily had left the house in a huff and gone to Hastings, but had soon come back.

I arranged to share a small furnished house with Herbert Halliday, my old Physics Master, but this did not work out either. Emily and I continued quarrelling, mostly about my behaviour.

I was accused by my brother Stanley of foisting Emily on to the family because I couldn't live with her myself. This was partly true. My father advised me to get rid of her and give her two pounds a week. This was when everybody was "at t'far end", to use a Yorkshire expression.

Looking back, I feel more tolerant now than I did then. Emily was a stranger, and did not understand the cultural background of North Yorkshire. My folks did not understand her or her needs. My manners and customs were exasperating, not only to her but to everybody else. It wasn't the first time that a young man had married an unsuitable wife, or that a young woman had been captivated and collared by an irresponsible and eccentric young scientist.

About this time I had a letter from Lawrence Balls, a man for whom I had the greatest respect and admiration. After a brilliant career at Cambridge, he went to Egypt to work on cotton for the Khedivial Agriculture Society. With scarcely any apparatus or equipment, he carried out a series of classical researches on the cotton plant—its genetics, physiology and agriculture. In 1912 he published his work in a book, *The Cotton Plant in Egypt*, and became recognised as a world authority in cotton.

We had corresponded a good deal, and he had praised my work in St Vincent. He invited me to stay with him in his house in Edale, Derbyshire. He had left Egypt and was working in Manchester as Director of Research of the Fine Spinners and Doublers' Association. He lived far out in the country because he said that civilisation could not exist side by side with atmospheric pollution.

He was an inventor of household gadgets. He used to make up the kitchen fire at night before going to bed, putting a little kerosene on to the wood. An alarm clock went off at 6.00 a.m. and set off a little spark that ignited the fire and boiled a whistling kettle. Then, and not before, did he get up and make tea.

Another of his ideas was to put a post in the middle of the lawn and fasten the lawn mower to it with a rope. The mower went round and round, the rope winding itself round the post until the lawn was mown and the mower stopped. While the mower was working, he sat and watched it, smoking his pipe.

Although I did not know it, I was being vetted for a new post—Head of the Department of Botany in the newly formed Shirley Institute of the British Cotton Industry Research Association. The laboratories were to be built in Didsbury, a suburb of Manchester.

I was called for an interview before a committee and asked to give my ideas on how botany could be useful in research on fundamental problems affecting the cotton industry. I was naturally very voluble and full of ideas. I impressed the committee, and was offered the post. The competition was pretty fierce: also called for interview were R. Ruggles Gates, Professor of Botany at King's College, London and H.G. Atkins, a Fellow of the Royal Society (F.R.S.).

I had the advantage that I knew a lot about cotton and had the support of Balls, who was a member of the Selection Committee. I was offered the post, which I accepted. Asked when I could start, I said that I should first like to go to the West Indies to finish off some research. Permission was gladly granted.

The post carried a salary of 800 pounds a year. Many university professors were not paid as much. The Heads of Departments would also be provided with new houses, and the rents would be reasonable, about ten per cent of salary.

Until the house was ready, my wife went into furnished rooms in Scarborough and I joined her for weekends. Then we had a furnished house in Buxton and I went into Manchester by train every day; I had a first-class season ticket. Since then, I have never been able to afford to travel first class.

While my family was in Scarborough, I went back to St Vincent to round off my work. Shipping was still very disorganised, and it was not possible to get a direct passage. I went first to Halifax, Nova Scotia by the Mauritania, spent a few days with my wife's parents at their farm in Advocate Harbour, then took the Canadian steamer from Halifax to the West Indies. It was January, and I had to do the 30 miles from Parrsboro to Advocate, and back again, by sleigh. When the road became difficult, I had to get out and walk in the tracks of the horse. I enjoyed my short

stay with the Camerons. My mother-in-law was a quiet and sweet woman who encouraged me to say something about my married life. She sighed and said, "Emily has always been difficult."

I got my work rounded off, and took to England the manuscript of my paper on the inheritance of the number of boll loculi in cotton. When I got back, the house was ready, and I plunged into research with great enthusiasm.

The Director, Dr Arthur William Crossley F.R.S., ex-Professor of Organic Chemistry at King's College, London, was a unique combination of a first-rate administrator and a first-rate scientist. His main idea was to get a set of Heads of Departments who were young, with high academic qualifications and proven research ability, and give them full scope and responsibility to develop their ideas.

Out of five Heads, three were D.Sc.'s. In the West Indies, I was a subordinate and often treated as one; I had almost to go on my hands and knees to get a good typewriter. In Manchester I was treated as an equal, and chose my own staff.

Lawrence Balls came to me one day and said, "Look here, I've got a young man who is either a genius or a lunatic or possibly both. Would you like to take him on?" Well, a hint from Balls was enough, so I took him on. He was Humphrey John Denham, who had written a scholarly monograph for the Oxford Botanical Series called *Gossypium in Pre-Linnean Literature*. Since one of my ideas was to work out the chromosome numbers of the various species of cotton, I assigned this work to Denham. There was bound to be a lot of microscopic work and for this I chose H.A. Gunnery, a brilliant technician.

I was given full scope in the interior designing and the details of my laboratories, which were of the strictly functional mill pattern with the sawtooth-edge type of roofing. For the internal fitting of the laboratories I followed the ideas of Balls, who had designed sectional unit furniture long before anybody else,

A shelf ten inches wide ran around the room. On this, every five feet or so, were the gas and electric points, and a small round sink with a water tap. Sectional furniture consisted of a table top, table unit, cupboard unit, drawer unit and shelf unit, making it possible to construct a working bench in any part of the room.

A greenhouse was put up, in which to grow cotton plants. It was enormously expensive to run, being heated by gas and kept at a temperature of over 70 degrees Fahrenheit. I had a small table at one end, and spent much time there. It was a pleasant place to sit and work.

Humphrey Denham had a vast knowledge of many disciplines, and in the solution of problems he could marshall all his knowledge for immediate service. Where he really shone was in the design and making of gadgets. He designed a micro-balance based on the torsion of a quartz fibre, which weighed accurately to one-hundredth of a milligram, and could be used to determine the weight of cotton hairs. Balls had previously shown that this was an important test for fineness of cotton. The balance could be made at a cost of a few pence.

Denham could read almost as fast as he could turn the pages. He was, however, arrogant in the extreme, and not popular with the staff. He was only about three years younger than me, and probably looked down on me because I had not been to a public school. He once said of another member of the staff that his Oxford accent would be perfect if he didn't drop so many H's.

After a few months, we got our house in Kingston Road, Didsbury. There were six detached houses for Heads of Departments, and each had a fair-sized garden. My next-door neighbour was Alexander Williams, who was Co-Head of the Colloid Chemistry Department. One of the first things he did in his laboratory was to calibrate a set of weights. He found that the one-milligram weight was not accurate, and said so to the Director, who told him that the weight had a certificate from the National Physics Laboratory. Williams said that he knew this, but also that he knew how to calibrate weights as well as the National Physics Laboratory. Would the Director please return the weights to them for re-checking? The Director did this, and the weight was found to be inaccurate. Later, when I lectured to students, I used to tell them about this incident.

I still had the urge to improve myself. I took night classes in Dutch, and went to the University to do the Diploma Course in Bacteriology. During the three years I spent at the Institute, I did a lot of research and published a series of papers in collaboration with two of my assistants, Miss Clegg and Miss Calvert.

The papers were reasonably good, solid pieces of work, but looking back on them, I do not find them very interesting or exciting. Dr Crossley insisted that the names on a joint paper should be in alphabetical order; the name of the author responsible for the direction of the work and the main ideas was not put first. I felt that the Crossley system was not satisfactory, as it deprived me of a certain amount of credit, which was of some importance then, though not later.

I did one good paper by myself on correlations between measurable properties of the cotton hair and its spinning properties. This was published as a private memoir of the Shirley Institute. I still think this work was important.

I made one discovery that was adopted in technological cotton laboratories throughout the world. The diameter of cotton hairs is important as a measure of fineness, but diameter is difficult to measure, because the hairs are flattened and convoluted. I found that if they are treated with caustic soda solution—i.e., mercerized—they swell and become cylindrical. In this state, the diameter is easily measured. I also discovered that exposure of cotton fabrics to ultraviolet light alters the dyeing properties, making it possible to create patterns on fabrics. So far as I know, this method has not been applied commercially.

The Heads of Departments were expected to make themselves acquainted with the practises of industry. Accordingly, I spent a considerable time in the cotton mills, observing and talking to workmen, textile experts and managers. In this way I acquired a lot of information that was very useful to me later on, when I returned to cotton in the field.

I became a member of the Manchester Literary and Philosophical Society, which had a charming old house in George Street with a good library. I found Mendel's original papers with the leaves uncut. The house and library were destroyed by bombing in the Second World War.

Denham worked very hard on the comparative cytology of the New and Old World cottons; he knew no cytology when he began, but learned as he went along. Thanks to H.A. Gunnery's magnificent preparations, Denham found the Old World group to have 26 pairs of chromosomes, while the New World cultivated cottons had 52 pairs. Nocolaeva in the USSR found the same numbers.

I missed my St Vincent genetical experiments, and considered various plants as subjects for study in my garden. One year I grew over 100 varieties of sweet pea. The summer was very rainy, and the plants were so badly attacked by a disease—which I correctly diagnosed as a virus—that no seeds were produced. This was the first time that virus in sweet peas was recorded as a disease.

I considered the plantain as possible material for genetical studies, and sowed a large collection of types from all parts of the country. I also got a red-leaved variety from Germany. This grew magnificently, and the seeds were scattered into neighbouring gardens. After I left Manchester, I was told they took years to eradicate.

One night I was at the cinema and saw a picture with scenes of the tropics—coconut palms and sandy beaches. Going out into the cold drizzle of a Manchester November, I felt that I could no longer endure the life I was leading. Then, clear out of a blue sky came the offer of the Chair of Botany and Genetics in the Imperial College of Tropical Agriculture in Trinidad.

I sometimes think that if you want something very badly, the mathematical odds of getting it are somewhat improved. I badly wanted to go back to the West Indies.

Even if the salary had been less than I was getting, I would have accepted it. In fact, it was the same, but I was to be provided with a housing allowance and three months' leave of absence in England every other year, with free passage for the whole family. I accepted the offer by return of post.

CHAPTER 9

IMPERIAL COLLEGE OF TROPICAL AGRICULTURE, 1923-25

In September 1923 I left again for the West Indies in a Royal Mail steamer accompanied by several new members of staff and four postgraduate students. Emily and the children stayed behind till I could arrange housing.

On my arrival, I found that Sir Francis Watts, the Principal of the College, had already rented a house on my behalf. It was a huge hideous monstrosity on the eastern main road. On seeing it, I promptly refused to live in it. Sir Francis and I exchanged hot words. The old man was tactless enough to say that the Governing Body had not consulted him about my appointment, and he did not want me on the staff. I told him that if this was so, he should take it up with the Governing Body.

My best friend in Trinidad was William Nowell, the Assistant Director of Agriculture, who had stayed with me in St Vincent about five years before, while conducting his experiments on internal boll disease of cotton. Nowell came from Halifax in the West Riding of Yorkshire. He had been a Medical Orderly in the South African War when he was 18 years old. Afterwards, he worked as an elementary school teacher. When he was in his early thirties, a relation left him a legacy of 100 pounds, with which he hoped to study botany at the Imperial College of Science and Technology.

He was called to London for an interview with Professor J.B. Farmer, who gave him a whole plant to study and report on in the greatest possible detail. On reading the report, Farmer merely said, "You'll do." Nowell spent the next two years studying with Farmer, and came out with the Diploma of the Imperial College.

Nowell, like myself, had been enchanted by plants since boyhood, and was an exceedingly good field botanist. He told me of a group of Yorkshire workingmen in the district who went out every Sunday morning to collect plants. At midday they gathered in a local public house, put their treasures in jam jars, and got an expert, such as Nowell himself, to name them. The first category was "new to 't district", the second "new to 't country", and the last would have been "new to science", if it had occurred.

The Sunday morning botanical excursion is now a thing of the past. It could not exist in a world of radio and television, where the height of enjoyment is rushing about in a motorcar.

Farmer thought so highly of Nowell that he got him the job of Assistant Superintendent of Agriculture in Barbados. He had to pay his own passage, so he and his wife went second class on the Royal Mail steamer. This was fatal for them socially, as it excluded them from the so-called "high society" of the island.

Nowell's chief was John R. Bovell, an ex-head of a boy's reform school. To further the boys' rehabilitation in society, he had employed them in cultivating sugarcane and other crops. Bovell had noticed some odd grasslike plants among the sugarcane, which turned out to be

sugarcane seedlings. This "discovery" led to his appointment as Superintendent of Agriculture. Bovell wanted to be Director of Agriculture, but the planters rejected this idea. They said they wouldn't mind being superintended, but they certainly wouldn't be directed.

Nowell resented the complete scientific illiteracy of his chief. The Department was principally concerned with raising sugarcane seedlings, so Bovell instructed Nowell to make sugarcane hybrids, in which superior varieties were expected to occur. Nowell had to work with a binocular microscope on a platform eight feet above the ground. The wind blew continuously, and the tropical sun beat down on him.

After a few weeks' work, Nowell reported that it was not possible to make crosses. Bovell was very angry, and said that even an untrained field assistant could make them. The assistant assigned to the task was not stupid enough to work on the platform, but he was able to get numerous seedlings by sowing seeds of unknown parentage. One of these was a winner, and was called BH 10/12 (Barbados hybrid). Everybody but Bovell knew it was not from a controlled cross, and whenever it was mentioned, Nowell merely snorted and said, "Barbados Hybrid my foot."

When the post of Mycologist in the Imperial Department of Agriculture fell vacant, Nowell was appointed. He was heartily glad to leave Bovell, and found his new job very congenial. He published several first-class papers in the *West Indian Bulletin* and solved some difficult problems in plant pathology, including root disease of cacao in Dominica and red ring disease of coconuts. It was at that time that I first met him. Later he wrote a book titled *Diseases of Crop Plants in the Lesser Antilles*, which is a minor classic.

In 1922, when he was appointed Assistant Director of Agriculture in Trinidad, he abandoned scientific work. He found administrative work very much to his liking, and was superlatively efficient in dealing with minute papers. He used to visit the Government Stock Farm several times a week, to reorganise it, he said. As he knew nothing about animals, I told him that his sole ambition was to be known as the man who made the Government Farm pay. This really got under his skin, and for a time our relations were somewhat strained. I could not understand a good scientist giving up science for petty administration. Later I was to realise that many scientists cannot resist the combination of more money and power over their fellows.

Nowell's new chief, Sir Francis Watts, used to call Nowell into his office to discuss me. I was a tough administrative problem. Nowell stuck up for me, and in reply to the plaintive question, "What shall we do with Harland?" said emphatically, "Just leave him alone." On the other hand, as Nowell was accustomed to condemn and criticise, I came in for my fair share. He said in 1923 that I had shot my bolt. He was wrong.

Watts had been, successively, Government Chemist in the Leeward Islands, Commissioner of Agriculture in the Imperial Department of Agriculture in Barbados, and now Principal of the Imperial College of Tropical Agriculture. He had got me my position in St Vincent, where I had done five years uninterrupted research. During the war, communication with St Vincent had been slow and infrequent. He felt that I ought to have someone to control my work, but he didn't quite know how to arrange it.

I knew that he had often been irritated by my behaviour, but I had not realised that when I left St Vincent to take up my job in Manchester, he had been glad to get rid of me. He was intelligent, and spoke well at meetings of planters. He had no sense of humour and never relaxed. I never saw him either smile or laugh. His main occupation was to maintain his dignity.

Perhaps his character could be best summed up in the word "petty." On one occasion, we were walking round his garden after lunch. There was a poor specimen of a banana plant which had a tiny bunch of bananas on it, not quite ripe. I asked why he didn't manure it so as to get a bigger bunch. His reply was that he didn't want a bigger bunch, as he would then have to give some away.

As soon as he was appointed Principal, he provided a job on the staff for his son Charles to be "College Engineer and Clerk of the Works." Charlie was professionally unqualified for the job, and nobody liked the houses he designed, one of which I occupied later. Charlie carried on a running feud with several members of the staff, and the blatant nepotism of his father came in for much unfavourable comment.

As a Principal, I didn't think the old man was at all bad. But when I said this to another member of the staff, my view was tartly repudiated. Being a chemist, Watts liked to interfere with the Chemistry Department. When he suggested that the Department should make some of its own chemicals for the sake of economy, a first-rate war broke out.

Thomas Godfrey Mason, the wild Irish Professor of Botany, and my predecessor as Chair of Botany and Genetics at the College, used to drive Watts to a state of extreme fury by exchanges such as this one:

Mason: "I should like to have a long piece of string for one of my experiments." Watts: "How long a piece do you want?" Mason: "As long as possible, but any convenient length will do."

Sir Francis retired in 1924, a few months after I took up my work, and chose to live near the College. I went to see him sometimes. He was quite affable to me, but used to complain that the new Principal never asked his advice, and that nobody ever told him anything. So much for the Knight Commander, as we used to call him.

Although Watts was a small-minded fussy man, I rather liked him. He did not like me, however. In those days I behaved with none of the social graces. I learned—perhaps too late—that little things like letters of thanks for favours, occasional bouquets of flowers, and paying polite calls could act as a social lubricant. I was much inclined to accept what was offered me, and present-giving was not a part of my cultural background. When I was growing up, there was never any money for presents in my family.

The successor to Watts, Hugh Martin Leake, had spent most of his life in the Agricultural Service in India. On behalf of the Empire Cotton Growing Corporation, he had visited the Sudan and written an excellent report on its cotton situation. He had done some good research on the genetics of Indian cotton genetics and the opium poppy. His main interest at the time was agricultural economics. At first he tried to exercise some control over my work, but soon saw that he was out of his depth, and gave it up.

In 1926, Nowell left to assume the Directorship of the Amani Institute of Tanganyika. This had originally been founded by the Germans during their occupation of Tanganyika in World War I, and was intended for research on tropical crops.

On my first arrival in Trinidad, I stayed with the Nowells for several weeks, then found a small house owned by an East Indian parson. I bought a car—a Ford Model T, the first of several—and at first had a chauffeur. I soon learned to drive, and still have my driving licence issued by the Trinidad Police in 1923.

I began my work with great enthusiasm. I gave a course of about 50 lectures on the theory and practise of plant breeding to the postgraduate students and to the West Indian diploma students, telling them: "We shall yet find ourselves starving in the middle of technological perfection."

On Saturday mornings I gave a special seminar for the West Indian students, in which they were allowed to discuss questions on Government, social conditions, the colour question and everything under the sun.

One of my old friends, Fred Hardy, a fellow Yorkshireman, was on the staff as Professor of Chemistry and Soil Science. Another old friend was W.R. Dunlop, the Professor of Economics. The three of us felt that the West Indian students were not being given a square deal because the College was not a degree-conferring institution, although it probably could have been affiliated to the University of London as a Constituent College.

The West Indian students did not know of the fight that was taking place on their behalf. There was discrimination between the black and the white West Indians. The latter were given posts in various parts of the Empire, especially Africa, but the black West Indians were expected to find jobs locally. Unfortunately, there were very few jobs. Some of my black students therefore went to America and took degrees at Cornell and other universities. A number of these did well. Now, nearly 50 years later, there is a University of the West Indies with a School of Agriculture.

The two crops of greatest importance in Trinidad were banana and cocoa. I shared the banana work with another man, undertaking the breeding side, while he did the cytology. I took over cocoa myself, with the help of two postgraduates, Frenchville and Parga. Frenchville and I worked out the genetics of colour, using as a character the presence or absence of colour in the leaf axil. It turned out to be a simple character, and we published the results in the Dutch genetical journal *Genetics*. It was the first published contribution to the genetics of cocoa.

I found that most of the cocoa flowers went through their life history without being pollinated. When pollination did occur, the main agents were ants and aphids. There was, however, a night-flying insect involved which I was not able to capture, although I spent many nights in the cocoa fields. I did, however, make a discovery of great importance: in trying to self-fertilise cocoa flowers, I found that some trees would not set pods with their own pollen. They were self-sterile, or, as it is now called, self-incompatible. I published a paper on cocoa pollination in the *Annals of Applied Biology*.

Parga, the other postgraduate, was a Colombian student. His father had worked for the Colombian Embassy in London, and he himself had been sent to Rugby and Oxford. He was magnificently British, a really polished product of these two institutions. He did some nice work on dimorphic branching in cocoa, tackling the problem in a highly intelligent way, and I suggested that he should take up research. But he said that he had only come to the College because his father wanted him to learn something of tropical agriculture, and that he was only interested in politics and poetry—to my mind, the two curses of Latin America.

The most important problem facing the banana was the dreaded Panama disease, which was caused by a fungus called *Fusarium*. This attacked the root, blocked up the vascular system and caused the death of the plant. Once soil was infected, banana growing became impossible. In Central America, and especially in Costa Rica, many thousands of acres of rich land in the coastal belt were abandoned.

I discussed this problem with Thomas Mason, who was then Economic Botanist to the Imperial Department of Agriculture in Barbados. Watts had sent him to St Vincent to try to understand what my work was about. He was an extremely intelligent Irishman with degrees from Dublin in both Botany and Agriculture. In genetics, I never had to talk down to him.

We had concluded in 1918 that the problem was a genetical one, and a task for the plant breeder. We knew that some varieties of banana were immune from *Fusarium*, and that a wild banana in Trinidad was both immune and highly fertile.

The *Gros Michel* banana was the most popular variety on the world market. Mason set himself to cross the *Gros Michel* with the wild banana. He employed a number of boys of about 15 years old to make large numbers of crosses, offering a prize of 100 dollars (West Indian) to the first boy who got a seed from the cross.

One day a boy came to his office, and greatly excited produced a seed about the size and shape of a date stone, telling Mason that it came out of a banana. Disbelieving the boy, Mason had the bunch of bananas brought to his office. Every banana was opened, and two more seeds were found, again resembling date stones. These were sown and looked after with care: they gave rise to two magnificently healthy plants with splendid fruit. These were named I.C.1. and I.C.2. Though resistant to Panama disease, they were not commercially acceptable, as they did not possess the combination of characters which had made the *Gros Michel* universally successful.

Nevertheless, a great advance had been made. It looked as if the solution to the problem was in sight. The way was open for the raising of large numbers of seedlings, one of which might have the right combination of characters.

I had thought a lot about the centre of origin of the *Gros Michel* banana. Of its early history hardly anything was known, but it had certainly been brought from somewhere in the Far East, either by the French to Martinique, or by the Portuguese to Brazil. Somebody ought to go to the Far East to hunt for it—and that somebody was clearly me.

I bullied Leake into approval, so he approached the Governing Body and Colonial Office for the necessary funds. The scheme was approved. I was to be away for six months, and was going around the world.

CHAPTER 10

IN QUEST OF THE *GROS MICHEL* BANANA, 1925-1926

The first leg of the journey was from Trinidad to Panama. From there, I caught a United Fruit steamer for Costa Rica, where the United Fruit Company had a Research Station. What bananas were grown in Panama and Costa Rica had been virtually written off because of the *Fusarium* fungus. United Fruit had a large and well-equipped research Department, staffed entirely by plant pathologists. They had described the fungus, measured the diameter of its spores, and tried to find out how it got into the root. All this did not bring the solution any nearer. These pathologists had learned about our work in Trinidad and were just beginning to try to produce seedlings.

This was a case of a large company employing the wrong experts. One of the most difficult things in science is to find experts who can choose the right kind of expert. This is a limiting factor in scientific and economic progress. All scientists know of third-rate men occupying key positions.

The Panama disease of the banana had long ceased to be a problem of pathology; rather, it was one of plant breeding and cytology. But would the pathologists tell the Company to fire them? Naturally not. Instead, they would attempt the breeding themselves in a tame and inefficient fashion.

I enjoyed Costa Rica, whose capital, San Jose, has possibly the best climate in the world. Returning to Panama, I waited for a boat to take me to California, my first trip to the United States. At that time, one travelled with a large steamer trunk, so there was plenty of room for souvenirs.

In a few days I was on my way to Los Angeles with an all-American passenger list. I was made one of the judges in a beauty contest, and I gave points for various attributes, rather in the manner of an Aberdeen Angus judge at a cattle show. The prize winner was a young schoolteacher whose morale was permanently elevated by our choice.

Los Angeles was a shattering experience. To show how efficient they were, they kept everything open all night: restaurants, cinemas, banks. I went by bus to the Riverside Experiment Station, where I saw the work of Howard B. Frost. He had been crossing species of citrus, and had hybrids between oranges and grapefruit, mandarins and limes, and many other spectacular combinations. Although these were of great interest, nobody would grow them commercially, as the market was satisfied with the existing varieties. I learned much about citrus cultivation by attending a course of lectures by Robert Hodgson.

From Los Angeles, I went north to San Francisco. I gave a lecture to genetics students at the University of California at Berkeley and met Ernest Brown Babcock and Roy Elwood Clausen, authors of the well-known textbook *Genetics in Relation to Agriculture*. From Professor E.D.

Merrill I got letters of introduction to Major General Leonard Wood, Governor General of the Philippines, and to Dr Joji Sakurai, Chairman of the National Research Council of Japan.

My next stop was Honolulu, where I visited the Experiment Station of the Hawaiian Sugar Planters Association and the Government Experiment Station, both first-class institutions. Hawaii's sugar industry was the most efficient in the world. Its scientists were much better paid than in the British Colonial Possessions; the Director of the Sugar Planter's Association Station earned 20,000 dollars a year.

Hawaii had a great asset in its soils. These, being volcanic, were naturally rich. And with the addition of great amounts of fertiliser and adequate water, the yield of sugar was several times higher than in the West Indies. About ten million seedlings a year were raised. There was a department for the introduction of beneficial insects. Sugarcane was attacked by numerous insects, and parasites of these had been introduced from other parts of the world to control them. Insects were also used to control noxious weeds.

The population was probably the most mixed in the world. Labour was abundant, and apparently satisfied; wages were about five dollars a day for field labour, roughly ten times the rate paid in the West Indies. Another factor of great importance was that there was no malaria or hookworm. Honolulu resembled a typical busy American city. After a most profitable two weeks, I embarked on a President Liner for Japan. A fellow passenger was the American author Frances Parkinson Keyes, accompanied by her son. We played in a bridge four; she still owes me five dollars.

In Tokyo I had to stay at the Station Hotel, a rather scruffy place. I asked the hotel to call Professor Joji Sakurai on the phone, and told him I had a letter of introduction to him from Professor Merrill at the University of California. He at once called on me at the hotel, dressed in immaculately cut striped trousers, tailcoat, wing collar and top hat.

I found that he was very famous indeed. Not only was he Chairman of the National Research Council of Japan, but also a member of Japan's House of Peers. As a youth he had been sent to London to study chemistry at University College. On his return, he ultimately became Professor of Physical Chemistry at the University of Tokyo. In addition to being a scientist, he was a poet.

Sakurai told me that when the Japanese made up their minds to acquire science and technology, they founded their first modern universities and sent large numbers of students to Britain, France and Germany. They began by admitting that they knew nothing: the University of Tokyo was to be managed by scientists and scholars from all parts of the West, and it was to be in their hands for 25 years. After that, the Japanese would take over. This attitude of humility paid off handsomely. It is a strategy which the underdeveloped or emerging countries might well adopt.

At the time of my visit, the University of Tokyo took in 20,000 scientific periodicals, more than I had ever seen elsewhere. Much of their content was sheer rubbish, but they were very carefully sifted through, and anything worth while was translated into Japanese.

I visited Joji in his beautiful Japanese house to take ceremonial tea. I had not seen a Japanese garden before; it was a wonderful arrangement of rocks, with greys, greens and browns. There were no flowers, but there were little rills of water falling over carefully arranged stones. He told me that a suitable stone might cost 100 pounds.

Joji arranged for me to meet a group of citrus experts. They were suspicious of why I was in Japan. Apparently they believed I wanted to rob them of their citrus industry, which was not in Japan at all, but in Formosa. As I had no intention of going to Formosa, nothing at all came from this meeting.

In Hongkong, I stayed with the Curator of the Botanical Gardens for a few days, and made a list of all plants that I thought would be useful for Trinidad. Hongkong had a special interest for me, as a distant cousin, Dr William Aurelius Harland, was the first Surgeon General of the Colony in 1846. He was a botanist, geologist and meteorologist, and an excellent Chinese scholar who translated a book on Chinese medical jurisprudence into English.

On arrival in Manila, I presented my letter of introduction to the Governor General, Leonard Wood, a middle-aged, florid-complexioned man with a large moustache. He invited me to stay at Government House.

Until now, my journey had been almost purely scientific joyriding. I had learned much, but nothing of bananas or citrus. I was now to make a beginning by visiting the Agricultural College and Experiment Station at Los Banos, about 30 miles from Manila.

This had been started by Dean Copeland, whom I knew as the author of a standard work on coconut. He was given a large area of land by the US Government and told to build a College and an Experimental Station. He put some unusual ideas into practise. The students, all poor and barefooted, came from small farms. The age at entrance was 16, and the course of study for the Bachelor of Agriculture degree lasted six years. Lectures began early and covered botany, zoology, chemistry, entomology, agricultural engineering, surveying, woodworking, metalwork, bookkeeping, and two languages, English and German.

The afternoon was devoted to practical work, both in the laboratory and the field. Before graduation, each student had to prepare a thesis based on original work. The thesis was usually published in the *Philippine Agriculturist*. After graduation, some of the best students went to the Johns Hopkins University in America and worked for the degree of Sc.D. Then they returned and joined the staff.

Gonzales, an old student who had become Professor of Animal Husbandry, showed me how a small platform-type weighing machine could be used to weigh a cow. You first weighed it with its back feet on the balance, then weighed it again, this time with its front feet. By a simple formula, the weight of the cow could be calculated.

The students lived in a village, in huts of their own construction, all along a long road. They had fires in front, where cooked their meals. The Professors lived in simple bamboo houses on stilts.

I approved very much of this College: it was American idealism at work on its highest level. I felt that agricultural education in the tropics had to be like that. Agriculture, after all, was something one did, not just read about. How poor were our attempts at agricultural education in the Colonies! We had done good research, but had not gone far enough.

At Los Banos I saw the largest known collection of bananas in the world. It consisted of 169 varieties, ranging in size from the elephant banana, a cooking type about a foot long, to a tiny banana no longer than one's little finger. There was one variety of outstanding flavour known as the *Palembang*, of which I sent a specimen to Trinidad. But curiously enough, the *Gros Michel* was not in the collection.

I travelled from Manila to Singapore, where I stayed in the famous Raffles Hotel, a rather shabby and run-down place. The Curator of the Botanical Gardens, R.E. Holtum, was a splendid man, and he helped me a great deal. Years later, we corresponded about the taxonomy of bougainvillea. In the Singapore market I found the *Gros Michel* banana, looking just the same as it did in the West Indies. It was grown under the name of *Pisang Embon* or *Ambon*, by Chinese market gardeners. I was told that it probably came from Malaya.

I had originally thought of going south to Java and Sumatra, but now I felt that the true centre of origin was on the mainland. Burma seemed the best place to explore. I first visited the Malayan Department at Kuala Lumpur. All senior positions were held by the British; no attempt had been made to train a Malayan staff. Only a few Junior Assistants were Malaysians.

Little or no plant breeding was done, and rubber breeding had hardly got beyond the stage of preliminary observations. There was no library worth speaking of, and it was my impression that the staff were not at all dedicated or enthusiastic.

Whilst I was having lunch one day, I suddenly recognised an old friend, Arthur Wilson, who had been a fellow pupil teacher at the Friarage Elementary School 16 years before. He had become a Chartered Accountant, and now held the very high position of Auditor General to the Malay States. I was with him for the remainder of my stay; I remember his magnificent motorcar with a uniformed chauffeur. Wilson was a splendid example of Yorkshire pertinacity. He said he went out of his way to make the Scots his special prey.

A Genoese assistant at one of the Experiment Stations I visited told me that wild bananas were grown on one of the islands of the Mergui Archipelago in southern Burma. He said the natives fired an area of land and sowed banana seeds in the ashes, and the crop was ready in about a year. I should have followed it up. But it was too difficult to get there, so I went to Penang by train and took a steamer to Rangoon.

The Director of the Station was a pleasant and helpful man, who advised me to go up country to Mandalay. He was a Scot, and whenever vacancies occurred, he filled them with his fellow countrymen. It is interesting to observe that Yorkshiremen find it extremely difficult to appoint a fellow Yorkshireman to a job. Not so the Scots.

In Rangoon, I found no *Gros Michel* banana. I visited the Shwe Dagon Pagoda and acquired a magnificent pith helmet, called in Trinidad a cork hat. It gave me good service for many years. In Malaya the Europeans, being afraid of sunstroke, always wore a terai (double felt hat). Now all whites in the tropics go bare-headed.

I took the train to Mandalay, and at one o'clock in the morning, I was awakened by a lot of noise at the Toungoo Station, where we had stopped. I looked out of the window. Eureka! The *Gros Michel* was being sold by vendors on the platform. I quickly got myself and my baggage out of the train and spent the rest of the night on a bench in the Stationmaster's Office, being badly bitten by fleas and mosquitoes. All during my stay in Toungoo I was bitten by fleas, and was somewhat nervous, as bubonic plague was prevalent all along the line to Mandalay.

I hired a Ford car to explore the region, and found the *Gros Michel* being grown by the peasants. When I got out of the Ford to look for wild bananas and was walking down a grassy road, I was chased by a king cobra. It could move fast. I threw my handkerchief down, hoping to deter it, and it stopped for a moment. This enabled me to get into the car just in time.

Later, in the Rangoon Zoo, I was looking at a huge king cobra which had reared up and swelled its head out to a monstrous size. I had great, if childish, pleasure in propelling a large cloud of cigar smoke at the head, and watching the snake slowly deflate like a pricked balloon.

My next stop was Mandalay, where there was an Experiment Station working mainly on cotton, directed by T.D. Stock, with whom I stayed. Stock was born on the same day and the same year as myself. He had taken a Degree in Botany at London University, and had adopted agricultural research on cotton as a career.

This is indeed a curious series of parallels, which the astrologers would make much of. I do not comment, as I regard astrology one of the fetid slums of human culture. It makes me angry that even at this day, more money in the world is spent on astrology than on medical research. In India nobody undertakes an important task without consulting his astrologer. I met one scientist in India who went to his astrologer to find out if his paper would be accepted for publication in the *Journal of Genetics*. I have met only one scientist, the physicist and mathematician Dr Fred Pierce at the Shirley Institute, who believed in astrology.

Some people believe in astrology because of patterns they see in their own experiences, which may in fact be coincidental. First-hand experience is useful, if the person is a keen and educated observer, but the main thing is to get together a series of facts. Facts may be derived from other observers, from newspapers, from articles, from inhabitants of a country. Personal experience can be very misleading if not supplemented by facts derived from other sources.

I reject both astrology and palmistry absolutely and entirely. When Osbert Sitwell wrote a book titled *Left Hand Right Hand*—which advanced the theory that the lines of the left hand showed the potentialities of what could happen, while those of the right hand showed what did happen—I put the author down as a half-baked ignoramus.

I think it is one's personal duty to study facts and arrive at conclusions, and to attack superstition wherever one finds it. The astronomers did demolish about 99 percent of astrology, but the demolition rate is rather like the law of cooling of a hot body—at first very rapidly, and then only slowly.

In Mandalay, I found cotton attacked by internal boll disease transmitted by a species of *Dysdercus* (cotton stainer). Nobody in Burma had noted this, although the discovery had been published in the *West Indian Bulletin* in 1917. It takes a discovery about ten years to get known, sometimes more. And sometimes, as is the case with some of my own work, it never gets known at all.

I gained no information about either bananas or citrus in Mandalay, so I made my way back to Rangoon. I had established that the centre of origin of the *Gros Michel* banana was in this area. I surmised that the wild species *Musa acuminata* could form part of the genetical makeup of *Gros Michel*, and was certainly important in future banana breeding work.

I concluded that the area between Burma and Assam was the most promising for future exploration. This area was infested by bandits, and was later affected by Civil war, unrest and lack of funds, so it has still not been explored, 50 years later.

In Rangoon I had samples of the Burmese *Gros Michel*, *Musa acuminata* seeds, and a superior variety of lime sent to Trinidad. The latter proved to be a great success in Dominica, which is now the centre of the West Indian lime industry. It became the standard variety, and bears the name of the Dr Harland lime.

In Rangoon I stayed with a Dr Pal. He told me that when he graduated in medicine, he had no money. He did, however, have a large garden with plenty of bananas and a cow. So for two years lived almost entirely on milk and bananas. He said that he kept perfectly fit; it was not a bad diet, especially when supplemented by wild pot herbs such as *Amaranthus* and sweet potato leaves.

I left Burma with regret. I had enjoyed every minute of my stay, and felt that I had been successful in my mission. For half a century I have remembered the beautiful Burmese women with their large cheroots, and the vast number of Buddhist priests in yellow robes carrying begging bowls.

My next stop was Ceylon, where I stayed with Colin Hutson, the Government Entomologist, whom I had known in Barbados. His house was in the Peredenya Botanic Gardens, one of the finest botanic gardens in the world. Ceylon was very much like Trinidad, with more of everything. I got no new information about either banana or citrus, but was surprised to find grapefruit being imported from California.

My final stop was Egypt, where I stayed with my old friend C.B. Williams, then Entomologist to the Egyptian Government. He was of a very inventive turn of mind, and had devised an ingenious multiple temperature incubator. It consisted of a long hollow aluminium bar, one end of which was in ice and the other in boiling water. There was a slot along the top into which could be inserted test tubes. These could contain cultures of bacteria or fungi, or insects.

One could study the reaction of insects to different temperatures. If you put an insect in at the cold end, it would walk up the tube until it felt comfortable. C.B. had a beetle from the desert which always walked to the 92-degree point and then stopped. This was also a most useful piece of apparatus for determining the optimum temperature for germination of seeds and for some aspects of plant growth. Plant pathologists and bacteriologists would find it invaluable, but so far as I know, nobody else ever made use of it.

Saying a regretful goodbye, I caught a steamer to Marseilles, and after a long and weary journey arrived in London. Naturally I first called at the Offices of the Imperial College in London. I was so bubbling over with enthusiasm over what I had found out that I did not notice my reception was extremely frigid.

This, I thought afterwards, was hardly surprising, considering that I had disappeared for seven months into heaven knew where, and had never written to Trinidad. All that was known of me was that I had been in the Malay States, since the Government had received a request there for the reimbursement of money I had borrowed.

I was thinking of taking a well-deserved short holiday in England, but was politely but firmly requested to catch the first boat back to Trinidad. This I did, arriving for the spring term of 1926.

When I saw Martin Leake, the Principal, he merely said, "Oh, it's you, is it?" But nothing could dampen my spirit, for I had been round the world. I lectured to the Science Club and to the Agriculture Society on my experiences, and settled down to my own research and that of my students.

Hardly had the term started when two men arrived from England on what today would be called a fact-finding mission. The chief was Sir John Farmer F.R.S., Emeritus Professor of Botany of the Imperial College of Science in London. He was a tall thin man with a let-no-dog-bark way of speaking. His companion was Leonard Killby, the Secretary of the Empire Cotton Growing Corporation in London. Their mission was to consider Trinidad as a possible site for a Cotton Research Station.

Being asked to submit my views on the subject, I presented a formidable memorandum on the advantages of Trinidad over other places as a site. I pointed out that all the known species of cotton could be grown in Trinidad; that there were no political difficulties on the horizon; that there was a first-rate library at the College; that cotton was not grown commercially as a crop, and therefore, no farmers would be bothering the research workers for advice.

They were deeply impressed by my memorandum, but to provide a minimal degree of verisimilitude to their recommendations, they went around digging a lot of holes and solemnly inspecting the excavated soil. This seemed very odd to me, since their combined knowledge about tropical soils could be easily written on the back of a picture postcard. But the outcome was that the Empire Cotton Growing Corporation decided to put the Research Station in San Fernando, Trinidad, 50 kilometres south of the capital, Port-of-Spain. It came as a great surprise when I was offered one

of the top jobs, as Head of the Genetics Department. The salary of 1,200 pounds a year represented an increase of 50 per cent, and I was also offered a free house and adequate leave.

I should have been quite content to go on teaching and managing the research work of myself and the postgraduate students. My eccentricities had been looked on quite amiably by Martin Leake, who was a real scientist. Leake knew good work when he saw it, and the stream of papers in good journals which had begun to pour out of my Department was impressive.

But the new offer seemed too good to refuse, so in April 1926 I accepted, and resigned from my chair at the Imperial College of Tropical Agriculture. Little did I realise at the time that I had made one of the worst decisions of my life.

CHAPTER 11

THE EMPIRE COTTON GROWING RESEARCH STATION, 1926-1934

My first tasks at the Research Station were to build up a world collection of species and varieties of cotton, and to look out for and begin to train junior staff. The Corporation appointed a postgraduate student, Joseph Burt Hutchinson, as my assistant. I did not feel easy about this, but also did not realise that this act, relatively minor in itself, was a symptom of future administrative attitudes. At the Shirley Institute in Manchester, Dr Crossley had always allowed me to choose all my own assistants.

The Director of the Corporation was Sir James Currie, whose background was in classics, and whose principal distinction was that he had played golf for Oxford in 1889. He had also been Principal of the Gordon Memorial College in Khartoum, Sudan.

He was as unlike Crossley as it was possible to be. He was rich, having married a Hanbury; he had a luxurious house in London and a Rolls-Royce. He was inclined to be autocratic, and his conversation was a succession of barks and grunts, and

Knowing no science, he relied on Sir John Farmer to guide him in policy. The Station was to do research on the genetics and physiology of cotton. There were to be two joint Heads, for Physiology and for Genetics. There was to be no connection with practical cotton-growing.

Four bungalows were built—two for the residences of the Geneticist and Physiologist, respectively, and two for laboratories. The Heads were not consulted about the design or size of the bungalows. The design was bad and the site worse.

Following the example of Lawrence Balls, I looked out for intelligent girls with a good secondary school education who were just leaving school, as assistants. First, I needed one who could paint flowers and illustrate scientific papers. I chose Anita Montrichard, whose father was a French Creole. She had some artistic talent and remarkable observing power.

I met my next assistant at a tea shop in Port-of-Spain while I was there with Emily and our two little girls. Emily was often unrestrainedly noisy and quarrelsome in public. On this occasion, some row or other started, voices were raised and epithets bandied. Suddenly from the back of the room appeared a Chinese girl, beautiful in the classical Chinese manner, and utterly charming and soft-voiced. As she spoke, the acrimonious dispute settled itself. Then she disappeared, leaving me indescribably moved.

I said to myself, "Du bist die ruh", and sent the girl a message by Anita, asking her to come and see me at the College. She did so. I found out that her name was Olive Atteck. I gave her a combined intelligence and aptitude test, in which her result was excellent. She was nervous and naive, but terribly anxious to please. A week later she joined my staff.

Somewhat later, two of Olive's sisters, Olga and Rita, joined us. Another Chinese girl, who was good at figures, was taken on to keep the accounts. When Anita left in 1930 to marry and go to

Africa, Olga replaced her as artist. Anita had been good, but Olga was far better. She was described later by an eminent British botanist as the best flower artist in Europe.

In addition to the five girls and one male assistant, I employed a number of boys of school-leaving age to help with field work. They were enormously keen on educating themselves, and I gave them evening classes in English and mathematics. Fifty years later, they must still remember the learning by heart of Gray's *Elegy* and some florid passages of Macaulay.



**Sydney Harland (front left) with his staff
at the Empire Cotton Growing Corporation, Trinidad, circa 1930**

A boy whom I had looked on as rather backward—perhaps because he spoke in a falsetto voice and was confused and diffident through sheer nervousness—turned out to be a star performer. Clarence Darsan, who was of East Indian extraction, was able to describe practically every plant in the genetic plot. "Darsan," I would say, "which plant in row 50 has a flower with a yellow corolla, yellow pollen and a large petal spot?" He would think for a short time and then say, "It is the sixth plant from the end. I think it is number 753."

The fame of the evening classes spread rapidly, and several boys from the neighbouring village of Curepe came and asked permission to join. Darsan ultimately got a responsible post in the School of Agriculture of the University, and later was able to send his children to a Canadian university. Another went to Calcutta, qualified as a dentist, and now has a large practise in Bristol. So shines a good deed in a naughty world.

Early in 1927 Emily became seriously ill. I consulted the College Doctor, Edward Seager, and he diagnosed pernicious anaemia. I had to take her to London immediately and put her in hospital.

We were met at the dock by Sir James Currie's Rolls-Royce, and we went right away to St Bartholemew's Hospital. At that time, pernicious anaemia was regarded as incurable. But by treatment with hydrochloric acid and arsenic, a remission could be obtained. So after a few weeks in hospital, Emily was discharged.

I had bought a good second-hand Buick, and we went on the Continent for a long holiday, driving from Belgium through Holland, Germany and Denmark to Sweden. There Emily had a sudden relapse, and I had to get her back to hospital as soon as possible.

I had spent my time reading the literature on pernicious anaemia to see if a new curative treatment had been discovered. I came across an article by George R. Murphy and William P. Minot of Harvard, stating that raw liver could control the disease, and prevent a relapse. Greatly excited, I wrote to Dr Murphy for a reprint of his work, which I showed to the young house physician in charge of my wife. He had not seen the article, and was at first quite sceptical, believing it was one of those American stunts. However, he consented to try it, and it worked.

Raw liver is nauseating stuff to swallow, and the only way Emily could get it down was to mince it, mix it with ginger ale, and bolt it. From that time she improved quickly, and remained in good health as long as she took the liver. Sometimes, as was understandable, she stopped taking it, which brought an immediate relapse. It was later discovered that the active principal of the liver was a vitamin of the B group known as vitamin B12.

The discovery of liver as a cure for pernicious anaemia came quite fortuitously. Researchers had been giving liver to dogs that had been made anaemic by bleeding. The dogs recovered quickly. Although pernicious anaemia was quite different in nature, liver was found to be a cure. Apparently this vitamin is necessary for the formation of red blood cells. Vitamin B12 cannot be absorbed by the mucous membrane of the stomach, and has to be injected. Emily lived to be 87 years old, and had a life of good health.

During my 1927 visit to London, the Corporation made much of me. Leonard Killby, the Secretary (who had dug holes in Trinidad), invited me several times to his house. When he saw from my birth certificate that my father was a journeyman tailor, he never invited me again. On the other hand, Currie put me up for the Savile Club, of which I was a member for 27 years.

Returning to Trinidad late in 1927, and leaving Emily in England, I could no longer disguise from myself that my marriage was a disaster. Emily never came out to Trinidad again, and for several years I lived on my own. For the time being, divorce from a sick woman was unthinkable, and I had to consider our daughters. I have always believed that divorce is bad for children. By that time, the girls were at the Friends' School in Saffron Walden, Essex, and doing well.

In Trinidad, things were changing for the worse at the Imperial College of Tropical Agriculture. Martin Leake, after a prolonged combat with the Governing Body, had been forced

into retirement in the summer of 1927. If he had taken the staff into his confidence, they would have supported him. Leake received 8,000 pounds on departing, but told me later that the payment could not compensate him for a ruined career.

Leake's successor, Geoffrey Evans was a graduate of Cambridge who had gone into the Indian Agriculture Service from 1906 to 1923. Under the mistaken idea that Evans knew something about cotton, the Empire Cotton Growing Corporation sent him to Queensland to be Director of Cotton Culture, where he remained from 1923 to 1926. The dismissal of Leake being in the offing, Evans was brought to Trinidad, undoubtedly with the idea of succeeding him.

Throughout his career he had never been in contact with top-rank scientists, and now he met them in Trinidad. Having been in India for so many years, he had completely absorbed the cultural pattern of the Anglo-Indian. He believed that any white man was better than any Indian, and that senior posts could only be occupied by Britons. He had not been to a public school, only the local grammar school in Bolton, and he was thus somewhat sensitive about his social background. Any member of staff who either married a Trinidadian or associated with Trinidadians was marked down for demotion.

Evans soon saw that if he was to be a success in his job, he must abandon all pretension to be a scientist. His role now was to play politics, and to cast slurs on scientists whenever he felt it necessary. He had to play his cards very carefully. Scientists were all very well, but they needed a certain amount of discipline, and they had to be kept subordinate to the administrators. The spectacle of a Research Institute independent of the College galled him.

As he was a crony of Currie—the Chinese would call him a "running dog"—he got himself made Controller of the Station. For the time being, he was satisfied with the title, and did not interfere with the research work.

My colleague at the Cotton Station was Thomas Godfrey Mason, the Senior Plant Physiologist, who had been a friend since 1917. Mason and I adopted the policy of blinding Evans with science whenever he paid one of his rare visits to the Station; otherwise we went on with our work and ignored him.

During the late 1920s, one of the principal figures of the Trinidad Establishment with whom I was on reasonably good terms was William Freeman, the Director of Agriculture for the West Indies. In his earlier years he had done some good academic work on the cultivation of cocoa, and he had collaborated with Sir Francis Watts in a general textbook on botany. At this period he was in his late forties, and had largely given up academic work, but I always found him a stimulating companion.

One thing we had in common was that Freeman's wife was, like my own, of a rather neurotic disposition, and lived in England rather than in the West Indies. His daughter Ann kept house for him in Trinidad. She was then in her early twenties, and during the course of my contact with her father, I saw quite a lot of her. In 1928 we became lovers.

In the spring of 1929, Ann announced to me that she was pregnant. This presented something of a problem, because I was still married to Emily, who was not willing to consent to divorce at that time. There was therefore no possibility of our marrying. Nor would it have been possible, in the social climate of Trinidad, for us to have lived openly together as man and wife and brought up the child.

I discussed with Ann the various options. One was for her to go and stay quietly somewhere in the country in England until she had the baby, and to let the child be adopted by my brother Oswald and his wife. Oswald's only son had died tragically at the age of ten as the result of an accident in the school gym. Oswald's wife was unable to have more children, and they wanted to adopt Ann's baby.

However, Ann had already made up her mind to return to England and bring up the child herself. As this was her resolution, I thought it best to provide her with a marriage certificate and a new identity as a married woman. I explained this to her, and she could see that it was sensible.

We went together to New York. I wrote some names on the back of an envelope and asked her to choose one for her husband. She selected the name Richard Lynn. We then went to a registry office and were married in the names of Richard Lynn and Ann Freeman. The whole transaction took no more than a few minutes. I was interested, although not particularly surprised, at how easy it was to obtain a false marriage certificate, and, for Ann, a new identity.

We spent two or three weeks together in New York, until I had to return to my work in Trinidad. I bought her a single ticket for the Cunard Liner to Southampton, and gave her such money as I could spare to start her on her new life. I took her to the place of embarkation on a fine sunny morning in September 1929 and kissed her goodbye as she mounted the gangway. I can see her now as she reached the top and turned round to wave me a final goodbye. I never saw her again.

She arrived in England in her new identity as Mrs Lynn. Her story was that in the United States she had met and married a mining engineer, who had been killed in a mining accident. The young widow was now returning to England, carrying his child.

She stayed with her mother in Hampstead, London, until the baby was born. It was a boy, and she named him Richard, supposedly after her late husband. Richard and I never quite established the relationship of father and son, but in due course we became firm friends.

When my daughter Margaret was married in 1943, Ann attended the wedding, and there she met my younger brother Bernard. Apparently they got on well: they stayed together for more than 20 years, and died within three months of each other in 1964.

CHAPTER 12

AFRICA AND BRAZIL, 1930

In January 1930 I was requested by the Corporation to visit the Cotton Experiment Stations in Africa, situated in Southern Rhodesia, Barberton, Rustenberg, Swaziland, Mozambique and Nyassaland. Sir James Currie took me to lunch at the Reform Club in London, and said that he was sure my visit would be of great help to the workers in Africa. Killby asked me not to convey my impression to the workers that they were incompetent.

I found Capetown to be a captivating city, marred by the hangdog looks on the faces of the Africans. I was revolted by the treatment they received from the whites. A woman reporter on a well-known South African newspaper told me that when she was in Berlin, she was fined the equivalent of 30 shillings. Her offence was that when a Negro sat beside her on a bus, she pushed him on to the floor. The German Magistrate said that if she wished to be so private, she should travel by taxi.

The first Station I visited was in Barberton in the Transvaal. It was headed by a man named Parnell, who had done cotton work in India. He was also furious about the treatment of the natives, and said that if he were in their place, he would poison every white man in sight. These were strong words from an ex-Indian civil servant, but he told me that a few weeks previously, a native had been roped and dragged behind a motorcar until he died. The man responsible, a South African Dutchman, received a small fine.

Parnell himself had clashed with the authorities. One of his labourers had been fined 20 pounds for drinking beer, it being forbidden for natives to do this. Parnell paid the fine out of his own pocket. The Dutch magistrates told him that if the offence were repeated, the man would have to go to prison for the rest of his life.

In Barberton, Parnell had struck a winner by breeding a low-growing, highly productive cotton named U4, strongly resistant to jassid (leaf hopper) by virtue of a heavy coating of hairs on the undersurface of the leaf.

On the whole, the Station in Barberton was well run. The entomological work was being done by F.S. Parsons, an old student of mine in Trinidad. He had started his career by turning up at the Corporation Offices in London one day and asking to see the Director. Currie asked him what he wanted. He said that he had come to try to get one of the cotton scholarships being advertised, that would give training in tropical agriculture and especially in cotton work. He outlined his qualifications to Currie.

"How did you travel from Canada?" asked Currie. "Worked my way over on a cattle boat," said Parsons. Currie rang the bell. The secretary came in. "Put this young man down for one of our scholarships," said Currie, and holding out his hand he said, "Goodbye, young man."

Parsons had spent a year with me, doing a thesis on the relationship of water supply to the measurable characters of the cotton fibre. This entailed recording the strength of cotton fibres on a

simple homemade apparatus. Parsons spent 24 hours on this work without resting. He was now working on the ecology and control of the red boll worm, a major cotton pest in the area.

I then went to Swaziland, where there was a small Station run by a Scot called Macdonald. Currie had formed the unethical habit of giving an undue share of jobs to his fellow countrymen. I asked Macdonald if he had seen any wild cottons in his area. He replied in the negative. Walking round next morning, I found a beautiful specimen at the bottom of the garden. I need say no more.

In Southern Rhodesia, another Scot, Georgie Cameron, was in charge of the cotton work. So far as I could see, his only qualification for his job was first, that he was a Scot, and second, that he was an extremely charming and hospitable man. The Station was several miles distant in the country, at Gatooma. It was doing routine selection for the particular conditions of Southern Rhodesia.

The Gatooma selections were based on hybrids of U4 by other cottons. The work was of no special merit. But so far as I could see, Georgie Cameron hardly ever visited the Station, being very comfortably settled in a nice house in Salisbury.

When I was asked to speak at an official lunch in Salisbury, I launched into a smashing condemnation of the treatment of natives in South Africa, and demanded to know whether it was possible to expel South Africa from the Commonwealth. Years later, South Africa left the Commonwealth of its own accord.

When I was about to board the train from Johannesburg to Lourenco Marques, Mozambique, I heard an altercation on the platform. In terms almost obscene, two South Africans were objecting violently to the presence of a "coloured" man in their compartment. I intervened and invited the man into my own reserved compartment. He was a Portuguese Judge travelling back to his headquarters after medical treatment. I found him to be well-informed, and enjoyed his company.

Shortly after crossing the border, I had to leave the train to visit a large cotton-growing enterprise, the Premier Cotton Estates. Here I saw several thousand acres of cotton, bearing what was apparently a large crop. The average plant had 30 to 40 bolls. Although the bolls looked healthy, and the manager was expecting them to open shortly, I saw numerous specimens of the cotton stainer, a species of *Dysdercus*. When I cut open a large number of the bolls, I found that every one was badly infected. In the whole of this vast extension of cotton, there was not one healthy boll.

This enterprise clearly demonstrated the folly of embarking on a new crop without good scientific advice. The trouble was that these cotton men were all such nice chaps. How to tell a nice man that he is an ignoramus in his job is a problem the solution of which has always evaded me.

I continued my journey on the Zambezi River, crossed it by raft, and finally reached Nyassaland, where I stayed with H.C. Ducker in Zomba. Here I fell ill with a bad attack of malignant malaria. I was taken into the house of a Seventh Day Adventist Medical Missionary for

some time, and after that, I was very weak for some weeks, and not able to take much interest in the cotton work.

At a high elevation in Nyassaland there is a beautiful indigenous tree, the Nyassaland pine. I have always wanted seeds of this tree, but have never been able to get them. I can think of many areas of the world that this tree might well revolutionise.

I do not remember how I got back to Capetown: perhaps my memory suffered a blackout. There I caught a Japanese ship to Rio de Janeiro. It was beautifully decorated, and the food and service were admirable. There were about 1500 Japanese going to Brazil as emigrants. They comprised not only agricultural workers, but also doctors, teachers, lawyers and engineers.

There was an ugly scene the first night on board. In the smoking room was a model of a samurai warrior. A couple of South Africans somewhat the worse for drink had amused themselves by putting a lighted cigarette into its mouth. They were guffawing at the spectacle when the captain came in unnoticed. As soon as he saw it, his face became the colour of a ripe eggplant; his rage was frightful to behold. In ice-cold English he told the South Africans that if they dared to attempt such a thing again, they would be put in irons for the rest of the voyage. No more incidents occurred.

I spent three days in Rio, and thoroughly enjoyed the beautiful Botanic Gardens, laid out by an Englishman, T.C. Willis, who had also designed the Peredenya Botanic Gardens in Ceylon. I then determined to go by plane to Trinidad, with a stopover in Natal, Brazil to see the cotton-growing area. Natal's cotton industry was based on a perennial known as Serido, a Marie-Galante cotton with long, fine staple which I had grown in Trinidad. The cotton specialist was Octavio Lamartine, a pleasant young Brazilian who had visited us in Trinidad.

The plane service was called NYBRA (New York-Buenos Aires) and was the forerunner of Pan American Airways. The planes were small amphibians accommodating about 20 passengers. The pilot wore an old Army combat jacket and a baseball cap. We flew every day from dawn to dusk, stopping every night on a river or lagoon and sleeping at a hotel. Some sketchy meals were provided, mostly out of warmed-up cans. The journey was hazardous, as there was a danger of striking power lines. After three days, we came down on a small river at Natal.

The Experiment Station was 200 miles inland, at Acari. I hired a car and we set off at about five o'clock in the afternoon. All went smoothly until I was woken at about nine o'clock with a violent jerk. Looking out of the window, I saw one of our wheels bounding down the mountainside. The chauffeur climbed down about 300 feet to get it. Just as he got almost back to the road, he let go, and it went bounding down again. After extensive cursing, he went down once more, got it all the way to the top this time, and replaced it so we could resume the journey.

We stopped at a small village about midnight and spent the night at an inn. I was conducted to a room with a spare hammock, and slept without interruption till dawn. After a breakfast of fried eggs, boiled cassava and strong coffee with goat's milk, I felt revived.

We got to the Acari Experiment Station in time for lunch. Octavio Lamartine was on the lookout for me, and had arranged for me to spend the night. The cotton was of the Serido type, and I was able to collect much valuable material.

Lamartine was glad to have somebody to talk to, so we sat up until very late. He told me that the whole region was subject to droughts, and that apart from a little cotton growing, there was nothing for the peasants to do. There was therefore an extensive migration to the south. The attempts to form new settlements in the Amazon region were largely failures. The whole region was unsettled, and there were many assassinations.

I had noted the absence of bread, and he confirmed that the peasants did not use wheat because they were too poor. Cassava was the main carbohydrate food, with a little meat and beans. Also, there had been a colossal epidemic of malaria in the region, in which thousands had died. This was because fast French destroyers sailing out of Dakar, French West Africa to transport the mail had introduced the malaria vector *Anopheles gambiae*, which carried a new strain of malaria. The Rockefeller Foundation had embarked on an extensive eradication programme, which fortunately was later crowned with complete success.

I was glad to have got my cottons, and to have seen a region resembling the Portugal of 300 years ago, but I did not want any more malaria and was glad to be on my way again. Some months later, I learned, Lamartine was found murdered.

Up till then, I had not realised what an huge river the Amazon was. It was more than 200 miles wide at the mouth, and the sea was yellow with mud for 200 miles out. We stopped at a village in the jungle at midday, being greeted with a delegation and a band playing music. We passed over Devil's Island, the French penal settlement, and made a stop at Paramaribo in Dutch Guiana.

As we crossed the Orinoco River, a violent electric storm began. The plane was tossed this way and that, and we could hardly keep our seats. The pilot was as calm as if he were driving a taxi. With his baseball cap on the top of his head and a cigarette stuck in his mouth, he was doing extremely well, and he knew it. Arriving at Port-of-Spain at eight in the evening, with only one landing light functioning, he made a perfect landing in the harbour, missing a small boat by only a few inches. Before disembarking, I got the pilot to have the plane thoroughly disinfected. I had seen at least one mosquito, and it would have been a disaster to introduce the Natal malaria into Trinidad.

It was good to be back in my own house and in my own bed. I lost no time in warning the health authorities of the malaria danger, and settled down to my work. I wrote a report for the Corporation and an article for the *Empire Cotton Growing Review* on cotton in North Brazil.

Some time later, I got a somewhat peevish letter from the Corporation, complaining about the expenditure on the airplane journey from Brazil. I rather waspishly replied that by using air travel, I had saved a considerable amount of money for the Corporation, and had returned to my work several weeks earlier than if I had gone the roundabout way from Cape Town to Britain to Trinidad, a journey of at least five weeks. I heard no more.

Meanwhile, I had worked out a method for analysing the genetics of characters in species crosses, which threw light on the evolutionary history of *Gossypium*, to which cotton belonged. My work was going well, and the reputation of the Station was growing.

CHAPTER 13

A VISIT TO THE SOVIET UNION, 1933

In June 1931 I went on leave to England. During the vacation I took my mother for a visit to Germany, Switzerland and France. Her comments were often very artless. I asked her what had impressed her most about Heidelberg, expecting her to say something about the castle. Instead she said that the girls had very fat legs.

In 1932 I got special leave to attend the International Congress of Genetics in America, at Cornell University in Ithaca, New York. At the Congress, a new planet swam into my ken in the person of Nicolai Ivanovitch Vavilov, the most famous of the Russian geneticists. He came up to me at a preliminary meeting of the Congress in New York City—a shortish, burly figure with unpressed trousers, a scrubby black moustache, intensely black eyes, a swarthy skin, and something of Tartar in his aspect.

He said that I was just the man he was looking for. He knew about my work at the Cotton Station, and had read all my publications. After about the first five minutes, we became friends for life. He was President of the Lenin Academy of Agricultural Sciences and Director of the Genetics Institute of the USSR Academy of Sciences. He had founded 200 large Experiment Stations, each with more than 100 scientists. He had organised more than 20 expeditions to various parts of the world to collect plants. No illness or physical discomfort was allowed to get in the way of his work. He promised to visit me in Trinidad later in the year.

In New York, through his influence, I was given the use of one of the USSR's Consular cars, and felt very important riding round in a Cadillac with the hammer and sickle flag floating on the bonnet.

When the Congress moved to Cornell, I saw much more of him. He met me most days, and usually had a string of questions to ask me. He knew all the European languages as well as some Oriental ones, and would go round the Congress chatting with the delegates in their own languages.

He was an economic botanist and a specialist in wheat. His own contribution to science up to that time was the concept of centres of origin of economic plants. The centre of origin was the region where variability of the species was at a maximum. Valuable recessives were characteristic of the periphery of the area of distribution. I enjoyed the Congress, and made many friends.

Returning to Trinidad, I continued with my researches. The administrative situation remained much as it was, but Evans was preparing the ground to undermine my position. First he secured the right to communicate directly with my assistants, then he proceeded to encourage them to take their small grievances to him. When a chief is superseded, the members of his staff lose some of their respect for him.

My position became impossible, and I saw a dark future for my work. I had got rid of my previous assistant Joseph Burt Hutchinson in 1930 by encouraging him to apply for a good post in India. Passing through London, he had seen Currie, who had got him to discuss my shortcomings in

administration. Hutchinson had done good work—perhaps not highly original, but he had published under his own name and was ripe for promotion.

I was learning by bitter experience that if an administrator cannot attack your scientific work, he can try to cast doubt on your administrative ability. This had never happened to me before. At the Shirley Institute and at the Imperial College of Tropical Agriculture, I had guided teams of research workers with no friction whatsoever.

By this time I was—so far as Evans and his College cronies were concerned—an outcast. I remained on friendly terms with my old friend Fred Hardy; and Dr Mary Beattie, the College Doctor, came to chat with me from time to time. But Evans forbade the postgraduates to call on me.

In 1932, I caused the Government some annoyance by harbouring a Russian refugee, Seraphim Popov. He had escaped from the Soviet Union through Manchuria and enlisted in the Shanghai Police. Then he had made his way by stages to Trinidad, usually as a stowaway. The police finally caught up with him and took him to gaol. They searched my house thoroughly, without a warrant, for seditious literature, but did not find any. I am not a Communist and never was.

Early in 1933, Vavilov turned up. I gave a cocktail party, to which I invited all the staff at the College except Evans. Every time the maid approached Vavilov with the tray of strong rum cocktails, he took one. He said afterwards that he thought it was not polite to refuse. The amount of alcohol he imbibed was enough to knock out any normal individual, but he showed no signs of being affected. After the party finished at midnight, he retired to his bedroom, which was next door to mine, and began working. When I awoke at 4.00 a.m., he was still working. He told me that he never slept for more than four hours. More sleep, he said, was a waste of time.

Next day we took him to the market, where he made a list of fruits and vegetables, recording more than 60 species. After that, I always did the same thing when I was in a new place. He sampled a large number of native Trinidadian products specially cooked for him. Travelling through the countryside, he noted the shacks in which many of the peasants lived, and described them as nice little bungalows. Finally I arranged a demonstration of all our genetical work, which seemed to make a very favorable impression. He invited me to pay him a long visit in the Soviet Union that summer.

This was my year for taking leave in Britain. Currie invited me to lunch at the Reform Club, and over coffee I offered him a cigar. He took it, grumbling that it was probably not very good. It was, in fact, the best that seven shillings and sixpence could buy. After a few puffs he said, "By God, this IS a good cigar." As he sat there leisurely puffing, I thought it was a good time to ask him for permission to go to Russia. Greatly softened up, he consented, and offered to pay the steamer passage both ways. I thought that seven shillings and sixpence was not too high a price to pay for the trip.

I went to Berlin to pick up my daughter Margaret, as I had promised to take her with me. She had passed her school-leaving exam at the age of 16, as she was at a loose end, I arranged for her to go to Germany and enroll in a Berlin high school. There she became fluent in German and

learned a good deal of Russian. Her room was full of pictures of Hitler with numerous swastika flags. "Not before time do you get out of here," I said. "Don't you praise Hitler when you are in the Soviet Union."

We boarded a Russian steamer in Hamburg. On board was William Allen White, the American Editor of the *Kansas Emporium*. He had been at an economics conference in London, and thought that the only real sense had come from the Russians. He decided then to go to the Soviet Union to get more information. When the ship suddenly stopped in the middle of the Baltic, White remarked that, according to the fairy tale, machinery of any kind went wrong as soon as a Russian laid hands on it. The ship, he said, had "shot a berry, or, if you like, had blown the works."

Vavilov met us at the docks in Leningrad and took us to an old-fashioned hotel where, if you did not tip the waiter quite heavily, you might have to wait an hour for the first course and an hour in between each course. Discovering that Vavilov had put me on the payroll of the Institute of Plant Industry, I gave a suitable number of roubles to the waiter. After that I was first in and first out.

As I could not take Margaret with me, Vavilov had arranged for her to stay with a woman geneticist, Dr Emma. She had a son of 18, Andrei, who would take her around Leningrad and introduce her to some of his friends.

In the afternoon, Vavilov took me to see Karpechenko, the cytologist, and to inspect the world collection of wheat, 26,000 varieties. As Vavilov always thought in millions, this was by no means a large collection. The Cytology Laboratory was an English villa presented by Queen Victoria to the Czar. I thought how shocked she would be if she knew what happened to it.

Next day we went on a long car journey to Torshok to visit the Flax Experiment Station. It seemed to me to be well run, except that all the roads were ankle-deep in mud, and the lavatories were frightful. There was a machine which cut the flax and processed it on the spot. Returning to Leningrad, we took the night train to Moscow, the Red Arrow. It left Leningrad on the second and arrived in Moscow on the second. I hope they can keep it up, I thought. In Moscow I was put in the Metropole Hotel, and given a special suite, at one time inhabited by the Shah of Persia. I had a bedroom, salon and bathroom. But true to tradition, the water system was not working, and there was an overall air of tawdriness.

The same night, Vavilov took me to the Bolshoi Theatre to see the ballet *Swan Lake*. He said he had to get tickets on the black market. We occupied a box formerly reserved for visiting royalty. Two of the seats were occupied by sheepskin-clad peasants from Siberia. Quite a few fleas seemed to be loose in the box. So much has been written about the Bolshoi Ballet that I can only say that it was one of the most beautiful spectacles I have ever seen.

In Moscow I found out that Vavilov was an Academician. In Britain this would perhaps be equivalent to being a member of the House of Lords and the Royal Society. He took me to visit a famous zoologist called Koltzov, who had discovered that the urine of a pregnant woman contained powerful aphrodisiac properties. Koltzov He invited us to submit to an injection. Vavilov said he

was quite satisfied with things as they were. I declined with thanks. Vavilov also took me to see his mother, a tiny little lady dressed in peasant style. Next day we set off on our travels again.

Our first stop was Kiev, where we inspected the Sugar Research Station. Here, on one site, all the sugar-beet research was concentrated, from the seed to refined sugar. Like all big stations, there were about 200 research workers. I thought that we in Trinidad, with a staff of fewer than half a dozen, knew more about cotton than this Station knew about the sugar-beet. I should not care to work in a large institution, but I know that many people attach great importance to size.

Our next stop was Odessa. We arrived very early in the morning after a long train journey, and Vavilov said that we would go straight to the Experiment Station and begin work. No such thing, I told him. We shall go to a hotel. I shall have a nice bath, followed by a nice breakfast—if possible—and somewhere about ten o'clock we would go to the Experiment Station.

He consented, and we arrived at the Experiment Station at ten on the dot. It was called the Institute of Genetics and Plant Breeding. In charge of the cotton work was a man about my age called Trofim Lysenko. He had some curious ideas. He thought that by grafting or by changing the environment, the nature of a plant could be changed. All he could show me were two miserable stunted cotton plants in six-inch pots. I thought the plants looked a bit waterlogged, so I looked at the bottom of the pots and discovered that they had no drainage hole. He also had some grafting experiments with tomato plants.

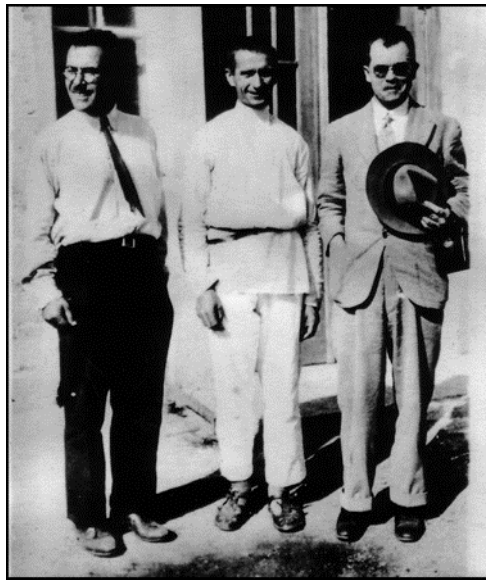


Trofim Denisovich Lysenko (1908-1976), a "barefoot scientist" who opposed the theories of heredity accepted by most geneticists, was falsely credited with bringing massive increases in grain yields, and became the scientific and administrative leader of Soviet agriculture. He was removed as Director of the Institute of Genetics in 1965. Even today, his long shadow stretches over the countries of the former Soviet Union, as they deal with the disastrous consequences of his pseudo-science.

When I was a boy there was a rude conundrum: "Why is a plant pot like Queen Victoria?" Answer: "Because it has a hole in its bottom." I told this vulgar story, which was received by the Russians with guffaws. Some years later, reading a Russian paper, I saw the statement that the "Victoria" type of plant pot was used in the experiments.

I talked with Lysenko for three solid hours. I found him completely ignorant of genetics and of plant physiology. I was not impressed. He made me think of what Mark Twain once said: "It's not what we don't know that hurts us, it's what we know for sure that just ain't so."

I could not have predicted that this wretched little man would in a few years' time get his theories accepted by the great Stalin himself, oust Vavilov from his position, suppress genetics, and wield even the power of death—which came to many—over the 35,000 agricultural workers. How Nicolai Ivanovich Vavilov would later be charged with treason and die of starvation in a concentration camp is one of the most chilling tragedies of modern science.



**(L. to r.) Nikolai Vavilov, Trofim Lysenko,
Sydney Harland in Soviet Union, 1933**

I told Vavilov what I thought of Lysenko, and said that they should get rid of this man. He laughed and said there were many cranks in the Soviet Union, and they believed in giving them scope for their ideas, however crazy. I said that the proper place for crazy people was in an asylum.

Since leaving Leningrad, I had seen swarms of starving children in every railway station. Their arms and legs were like sticks. This was the Great Famine of 1933, though it was denied by the authorities. One episode deserves mention. We were sitting in a restaurant having lunch. Suddenly the door was flung open. A woman rushed in, seized a piece of bread from my plate and

tried to leave. The Manager ordered one of the waiters to expel her. The door was then locked. Vavilov remarked that most certainly there were a lot of hungry people around. "One of the negative aspects of our system," he said.

The next stage of the journey was from Odessa to Yalta in the Crimea. The great palaces of the former nobility were now houses of rest, where workers went to recuperate.

In the middle of the first night in Yalta I had a violent attack of diarrhoea, which I put down to eating melon. The lavatory was indescribably filthy. It was a room with a cement floor, wet with urine, and with numerous heaps of excrement scattered around. There was a hole in the middle, over which one was supposed to squat. There were also streaks of excrement covering the walls. The true story of the Russian lavatory has yet to be told. I was apoplectic with rage, as I had not provided myself with necessary medicines. Nowadays I always carry a miniature medicine chest.

The next evening we attended a wine-tasting ceremony. The Crimea produces first-class wines, although they are little known abroad. The whole stock of wines of the late Czar was at our disposal. We entered an extensive cave where thousands of bottles were stored round the walls. There was a long table with glass bowls at intervals of about a yard. In front of each seat were arranged about 10 tiny glasses. Presently a waiter came round and filled one of them.

Seated opposite me was an old bearded man with a white blouse and a leather belt round his waist. He took up the glass and sniffed it. Then, without a word, he threw the contents of the glass into a bowl in front of him. He did the same thing with the first six glasses. The seventh he sniffed and wet his tongue, and again threw the contents into the bowl. It was not until the last glass that his interest was aroused. He sniffed it, tasted it, then he nodded his head, smiled and drank the contents slowly. It must have been a very good wine. I did not touch alcohol or tobacco during the whole of my visit.

Next day we continued our voyage in an old Soviet Ford, with tyres made from rubber extracted from a species of dandelion. My bowel trouble was steadily getting worse, and I told Vavilov that I could not go on. He therefore left me at the house of the Director of the Institute of Oil Plants in Krasnodar, a man called Bryk. Then Vavilov continued his cotton surveying without me.

The Institute of Oil Plants was one of the largest research institutes in the country. Bryk was not a scientist but an administrator. His salary was only half that of the head scientists, on the ground that it was much easier to get another administrator than another scientist. He was given a good house and servants. As Director, his function was to provide the scientists with apparatus and equipment. This seemed to me a reasonable way of doing things. When I lectured to the Science Club in Trinidad on my return and told the members about this system, Evans did not look at all pleased.

Bryk had been in the United States for several years, and was an intelligent and civilised man. We talked a lot every morning, when he would spend an hour with me. There were two house servants, hefty country lasses. I was looked after very well. There was plenty to read, and I read the whole of Dickens during the three weeks I was there.

When Vavilov returned, I asked him why tobacco research was in the Institute of Oil Plants. He told me that one of the old Bolsheviks, who was very anti-smoking, came to Lenin to request that no research be done on tobacco. Lenin thereupon sent for Vavilov, and told him to talk about tobacco. Vavilov began by discussing the botany, taxonomy and chemistry of tobacco. After an hour, during which Lenin was puffing away at his pipe, Vavilov said that he knew no more. Then he added, "The seeds of tobacco contain a very fine oil." "Good," said Lenin, "we shall put all our experiments on tobacco in the Institute of Oil Plants."

The bulk of the research was not on ordinary tobacco, *Nicotiana Tabacum*, but on an allied species, *Nicotiana rustica*, called *Mahorka* in Russian. This is stronger and coarser than tobacco, and contains much more nicotine. The Russians seem to prefer it. Whenever we passed through a village, we were asked for old newspapers. These were used for making long cigarettes bent near the end and called goat's legs.

When I was ready to continue, we inspected the cotton-growing areas of North Caucasus. The cotton was dwarfed and miserable-looking. Many fields had only a few scattered plants. The reason was that they had received orders from Moscow to sow on the first of May. This they did, but the seeds did not germinate. They then sent a telegram to Moscow asking for further instructions. No reply was received.

Other fields in the cotton area were swamped with weeds. "We were too weak to work," said one woman. I told Vavilov that they should not attempt to grow cotton in this area.

We made a long inspection of the nearby mountains. Travelling up the great Georgian military highway, we saw the snow-capped mountains of the Caucasus in the distance, and part of the great wild fruit forest which covered about 50 million acres. The forest contained wild pear, apple, cherry, medlar and walnut. Not far away was the centre of origin of the pomegranate. We spent the night at the OGPU (Soviet Secret Police) Headquarters in a small village.

Vavilov called a meeting for six o'clock in the evening, and lectured for six hours. He told me that he had reviled them heartily. I spoke for about half an hour. When I referred to Darwin, it evoked terrific applause. Next day we inspected an Egyptian Cotton Experiment Station at Gandzhaa, and the great State Cotton Farm at Miljsky, where there were more than 20 huge cotton-picking machines that worked on the principle of the vacuum cleaner. I did not think much of the farm.

We went by car to Baku. The first thing I saw was a pile of gravestones about 50 feet high. A bulldozer was systematically destroying the whole cemetery. Next day a banquet was given at which the Commissar presided. All the guests wore black ties. Enquiring the reason for this, I learned that this was a day of mourning for the 26 Commissars—administrators of regions—who had been captured and promptly shot by order of an English officer, Captain Jones, during the First World War when Baku was occupied by the British.

I felt somewhat nervous lest old memories should be revived, but Vavilov told me not to mind, as the Commissar present—a saturnine-looking man in a well-cut blue suit—had disposed of quite a few British. There was nothing sad about this party, as much wine was being consumed.

The British had been quite popular in Baku, and many had married Russian women. When the British were evacuated by train, the wives were all put together in the rear coach. After the train had gone a few miles, the rear coach was disconnected and shunted into a siding.

We crossed the Caspian Sea on a steamer which had none of the camaraderie of the one which had brought me to Leningrad. The steerage passengers, about a thousand of them, were lying in heaps on the lower deck. I asked Vavilov why and where they were all going. "To seek a better life," he said.

All over the Soviet Union, people were travelling backwards and forwards. The trains to Middle Asia were all packed. The trains returning were all packed. Landing at Krasnovodsk, we travelled by car to Gedk-Tepeh, Ashkhjabad and Merv. Merv is not far from the Persian border, where the Commissar had a summer residence. We spent a night there. The house was full of beautiful Bokhara carpets, and was extremely well furnished. A banquet was given in my honour. I had a nice plateful of roast mutton.

Remembering that I had shaken hands with many comrades, I went out to wash my hands. When I came back, I found that my neighbour had eaten my dinner. Vavilov was quite unsympathetic. He reminded me again that there were a lot of hungry people about, and that I must always remember this. I had to go without dinner, as there was no food left. I then had to listen to impassioned speeches from the comrades for three hours, and was still feeling far from well. I began to think that this trip was not really worth while. I was not very energetic, as I had lost about 10 pounds in weight.

Near Merv I visited a large collective farm with the best cotton I had yet seen in the Soviet Union. The yield was almost 1200 kilos per acre—a magnificent yield. A lot of cotton selection work was being carried on, and the results were written up in dog-eared exercise books, which filled a whole room. I doubt whether anybody ever looked at them. About 100 women were engaged in examining cotton samples from 100,000 progeny rows. I was asked whether I thought this number was too small or too big. As I saw no advantage in examining more than 500 rows, I tactfully told them to reduce the number to 20,000.

There was no doubt, however, that this district could grow good cotton. The farm was managed by an agronomist who had worked in Texas. I asked if he needed any help from the Government. He said he would be grateful if I could keep these G-D experimenters off his farm. If they would leave him alone, he could grow cotton.

Approaching Tashkent, we passed through large areas of dead grapes. This used to be a very famous wine district, but the Government wanted to grow cotton. The peasants resisted, so the Government cut off the water supply until the grapes were dead. This took a long time, as grapes are very drought-resistant.

In Tashkent, great changes had taken place during the previous decade. Formerly there was no education to speak of. Now there was a University with several thousand students, not only from the region but from every country in the Far East. There were seven high schools. One could see a Moslem mother with veiled face accompanied by her daughter with bobbed hair, horn-rimmed spectacles and a schoolbag.

The city was a strange mixture of the old and the new. I was shown a Moslem temple which had been converted into a glass factory. If, as the authorities thought, religion was the opiate of the people, the supply of opium had been cut off at the source. There was a large Cotton Research Station. It was controlled by a gang of thugs who had caused the mysterious disappearance of several scientists who disagreed with them. Vavilov took me to inspect the Station. I found the work either inaccurate or useless.

I was shown an experiment in which it was alleged that a cotton plant had been grafted on to a mulberry. A cotton plant and a mulberry were growing side by side. A slice had been cut out of the side of each, and the two were then bound with tape. If the graft were successful, the lower part of the cotton stem could be cut off, leaving the cotton scion to grow on the mulberry stock. I therefore took my pocket knife and severed the stem just below the junction. The next day the cotton plant was dead, as I expected, and I was accused of sabotaging this most important experiment. But this did not prevent me from addressing a meeting in the Great Hall of the University. I was extremely critical, in a nice way, of the cotton work. Vavilov told me afterwards that he had taken me there in order to expose this gang. The leaders were punished by being sent back to the University for a further course of study.

There were a lot of hungry people in Tashkent. I saw a pathetic sight—a Turkoman about six feet six inches tall, holding a piece of sugar in his outstretched hand. He was trying to sell it.

Our journey was nearly over. We set out for Fergana in a Soviet Ford. Fergana was a splendid cotton-growing region, which had the largest textile mill in the world. We were accompanied by three other cars full of comrades, who did not wish to miss anything. If you occupied the front car, all went well. But if, as in my case, you were unfortunate enough to be in one of the following cars, the dust developed was so frightful that one could scarcely breathe.

The next day I had developed a bad eye infection, and could not open my eyes at all. I told Vavilov, but he did not say anything. This added to my depression. I found, however, that he had telephoned ahead to the next village, so that when we arrived, a lady doctor was waiting. She treated my eyes and informed me that further delay in treatment would have meant the loss of my eyesight altogether. To allow me to recover, we spent the day and night in the OGPU (secret police) headquarters and then resumed our journey. This time our car was in front.

After seeing Fergana, we returned to Tashkent and got on the train for Moscow. The journey took three days. One night, crossing the desert, a huge stone crashed through the window. Vavilov said that the nomads did not like the Government, and this was their way of expressing dissatisfaction. Every train arriving in Moscow from Tashkent had all the windows broken. I asked what had become of all the nomads. Vavilov said that the Government had advised them to settle down.

I welcomed my bedroom in the Metropole Hotel, and told Vavilov that I required a complete rest for at least 24 hours. After that, I said, I should like to be taken to a specialist, as I was nearly stone deaf through dust getting into my ears. Vavilov said that I must be treated immediately, as many people had become deaf through the dust. I could rest afterwards.

The specialist was a man of 84, who nevertheless was very skilful. I returned to the hotel much relieved. After resting a whole day, I attended a banquet given in honour of H.J. Muller, the American geneticist and Nobel Prize winner. I sat next to him. He was at that time a Communist, and had come to Moscow with tremendous enthusiasm to establish a Genetics Research School. For a time he was successful, but then he was violently attacked by Lysenko and his followers, and had to leave.

It was now October and getting cold. I needed a warm overcoat, as the one I had brought was an ordinary Burberry. First we had to get permission to buy an overcoat. This took two days, as the office had moved to an unknown address. Next there was difficulty in finding out where the overcoats actually were. When we did track down the site, we learned that there were no overcoats. Vavilov finally secured one with a moth-eaten collar on the black market.

Taking the Red Arrow again, we reached Leningrad, where I had to give a lecture at the Academy of Sciences on "The Genetical Concept of the Species." Vavilov translated as I went along. The lecture was immediately published in both Russian and English, and I was given 50 reprints, which I posted to Trinidad. Vavilov came to see me off on the steamer to London. In that wonderful bass voice of his he said, "You have done good work for us, and we shall not forget you."

I had seen much that was good and much that was bad, but what I was quite sure about was that Vavilov was the best man I had ever met. In 1935 he was deprived of his position as President of the Lenin Academy of Agricultural Sciences, which he had founded. In 1940 he was arrested and sent to a Soviet prison camp, where he died in 1943. To the end, he was talking about the wheat he was going to breed when he got out. His collection of wheat, with the genes of 26,000 varieties, was eaten in the siege of Leningrad.



Commemorative stamp for Nikolai Ivanovich Vavilov (1887-1943), geneticist, botanist, and the foremost plant geographer of modern times. Attacked by Trofim Lysenko, he was arrested by Soviet authorities, found guilty of sabotage in agriculture, and sentenced to death. He died in Saratov prison in January 1943 and was buried in a common grave. In 1955 he was posthumously rehabilitated by the USSR Supreme Court.

The steamer was full of tourists, all more enthusiastic about the Soviet Union than I was. When we arrived in London, a police officer came on board. I found that he was a keen amateur gardener, so I gave him a huge potato which had been grown inside the Arctic Circle. The customs officer was very amiable. He asked me if I had anything to declare. I said that I had a carpet that I said was worth about 100 pounds. He opened one end and said he did not think it was worth anything like that. Could I pay 15 shillings? I gave the overcoat to the taxi driver.

In London I was made much of by Currie. He sent me for a checkup to a Harley Street specialist, who said I needed at least a month's rest before returning to Trinidad. He invited me to dinner at his house, together with Ormsby Gore, then the Colonial Secretary. I was commanded to talk about the Soviet Union. He lunched me at the Reform Club and again commanded me to talk. I had to lecture to the Royal Institute of International Affairs, and was asked to see a man at the Foreign Office to discuss conditions in Central Asia. He said that I was the first Englishman to visit Central Asia since the Russian Revolution. They were glad to get some first-hand information.

I had to get my daughters settled. Margaret was accepted as a medical student at the University of Bristol, and Elizabeth went to the Royal College of Art. I spent a pleasant two weeks at Cliff Grange, the Georgian house in Snainton, Yorkshire that I had bought three years previously. Then I returned to Trinidad. The experiments had gone well during my absence, and there was much to write up.



Sydney Harland with his daughter Margaret



Elizabeth Harland Large (1917-79), Harland's second daughter

* * *

Early in 1934 a charming Colombian gentleman, Dr Pedro Obregon, visited the Station, and he invited me to visit Colombia to advise him about cotton. He had large cotton estates.

I spent a profitable month in Colombia. The cotton was of the perennial Marie-Galante type, which I had last seen in North Brazil. There were many different types, some of which were of excellent quality.

I instituted a selection programme, stating quite emphatically that on no account should the Colombians introduce American Upland: the climate was unsuitable, and there was a risk of introducing pink boll worm. This advice was not heeded, and in less than five years Upland had been introduced and pink boll worm was widespread. So much for advice. Experience has led me to believe that bad advice is often taken, good advice seldom.

I took advantage of my host's kindness to pay a visit to Medellin and to the Valle del Cauca, where Cali is the principal city. This valley is perhaps the most fertile land in South America. Sugarcane can be ratooned for 20 years, I was told. I found numerous species of semi-wild cotton, and was led to believe that this region was not far from the centre of origin of *Gossypium barbadense*. Seeing this region further enlarged my knowledge of tropical agriculture.

In 1933 and 1934 I began to see a lot socially of my assistant Olive Atteck. In due course we decided to marry. I secured a divorce from Emily, and the way was now clear. There was much petty gossip going around, and our marriage would, at any rate, stop this.

In June 1934 we went by steamer to Grenada, got bans put up, and were married at the Registry Office in St George's, the capital. My best man was O'Brian Donovan, the coloured Superintendent of Agriculture, and we spent two glorious weeks of honeymoon at the Quarantine Station. This was a house which belonged to the Government, and which could be rented for short periods. It was on the end of a promontory overlooking the Grand Anse beach, one of the finest in the West Indies (now given over to luxurious hotels and tourists). The beach was usually deserted, and we bathed in water which was crystal clear to a depth of 20 feet.

Naturally I had taken my research notebooks, and I would sit on the edge of the cliff at five in the afternoon doing calculations. By then the sun had lost most of its power, and it was pleasant to work outdoors with the north wind blowing gently and creating an ideal temperature.

When I returned from the honeymoon, I took stock of my position. After nearly 20 years of an unsatisfactory marriage, I had now found domestic happiness. From that time forward, Olive enormously enriched my life.

Since coming to Trinidad in 1923 I knew that I had done a lot of good research. It was during this period that I did the work that was to lead some 10 years later to my election to a Fellowship of the Royal Society. Day and night I had thought of little else but cotton. I published many papers and I became known to geneticists all over the world. I was so immersed in cotton that I lived in a kind of symbiotic relationship with it.

I loved my work. In 1934 I was still only 43, and I thought I had many more years of good research left in me. Alas, it was not to be so. I little thought that soon I would be dismissed from my position, face the prospect of financial ruin, and leave Trinidad for ever.

CHAPTER 14

HARLAND VERSUS THE EMPIRE COTTON GROWING CORPORATION, 1935-39

During my years in Trinidad, I had become increasingly persona non grata with the British Colonial Establishment. This was in large part due to my own personality, which from my early childhood has been disrespectful of authority and indifferent to social convention. This led me to actions which would not have been taken by those more cautious and sensitive to the views of people in positions of power. I believe that one important lesson of a public school education is that if you step out of line, you get slapped down. In this respect, my education at the Scarborough Municipal School was deficient. It was a lesson I was now to learn the hard way.

My irreverent attitudes and behaviour were, to a greater or lesser extent, tolerated by most members of the British Colonial Establishment. But Sir Geoffrey Evans, the Principal of the Imperial College and Controller of the Cotton Growing Research Station, found me intolerable, and he determined to destroy me.

I can single out three episodes in particular which Evans used to prosecute his plan. The first took place in 1931. I unwisely wrote a letter to the local newspaper strongly criticising the Government. The Governor had persuaded the Legislative Council to present the British Government with the sum of 25,000 pounds to help it financially. This was large by Trinidad standards, but for the British, it was like giving a halfpenny to a man with a million pounds. My letter said this, and continued by describing the action as an exhibition of organised cretinism. If the Trinidad Government had any money to chuck away it should be used to improve the pitiable hospitals or to help the people by reducing the tax on imported rice.

My letter was a sensation. When I went to Port-of-Spain, people came up to congratulate me. But my euphoria did not last long. Evans had immediately written to Currie and asked whether he approved of his officers writing to the press in this way. Enclosing a copy of the letter, he said he thought that the relations between the Corporation and the Government might suffer. I got a real stinker back from Currie, telling me I must not write letters to the press, since the Corporation was closely connected with the Government. He said I must apologise to the Governor in person, and if I repeated the offence, I would be dismissed.

I went to the Governor, Sir Claude Hollis, and told him that ignorance of official procedure had caused me to act at variance therewith. He looked at me sourly. "Is that your apology?" he asked. I assured him that it was. "Very well," he said. This was apparently the end of the matter, but a black mark had been entered against me.

The second episode was my marriage to Olive. My disregard of the taboo on mixing socially with the local racial minorities was bad enough in itself, but when I actually married a Trinidadian Chinese, it was considered beyond the pale. The situation was made worse by the fact that Olive worked as one of my assistants, and Evans said this would create difficulties with the others.

The third episode was a dispute which developed with my Danish research assistant Skovsted, who had joined my staff in 1930. He had published one paper in Denmark, and had followed this up by some first-rate work for me on the cytology of cotton. Although he had no experience in genetics, I prepared a research programme for him, giving him all the wild New World species to study. He was to do the cytology of species hybrids.

In a small institution, extreme care must be exercised to delimit the material handled by each person. I myself worked on the New World 26-chromosome species and their hybrids with the 13-chromosome species. Notwithstanding this, Skovsted was secretly planting seeds of crosses between 13- and 26-chromosome species. This was the most important part of my own programme. When I discovered what he was doing, I came down on him sharply, and told him to stop this invasion of my work. My letter to him follows.

Dear Skovsted:

1. Some time ago I had a discussion with you about the particular relation of your work to the genetics of New World cottons.

2. I pointed out to you that your work included the genetics of 13-chromosome wild species, but not the genetics of crosses between any wild cotton and New World 26-chromosome species.

3. This decision means that your part of the work will include only the cytology of New World "wild crosses" *Eriosylum*-Sea Island and *Harknessii*-Sea Island. I have amended Madoo's instructions accordingly.

4. I have to point out that if you had furnished me with a progress report of your experiments as I requested, a lot of trouble would have been saved.

Yours sincerely,
S.C.H.

Skovsted then did a thing which no British assistant would have done. He took the letter to the Secretary of the Empire Cotton Growing Corporation, Leonard Killby, who interviewed him and sent me the following comments:

Director,

Skovsted's comments on the attached letter are: He had not been told by Harland that he was not to undertake work on the genetics of crosses between wild cottons and New World cottons. As a matter of fact it was not thought that such crosses were possible, so no question of their hybrids had been raised. However, Skovsted has succeeded in making crosses, and moreover he has got fertile ones, so the genetics of the hybrids can now be studied. Now that this has become possible, and the hybrids show some characters that might be of commercial importance, Harland has told him that he will continue the

work himself and has instructed him to confine himself to the cytology of the hybrids. Skovsted feels that it is unfair to take away from him work that he had started, and which may give interesting results. However, the work needs a knowledge of cytology as well as genetics, and Harland has told him that he prefers not to collaborate with anyone. This being so, the cytology as well as the genetics must be worked out. The same material would have to be collected twice over, once for the cytological work and again for the genetics work, which Skovsted says is wasteful of time and energy. As regards the last part of Harland's letter, Skovsted says that he made a weekly report on his work to Harland, and gave him a verbal report before he left on the back-crossing work described in paragraph 4 which he is now required to hand over.

Killby sent his memorandum to Currie, who interviewed Skovsted on July 17, by which time the news of my marriage had reached him. Without hearing my explanation, Currie gave Skovsted permission to go on with the work, and asked Evans to hold meetings to settle any grievances.

Also in this interview, Currie asked Skovsted if he would be willing to take the matter up as an official complaint. Skovsted agreed to do so, saying that unless the position were improved, he feared that he might have to resign. Asked whether he wished to continue the genetics work that Harland had instructed him to give up, Skovsted said that he certainly would like to, as he would be able to work it in with his cytological work on these particular crosses.

Currie then asked whether Harland's marriage with his Chinese laboratory assistant would affect him at all. Skovsted replied that he feared it would make the position of the rest of the staff difficult in the extreme, particularly if Mrs Harland and her two sisters were retained on the staff. Hitherto, they had not been subject to the ordinary regulations of attendance and general discipline. They were in the laboratory some part of every day, but did not keep regular hours, whereas the other members of the staff had to be in the laboratory punctually at eight o'clock every morning.

Currie then asked whether Skovsted could speak as to the ability of Mrs Harland and her two sisters. Skovsted responded that some time before, Harland had asked him to teach his present wife some cytology, but he had found her education defective and her intelligence insufficient for such work. He had accordingly been forced to report to Harland that he was unable to teach her. One of the Atteck sisters had been his assistant for nine months at Harland's request, but he found her very careless, and her work so unsatisfactory that he told Harland his work would progress more quickly if he had no assistant at all.

Skovsted added that later he had an Indian, Madoo, as his assistant. Madoo's education was better than the Atteck sisters', and his work was more satisfactory, but he had received lower wages than they had. Asked whether he knew what work the three ladies respectively did in the Genetics Department, Skovsted said he could say little of Mrs Harland's work, because she had her own room in the laboratory, which he was not allowed to enter, and he knew nothing of her knowledge of genetics.

Skovsted complained that he had often asked to see Harland's experiments, but the latter had declined to tell him or show him anything of his work. He wondered whether Harland might be reluctant to show his experiments to anyone with the technical knowledge to offer criticism of them.

Currie told Skovsted that the Corporation believed he was doing valuable work, and Currie would do his best to make his position more satisfactory.

Currie had accepted without question a number of damaging accusations against me, and my authority as Head of the Genetics Department was completely undermined. But matters were to get worse. When I returned from my honeymoon, I found that he disapproved of my marriage more strongly than I had anticipated. He had written the following letter to Currie:

Dear Sir James:

I wrote to Killby by the last mail and informed him that Harland was taking three weeks local leave and going to the Grenadines for his health, so he said. Today on the front page of the Guardian I see a note to the effect that Dr S.C Harland, Geneticist of the Imperial College, had married Miss Olive Atteck in Grenada.

Old Atteck is a Chinaman who came originally from Manchuria, made his money in Coco, lost it all, and now lives in Port-of-Spain supported by his daughters, of whom he has, I believe, 14 or 15. Three of these girls work in Harland's office, and he has apparently married one of them on the quiet. I have had Mason over, and he is very concerned about it all as it will create local difficulties. In the first place it will put the ladies of the Cotton Station in a very false position, e.g. Mrs Phillis, Mrs Skovsted and Mrs Silow.

The fact that the new Mrs Harland has two sisters in the genetics laboratory and presumably she herself will want to stay on and work as an assistant will be bad for discipline in the Cotton Station and will also make it difficult for the Indian and other assistants. I had no inkling that Harland was going to make a fool of himself and neither had Mason. It is very bad luck for his two daughters by his first marriage who are nice kids. The whole thing has been done in great secrecy and in a great hurry. I recommend his transfer as early as may be convenient.

It is no use putting in your report on the College that there is a desirability for closer cooperation between the Genetics Department of the College and that of the Cotton Station. It really will be a pious hope so long as the little man stays here. He is, and has been, the stumbling block all along.

I am causing to be inscribed on the front page of the Trinidad Guardian tomorrow a correction by the editor regretting his mistake in stating that Harland was a member of the College staff and that he belongs to the Cotton Research Station. I am not mentioning the Empire Cotton Growing Corporation, and will try to keep its name out of it, but I am tired of having Harland described as belonging to the College when the little blighter gets into trouble. I am writing this in longhand, and in a hurry as the mail goes off directly.

Yours very sincerely,
G. Evans

Shortly afterwards I went to see Evans again. He had to leave his office for a minute. I saw a letter on his desk, which I read. It was a copy of a letter from Sir John Farmer, Currie's consultant. I quote: "If you would wield the big stick I am sure the little man will come to heel." I was so angry I could hardly speak.

I went home and began to assess the whole situation as I would a scientific problem. There was an object, a method and an expected result. First I would fight. My old chief in St Vincent, the able administrator Reginald Popham Lobb, once told me: "Never resign because that is what they want." If I resigned, I had no job to go to. I had no savings. I had to maintain my ex-wife and my girls at school and university.

But if the Corporation could be provoked into dismissing me without reasonable cause, I could bring an action against them, and probably win substantial damages. Meanwhile, I would let Olive go to England to get out of the poisonous atmosphere. She left in December 1934, and took a Diploma course in Dietetics.

My chance came unexpectedly in March 1935. I got a letter from the Institut Agronomico in Campinas, Brazil, offering me the post of General Adviser to the State Cotton Industry of Sao Paulo, and all the facilities I required for research. What were my terms?

I asked for a salary of 9000 dollars a year, nearly double what I was getting from the Corporation. I asked for ample leave, and a four-year contract. My terms were agreed to in principle, and it was suggested that I should pay a visit, to survey the cotton-growing areas and discuss the working conditions in detail.

I planned to leave for Rio on May 19th. Shortly before my departure, the *Trinidad Guardian* printed a notice by Evans stating that Dr S.C. Harland was not connected in any way with the Imperial College of Tropical Agriculture. This was incorrect, as I was still Cotton Adviser to the Commissioner of Agriculture, and the commissioner was a member of the College staff.

I therefore consulted Scipio Pollard, a coloured lawyer who was a friend of mine. He agreed that the letter could form grounds for a libel action against Evans. I could predict exactly what would happen. Currie would not tolerate my threat to sue Evans for libel, and I should be summarily dismissed. Having a better-paid job to go to, I could then bring an action for wrongful dismissal against the Corporation. The following letter was sent to Evans:

11th May 1935
Sir,

We are instructed by our client Dr S.C. Harland that for the past eleven months you have published in writing and by word of mouth defamatory statements concerning his wife and himself.

Dr Harland has instructed us to institute legal proceedings against you and to claim therein damages and an injunction. Our client feels that as the interest and standing of the Imperial College of Tropical Agriculture are to be intermixed with and affected by this action, you in your private capacity and also as Principal of the College should be afforded the opportunity of knowing beforehand of the contemplated litigation.

Yours faithfully,
Scipio Pollard

Evans was leaving for England on Monday the 13th, and the idea was to spring the letter on him late on Saturday afternoon so he would have no time to do anything. Pollard's chauffeur delivered the letter to him at 5.20 p.m. on the 11th, and about five minutes later Evans rang me up in the most awful passion. He described the letter as dirty, ungentlemanly and outrageous, and commanded me to withdraw it immediately, saying that he had supported me on every occasion.

I told him that I had taken this step after a great deal of thought, and that I should not have done so if I didn't have a case which was completely copper-bottomed and watertight. He said he would report the whole matter to Currie and there would be a hell of a row. I said I expected there would be, but this would not affect my action in any way. He then ordered me to come to his house to discuss the matter. I refused, and said that if he wished to discuss the matter, he must come to my house, and that my legal adviser must be present.

He finally agreed to this, and came to my house at 9.15 p.m. Pollard and I worked out a plan of campaign just before he arrived. This was to make him talk as much as possible and give nothing away. First he blustered and demanded to know what was at the bottom of this. Pollard said that we were not giving him any information. Evans then asked what he had come for, if it was not to learn anything. Pollard said, "Well, this is the gist of our case—that you telephoned to the Editor of the *Guardian* and spoke in a very irate and vitriolic manner, and you inserted a notice in the *Guardian*. You know what the notice was."

Then Evans walked into the trap and said, "Well, I had to make a correction as they were always getting Dr Harland mixed up with the College." Pollard then said, "Dr Harland is connected with the College, his official position being that of Cotton Adviser to the Commissioner of Agriculture, and in that capacity he appears on your list of staff on the first page of the calendar of the College of Tropical Agriculture."

Pollard went on to say that the notice inserted in the *Guardian* was a malicious and uncalled-for attack on Dr Harland and his wife. He said we were going to bring an action against the College as a body, and that he should therefore inform Sir James of the situation.

Just when Evans was leaving, he said, "Well Sydney, this is a most distressing affair." I said, "It is no less distressing for me than for you." He then said, "How would it be if Lady Evans came round to call on your wife?" He coughed apologetically as he said this, adding, "I will just get Lady Evans to drop cards and that will make it all right as far as social complications are concerned." I said that there had been no social complications for us in Trinidad except in

connection with the College, and hoped he would have a nice voyage home. He would have plenty to think about in his two weeks at sea.

Evans might have sent a cable to Currie, asking him to call for my immediate return to England to get the matter settled. But he did not think of this. I was therefore free to go to Brazil to discuss the terms of the appointment there. Evans rang me up on Monday just before he sailed, and asked me not to do anything in regard to our case against him until he met with Currie. I agreed.

I spent the next two days in getting together a little basic research material, and left for Brazil on 19 May. It was a sad and tedious journey of almost 2,500 miles: up at 4.30 every morning, getting on the plane at 5.00, flying all day till 5.00 p.m. and coming down in a harbour or river. This went on for five days, and I reached Rio in a state of almost complete collapse. I made my way by train to Sao Paulo, then to Campinas, a pleasant little town. In the next few days I was taken by car to all parts of the state.

The cotton research organisation was about as primitive as it could be, and I could see vast possibilities for research. I discussed the terms of the contract with Director Camargo, with whom I spoke in French. I asked for five greenhouses and a laboratory, all to my own design, and four assistants. He accepted that I should bring my own Research Assistant. I told them I would let him have a definite answer in about two months.

I grieved over the possible termination of much of my research work, as my duties would be mainly concerned with plant breeding. I wrote to Olive in England that the conditions for work seemed to be very good, but that I felt so intensely worn out by mental stress that I didn't know whether I could tackle a new job in the way it should be tackled.

I left for England on 28 May. I reported my arrival to Sir James Currie, and was instructed to attend a meeting at the Corporation offices on June 14th. The meeting lasted only a few minutes. Sir James informed me that as I had threatened legal action against Sir Geoffrey Evans, I could no longer remain in their employ, and was forthwith dismissed. I should receive my salary to the end of the month.

I asked permission to return to Trinidad to wind up my work and see about my furniture and books. This was refused. I was told that even if I returned, I should not be admitted to the Cotton Station.

All had gone the way I predicted. Naturally, my next step was to sue the Corporation for wrongful dismissal. I had to get good legal aid. I was friendly with Ernest Davies M.P., who put me in touch with Kenneth Brown, of Baker and Baker, the solicitors to the Labour Party. I had a long discussion with them, and they undertook the case on my behalf.

Meanwhile, I sent a definite acceptance of the Campinas offer, to begin in late autumn. I wrote to the assistants in Trinidad to get together my research notebooks and seeds of some crucial experiments, and take them home to keep until they could be shipped to Brazil. A great load was lifted from my mind: I was at last free from a year of insult, persecution and distress.

I immediately became a different person. Olive could not understand my feverish high spirits, but this feeling is not uncommon. It is expressed well by Thomas Mann: "The bright and cheery possibilities of life only reveal themselves after that truly cleansing catastrophe which is correctly called social ruin, and the most hopeful situation in life is when things are going so badly for us that they cannot possibly get worse."

In London, we had a bed sitting room in Gower Street, very grubby and slummy, but we were happy. I had long interviews with the solicitors. I spent much time in the libraries, at the Savile Club, and visiting various research institutions to keep in touch with what was going on. Olive easily passed the examination for her Diploma in Dietetics, and we spent the rest of the summer at Cliff Grange with my parents.

We left for Brazil in the Royal Mail steamer Alcantara. Arriving in Campinas, we found a house of sorts, rather tawdry and unsatisfactory. I sent for Olga Atteck, who was to be my Research Assistant, and Rita, who would help me unofficially with the work, and also help with the baby, who was expected in April.

I arranged a vast programme of cotton breeding, but also numerous genetical experiments. I was given an efficient male secretary named Paulo Bolligar, who could do shorthand in English, Portuguese and German. Unfortunately, as I found out later, he also investigated my private papers and correspondence.

Slowly I got together a team of workers. I had a lot of genetical material from Trinidad, and a collection of about 60 standard American Upland varieties. I had to do a lot of travelling, even into the neighbouring state of Minas Gerais.

In one area of the state, cotton was a complete failure owing to some toxic factor in the soil. My U4 from Rhodesia, which I named Gatooma, was a big success. Thanks to a field staff of about 30, the experimental field was a magnificent sight.

I tried hard to accommodate myself to the new conditions of work. The Director did his best to give me what I needed, but "authority" was there all the time. Before we came to Brazil, we had made up our minds to bring our child up as a Brazilian and become good South Americans ourselves. After a few months we knew that this would not be possible. Some of my colleagues were charming and friendly, but the cultural barrier was too great to permit of any real close contact.

Our son was born on 26 April 1936, and was named Philip Sydney Erasmus Gregory Harland; we would call him Erasmus. We registered him at the Consulate in Sao Paulo as a British Subject.

I designed a laboratory building, which has since become the prototype for similar buildings in various parts of Brazil. One of these is in the Amazon area, the Instituto Agronomica do Norte. I worked hard at Portuguese, and finally reached the stage at which I could give a reasonably good lecture in it.

The conditions were not entirely to my satisfaction. I had been given three assistants. I sacked one for bad work, and was informed by the Director that I was not allowed to sack an assistant. "Very well," I said, "let us put it this way: I haven't sacked him. He just cannot work in my laboratory any longer." He didn't.

A car with chauffeur came for me every morning and took me to the Experiment Station or the Administration Building. The car brought me home to lunch, and took me back to work in the afternoon. In Trinidad I was accustomed to rest until four o'clock and then work in the field until dark. The fixed office hours did not suit me at all. Sometimes I wanted to work late at night in the laboratory, and this was not permitted.

Then I found there was another independent Cotton Department in full swing, practically duplicating the work I was contracted to do. It was headed by a malevolent individual called Cruz Martins. Before my arrival, he was considered to be a great authority on cotton. Naturally, he resented my presence and did his best to sabotage my work. He even attacked me in the press. I found that I had been contracted as the big cannon to shoot him down. All this created a very tense atmosphere in which to work.

Before going to Brazil, I had the impression that there was no colour prejudice in that country. I found that this was untrue. In the Instituto Agronomico where I worked, there was only one coloured man among the 300 employed. He was a chauffeur. There did not seem to be any prejudice among children. You could see black and white children walking hand in hand coming out of school, but there were no coloured members, for example, of the tennis club. Prejudice took the form of seeing that no black man ever got a good job; exceptions were rare. Rio was more tolerant, but the same attitude was there.

In Brazil, I made friends with a splendid man called Dan Haggard. He was the nephew of H. Rider Haggard the novelist, and was General Manager of the Cambuy Coffee and Cotton Estates, a British company that had a million coffee trees and 30,000 acres of cotton. He was not an agriculturist by profession, but a railway engineer. Nevertheless, he was an able administrator and had sound ideas about agriculture.

Agriculture on a large scale has always seemed to me to concern machinery rather than plants. I used to advise young men who wanted to go in for agriculture to take a degree in Agricultural Engineering, not in Agriculture. Haggard had 300 mules, which gave him a lot of manure. He had no tractors because tractor drivers came from the city and were usually Communists, and he had enough trouble without asking for more. He looked after the coffee himself. The cotton area was divided into seven self-contained farms, each with a Manager, who had permission to sack any employee, on the condition that he find a replacement.

* * *

The case of Harland v the Empire Cotton Growing Corporation continued slowly. The Corporation had to disclose all correspondence bearing on the case, so I was able to read the letters which passed between Evans, Currie, Skovsted and others. I found that both Skovsted and

Hutchinson had been used as spies, and that Currie had not once consulted his Research Committee about the matter.

Having unlimited resources, the Corporation was able to send a lawyer to Trinidad to rake up material to strengthen their case. They sent a lawyer to India to get a statement from Hutchinson. Most of my greatly increased salary had to go via the black market to my lawyers in London. I had to mortgage Cliff Grange. The Corporation had paid over to me what was due under the Federated Universities Pension Scheme, but this was immediately swallowed up. Mason lent me 400 pounds, and eventually got it back with interest.

Sir James Currie died in 1937, in sad circumstances. He was staying in Cambridge with his old friend, Sir Will Spens, Master of Christ's College. One night Currie went to bed as usual. It was believed that he turned off the gas fire before he retired, then turned it on again by accident. Gas escaped, and he was found dead in his bed the next morning. An open verdict was returned.

Certainly the legal action hanging over him affected him deeply, especially as his administrative ability was going to be called in question. Two members of his own Research Committee, Lawrence Balls and J.B.S. Haldane, had resigned in protest at his treatment of me. Both of these were Fellows of the Royal Society. Lawrence Balls was a close friend of many years standing. His letter to Currie follows.

Dear Sir,

I regret that I am unable to continue my membership of the Research Committee. Since my resignation from it is on matters of principle, it also involves my resignation from the Council. This is of no importance to the Corporation since I am in Egypt most of the year, but I should like to express my deep regret at having to sever contact with the Corporation which I helped to found. The matters of principle relate to the conduct of your valuable Research Station in Trinidad.

1. I hold that the Research Committee as a whole should have been consulted before such a step was taken as was involved in abrogating the authority of the independent research staff, by appointing Sir Geoffrey Evans over them, with powers of scientific direction as well as administrative control. Actually the Committee was confronted with an accomplished fact.

2. The disobedience of a junior officer has been encouraged in derogation of the senior's authority and orders on purely scientific matters.

3. Personal considerations irrelevant to the scientific work of the Station, in consequence of Dr Harland's marriage, have been allowed to outweigh the fine discoveries and the fundamental importance of the work done in the Genetics Department.

4. Negotiations directed to forcing the resignation of the Geneticist have not been communicated to the Research Committee. As the only

member of the Research Committee possessing active experience of cotton research, and also of its practical value in administrative application, I am unable to approve the discounting of practical usefulness in favour of personal disagreements. I note that the Research Committee no longer appears on the list of Committees and Staff 1935, so it may be that I am resigning from something which no longer exists. If so, its disappearance without notification at a time when it is urgently needed on account of the unrest in the Trinidad Station is an additional reason why I must resign from the Council lest I should appear on paper to approve procedures of which I have no official knowledge.

Yours very sincerely,
W. Lawrence Balls

These resignations were known to have shocked Currie. When I heard of his death, I thought that the Corporation would quietly try to withdraw from the case. This did not happen. The Chairman was a Lancashire man, and men from that county are known to be very obstinate, especially when disposing of money not personally theirs.

In the spring of 1938, three years after my dismissal by the Corporation, I was told by my solicitors that the case of Harland v the Empire Cotton Growing Corporation would be heard in June in the High Court of Justice.

The Judge was Sir Anthony Hawke. There was a jury of ordinary-looking citizens, among whom were two women. The Corporation's Counsel was Gilbert Beyfus K.C., a skilful and able barrister of the bullying type, who had the reputation of winning difficult cases. My Counsel was F.W. Beney, who had not then taken silk.

The Judge seemed to be a sort of father figure. As soon as I heard him speak, I had a sense of great relief. Now I was going to get a fair hearing. My wounds, which were deep, would cease to be running sores. I should be healed and be a whole man again. I knew that I was going to win, in spite of the enormous sum of money already spent by the Corporation and the formidable legal talent they had enlisted.

Hutchinson had been brought from India and Skovsted from Denmark. As the case developed, the results of the Corporation's muckraking operation in Trinidad were brought out. Evans had a bad time in the witness box. When he said that he thought my threat of a libel action against him had justified my dismissal, the Judge said urbanely, "The plaintiff thought he had been libelled. He could not get any satisfaction so he said he would see what the courts would have to say about it. What is wrong with that?"

Evans did not reply. Three F.R.S.'s gave evidence in my favour—Balls, Haldane and Sir A.D. Hall, Director of the John Innes Horticultural Institution. Their evidence was principally on my scientific work and its value. I was described as the foremost plant geneticist in the British Empire. I knew I was good, but not that good.



John Burton Sanderson Haldane (1892-1964), Scottish geneticist, biometrician, physiologist, prolific writer, and popularizer of science who opened new paths of research in population genetics and evolution.

Balls was more than a match for Beyfus. When Beyfus asked, "Will you answer this question with truth and accuracy?" Balls said, "What distinction, if any, do you make between them?" Beyfus was obviously rattled, but my Counsel advised Balls not to try to score off Beyfus. "Doesn't really help," he said.

I was in the witness box for about six hours. I was so convinced of the rightness of my case that I didn't care what questions Beyfus asked. I answered them all brightly and confidently. He spoke to me in a loud voice. I answered in a louder voice. He complained, but got no support from the Judge.

The case dragged on for three weeks. Costs mounted up astronomically. At one point the jury asked for the case to come to an end. Beyfus protested that the jury had prejudged the case before he could present all the evidence. Finally the case finished.

The Judge, in his summing up, said, "The plaintiff has been called arrogant, domineering and dictatorial. This has been said of some of the greatest men in history. "The jury found in my favour, and recommended damages of 9,000 pounds. The Judge said that the damages would be assessed in Chambers.

It finally emerged that although I was awarded costs, the damages amounted to only a few hundred pounds. This was based on the fact that I had got a good post in Brazil at a higher salary.

Alas, my "good post" did not continue. In June 1939, the Director called me into his office and said that my job had come to an end. The Government had issued a decree terminating the

contracts of all foreigners in the country. It was alleged to be aimed at the Germans, many of whom were known to be Nazis. I could go to the laboratory and take away all my papers, and that was that.

That afternoon, I got my research notes and some seeds from important genetical experiments. The Director thought, as many Brazilians would, that I had stolen some things. Carlos Krug, an ambitious and unscrupulous Brazilian, was told by the Director to make an inventory of all my apparatus and equipment. He found that I left everything behind except a pair of dissecting scissors, which I offered to pay for. Next day Krug took possession of my four beautiful greenhouses and my lab.

I left for Rio almost immediately, and went to see my old friend Henry King, the former pupil from Scarborough Municipal Secondary School, who lived in Brazil. He was eventually able to help me get a few hundred pounds' compensation from the Sao Paulo Government.

Olga and Rita returned to Trinidad, while Olive, Erasmus and I got on the first available steamer for England. On reaching England, we established ourselves in Cliff Grange.

The publicity over my four-year legal battle with the Empire Cotton Growing Corporation had done me little good, and I wondered if I should ever find employment again.

CHAPTER 15

COTTON BREEDING IN PERU, 1939-1949

At this low point in my life, the wheel of fortune turned again in my favour. I received a letter from the Secretary of the Sociedad Nacional Agraria of Peru offering me a job as Director of the Institute of Cotton Genetics. My task would be to purify and improve the cotton of Peru, called Tanguis, which had degenerated badly. I could draft my own contract.

By this time, I had become pretty expert in formulating contracts. I asked for a salary of 9,000 dollars a year free of tax, with a furnished house, medical attention, car and chauffeur with all running expenses to be paid by the Society, and three months' leave in England every second year, with free passages both ways for myself and my family. My terms were accepted.

The Second World War broke out in September 1939, and it was hard to get out of the country. We were in London for three weeks while seeking for a passage. At night there was a total blackout. Nothing was allowed to leave the country without careful inspection.

Julian Huxley, the English botanist, was friendly with Sir Walter Monkton, who was in charge of the Inspection Department. I went to see Sir Walter. He sent a man round to our hotel, where he perfunctorily inspected our baggage and placed seals on every box and trunk.

We were now free to leave the country, but the only passage we could get was at Newcastle, on a Danish steamer bound for Panama. So at vast expense we went to Newcastle, waited several days and finally got on board. The route was right round the north of Scotland, on orders of the British Admiralty. The Danish Captain was cynical about this, saying that German submarines were waiting on the coast. Fortunately we had Red Cross markings, but the Captain said later that we had just escaped being torpedoed.

We arrived at Panama with almost no money. There were no steamers from Panama to Callao, Peru, so we had to go by plane, leaving the baggage to be shipped later. Half of it never arrived, and Olive lost most of her clothes.

We spent the night in a hotel in Guayaquil, Ecuador, as the plane could not do the whole journey in one hop. I had time to follow my usual custom of going to the market and making a list of all the vegetables and seeds. Erasmus's cap was snatched off his head by a boy who ran away with it and was lost in the crowd. Erasmus was furious, as he had no idea that anybody would steal from him.

We got to Talara, the oil centre of North Peru, at dawn. It is in the middle of a desert. As I write, I can smell the air, pungent and invigorating. We arrived at the Lima Airport late in the afternoon. All day we had been flying parallel to the Andes. I had had my nose glued to the window watching the colossal mountains, at times snow-capped, and the lower slopes barren like the moon. Below was pure desert, every 100 miles or so broken by a narrow green irrigated valley perhaps two miles across. I kept repeating the words of Mole in *The Wind in the Willows*: "Oh my, oh my."

At the airport, Enrique Alvarez Calderon, the Manager of the Sociedad Nacional Agraria, was waiting to meet us. He was a little man, fiftyish, an aristocrat, elegantly dressed and very Spanish. He spoke perfect English. He was, I think, somewhat taken aback to see that Olive was Chinese. He put us in the luxurious Hotel Bolivar.

Next day we moved into the furnished house provided for us. Tawdry in the extreme, it was on a street with hideously noisy trams passing every few minutes. We spent a sad Christmas—a wretched house, a sloppy servant of sorts, a strange country, an unfamiliar language, and the war going on in Europe.

But it was a relief to be in Peru at last, ready to begin a new life. Since I had begun roaming, I had started many new lives. Whatever came along, I was ready to meet it.

My work on Peru would mainly be practical cotton breeding, but I hoped to have the time and opportunity for some pure research. The loss of all my work in Brazil and the hateful working conditions there had not eroded my curiosity or enthusiasm.

Next day a car came to take me to meet the Agraria Committee, a group of wealthy farmers. They were polished and affable; several were Engineering graduates of British universities. Their main objective was to make money, and it was my task to help them by improving and purifying the existing Peruvian cotton.

I was provided with a new Chevrolet car with chauffeur, which could be used for private as well as official use. This was a very sensible arrangement, I thought, and preferable to the pence-per-mile customarily paid in Britain.

During the American Civil War and for many years afterwards, a form of American Upland cotton was grown in Peru, called Suave. But from time to time, other cottons had been introduced, notably Egyptian, and some hybridisation had taken place with both the Egyptian and the native brown-linted tree cotton. About 1915 the whole industry was in danger of extinction by a disease known as Verticillium wilt, to which Upland cotton is notoriously susceptible.

I discussed my requirements with the Agraria Committee. First, I would need an Experiment Station. The Committee wanted it to be near the old Tanguis Farm in the Pisco Valley, about 150 miles away. I was able to quash that idea; I wanted a small station as near Lima as possible, and a genetics garden of a few hundred square metres in or near Lima, with a small laboratory and an insect-proof cage of nylon gauze.

The Committee finally found a suitable Experiment Station of about ten acres, ready-made, on the road between Lima and Callao. It belonged to the Guano Company, which had thought it needed an Experiment Station without quite knowing why. There was a small bungalow suitable for the Resident Agronomist, and another small house occupied by the foreman. Some of the land was devoted to bananas, which could be sold to help defray labour costs. Unfortunately, the land was not adequately fenced, and both bananas and other later food crops were stolen.

The Station was handed over to me in April 1940, but as cotton could not be sown till the end of September, I began to experiment with maize and some special varieties of dry land rice which I had brought from Brazil.

I began to select assistants soon after the New Year. The Agraria provided me with a first-class bilingual secretary, Elana Flores, who had been the Secretary of the Manager of the National City Bank of New York in Lima.

I took on four girls from the University of San Marcos. They were psychology students, as I did not want biology students who had a sketchy knowledge obtained by learning passages by heart from out-of-date and inaccurate textbooks. Later I took on another girl who had a Law Degree from a French university.

As temporary office accommodation, the Agraria gave me two rooms in their main headquarters. By April 1940, the girls were installed in one of these rooms, learning how to examine cotton for commercial characteristics. They were quick to learn, but were inclined to take shortcuts and make elementary mistakes.

The Agraria asked me to appoint Eugenio Delgado, a young Peruvian, as Resident Agronomist at the Station. He had taken a Diploma in Agriculture in France. I put him to live with his French wife in the Station bungalow, and gradually introduced him to experimental work. Unfortunately, his work was invariably casual, sloppy and careless. When I caught him out in a serious error, he merely shrugged his shoulders and said, "Anybody can make a mistake." I was furious and said, "Not round here they can't." He was not in the least sorry. Not wanting to risk more mistakes which could ruin the experiments, I induced him to resign.

I could endure mistakes if infrequent, and if the perpetrator admitted them with a contrite heart and resolved to improve. But such an admittance is quite contrary to either Peruvian or Brazilian psychology, as it would involve loss of face. My own custom was to go straight along the path I had chosen, check and recheck, and recheck again. Nothing was allowed to interfere with the efficiency of the experiments.

As a replacement, I soon found a capable Englishman, Charles F. Scrimgeour, and took him on as Administrative Secretary and technician. He could estimate length, colour and fineness with great rapidity, at the rate of several hundred samples a day. In this way, we were able to eliminate over 19,000 samples of the 22,000 single boll selections I made on the farms in the first four months of 1940.

For help in sowing, I roped in the four girls from the office. Together with Scrimgeour, seven labourers, the foreman and myself, we made up a team of 14. Field work was a new experience for the girls, but they had none of the reluctance of Peruvian males to join in, and they set to work with a will. We sowed 2,863 selections between September 30th and October 3rd, making 11 holes for each selection. The plants grew well, and there was little loss through cutworms or damping off.

The Agraria had arranged for me to plant several hundred duplicate selections on Hacienda Villa, a large farm a few miles out of Lima. The land was good and the selections grew well. One day I went to inspect the plots, and found that the Army had conducted tank exercises and flattened everything to the ground. It was no use complaining: the powers of the Army were absolute.

Arrangements were made for me to survey the main cotton-growing regions of Peru. In my travels over much of the coastal area, studying cotton and collecting samples, I visited most of the large farms and became acquainted with hacienda life. Usually the farmer invited me to stay. My experiences in Brazil had given me a profound distrust of Latin Americans, and I thought at first that I should never make any Peruvian friends. They are basically a kind people, and if you were in any difficulty, they would go to endless trouble to help you. However, if their own interests were involved, they could be quite unscrupulous.

All Peruvians inevitably acquire some cholo characteristics. Cholos are part Indian and part Spanish, and they are supposed to possess an uncanny aptitude for getting themselves out of awkward situations. It is a sort of low cunning. I invented the concept of the C quotient instead of the intelligence quotient. A high CQ is probably of more use in South America than a high IQ—which may at times be actually disadvantageous.

On one occasion the Manager asked for the loan of my spare tyre for a few days. I lent it to him, and when he came back a week later, I asked him to return it. He said it would be ready in a day or two. Then his secretary advised me not to ask him again. When I asked the reason, he said, "He has sold it."

I became very friendly with Pedro Beltran, who owned the important newspaper *La Prensa* and the Hacienda Montalban, an estate in the rich Canete Valley, some 150 miles to the north. Pedro had lived in England for a number of years, and was a graduate of the London School of Economics.

I often stayed with him at the Hacienda, which was formerly the property of General Bernardo O'Higgins, the revolutionary ruler of Irish descent who had fought for Chile in its war of independence against Spain. He became Chile's first President, but was later deposed and exiled to Peru for the rest of his life.



Bernardo O'Higgins (1778-1842), South American revolutionary, combined forces with Jose de San Martin to drive out the Spanish Army and restore Chile's independence in 1818. He ruled the country until he was forced from power in 1823.

There was a painting of him on the dining room wall—a red-haired, thick-set figure with little hard blue eyes wearing a blue uniform. The Peruvian Government had given him the Hacienda to live in for the rest of his life. He is reputed to have died by poison. He is held in high esteem in Chile; O'Higgins is the name of a province; the Avenida O'Higgins is a magnificent avenue in Santiago; and Higinia is a favourite girl's name.

The social life of Englishmen in Lima was centered in the Phoenix Club, which I joined. Peruvians and other nationals could also join in limited numbers if they spoke English fluently. But when I proposed a Peruvian doctor of German descent for membership, one committee member said, "We don't want too many foreigners in this club."

Being near the Plaza San Martin in the centre of Lima, the Phoenix Club was a pleasant place to chat and read newspapers and periodicals. It had a good library, where I became friendly with a remarkable Peruvian, Don Enrique Grau, a descendant of Admiral Miguel Grau, the national hero of Peru. Every day at four o'clock in the afternoon, Don Enrique entered the Club and went to his favourite seat by the fireplace in a corner of the Reading Room. His first act was to call for his spittoon and a small pot of China tea with toast. Then he was ready to chat.

He was about five feet four inches tall, slight in figure, bearded, blue-eyed, and at 84 years of age with a perfect set of pearly white teeth. As an aristocrat, he had no liking for the predominantly Spanish Indian population, and still less for the Negro element in it. He described the Peruvians as the mongrel offspring of everybody's daughters by nobody's sons.

He had had a long career in the diplomatic service and had spent some years in England, for which country he had a great admiration. He spoke English with hardly a trace of accent, and one of his hobbies was the pedigrees and achievements of the peerage of Britain. His physician advised him to give up smoking, but he would not. He had a gold cigarette case, on one side of which was a single cigarette, and on the other a tiny pair of scissors. He would cut the cigarette in two, and smoke one half after lunch and the other half after dinner, placing it in a long ivory cigarette holder. He discoursed endlessly on his diplomatic experiences, on Spanish art, literature, history and music. He said that every Spaniard was a separate and distinct political party, acknowledging the King as his superior, but "bajo el rey, nadie" (below the king, nobody). After spending one hour at the Phoenix Club, he would go on to the National Club, where he talked for another hour with a group of aged cronies.

The meeting place of the whole British community was the Lima Cricket and Football Club. Every British person could go there, including women and children, whether or not they played games. In the afternoon there was always a large crowd,

The Peruvian textile industry was principally run by Lancashire experts, and there was a strong contingent of Lancashire women who tended to segregate themselves. Many women who had lived in Peru for years refused to learn more than a few words of Spanish, and preferred to do their own cooking and household chores, although they might have a girl to help with the rough work. They met other British subgroups on such occasions as the Queen's Birthday Celebrations held at the British Embassy. They felt that they were as good as anybody, if not better. On one occasion a Lancashire woman, on being introduced to the British Ambassador, said, "Ah'm sure ah'm pleased to meet ya, ah think ah've seen ya knocking about somewhere."

There was also the Peruvian British Cultural Association, supported financially by the British Council. The headquarters were in a beautiful old Spanish house. There was menu service and a good library. The "Cultural" was used rather a lot by women who wanted to rest after shopping and by men who lunched and read the papers. There was a good assortment of newspapers, including the air editions of the *Times*, *Telegraph*, *Observer* and *Sunday Times*, and a fair number of periodicals. A man called Selle, a temporary member of the Embassy staff, appeared to be in charge. When I asked him why they did not get the *New Statesman*, he asked patronisingly, "Is it not rather on the pink side?"

It was through the periodicals that I fell out with the Ambassador, Sir Victor Courtney Forbes. I found that all the new periodicals were being sent to him at the Embassy and were only put into the Reading Room when he had finished with them, perhaps several weeks later. I wrote a letter to him, protesting against this practise. He did not reply, so I wrote to both the British Council and to the Foreign Office. The practise ceased. As a result of this episode, I became persona non grata with the Embassy staff.

Olive changed over from Portuguese to Spanish with little difficulty, although 30 years later she was still inserting a few Portuguese words into Spanish sentences. Even when she doesn't know the language, she can sense what the other person means. I cannot. I have to have a sentence all laid out neatly with all the parts of speech and clauses in the right order and perfectly enunciated,

which practically never happens. Although I can still read Spanish almost as well as English, I need to ask Olive what a labourer is saying.

We stood our wretched house for a few weeks, but we never got used to the trams. I am very sensitive to noise. If you have never heard a Peruvian tram (they have now been abolished), you don't know what noise is. I like to lie in bed at night and hear absolutely no sound, as at my house in Snainton.

I did not want to offend my bosses—rather a novel attitude for me, perhaps—but I finally went to Alvarez Calderon, the Agraria's Manager, and told him firmly that we must have a better house. He saw that I was serious, and so he found us a house which was furnished in a sort of hybrid French-Upper Blackpool style. We undertook to keep on Juan, the Majordomo, a sort of butler and man of all work. He waited at table in a white jacket and white gloves, and we found it hard to live up to him.

One morning he went out early to buy the newspaper but did not come back. He had been arrested for not carrying his *Libreto Militar* (military identification document) and was taken to prison. They refused to allow him to return to the house to get his *Libreto*, or even to telephone. Through influence exerted by the Agraria, he was finally released.

At midday during the week, the Committee would meet at the Agraria Office, where the members consumed large quantities of whisky. From the beginning, the Agraria gave me complete freedom in money matters. When I travelled, Alvarez Calderon went to the safe and handed me a bunch of notes, for which I signed. I opened accounts in the National City Bank in both dollars and sols. The Agraria put money into these accounts whenever I was short. They did not enquire how the money was spent, though I kept an accurate account in case it should be needed. This system went on for six years, when finally the new management thought there had been too much leniency. Thereafter I ordered materials as needed, and they paid the bills.

Any research worker who has suffered from Government red tape will agree that I was extremely fortunate, and it was a great tribute to Englishmen that they were all thought to be completely honest in money matters, as well as always in time for appointments.

In May 1940, in the middle of the afternoon, a great earthquake hit Lima. I was working in my office when there was a noise like an express train approaching. The noise got louder and louder, and everything in the room began to shake. I knew it was an earthquake, as I had spent time in Montserrat in the West Indies when there were about a hundred small quakes a day. I had never taken any notice of them. So on this occasion, I went on with my work.

Presently a large chunk of plaster dropped from the ceiling on to the desk, just missing my head. It occurred to me that it would be a good time to get out. I slithered towards a glass-fronted door leading on to a veranda, but it was jammed shut. Looking through the window, I saw big buildings swaying backwards and forwards like the masts of sailing vessels during rough weather at sea. Then a huge mass of masonry fell on to the veranda, just where I had intended to stand. At the same time my desk slid along the floor and crashed into the wall. I managed to open the door leading to the corridor.

A large number of workers, including my three assistants, were fighting to get down the stairs to the main door three stories below. I tried to shepherd my assistants downward, but was pushed suddenly from behind. I shot down the stairs head first to the bottom and fainted. When I opened my eyes, all the shaking had stopped.

Apart from dizziness, a terrific headache and a large lump on the head, I appeared to be unharmed. An American colleague came up and said, "Gosh, you do look frightened." I said, "I was, I am." Crowds of people were sitting in the middle of the road, their teeth chattering like castanets. My chauffeur brought me home, passing the Hotel Bolivar; in front, a number of cars were completely flattened by falling masonry. Olive, Erasmus and Juan, the majordomo, were outside the house waiting.

Olive said that when the quake started, Juan took Erasmus into the middle of the road, and she followed. The occupants of all houses on the street were outside, as they feared there would be another quake. From my experience, I thought this highly unlikely, so I went to bed. We were indeed fortunate, as many thousands of people died. In Callao, the roof of a church fell in, killing the crowd who had taken refuge in it.

About July our landlady wanted the house, so we found another in Calle Las Flores belonging to an Italian called Vaccari. Relations between us and the Vaccaris were on the cold side, as the war was on and the Germans and Italians seemed to have a sporting chance of winning. The house was not so ritzy as the one we vacated, but it was larger and it had a garden where I could keep hens.

Lilo Linke, the tall blonde German girl mentioned in Storm Jameson's autobiography, was living in Ecuador and wanted to come to Peru to compare conditions. We invited her to stay, and she spent several weeks with us in the summer of 1940. Lilo was a handsome woman, of a type greatly attractive to Peruvian males. Alvarez Calderon and his friend Enrique Ayulo came to the house very frequently and took her out, ostensibly so she could learn about Peru and make contacts. When the police began to make enquiries about her, their visits ceased abruptly. She was suspected of being an Ecuadorian spy, and when she was expelled from Peru across the Ecuadorian border, we were not sorry.

In October 1940, I finally got my genetics garden with its laboratory and insect-proof cage. It was in Miraflores, not far away. I began to get together a collection of wild species of cotton for genetical studies. I also worked on the Peruvian wild tomato, potato, garden pea, sweet pea, and Andean lupin.

The pre-Incas were expert agriculturalists, and succeeded in domesticating about 30 species of plants. The Andean lupin, *Lupinus mutabilis*, was one of these, and was grown in the high Andes of Peru, Bolivia and Ecuador. Under cultivation, the plant grows to a height of up to two metres, in regions almost up to the snow line, or 12,000 feet in Peru. The yellowish white seeds usually have a black eye at the hilum. They are about the size of small beans, and are rich in proteins and oil. The seeds contain a poison alkaloid, but this disadvantage was overcome by the pre-Incas, who partly germinated the seeds, then washed them in running water for several days. We tried this and found

the seeds to be very palatable, tasting rather like groundnuts. What was needed was to eliminate the alkaloid by selection. Many years later I learned that Sengbusch in Germany had done this. But the alkaloid-free strains never reached Peru.

The potato is indigenous in Peru and Bolivia, and there are many hundred named varieties scattered through the sierra, that were selected by the pre-Incas. The Peruvian potato is closely allied to the European potato, and they can be crossed easily. From seeds I grew a hybrid between a Scottish potato *Epicure* and an Andean type. At five months old, the yield was about 22 pounds per plant. The tubers were also of very good quality. Due to virulent attacks of virus, I was not able to follow up this work.

On one of my visits to the sierra I noted hundreds of potato seedlings growing on the top of an adobe wall; the seeds had been deposited there by birds. The Andean potato produces huge quantities of yellow fruits about the size of a walnut, which are used as food for pigs. A distinct species of potato, *Solanum goniocalyz*, produces yellow potatoes of insuperable quality.

When I first began to study potatoes in Peru in 1940, there was hardly any disease. Successive Governments have introduced disease-carrying potatoes from various countries, and disease is now widespread over the potato areas. Perhaps the worst disease is the well-known blight *Phytophthora*, which was responsible for the Great Famine in Ireland in the 1840s; it was introduced by potatoes from Chile about 1943-44. It has sped with great rapidity over the country, causing great hardship to the Indian cultivations. The rare species of potato *Solanum Wittmackii*, which I found near Lima in 1940, appears to be extinct.

Regarding the garden pea, I found an enormous admixture of types from the sierra. One of these was immune to the destructive mildew disease. I succeeded in transferring the gene for immunity to many cultivated varieties, but as is often the case, immunity broke down in England due to the appearance of a new race of mildew.

The sweet pea presented some interesting problems. At a height of about 6,000 feet in the Andes, I found a small-flowered type with an intense scent. I began to work on the genetics of scent. Inheritance appeared to be due to a large number of genes, each with a small effect. I sent seeds of this sweet pea to Iowa in the USA, and it grew well.

To produce quick results with cotton, I devised a new system of cotton selection known as the mass pedigree system. Each selection had to pass a number of tests in which the value of a commercial characteristic had to be above the arithmetic mean of the whole population. Only 40 strains out of the 2,863 strains passed all the tests. The seed of these was mixed and planted in a large multiplication plot, away from any other cotton. The resulting seed was enough to plant the whole of the cotton-growing area of the country. The new Tanguis was called SNA 242.

I published a detailed account of the experiments up to and including the results for the 1943 season in a bulletin titled *The Selection Experiment with Peruvian Tanguis Cotton*. It was reviewed favourably in *Nature*, and requests for copies came in from all parts of the world. The new methodology was adopted in some of the important cotton-growing countries, with local modifications.

From the farmers' point of view, the new Tanguis was a great success, and an enormous amount of seed was distributed in the planting season of 1943. It was heavy-yielding, with commercial characteristics acceptable to the industry, and it was free from hybrid unproductive types.

My reputation was made, and after that I could get anything I liked from my employers. I made one mistake: I should have left the cotton alone, or corrected it only for minor defects. Instead, I tried to put out a new cotton every year. None of these was better than SNA 242, although the latest, SNA 249, was highly resistant to *Verticillium* wilt.

Early in my contract, I had realised that the Agraria was a very casual and unpredictable body. So in 1943, in addition to my other work, I accepted an offer to become Professor of Animal Genetics to the Army Veterinary School. Although my Spanish was not very good, I did quite well. I was also appointed Technical Consultant to the Ministry of Agriculture, which entailed extensive travelling all over Peru. I wrote many memoranda for the Government, but I'm quite sure that none of them were ever read.

I conducted a series of manurial experiments in the Mantaro Valley at a height of 10,000 feet. There was a simultaneous deficiency of phosphorus and potash in the soils of the region. With phosphate alone, the yield of potatoes went up by 10 per cent. With potash alone, there was likewise an increase of 10 per cent. But with both phosphate and potash combined, the yield of potatoes went up 300 per cent.

The vegetation of the great Pampas de Junin consisted almost entirely of a stiff and unpalatable grass. The soil had an astronomical deficiency of phosphorus. I told the Government that in New Zealand, nearly a million tons of fertiliser was applied by plane to the upland mountain regions. There was plenty of low-grade phosphate in Peru for that country to do likewise, but nothing was ever done.

One day I went to the Ministry to collect my small honorarium, I was told that my name did not appear on the pay sheet. That was a polite way of dispensing with my services. However, this gave me more time for research and writing.

At the beginning of 1944, the owner of the Genetics Garden in Miraflores, one of the Directors of the Agraria, suddenly announced that he wanted his property back so that he could put a cinema on it. We lost much of our material. Naturally he got all our buildings for nothing.

For several months in the year the climate of Lima is damp, cold and occasionally drizzly. Erasmus suffered a lot from bronchitis, so I decided to buy some land in a drier and sunnier area, where we could build a weekend camping hut. As you travel along the central highway east from Lima, you leave behind the sunless drizzly climate and enter a zone with a perfect Mediterranean climate. Here, 25 miles from the city at a place called Nana, I bought about 14 acres.

The first task was to build a high wall around the property with a large entrance for the motorcar. The local building material consisted of sun-dried bricks called adobes, laid on a broad

concrete foundation. The adobes were made by a specialist called an adobero. He and an assistant dug a large hole in the ground, mixed the heavy clay soil with dried grass, puddled it well, put the resultant material into a standard mould, then laid the adobes on a flat piece of land to dry very slowly. When made properly, adobes are the best and cheapest building materials in the world. I paid the equivalent of five shillings a hundred.

When the wall was finished, we dug a well. The valley had a river running through it, and one could get water anywhere at a depth of 45 feet. The soil was more than five feet deep, and below this was gravel ranging in size from quite large boulders to coarse sand. The water was filtered through this, and was of magnificent quality. We lined the well with cement. At first we hauled water up with a bucket and rope, and later we installed an electric pump and storage tank. We built three rooms of adobe in the corner of the corallon—the enclosed walled area—and camped out every weekend. Erasmus's bronchitis began to improve.

Meanwhile, the Italian owner of our furnished house in Lima was anxious to repossess it, so I began to think that we should go on building rooms at Nana and live there permanently. I told the Italian that if he would get me a sufficient number of roof beams, I would vacate his house. This he did, and I entered on an orgy of building until I had 22 rooms. I then made another corallon, and built four more rooms in that.

The house was not finished until 1949. I employed a carpenter for nearly two years making cedar doors, window frames, and window shutters. The walls were coated inside and out with pure gypsum plaster, and the floors were covered with red, white and green tiles. We even built a Van Gogh room, a replica of the artist's room at Arles, France—walls pale violet, woodwork buttercup yellow, and red tile floor. We put electric lighting in all the rooms, installed showers and lavatories, and finally had—and still have—a supremely livable house.

The year 1943 marked my election to the Royal Society. The Fellowship meant little or nothing to my fellow countrymen in Peru. When the Ambassador was told about it he said, "I didn't know the fella painted", confusing it with the Royal Academy.

A local newspaper sent a reporter to interview me. I did not have a recent photograph, but gave him one taken 25 years previously. This was reproduced badly, with a caption translated as: "Time has naturally somewhat ravaged the lineaments of that noble countenance."

In April 1943, the selections in the Callao Station were producing such magnificent results that the Agraria gave a big party for the cotton growers and consumers. I was in high spirits. Whisky flowed like water. There was abundance of everything eatable and drinkable. All this cost a great deal of money, but as I have often said, nothing is too expensive to those who do not have to pay for it. Likewise, no task is too difficult for those who don't have to perform it.

Understandably, I drank too much whisky. When I got home, I sat in a chair feeling dazed. Erasmus said to Olive, "What's the matter with Daddy? He looks funny."

I knew quite well what was the matter with me—too much alcohol and too much smoking. I went to my doctor next day. My heart was missing beats, and I was not in good shape. He

advised me to cut down smoking and if possible to stop it altogether. I asked a bit ironically: "I suppose I should give up alcohol too." "A good idea," he said.

I went home, poured a bottle of whisky down the sink, and threw away my pipes and all my tobacco. From that day I have not smoked or taken any alcohol. I even refuse dishes in which wine has been used in the cooking.

In 1944 I made a long trip to northeast Brazil, to a large cotton plantation owned by Coates of Glasgow. A young Peruvian agronomist, Carlos Saettone, accompanied me. One stop was at Manaus, formerly the centre of the rubber-gathering industry. It had none of the glory of the boom days; the famous opera house was tawdry and badly in need of repair, and the whole town was down at heel.

There are people who believe that the Amazon basin could be a sort of breadbasket of the world—that it could grow enormous quantities of food and help to solve the world's food shortage. This belief has no foundation. The soils of the whole region are incredibly poor, acid and leached, once the forest canopy has been removed. They are deficient in phosphorus and nitrogen, and in many places subject to flooding. Small, isolated areas could grow rice, though not much. Iquitos and Manaus, as well as the smaller settlements, keep going on imported foods, mainly canned. The smaller settlements grow limited amounts of maize and yucca (cassava).

Henry Ford had a big scheme for growing rubber in this area, and shipped bulldozers and agricultural machinery direct from Detroit. A large area was cleared and planted in rubber. Unfortunately, the soil was little more than silicious sand. Several years later the trees were only a few feet high, and all were debilitated and attacked by the defoliating South American leaf disease, which had proved fatal to the development of a rubber industry in British Guiana. Some years later, the whole property was returned to the Brazilians for a small sum. This should be a lesson to industrialists who think a problem is engineering one when it is a biological one. You can't obey the rules of biology unless you know what they are.

Something similar occurred when the British Government fathered the groundnut scheme of Africa, which became the biggest flop since the South Sea Bubble. It failed only because it was planned by the wrong men, administered by the wrong men, and put in the wrong part of what may even be the wrong continent. It was an experiment primarily in applied plant physiology and genetics. And if you want to be successful in this sort of game must remember that the rules of biology come first and the rules of engineering and administration come second. The groundnut scheme was never considered from the point of view of its fundamental biological bases.

Iquitos, Manaus, and the scattered settlements along the Amazon were and still are mere trading posts, into which flow all the saleable products of the forest—skins of alligator, snake and jaguar, Brazil nuts, timber, birds, butterflies and monkeys. The Amazon is not being developed: it is being mined.

At a small village called Tefe, we walked on a patch of grass, and back at the hotel, my legs began itching intolerably. I knew the cause: the mite known in the West Indies as *bete rouge*. This is allied to the harvest mite of England, but can cause agony for days if not treated.

If your eyes were good, you could pick off the mites with a needle before they burrowed into the skin. Some, however, had already got in, so I made an ointment of sulphur and lard and rubbed it well in. That settled them; it will settle anything with eight legs.

When I saw Carlos, he was in a bad state. The *bete rouge* had invaded him in large numbers. His whole body was swollen and he had a high fever. I applied the ointment, and next morning he was somewhat better, but he did not fully recover for about three weeks.

When we got to Belem, we could not get two seats on the plane, so I sent Carlos ahead to wait for me in Natal. I spent a pleasant five days at the Grand Hotel in Belem. All towns of any size in Latin America have a Grand Hotel, though sometimes it is a Bristol or a Carlton.

In Natal, Mr King, the Director of the Plantation, met Carlos and me and drove us to the fazenda, about 150 miles in the interior. The villages resembled those of Portugal 200 years ago. Mrs King welcomed us heartily. We spent two weeks at the fazenda inspecting cotton, and I recovered part of the Portuguese which I had lost when I left Brazil.

My visit to this region resulted in an important discovery—a truly wild cotton in the mountains of this region, undoubtedly the prototype of the modern Upland cotton. I took seeds back to Peru and verified the fact that it was indeed an ancestral type of Upland.

While travelling in the surrounding region, I noted that it was similar in climate and vegetation to the arid regions of North Peru, where the algaroba tree was a valuable asset. When I returned to Peru, I sent a pound of seed to Mr King. I learned recently that there are now about three million algaroba trees in the region. It is a valuable tree, providing honey, charcoal, firewood, animal feed, and a pleasant alcoholic drink from the fruit.

It was with regret that I parted from the King family. They were charming people living in typically English style, in a country attractive for its dry and not too hot climate, and for the simplicity of its life.

Early in 1944 the Peruvian Government suddenly stopped the free conversion of sols into dollars. To pay their American employees, whose contracts were on a dollar basis, the large American concerns in Peru had to buy dollars at the unofficial rate. My contract was of this nature also, but the Agraria adopted the typical "aprovechar" approach.

The Spanish verb "aprovechar" means to extract the maximum personal benefit for one's family or oneself, legally or illegally, ethically or not ethically, from a given situation. This practise is acted on in Peru by everyone from the highest members of the aristocracy to the lowest peon.

In my case, the Agraria wanted me to accept payment in depreciated Peruvian currency. I declined to do this, and consequently got no salary for several months. Finally I received all arrears of salary in dollars.

In April 1945 I decided to take some of my accumulated leave, first to visit Olive's family in Trinidad, then go to the United States to talk with scientific colleagues. The war was still on, though the end was in sight.

To get to Trinidad, we had to fly across hundreds of miles of tropical forest, with no visible break in which to make an emergency landing. At our first stop, Caracas, Venezuela, I was struck by the amount of erosion. Square mile after square mile of forest had been destroyed. From a great altitude it looked as if rats had been chewing the edges of a large green carpet.

After waiting for several days in Caracas, we finally got to Trinidad, our first trip there in 10 years. The warmth of our reception was unbelievable; we met old friends and were entertained royally. I was treated as a sort of prodigal son. My father-in-law, Philip Atteck, welcomed his grandson from a world which he did not understand. He was the only man I ever met who could make a fire by rubbing two sticks together.

During my last week in Trinidad I noticed a lump about the size of a walnut just above my groin. I surmised that it was a hernia, but thought it was quite trivial. When we left and touched down in Martinique, sirens were shrieking and guns going off, signalling the end of the European phase of World War II. After stopping for a night in San Juan, Puerto Rico, we finally reached Miami. There we were herded into a room, and thermometers shoved into our mouths. The Army was still very much in charge, and Olive's Oriental appearance may have caused us to be suspect. We were interrogated by a woman officer who took a great fancy to Olive and Erasmus, and drove us all over Miami, looking at places of interest.

I found that Dr David Fairchild, who had visited me in St Vincent more than 20 years before, lived in Coconut Grove, not far from Miami. We called on him, and were invited to lunch and shown his garden, which had an extensive collection of tropical plants from all parts of the world. David had been the first Agricultural Explorer of the United States Department of Agriculture, and had introduced many valuable economic plants into that country, among them the avocado pear from Central America and the famous Deglet Noor date palm from Algeria. Large industries had resulted from the introduction of these and other economic plants. David was married to Marion Bell, the daughter of Alexander Graham Bell, the inventor of the telephone.

At the time of my visit, David was 84 years old. He was making inter-specific hybrids in the genus *Annona*, to which belonged many delicious tropical fruits, such as sugar apple, cherimoya, custard apple and soursop. He was also using some wild species for crossing, and Olive was able to help him by making a lot of crosses. David and I got on splendidly, and talked endlessly about plants.

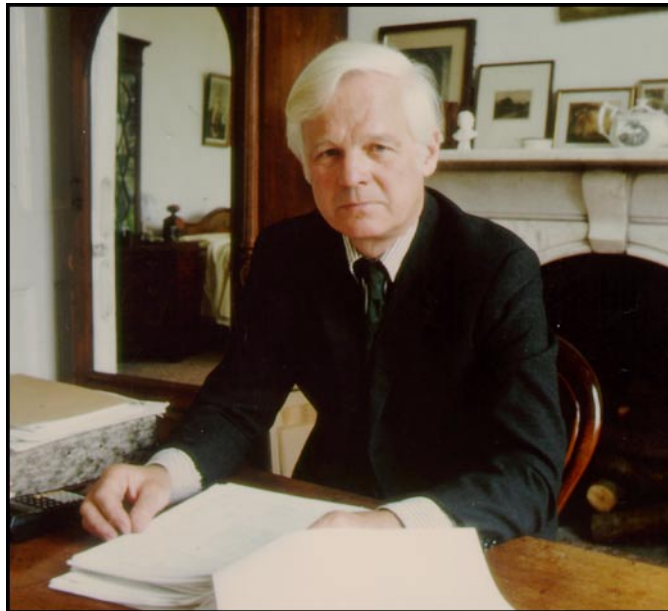
One day I mentioned to him that I had a lump in my groin that was getting bigger and causing me some pain. He was alarmed, and told me about a friend of his, who, through neglect of a similar condition, had died quickly of a strangulated hernia. He said that I should have an immediate operation, and arranged for my admittance to the Jackson Memorial Hospital in Miami to have it performed.

The anaesthetist, a competent woman doctor, plunged a big needle into the middle of my back, and I became completely paralysed from the waist down. I never saw the surgeon who performed the operation, which was followed by two weeks' recuperation in the hospital at the horrifying cost to me of 28 dollars a day. Olive got a couple of housekeeping rooms, and she and Erasmus came to see me every day.

I had a sudden desire to see England again, after five tragic years of war. We took a liner from Halifax, Nova Scotia on 30 June, and arrived in Glasgow on July 7th. Rationing was in force, and only one lump of sugar was allowed for a cup of tea.

We arrived back in Snainton to find little change, and spent from July to December enjoying the calm, peaceful orderly life. I studied egg production in White Leghorn hens using the very complete records of the local farmer. I made a visit to Bristol and stayed a few days with my daughter Margaret. She had by now graduated in Medicine, married a British research chemist, and had her first child. By chance, my son Richard was living in Bristol, and I was able to see him for the first time. We had a long talk. I asked him what he wanted to do, and he said he was working to get into Cambridge.

We talked mainly about literature, history and politics. The Labour Party had recently won the postwar election and was embarking on its programme of nationalising the basic industries. I and my socialist friends were enthusiastic supporters: we thought that the hour of socialism had come at last. I was surprised to find that Richard took a contrary view. He said that nationalisation would only create state monopolies which would exploit the public.



**Richard Lynn, the second son of Sydney Harland,
now a retired Professor of Psychology**

I was quite shocked, but thinking about it later, I reflected that Richard was adopting the same intellectually unfashionable stance that I had myself taken in my younger days. Socialist views were in the ascendancy, and now these in their turn were being questioned by a new generation of independent-minded young people.

Meanwhile, I wrote to the Agraria explaining that I could not get a passage, and offering to go on half pay until I was able to return. They agreed to this. Finally I succeeded in getting passages on the Johnson line from Sweden. We spent Christmas in Stockholm.

Bonnier, the animal geneticist, took me to a meeting of the Academy of Sciences and arranged a visit to Upsala. There we were met by Professor Turessen, the genetical ecologist. He took us to see the summer house of Linnaeus. It was a simple house in the heart of some beautiful country, with plain wood floors and tables scrubbed white by years of labour. I was enchanted with it. "I could work here," I said.

A young Swede with exquisite manners travelled with us on our way back to Peru. He was Mauritz Friis, the son of General Friis, Keeper of the King's Household. Mauritz was tired of Sweden and the Swedish climate. He was seeking the sun and was bound for Chile. We persuaded him that Peru was nicer, and he disembarked with us at Callao.

Mauritz immediately made himself at home, and through his diplomatic connections, he got to know all the Peruvian aristocratic families. He was tall and blue-eyed, and had the charm of the experienced diplomat, knowing to a hair's breadth how far he could exploit his surroundings. To watch him was good for me. He knew English, French and German, and soon learned Spanish.

We went straight to the house in Nana, and I immediately resumed my experiments, having been away for nine months.

About the middle of 1946, the Agraria was given notice to quit the Experiment Station in Callao. The Guano Company wanted it back. I was now in a position to be able to tell the Agraria that they could save themselves the trouble of looking for a new Station by renting mine. I had two large laboratories and three small ones, a dining room, and a kitchen to serve meals to the staff.

The Agraria Committee came out to inspect it, and were much impressed. They gave me a capital sum to install electricity, build a good wall around both fields, construct proper irrigation canals, and provide a storage tank and an electric pump for the well. They agreed to pay a fair rent, so I was in a unique position of being the Director an Experiment Station that I owned myself.

I was able to get plenty of labour from the district, and by September 1946, the Station was in full activity. Plots for cotton were properly laid out. The girls came by car from Lima every day, and enjoyed the climate and working conditions.

For me, Nana was marvelous. I no longer had to travel to work. I had my morning tea brought at 6.00 a.m., and by 6.30 I was out in the fields. If anything, the conditions were too good. I spent perhaps too much time in the field and too little time thinking and writing.

I had given Erasmus lessons every day, so that he could already read. I amplified the lessons, and taught him Latin and arithmetic (plenty of tables), history and English literature. He helped me with *Drosophila* experiments and devoted much time to reading the *Encyclopedia Britannica*. I made him learn a lot of poetry and prose by heart, and taught him singing, as he had a beautiful treble voice. He heard continuous good music, and would go round whistling Bach.

In the afternoon he went to his workshop, where he made all sorts of things, principally wooden revolvers. Every now and then he invited one of his friends to stay for a few days. This odd sort of schooling was almost ideal for him, so that when he finally went to prep school, his general knowledge was far greater than that of most other boys.

Early in 1948, when Erasmus was 12, he decided of his own accord that he wanted to go to school in England. Finally I got him admitted to Hawtrey's, a prep school with a good record for winning scholarships, from which boys went principally to Eton and Winchester.

The school was disastrous for him. No subject was taught in the way I thought it should be. Preparation was strictly for the Common Entrance Exam, and the whole syllabus was narrow. There was a lot of beating, and though Erasmus was not beaten, he was frightened. When he came home for holidays after three terms, he walked with head down and a shambling gait.

His accent was exquisite. He asked, "Where is my brosh (brush)?" But when he at last wrote in complete desperation, "Take me out of this dump," I immediately removed him from the school and consulted the Institute of Industrial Psychology in London. He was examined there, and pronounced to be highly intelligent but psychologically disturbed.

Through Gabbitas and Thring, the Educational Agents, I found another prep school called Ashford near Hayward's Heath in Sussex. Erasmus took his pet mouse with him, and from that time was reasonably happy. The question then arose: what public school to send him to? Rugby and Harrow offered him a place, but I decided on Bryanston, a school with good music and art, and with pretty good science and engineering, and a Greek theatre which the boys had built themselves.

Also there was no corporal punishment, a practise for which I have a great horror. If you beat a boy, he will hand on the violence to another boy, or the cat or dog. Also he will react against his parents. I think Erasmus was fairly happy at Bryanston, but his cultural pattern had been fixed in Nana, and he never became the typical English public school boy. Education should follow Herbert Spencer—that people should have the knowledge necessary for self-preservation.

We took leave from Peru again in 1948, arriving in Liverpool in June. Erasmus went back to school in September, and we remained in London. At that time, the BBC was greatly interested in the Lysenko controversy, and put on a programme about it with four speakers: J.B.S. Haldane, Sir Ronald Fisher, C.D. Darlington and myself. Haldane hedged; Fisher was dull; Darlington was his usual bright self. I thought that I, having met Lysenko, was the best of the four. Afterwards, I was besieged with calls from the BBC, and was invited to participate in the *Brain's Trust* program. I was asked to prepare 12 five-minute talks on genetics for the Overseas Service, and was lunched handsomely by two producers.

My performance on the *Brain's Trust* was not a success. I only remember one question: Why do men wear beards? I briefly blundered into the tactless comment that it was to scare women.

About that time I met William Dick, the editor of *Discovery*, the best popular scientific magazine in Britain. We became close friends, and later I often stayed at his house in South Woodford. He was erudite, but small and unimpressive in appearance. It is curious that mere poundage should be so strongly connected with success. If your height is only four feet six inches, you cannot become Prime Minister, or Chairman of the BBC.

I did not know that William Dick suffered from severe mental depression, and was surprised and deeply distressed when he took his own life a few years later.

Just after the BBC broadcast I was approached by a group of publishers to write a book called *Genetics for the Administrator*. I consented, but as I can never write a book to order, I later begged leave to withdraw.

I did another broadcast titled *Cabbages and Kings*. It was about elementary genetics, and I received many letters about it. One letter ran as follows: "My wife has blue eyes, I have one blue and one brown eye, my son has just been released from the police Station with two large black eyes. Please comment in detail."

I found out later that it was from Bon Edmonds, a professional joke writer from Hollywood, whom I had met some years previously. He told me that he kept a huge card catalogue of jokes, and could find one about any subject. He said that in a film such as one featuring the Marx Brothers, the wisecracks followed so quickly that the audience could laugh at only one joke out of every three. You were not intended to catch them all.

Returning to Peru late in 1948, I concentrated my attention on producing a strain of cotton that was resistant to the destructive *Verticillium* disease. This I accomplished, and wrote a comprehensive paper describing the methods followed and the results obtained.

My contract was due to expire at the end of 1949, and though the Agraria offered me a renewal, I had made up my mind to live in England again, to look after Erasmus and to "perambulate in the company of ingenious men."

This was perhaps an unwise move, as Erasmus's roots were in Peru and he would have enjoyed returning for the summer holidays. Later I did think we had done the right thing. Mind you, everything you do with children is usually wrong.

Another reason for my decision was that my relations with the Agraria were far from satisfactory. The initial jubilation aroused by the production of the vastly superior cotton had died down, and I thought that further improvement was possible only through improved agricultural methods, which the Agraria would not adopt.

I felt also that my freedom to do what I liked, when I liked, and how I liked had been greatly eroded. The Agraria was under new management, and many of my old friends had been replaced by a new lot who were apt to be very critical. During my absence, the Station was run by my sister-in-law Olga Atteck, who, although capable, was in no sense a substitute for myself, and there were accusations that the Station was very much of a family affair.

In June 1949, I applied for the post of Senior Lecturer in Genetics at Manchester University. I went over to see Eric Ashby, the Professor of Botany. He was a good scientist and an even better administrator. We got on well from the beginning, and I was offered the job, which was upgraded to that of Reader. I knew that perhaps the best job in a university was a Readership under a benevolent and understanding professor.

My appointment was to begin on the first of January 1950. I went back to Peru to round off my work and make arrangements for future work.

It is the law of Peru that an employee relinquishing his post is entitled to a month's pay for each year of service. The Chairman of the Agraria, an eminent lawyer who had made a lot of money from my cotton, explained carefully that as a foreigner under contract, I was not entitled to this benefit. I had come prepared for this, and said in what I hoped was impeccable Spanish: "Sir, with respect, I do not think you are entitled to overrule the Peruvian Constitution." Looking at his colleagues, the Chairman barked briefly, "We have to pay him." He knew from the beginning that they were obliged to, and after considerable delay, they paid.

I leased the Station to them for 10 years. Olga was to be in charge for the time being, and I was to pay a visit each summer to keep the work going. I did this for three years, but then found it impossible to continue. They asked me to recommend a new Director and said they would bind themselves to accept anybody I recommended.

However, they turned down two of my nominees. Finally, after three years, they appointed a new Director from the United States. I knew him to be entirely incompetent, and so he proved to be. When he left, the cotton was worse than when he began.

CHAPTER 16

MANCHESTER UNIVERSITY, 1950-1958

In early 1950 I took up my new post at the University of Manchester. I was to begin my ninth and last working life. What short memories people have, I thought. Only 12 years before, the case of *Harland v the Empire Cotton Growing Corporation* had occupied the High Court of Justice for three weeks and had been extensively reported in the press throughout the Commonwealth.

Shortly after my arrival, Professor Ashby put me in charge of the Experimental Grounds at The Firs and the Experimental Station at Jodrell Bank. The Firs was a very large garden, formerly the property of C.P. Scott, the Editor of the *Manchester Guardian*. It had a number of greenhouses—though obviously more were needed—and a limited amount of outdoor space.

Olive and I settled down in a tawdry flat in Withington, and I took to university life with great enthusiasm. Although I had had nothing to do with university life since holding the Chair of Botany and Genetics at the Imperial College of Tropical Agriculture 24 years previously, the new atmosphere was not strange to me. I had some advantages over the rest of the staff: I had been trained as a teacher; I liked teaching; I had taught pupils from three years of age to 23; and I knew how to grow plants, being a better gardener than anyone else in the academic or garden staff.

The Head Gardener at The Firs was accustomed to dealing with botanists who had no practical knowledge of horticulture. He occupied himself chiefly with growing ornamental plants for the decoration of University functions, and providing material for the practical classes. When he saw disagreeable changes following rapidly one after the other, he resigned.

I was too well aware that it was possible to get an Honours Degree in Botany without ever having grown a plant. This I thought wrong, and I proposed to do something about it. From what I could see, academic botany was pale and anaemic, and in no position to cope with the numerous problems awaiting it in the outside world.

The Manchester winter is notorious, and I had to learn afresh how to cope with it. It was cold, wet, sunless and cheerless. It was dark at four o'clock every afternoon, and sometimes all day, so that the whole university blazed with lights. On one occasion the electricity was cut, and the whole Botany Department was in darkness. One student, J.C. Skinner of Queensland, brought an acetylene bicycle lamp and continued working as usual. I admired his resourcefulness—which I found afterwards to be widespread among Australians—and knew he would go far. He is now probably the world's most distinguished expert in the breeding of sugarcane.

The only place where I felt comfortable was in the tropical greenhouse at The Firs, and even there the air was intensely polluted with sulphur dioxide. Acclimatisation was more difficult for Olive than for me. She was a tropical bird of paradise, who had had no experience of the prolonged English winter till she was 26 years old. It was hideous for her, but she stood it nobly and never complained.

Climate or no climate, I had to arrange my work. I planned to give one course of lectures on Elementary Genetics and another on Applied Genetics, the principles of plant and animal breeding. I also planned a laboratory course in Practical Genetics using *Drosophila* as experimental material.

I prepared my lectures with great care, taking up to eight hours to compose one of 50 minutes in length. On the whole, I think that relatively few staff members in University Science Departments have dedicated themselves to the art of lecturing.

I did not reach the zenith of perfection achieved by Graham Wallace, the great lecturer I had witnessed in my youth, though sometimes I thought I was near to it. To stimulate flagging interest by the students, I wrote little quotations on the blackboard, such as the very apt one by James Thurber: "It is better to know some of the questions than all of the answers." When I came to discuss the phenomenon of mutation, I quoted Shakespeare: "his humour was nothing but mutation, ay, and that from one bad thing to worse" (*Cymbeline* Act 4 Scene 2). Shakespeare was uncannily correct, for mutation often does work in this way.

At that time, there was much discussion regarding compulsory attendance at lectures. I told my students that my lectures contained information which they would not find in the books. After that, I had no trouble and found the students enthusiastic and cooperative.

My facilities for research in plant genetics were probably the best in the country, and were crying out to be used, so it was not long before numerous applications to work for a higher degree began to arrive. Ultimately I had postgraduate students from Australia, New Zealand, India, Pakistan, Ceylon, Burma and Egypt, as well as some of Manchester's own graduates, and those from other British universities.

The plants I selected for research were groundsel (*Seneca vulgaris*), strawberry, sweet pea, fuchsia, clover and some grasses. I selected groundsel because it had a short life history, enabling three generations a year to be grown—a sort of plant *Drosophila*. At one time I had a greenhouse full of groundsel, with over 100 different strains from countries as far apart as Iceland and Chile. One Vice-Chancellor introduced me as "the Groundsel King."

I chose strawberries because they were good to eat and they presented interesting evolutionary problems. By 1955 we were the foremost research centre in the world on this plant, and it was through the strawberry that I formed a lasting friendship with Henry Wallace, who had been Vice President of the United States during Franklin Roosevelt's third term of office. We got a large Government grant for strawberry research.

The fuchsia was chosen because it was very beautiful, and it grew well in the polluted air of Manchester. The sweet pea was my favourite flower, and my passion for it dated from my school days, when I made a hybrid in my school garden. In Manchester we worked principally on a hybrid between the sweet pea and the closely related mildew-resistant, small-flowered wild species, *Lathyrus hirsutus*.

We saw the possibility of creating an entirely new fruit by crossing the gooseberry and black current. This had already been done, but the vigorous and thornless hybrid was sterile. I thought

we could make the plants fertile by using colchicine to double the chromosome number. I devised this technique and used it successfully with cotton hybrids in Brazil.

Olive was in charge of this work. She made crosses and obtained the same sterile vigorous hybrids as were already known. These occasionally produced a seedless fruit twice the size of a blackcurrant. The flavour was mainly gooseberry, but with a trace of blackcurrant in the background. She was not successful in doubling the chromosome number; this was done later by my old friend Robert Knight of the East Malling Experiment Station. He not only got fertility, but was able to cross the hybrid back with the gooseberry.

Soon after I arrived at the University, Eric Ashby, the Professor of Botany, told me that he was leaving Manchester to become Vice-Chancellor of Queen's University, Belfast. I was so busy mapping out my research and preparing lectures that I did not think at all about who would be his successor. But one day, early in March, the Vice Chancellor, Sir John Stopford, came to my room and told me that the Senate Committee had decided to offer me the post.

I told him that I was very pleased to have been chosen, though I had not thought of applying. I said also that I did not know much about general botany, and that such things as mosses and lichens were a complete mystery to me. He said that the Committee was confident that I had all the qualifications necessary for the post, and that he himself knew that I liked young people.

The job carried a much larger salary than the Readership, but it was still less than half what I had been getting in Peru. I had to keep Erasmus at school, help to support my parents, and pay alimony to my ex-wife. However, one of the main attractions was that I should have a free hand with finance, and make some much-needed changes in the Department. I was 59 years old, perhaps too old for a chair, but I knew I could handle the job and would be happy in it.

The following appeared in *Nature* in March 25, 1950:

"Dr S.C. Harland, Reader in Genetics in the University of Manchester, has been appointed Harrison Professor of Botany and Director of the Laboratories and Experimental Grounds in succession to Professor Eric Ashby.... Dr Harland has had a distinguished career in economic botany and is one of the leading authorities in the world on plant genetics. Dr Harland's principal contributions to genetics have been made with the cotton plant, and his book, *The Genetics of Cotton*, is the standard work on the subject. His researches are remarkable for their boldness of approach and their relevance, not only to cotton breeders but also to plant geographers and experimental taxonomists. Dr Harland is an inspiring teacher and a man of wide interests, so it is a matter of great satisfaction that he has been called upon to maintain the high tradition of botany at the University of Manchester."

The staff welcomed my appointment, with only one exception I knew of. He was a lecturer whose main interest was a rather peculiar type of ecology. I was very sympathetic to my kind of ecology, but not to his. I felt that many published papers on the subject were not only of little significance but intellectually contemptible. In Trinidad we used to call ecology "bush physiology." There was, I think, a large escape movement into ecology when biology got too difficult.

Ecologists can point out that the environment is being crippled, but what can they *do* about it? The solution must come from other disciplines—bacteriology, biochemistry, colloid chemistry, soil science, geology, marine biology.

All over the world, cesspits are not working because detergents prevent decomposition. The air near highways is so impregnated with lead that vegetables contain dangerous doses. If you live near a river or lake, who is putting *what* into it? It isn't their lake or their river. If a million students made up their minds to get some of these things stopped, they could be a force to be reckoned with. Even a hundred students could do something.

Medicine, which includes human ecology—a science we know very little about—is in a most fascinating and spectacular stage of development. It is intellectually exacting to a far greater extent than conventional ecology. One can branch off into anything from control of pulse rate by autosuggestion, to parasites in children, to medical entomology, to nutrition, to human cytology and genetics. If I were a fetus I would leave myself for medical research.

In Manchester, I soon came to terms with my new status. There was a good deal of routine administration, but I had a very efficient secretary in Joyce Shore, who helped me to get through the chores with small effort. Joyce was Lancashire at its best—loyal, dedicated, hard-working, practical and completely selfless.

I also had a research assistant and secretary, Angela Haygarth-Jackson, who compiled bibliographies of the literature and helped in other ways. She was happy only if she had enough work for a long time ahead. I gave her a problem in the behavioural genetics of *Drosophila*, to determine whether, in the dark, the white-eyed mutant could find its way to food through a long glass tube more quickly than the normal red-eyed type. She discovered that it could. She also found that the hybrid was intermediate in behaviour between two parental types. For this pretty piece of work, she got her M.Sc. without difficulty.

To the non-scientific worker, this sort of work may seem silly and childish. It is neither, since it established that a mutant, which is in most respects at a disadvantage compared to the wild type, can sometimes show an advantage in a novel environment.

Once when I was lecturing, a student put up his hand. "Can I say something, Professor?" he asked. "Certainly," I said. "Well," he said, "if you don't mind me saying so, I think what you said just now is bunk." "Well," I said, "could you find the time to have a cup of tea with me this afternoon, and then we can talk about it." I took him to the best place in Manchester and gave him a magnificent tea, what is called in the north a knife and fork tea. We had a good discussion, and he went away satisfied.

One day while walking round the laboratory I saw a student cutting a section of a stem for microscopic examination of its structure. I said that this must be very interesting to him. He said it was terribly boring, but it had to be done because it was in the syllabus. This kind of botany was a hangover from the past, when vegetable remedies were a doctor's main stock in trade.

All first-year medical students had to take a course in Conventional Botany. Old customs die slowly, but I made up my mind that botany as such would have to go. I went to see the medical people, who wholeheartedly agreed. Then I got the Faculty Board to agree to the substitution of a course in Elementary Human Genetic Cytology and Evolution. I gave some lectures in this course, and the students used to stay behind and ask difficult questions. Many approached me later to tell me how useful they had found the course.

Students for the Honours Botany Course had to have at least two subjects at A Level of the School Certificate and a pass in mathematics at O Level. I believed that we were losing many first-rate botanists on account of this regulation, because I had known a number of good botanists who were mathematically almost blind. It was possible to be a good paleontologist (fossil botanist), taxonomist or plant pathologist without any knowledge of mathematics at all.

I brought this to the notice of the Faculty Board, and got their consent to eliminate mathematics from the entrance requirements. Professor James Lighthill, the eminent mathematician, said plaintively that he hoped the students would know their 12 times table. I was able to reassure him on this point.

One good thing about being back in England was that I was able to see more of old friends. One whom I valued highly was J.B.S. Haldane. I had known him from the spring of 1927, when I used to go pub crawling with him and his wife in the West End of London. On one occasion a man sitting near made a sneering remark about Mrs Haldane, who was talking in a loud and rather shrill voice. Without saying anything, Haldane walked over to the man, took him by the scruff of his neck and the seat of his trousers, and propelled him through the door into the street. Then he sat down again. "Do you think I did right?" he asked.

When Haldane was little agitated or excited, the first half of each sentence was spoken while breathing out, and the second half while breathing in. Although Haldane could be brusque and even rude if he was bored or irritated, he was, if anything, slightly deferential when he spoke to me.

I based my conclusions on what I thought was sound experiment, and hardly ever went in for speculation. When I upset one of his theories, he used almost to brag about it, rather as if he had done it himself. In conversation he could throw new light on almost any topic that arose. If you had him by himself, he would talk, but when his wife was there she tended to monopolise the conversation or even contradict him. I used to invite him to dine with me at the Savile Club, where, to please his wife, he politely drank rum when he would rather have had beer.

Once I was talking to Haldane about the characteristics needed by a man to become successful. I said that a man should have a good brain and a skin like a rhinoceros. He disagreed, saying that all a man needed was a brain like a rhinoceros.

He was almost tone deaf, and could just about distinguish between *God Save the King* and *Rule Britannia*. He thought that this attribute had probably been of advantage, as it enabled him to give more time to mathematics. He liked to say things to shock people. He published a book in which he stated that gas warfare was more humane than that conducted with ordinary weapons. At

the International Congress of Genetics held in Edinburgh in 1939 he said, in the hearing of some Germans, that he had enjoyed the First World War as it had enabled him to kill Germans.

Many thought he had no sense of humour. I disagreed; he had, but it was unlike anyone else's. I never heard him laugh out loud, and though at times he would make an attempt to smile graciously, it was rather an evanescent and flickering sort of performance. He never joked or told a dirty story. Towards women, with rare exceptions, he was exquisitely courteous.

I could not imagine him putting on the wide, wolfish or oafish grin popularised by the United States. This false bonhomie, which may have originated with Franklin Roosevelt, has now spread to almost every country in the world. The USSR held out for a long time, but their top men, except I think Gromyko, do grin. Many Chinese top men do not. I dislike this custom myself, and prefer to see a face in repose.

Professor Lionel Penrose of University College in London frequently acted as a buffer between Haldane and the outside world. A member of staff at the University complained that Haldane had called him an abominable liar. Could he bring a legal action against Haldane? Lionel thought not, but would tackle Haldane about it. He did so, telling Haldane that he should not speak to a colleague in this way. Haldane responded: "I shall make it a rule to call him an abominable liar only once a year."

At this time, doctors knew practically nothing about human genetics, although many of them thought they did. I once expressed the view to Haldane that the medical profession knew just enough genetics to be dangerous. "They don't yet," he said, "but they soon will."

Since then, the whole picture has changed. The medical profession is now intensely conscious of the importance of genetics, and many revolutionary discoveries have come from medical geneticists. Chromosomes now are household words. When the importance of chromosome abnormalities in man came to be realised, doctors had no technicians of their own to make chromosome preparations. They had to get them from the field of botany.

I last saw Haldane at the International Congress of Genetics in Holland, when he lectured on the subject "The Implications of Genetics for Human Society." This lecture contains some of the wisest things ever said about intelligence in various racial groups. Contributions on this question have mainly come from psychologists, whose credentials for the task are often dubious. It is not easy to be a good geneticist and a good psychologist at the same time. Haldane's view was that Africa, Latin America and the coloured population now living in European countries are reservoirs of human intelligence and capacities of unknown potential. This has always been my own view.

Almost as soon as I took up my work in Manchester, I was made a member of the Agricultural Research Council, for a term of five years. I was also put on several Royal Society Committees. This meant frequent visits to London.

I usually stayed with my friend Lionel Penrose, a scientific genius who was Professor of Human Genetics in the University of London. While I was still in Peru, I had corresponded with him on some questions of human genetics. Lionel succeeded Ronald Fisher as Galton Professor of

Eugenics at University College, but he disliked the term "eugenics" so much that, at his insistence, the title of his Chair was changed to that of Human Genetics. He worked on medical genetics, principally Down's syndrome, and on various aspects of mental deficiency. He was also interested in the genetics of variation in palm print patterns.

Penrose's hobby was the construction of intricate Chinese wooden puzzles, which were incredibly difficult to solve. He could picture them in three dimensions before making them. He was a good water colour artist and mathematician, and shared my enthusiasm for Mozart, whose music we always played before leaving the house in the morning.

The Agricultural Research Council allocated research grants and scholarships to postgraduate workers, and supervised the work of all the Research Stations maintained by Government funds. My membership was very useful. I was on a Committee that would visit a Station, report on its progress, and comment on lines of development. In this way I visited about a dozen different research institutes, where I had extensive talks with staff members about their research problems.

The Chairman of the Council was Lord Rothschild, who was at that time doing biological research at Cambridge. He was a good Chairman—bland, suave, and with a subtle sense of humour. He always had a box of Egyptian or Turkish cigarettes on the table in front of him, and smoked throughout the meetings.

For amusement, and knowing it was bad-mannered, I once said to Rothschild, "I suppose you are very rich?" He smiled and said, "Well, I can hardly call myself poor." He had an Aston Martin waiting outside the Lower Regent Street buildings where the meetings were held, and a house in Cambridge said to have cost 100,000 pounds. He seemed to be a highly intelligent and ambitious man who might in the future be of great service to the country.

Although I was the only member who had had practical experience in directing a Research Station, my knowledge was not made use of. No attempt was made to find out just what I did know, or—perhaps just as important—where my knowledge failed. I never had a chat with either the Chairman or the Secretary.

In one meeting, there was a discussion on the best way to dispose of the leafy tops of potatoes when the crop was reaped. The usual practise was to spray with sulphuric acid, a messy and expensive process. I pointed out that potato tops were an excellent fodder for dairy cattle, and were so used in Peru. This piece of information was received by the Committee with incredulity, although nobody could cite any instance of cattle being poisoned when they wandered into a potato field.

My membership in the Council was not a great success. I had been so long out of Britain that the mere technique of Committee work was a mystery to me. I knew nothing about the lobbying which always goes on behind the scenes. I had a foreign approach to things, and I had not quite got over my indignation complex. I was often rather intolerant and pesky, sticking to a point long after it should have been dropped.

So after five years of pretty hard work, my period of service for another five years was not renewed, and I retired with a formal letter of thanks from Lord Salisbury, the Lord President of the Privy Council.

As a member of the Council, I was given the privilege of buying tickets for myself and family for the Coronation Procession in 1953. Olive, my sister-in-law Olga, Erasmus and I got excellent seats not far from Buckingham Palace. We watched it through frequent rainstorms from beginning to end. The procession was indescribably spectacular. Here was royalty, with its self-conferred uniforms and decorations, and living in the fashion of the early 19th-century country squires, on display to millions of viewers throughout the world. Was all this necessary? I felt in the end that it was. Symbols were still needed.

On this occasion I received—in common with policemen, hospital matrons and numerous minor officials throughout the country—my only decoration, the Coronation Medal. I am still waiting for the magic words, "Orders and decorations will be worn", to use it.

When the Tercentenary Celebrations of the Royal Society took place some years later, the Duchess of Northumberland gave a tea party at her house in Surrey. Olive and I went, and sat next to the Duchess. She spoke in an easy and dignified way. One felt immediately her enormous personal charm, which I think is common in families which have purposely cultivated it for many generations. She said right away that she knew absolutely nothing about science, but said it in such a way as to imply that knowing science was merely a minor form of eccentricity, like a fondness for dominoes.

People at the party were divided into two groups, scientists and non-scientists. She belonged to the latter group, and that was that. When we got on to the subject of gardening, she talked well. Gardening is a subject which brings social classes in Britain near to each other. We are a nation of shopkeeping gardeners.

In 1953 I became President of the Genetical Society for a period of three years. My impact on the Society was probably negligible, but I put forward two ideas which have since been adopted—that the Society should have its own journal, and that an annual Mendel Lecture should be given by some eminent geneticist.

During the early 1950s, I made a number of visits to Cambridge, and on several of these I had lunch or dinner with my son Richard. He had won a scholarship to King's College and was an undergraduate at this time. He had started off by reading history, but became dissatisfied with this and was considering switching to psychology. I encouraged him to do so, for I saw in psychology the potential of an exciting young science, much as was genetics when I first entered it. He did make the switch, and has made his career in the field.

In the mid-1950s, Erasmus also went up to Cambridge, to St John's College, to read medicine. With two sons at Cambridge, I reflected that the family had come a long way from the two-up and two-down cottage in which I had been born in Snainton.

At Manchester University, I was asked to write a chapter on "Genetics and the World's Food" for a book called *Four Thousand Million Mouths*. Sometimes I am a bit slack about doing things that have to be done. I kept putting it off, and when the date arrived for the manuscript to be received, I hadn't begun it. The editor wrote to say that he could only give me two more days. So I got up at 4.00 a.m. and made a large pot of strong coffee before I began to write. I wrote continuously for 12 hours, taking a bit of benzedrine now and again. I did not have to correct one single line. Of course we cannot work like that every day. I suppose the chapter was already written in my mind for several years. It is a great thing to know something as well as the 12 times table.

When the book came out, a party was given at the House of Lords in order to present the book to Lord Boyd Orr, who had been the first Director-General of the Food and Agriculture Organisation of the United Nations. He was a craggy and splendid granitic figure. I was given the task of presenting the book to him and making a speech. Unlike the chapter, I prepared it well in advance.

Manchester University conferred Honorary Degrees every year on a number of deserving people, and members of the Faculty Senate were asked to recommend candidates. I advanced the name of Dr Lawrence Balls, who was well known in Lancashire for his pioneer work on cotton in Egypt. He was accepted for the Honorary Degree of Doctor of Science. The orator asked me to provide him with a little local colour which he could use in the presentation. I told him that at over 70 years of age, Dr Ball was still using the dress suit he had worn as an undergraduate at Cambridge. It had faded to a shade of greenish-black—which did not show by artificial light—but otherwise it was a truly magnificent tribute to English tailoring, and to Balls's metabolic inability to put on weight.

Balls gave a lecture after the ceremony, in which he criticised the proposal for the new Aswan Dam in Egypt. He predicted that the dam would be a disaster, as it would raise the level of the water table. This would result in less space for the roots of agricultural crops, especially cotton, and would reduce the yield. Also there would be no more of the annual deposit of fertilising Nile mud. His predictions have come true.

The following year, I put forward the name of another candidate, Sir Ronald Aylmer Fisher, the geneticist and statistician. He was Professor of Genetics and Master of Caius College, Cambridge, and was an international figure.

I had known Fisher since 1927, when he was Chief Statistician at the Rothampsted Experimental Station in Hertfordshire, and was revolutionising the techniques of agricultural experimentation. He was a vindictive and prickly man, who made enemies without hesitation; his comments on his colleagues were extremely biting.

He put forward a new Theory of Dominance, and this interested me because I had data from cotton which supported his theory. Haldane had come up with an alternative theory. When I wrote up the cotton story, I summarised the results by saying that both theories were correct, and sent a copy of the paper to Fisher. He responded that he was not at all flattered by my having referred to the Haldane and Fisher Effects in that order. It should have been the other way around, as the

so-called Haldane Effect was merely an obvious extension of the Fisher effect. I wrote back and said he should be grateful to me for having spent several years trying to confirm or disprove his theory, a thing which nobody else had done.

I remember sitting in Fisher's room late at night, listening to a discussion between him and a distinguished astrophysicist on the subject of whether the universe was an open or closed system. This went on until long after midnight. Finally the astrophysicist said that he would not be able to tolerate a closed universe, as it would give him claustrophobia.



**Sir Ronald Aylmer Fisher (1890-1962), statistician and biometrician, and originator of the theory of the origin of dominance, which suggested that mutant genes are inherently neither strictly dominant nor strictly recessive.
He is considered one of the fathers of modern statistics.**

I did not know that I should have canvassed around for support for the Honorary Degree for Fisher, and much to my disappointment, he was not selected. This created trouble for me, because I had mentioned it to him some months previously, and the suggestion had delighted him. He had invited me to Cambridge to attend the Annual Banquet of the College, and had made a great fuss of me.

Fisher must have blamed me for the rejection, as he never spoke to me again. Some years later I met him in Canberra, Australia, at a University reception given in his honour. He looked straight through me as if I were a stranger.

CHAPTER 17

LAST YEARS, 1958-1982

I retired in 1958 and left Manchester, never to return. I bought a house at Blackheath in South London, and we lived there for the next five years. In the early 1950s I had been elected to the Athenaeum (Club), and went there quite often. So at last, after fighting the Establishment for so many years, I joined it.

My chief crony at the Athenaeum was R. Ruggles Gates, who had been a friend for many years. He had done a lot of good work in genetics, and was the world expert on the genetic mechanisms responsible for hairy ears in man.

From time to time I used to have lunch at the Athenaeum with my son Richard, who had become a Lecturer in Psychology at the University of Exeter. It was at this time that I began to know him well. He was like me in a number of ways. My chief intellectual strength has always been my ability to discern from a vast number of facts the few that are significant, then to store them in memory and synthesise them into coherent wholes. Richard had the same ability.

By the early 1960s, Erasmus had completed his medical training at Guy's Hospital in London and taken a job as a Doctor in Uganda. Erasmus is one of the most civilised persons I know. This may be because I educated himself until he was 12.

There was now less to keep us in England, and we remembered the wonderful climate of Peru. In 1963 we gave up the Blackheath house and returned to our small estate at Nana outside Lima. Olive's sister had stayed on and looked after the place.

We spent the next seven years in Peru. I resumed my former life, looking after my small farm and experimenting generally. I made rose hybrids and put into effect some new ideas about corn and sweet potatoes.

I published a paper on the genetics of the New World cottons in 1970 when I was aged 79. This will almost certainly be my last utterance on this question, the one to which I devoted more than 50 years.

At Nana we could grow 60 different species of food plants, and were largely self-sufficient. Indeed, the study of plants and animals is one of the things which help to keep one sane.

I began an environment project: how to survive on seven acres of irrigated land. We grew all our own vegetables and fruits. I sowed two acres of hybrid corn and one of beans, planted hill rice and cherry tomato—a wild type magnificent for tomato juice—and transplanted Barbados Cherry trees (richest in vitamin C). I drank my own coffee, and ground wheat to make whole wheat flour.

After devoting some thought to the problem of meat production, I found the most satisfactory solution to be the guinea pig, which can be easily kept in pits, and breeds fast. The best

way of cooking it is by stewing. We had about 50 guinea pigs, 70 rabbits and some Japanese quails. They begin to lay at two months, and can lay 200 eggs a year.

The climate was marvelous—like an English summer on its best behavior. It was foggy till about 8.30 a.m., and then the sun would come out.

But towards the end of the 1960s, the economic and social climate of Peru began to undergo a marked deterioration. Inflation was rampant, crime and lawlessness were rising.

Lima was slowly dying. Hundreds of thousands of peasants left the sierra and began living in shacks round the city. There was not much work or much food. Peru ceased to be a happy place in which to spend one's old age. The climate, my house and farm became the only attractive things.

The Government of daft generals was almost impossible to tolerate, and foreign residents had a tough time. After 1970, we did not stay in Peru the whole year, but traveled often to England and other countries.

The Government generally left us alone, but it was quite unpredictable. One new regulation was that if you had a few uncultivated acres, the land could be expropriated. I began to feel increasingly the call of the moors and dales of the North Riding. In 1975 we left Peru for the last time, and returned permanently to our house in Snainton.

To my prejudiced mind England is the only civilised country in Europe. When we arrived at Gatwick from Uganda there was a notice, "If you have nothing to declare, this way." They trusted you. When I was stuck in Cornwall with no money, the Ticket Office man lent me some. Where in Europe can you find this sort of behavior? It is curious that the English phrase "fair play" cannot be translated into any other language.



**A retired Sydney and Olive Harland,
outside their house in Snainton, Yorkshire**

At my age it doesn't matter much where one is, as long as one is physically comfortable. It is nice living in a house 270 years old. I have a highly scientific diet, and my eyesight and hearing are very good, although I don't take enough exercise. When the weather is good, I go to the greenhouse to get on with some research.

My inner mental life is very rich. I read a lot—more slowly and carefully than in the past, but I am still learning. I sleep well at night, and as long as my environment is stable, I am happy and tranquil—no longer ambitious, and relatively free from the seven deadly sins.

In old age I contemplate with some astonishment the different careers, abilities and temperaments of my five children. I always wanted to be a doctor, and even at the age of 45 I contemplated resigning my job and taking up medicine. But I never had the money. So I did the next best thing: I put two children through Medical School.

My elder daughter Margaret emigrated to the United States with her husband Ben Millard, and became a pediatrician in Maine. My son Erasmus has worked as a doctor in Africa, Saudi Arabia, the West Indies and England.

My second daughter Elizabeth studied at the Royal College of Art and became a designer and painter. She married a printer, Thomas Large, who ran a family printing business in Newcastle-upon-Tyne. My son George DeLairre went to New York and became a designer, beginning with airplanes. He has several inventions to his credit. My son Richard Lynn became Professor of Psychology at the University of Ulster.

Among them, my children gave me 18 grandchildren. So far I have three great-grandchildren—the grand old man of the tribe.

Now all my children and grandchildren have completed the transition into the wider world. None of them speaks with any trace of the North Riding accent which I myself have never lost. They have joined the ranks of the rootless professional class. They are spread out over the globe, and so, in many different locations, the Harland genes are winging their way to eternity.

* * *

Sydney Harland died, as he predicted, in the North Riding on 8 November 1982, and was buried in the churchyard at Snainton.

GENETICS AND THE WORLD'S FOOD

**By Sydney C. Harland, 1951
(edited version)**

Since the dawn of history man has been an ardent student of the plants and animals which form part of his environment. He learned, through long and often painful experiment, which plants were good for food, and which—such as tea, coffee, or tobacco—possessed unusual or attractive physiological properties.

All primitive peoples are biologists. They possess a staggering amount of knowledge about their plants and animals, and any new plant which they encounter will undergo a battery of tests. Can it be eaten or used to prepare a drink, preferably alcoholic? Has it any medicinal value for man or animals? Can it be used to poison anything you want poisoned?

In time, man turned from hunter and seeker of wild food plants to cultivator of the ground. He had already explored the dietary possibilities of several thousands of plants, and he now began, consciously and unconsciously, to domesticate many of them. He did this by applying the principles of applied genetics, and by using methods which are still used today.

He used Mendelism as M. Jourdain used prose—without knowing that he was using it—and changed many plants so drastically that the original species from which they were derived are not known. This is true, for example, of maize, which seems to have been domesticated in Peru or Bolivia, perhaps more than 4,000 years ago.

Let us first consider what primitive man did to domesticate a few thousand plants out of the several hundred thousand species available to him. He brought home edible tubers and seeds—some inside him—and made great heaps of refuse outside the door, which constituted a completely new type of ecological niche, enormously rich in nitrogen, phosphorus, and potassium. These heaps were colonized by the discarded tubers and seeds of some of his wild food plants and by rapidly growing weeds capable of using this kind of soil. It is fairly clear that some crop plants—e.g., potato, tomato, and maize—originated from what E.G. Anderson called "dung-heap superweeds."

Mendel himself wrote that "our cultivated plants are members of varied hybrid series, whose further development in conformity with law is varied and interrupted by frequent crossings inter se. . . Cultivated plants are mostly grown in numbers and close together, affording the most favourable conditions for reciprocal fertilisation between the varieties present and the species itself."

When a plant was recognized as useful, it would spread over wide areas, and there would arise the opportunity for extensive hybridization not only within the species, but also within new species. New types would result from such hybrids, adapted to new ecological niches, and new crop plants would arise.

If we wish to create new and more valuable plant forms, we cannot do better than follow nature. We know how some of the cultivated plants reached their present perfection. We may

streamline the process. It is likely that many wild plants could be improved and thus be incorporated into the human diet, but except in rare instances, such plants would not have an advantage over those already cultivated.

The historic example of the domestication of a wild plant is the sugar-beet. More than a hundred years ago Louis Vilmorin of France worked on the selection of the sugar-beet for high sugar content. He threw the beets into a strong solution of brine and observed how they reacted. Most of them floated, but the sinkers were of greater specific gravity and presumably of higher sugar content. In 1851 chemistry had gotten so far that sugar content could be determined by chemical analysis, and was found to vary between 7 and 14 per cent.

Selection for high sugar content has continued ever since. Crosses have been made on a large scale with other wild species in the genus, and also with the ordinary red garden beet. In California a cold-tolerant variety can be planted in October and reaped in May or June. New methods are still being used to increase the already high sugar content, and to increase resistance to various diseases.

The plant breeder never reaches a point at which he can say that it isn't worth while working on the plant any more. However many improvements have been made, there are always others made possible by new methods, and made necessary by new demands from industry.

But perhaps more possibilities for the future lie in the further improvement of plants which are at present only half-tamed. One example of a plant which early man did partly domesticate, and which has been rendered vastly more useful by the plant breeder, is the lupin. The European lupin has for centuries been used as a forage plant for sheep. The seeds contain a poisonous alkaloid which has hitherto prevented its use as a human food. In Germany and the USSR it has been found possible to breed alkaloid-free varieties by selection, making a new source of high-quality vegetable protein for animal and human consumption.

Another species of lupin, *Lupinus mutabilis*, is grown at high altitudes in Peru and used as a human but not an animal food. It is rather like wheat. The seeds also contain a poisonous principle, but the pre-Incas learned to wash the poison out by treatment with running water for a few days. It is then very palatable, and contains more than 40 per cent of good protein. The European alkaloid-free lupin could be used over an area of several million acres in the Andean region. It is highly productive, and will grow well on poor soils almost up to snow line. It would enable the sheep-carrying capacity of large areas of the region to be at least doubled.

The production of a cactus without spines by Luther Burbank, the American plant breeder, was a valuable first step in the domestication of the cacti. This group is one which responds rapidly to selection, and improved varieties would be of great use in the arid regions of the world where little else will grow. Some are already known in Mexico and Peru.

We come next to what may be called multipurpose plants, of which a good example is the cotton plant. Cotton is grown primarily for the convoluted cellulose hairs that spring from the seed coat. The seeds used to be thrown away as useless, but it was then discovered that a valuable oil could be extracted from them and that the residue was a useful protein food for most animals.

The amount of oil in the seed varies a good deal according to the species and variety. American Upland cotton ordinarily has about 15-16 per cent, and Peruvian Tanguis about 18-20 per cent. While working in Peru in the 1940s, the writer began to select for high oil content and succeeded in producing a new variety with 29.4 per cent of oil. This relatively simple selection experiment puts cotton into the category of a first-class oil plant. The quality and quantity of the fibre are unaffected. So when other countries such as Egypt, the USA, and India go over to high-oil varieties, cotton looks to become the world's most valuable oil plant.

It has been shown in the USA that maize can be selected for high oil and high protein content. In the future, all our agricultural plants will have to be chemically streamlined. Good amino-acids will be increased and toxic compounds reduced or eliminated. The vitamin content of most fruits and vegetables will be doubled or trebled. The palatability and nutritive value of forage plants will be augmented. There are hardly any limits to what can be done by breeding plants to engineering specifications.

The high-altitude maize of Peru has a stem so rich in sugar that children chew the stem as Negro children chew sugarcane in the West Indies. Here, then, if we need it, is a new sugar plant, which for many areas may be potentially better than the sugar-beet, or even sugarcane.

Another way of making already existing cultivated plants more useful is to widen the climatic conditions under which they can be grown. The cultivation of outdoor tomatoes in this country is at present limited to favoured parts of the south of England. Until quite recently, tomatoes were not regarded as an outdoor crop at all. Breeding for cold resistance has given us some valuable and productive outdoor tomatoes. Now a considerable northward extension of the tomato area is possible.

The writer once made a hybrid between the wild tomato of the coastal area of Peru and an American cultivated variety. The second generation of the cross was grown in Peru at an altitude of 10,300 feet. The plants showed enormous diversity. Some had fruits only as big as small cherries; others had fruits weighing 500 grammes or more. The plot was left through two winters. Three years later, plants which had undergone more than 10 degrees of frost in two successive years were still flourishing—the basis of frost-proof varieties.

We see, then, that plants can be genetically moulded to be suitable for new ecological niches. Is it possible to grow the soya bean in England? If so, it would be a crop of the greatest importance for human and animal food and for industry. Many attempts have been made to acclimatize the soya bean, but although some progress has been made, the problem has not yet been solved. Many people believe that it cannot be done. But no practical breeder of long experience would deny the possibility of successful acclimatization.

So far, a few varieties of soya bean have been introduced and subjected to experiment on a small scale. It is, however, necessary to introduce hundreds of varieties from every part of the known geographical range—from China to Peru—and also all the possible wild species with which the soya bean may cross. The next step is to make hybrids on a gigantic scale, and cross everything with everything else. Then begin in the south of France and plant the whole hybrid mixture at

intervals of 50 miles in a northerly direction as far as the latitude of south Sweden. Study the morphology and physiology of the crop at each locality and find the point at which the crop begins to be climatically maladapted. At that geographic point, make more hybrids with the best types, give the material time to settle down, then slowly move north again.

It would be a good thing also to grow the whole heterogeneous collection of soya beans in constant-temperature chambers and reduce the temperature half a degree every generation. It is not known what degree of adaptation to cold weather would emerge. But every geneticist knows that experimentation on a less ambitious scale will achieve little or nothing.

Some other countries have done this sort of large-scale work, though not always with the right point of view. But whenever spectacular success has resulted, it has come through precise and specific objectives using very large populations. E. Baur in Germany worked on the transfer of resistance to *Phylloxera* and mildew from the wild American grape to the European grape. He worked with millions of seedlings.

Almost every cultivated crop has a bibliography running into several thousand titles on the work which breeders have done. A survey of wheat literature shows that this plant is not one which is being made continually more and more productive by selection. There exists, rather, an "Alice" situation in which you have to run very hard to keep in the same place.

The best-known and most destructive diseases of wheat are the rusts, which are for ever seeking a new ecological niche in which to spread. We find that large numbers of biological races of rust exist, each of which has a specific power of infecting different varieties. A particular variety of wheat may be either susceptible, partially resistant, or nearly immune to a single race of rust. But the rust may change to a new race, causing the whole wheat crop over a wide area to suffer catastrophic damage. So the pathologist who helps the breeder must keep an eye on all the races of rust, and by means of observation over a whole continent. He must observe whether a new, virulent race has made its appearance, and what modifications of the breeding program are necessary to counteract it.

The fight between the host and the parasite is never-ending, and some geneticists believe that some day there may occur a new race of rust which will attack all varieties, and against which the breeder may be powerless. Not long ago a new race of black stem rust made its appearance in Peru and crippled wheat-growing on the coast for many years.

Some workers hold that the yield of wheat in Great Britain either cannot be increased, or that further improvement would be so slight as not to be worth while. It seems likely, however, that an increase of the order of 20 per cent could be obtained. If the straw were strengthened sufficiently to stand much heavier doses of nitrogen, the yield could be immediately increased. The view that breeding for yield had reached its limit was widely held about maize before the growing of hybrid maize became widespread.

The weakest point about wheat as a crop compared, say, with maize, is the fact that it is a mostly self-fertilized and thus it is highly homogeneous. A good deal of the purity demanded by the industry is probably unnecessary. As O.H. Frankel says: "Purity is concerned with characters which

are readily seen, but often are of little significance. Its excessive pursuit absorbs energies, delays progress and deludes the breeder and the farmer as to the real merits of crop varieties. I suspect that often it is little more than a commercial convenience."

Cross-fertilized plants such as maize or rye are more efficient biological machines than self-fertilized plants such as wheat. The amount of genetical variability in a maize crop is so high that it doesn't, so to speak, *pay* a fungus disease to mutate in order to attack it widely. We therefore hear far less about epidemic disease in maize than in wheat. If it could be done, it would probably be a good thing in the long run to convert wheat into a cross-fertilized plant. But no existing research institution that I know of has the opportunity to do this sort of work. Quick economic results are demanded, and most attention is therefore given to "trouble curing."

The synthesis of what are virtually new species has fascinating possibilities for the future. We have seen it happen in the past, in the case of bread wheat, and we now know that the commercial cottons of the New World originated from hybrids of wild Asiatic and wild New World cottons. Can we imitate the accidental products of nature and make new species? The answer to this question is in the affirmative. It is possible to cross the radish and the cabbage, double the chromosome number, and get a new genus called *Raphanobrassica*. The result, however, does not seem much more than a curiosity.

But a new plant has been produced in Sweden by crossing wheat and rye and then doubling the chromosome number. This "wheat-rye", now called *triticale*, has all the characters of a new species, and if it can be further improved, it may be an important addition to the world's food crops. In the USSR and the USA, crosses of wheat have been made with some grasses such as *Agropyron* (couch grass) and *Aegilops* (goat grass). It is now clear that all sorts of wide crosses are possible in the grasses. Sugarcane, for example, will cross with maize, bamboo, and sorghum.

Among all the possible methods of increasing yield, there is one which is invariably a colossal success wherever it can be adopted: that is the utilization of the hybrid vigour which results from the crossing of inbred strains or of commercial varieties of somewhat different origins. All our vegetatively reproduced crops such as potatoes, raspberries, strawberries, and many fruit trees have this hybrid vigour. That is one reason why seedlings from them are usually inferior to the parent variety.

The plant in which hybrid vigour has been most used on a commercial scale is maize. Crosses between selected uniform inbred strains extracted from highly heterogeneous commercial varieties can give up to 25 per cent increase in yield over the most productive of these commercial varieties. Hybrid maize has been developed most successfully in the USA, and it is estimated that through its use, about 700 million more bushels of maize per year are being produced. This is certainly the most brilliant and impressive practical contribution which genetical science has so far made to agriculture.

Those of us who are in the game feel that we are just in the initial stages of the application of hybrid vigour to a large number of crops. At present it is possible to apply it to the tomato, some forest trees, sorghum, sunflower, cotton, onion, sugar-beet, clover, and lucerne (alfalfa), to mention

some of the more important crops. Cocoa, rubber, coconuts, and oil palms will probably be added to this list before long.

During the writing of this chapter I have become a little more optimistic than I was when I began it, though I am more than a bit frightened to reflect on the things that idiot children can do with boxes of matches in rooms full of high explosive.

The world's food supply has gotten dangerously low. What can applied genetics do to increase it, both quantitatively and qualitatively? We are all peddling our remedies for the desperate plight of mankind. But I think that we biologists could do a great deal more than we are allowed to do, if we were given an environment in which creative work could flourish. But almost any biologist will tell you that he does not have such an environment, and he is prepared to tell you why.

AFTERWORD

"I am of course very disappointed in a way that you have decided to quit Science for Journalism," Sydney C. Harland wrote to me in 1970. "It is, however, *your life* to make of it what you can. I think that writing as a profession is precarious. You will be right in the middle of a dog fight to the end of your life, and it will be difficult to lead a civilised life. . . . My own feeling is that it is not an intellectual challenge."

It was a typical paragraph—blunt, opinionated, cajoling, and well-intentioned—from one of the dozens of letters I received from my grandfather, in a correspondence that spanned more than 15 years.

As the result of my parents' emigration to the United States in 1949, I grew up without aunts, uncles, cousins or grandparents. The only relative who visited often enough to form a lasting bond was Grandpa, a world traveler who would occasionally drop in, perhaps on his way to South America, Africa, or some remote island.

I got to know him better in 1972, when I spent six weeks with him and my step-grandmother Olive Harland at Cliff Grange, their ancient stone house in the village of Snainton, Yorkshire.

In person, he was short of stature, somewhat frail in appearance, and rather reserved in temperament. He walked with a mild limp, and he spoke in raspy voice with a distinctly professorial tone.

He was a curious blend of contradictions—an intellectual who loved to read Sexton Blake detective stories in Spanish; a passionate gardener who developed many new food plants, but did not know how to cook; a man who designed his own buildings, yet was baffled by the task of repairing a broken window.

The house was in great disrepair, and its one indispensable room was the kitchen, where an imposing Aga coal-burning stove burned day and night, kept hot enough so that you could boil a kettle or bake a pie at any time. It spread a warm glow through the entire downstairs, a much-needed touch of comfort against the dankness that enveloped the house even in August. My morning ritual was to shovel out and dispose of the ashes, and refill the stove with fresh coal from the scuttle.

It was the summer of the Munich Olympics and the Fischer-Spassky world championship chess match. Even so, Grandpa seemed to spend an inordinate amount of time watching television. The rest of the day he devoted to reading books and newspapers, walking in the garden, and making occasional cultural excursions by bus. If he had any ambition left in him, he never revealed it.

In our long discussions in the kitchen, he lobbied for his private causes, railed against the foibles of others, and invariably softened his remarks with a gentle humor. While watching people singing on television, he excoriated them for unnecessarily moving their heads. If anything in the house was lost or misplaced, he explained it with his "Law of the Perversity of Inanimate Objects: When you put something down, it will sprout legs and walk away."

Growing philosophical one day, he noted that only two things in life were really important—what you chose for a profession, and who you married. He elaborated by saying that you couldn't be too choosy with a mate, because if you wanted someone who was just more intelligent than average, it would cut down your available choices to one in two, and if you wanted someone who was also healthier than average, and better looking than average, the odds would be reduced to one in eight, and so on.

He was a generous spirit: during my stay, he never asked me to pay for anything, and he didn't have a single unkind word about his embittered ex-wife, my grandmother Emily Harland, whom I had just visited. But neither did he give unearned praise. When I played what I thought was a pretty good performance on the harmonica, he asked if I usually did it without mistakes, adding: "It's like the curate's egg—good in parts."

The next year, while in Peru, he wrote to me that he had started his autobiography. He mentioned it several times in subsequent letters, saying with some pride that he had completed 70,000 words. But he later admitted: "Inspiration is lacking. I always find an excuse to go and work in the greenhouse." After that, I heard no more about the project.

Upon his death, he left behind a manuscript of 80,000 words. It was, in fact, a first draft—marred by repetition, pomposity, name-dropping, excessive details about academic qualifications, and much information that seemed dated or simply uninteresting. But it was clear that there was a good story buried under the layers.

In preparing the present edition, I mercilessly stripped it down to 60,000 words, bearing in mind the axiom he liked to quote from Vavilov: "Without criticism there can be no progress." Next, I added several thousand words from his letters to give a sharper picture of his later years. Then I fact-checked the text as thoroughly as time allowed. Finally, I collected some family photos, supplemented them with historic photos and maps from other sources, and added an essay to the end, condensed from one of the hundreds of articles and papers that he published in his lifetime. The result, I believe, is the kind of book my grandfather would have completed himself, with the assistance of any competent editor.

Sydney Harland was a product of his time. He grew up in an age when the British Empire and Commonwealth encompassed one-fifth of the Earth's surface, and every young Englishman with talent and determination, regardless of his economic status, had an opportunity to seek power and riches.

Grandpa once wrote to me: "I wish you would get involved with a real man's job—one which will stretch both your mental and moral faculties to the elastic limit." That, rather than money or fame, was his lifelong goal, and in most respects he achieved it.

Today, Sydney Harland is largely a forgotten man. His contemporaries J.B.S. Haldane, Nikolai Vavilov, and Ronald Fisher, who regarded him as a peer, have since grown in stature to historical figures, while Harland's name has receded to a mere footnote, or at best a fleeting mention, in most genetics texts.

Perhaps this is inevitable for a scientist whose most important work remains beyond the understanding of all except other scientists. But viewed as a whole man, and as a perceptive observer of the world, Harland remains an intriguing figure.

It is my hope that the current interest in genetic engineering will lead to something of a Harland revival, and that people who never heard of Sydney Harland will read this account of his life, and benefit from his wisdom.

Max Millard
San Francisco, California
August 2000
e-mail: sunreport@aol.com

END OF BOOK

**Copyright 2001 by Erasmus Harland, Richard Lynn,
Margaret Harland Millard and Max Millard
All Rights Reserved**