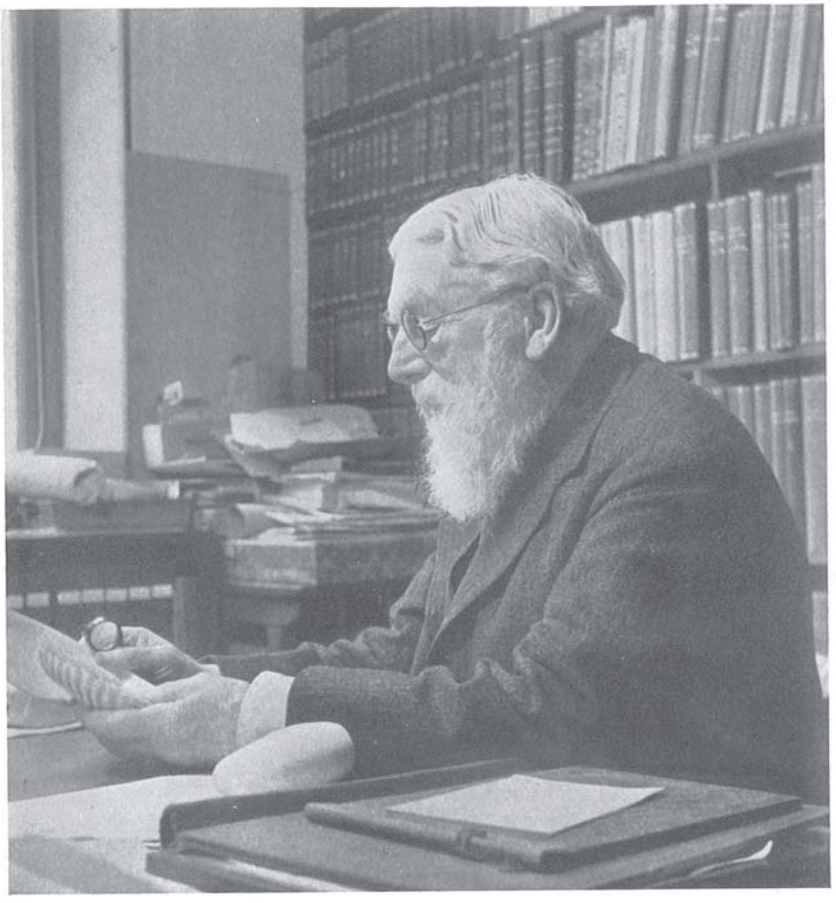
D'ARCY WENTWORTH THOMPSON

The Scholar-Naturalist

1860-1948



D'Arcy W. Thompson

D'ARCY WENTWORTH THOMPSON

The Scholar-Naturalist

1860–1948

BY HIS DAUGHTER

RUTH D'ARCY THOMPSON

With a Postscript by

P. B. MEDAWAR

LONDON

OXFORD UNIVERSITY PRESS

NEW YORK TORONTO

1958

Oxford University Press, Amen House, London E.C.4

GLASGOW NEW YORK TORONTO MELBOURNE WELLINGTON
BOMBAY CALCUTTA MADRAS KARACHI KUALA LUMPUR
CAPE TOWN IBADAN NAIROBI ACCRA

PRINTED IN GREAT BRITAIN
AT THE UNIVERSITY PRESS, OXFORD
BY CHARLES BATEY, PRINTER TO THE UNIVERSITY

To

MOLLY & BARBARA

with my love

FOREWORD

INNUMERABLE friends have helped me in the writing of my father's life; I cannot name them but I am grateful to each one. I should like to thank the following in particular: Professor P. B. Medawar for his valuable and critical essay on *Growth and Form*, without which the book would have lacked any scientific appreciation of my father's work; Sir James Gray for tracing old Cambridge photographs; the late Dr. James B. Salmond for corrections and emendations in Chapter V; Mr. G. H. Bushnell, Librarian of St. Andrews University, whose Bibliography has been invaluable to me; Dr. W. M. Dickie for permission to use the photograph of the staff of University College, Dundee; Mr. Michael Graham for much help with Chapter VII; Miss Mary Arnold for reading both manuscript and proofs and for making the Index; the Librarian of Cambridge University Library for permission to consult old numbers of the *Cambridge Review*; Mrs. Björn Soldan for permission to use the photograph taken by her late husband as a frontispiece; Emeritus Professor A. D. Peacock, D'Arcy's 'friend and colleague but especially friend', for advice, help, and encouragement over a long period of years; my cousins, Miss Clem Clark Stanton and Dr. J. H. C. Dunlop, for helping, the one with the history of the Gamgee family, the other with the character of our grandfather, D'Arcy Wentworth Thompson (the Elder); last but not least, my sisters, for supplying many missing pieces in the background of my memory, and for revising the manuscript. Finally I acknowledge my debt to the late Dr. Clifford Dobell and the late Dr. W. T. Calman whose Obituaries of my father written for the Royal Society and the Royal Society of Edinburgh respectively I have used freely.

R. D. T.

Edinburgh 1958

CONTENTS

CONTENTS

APPENDIXES

LIST OF ILLUSTRATIONS

I

BACKGROUND AND BEGINNINGS

Youth, what man's age is like to be doth show;
We may our ends by our beginnings know.

JOHN DENHAM

The Thompsons of Maryport
Joseph Gamgee, The Father of the Veterinary Profession
Childhood and early influences

D'ARCY WENTWORTH THOMPSON (the Younger) was born on the 2nd of May 1860, at 3 Brandon Street, Edinburgh, the only child of D'Arcy Wentworth Thompson (the Elder) and Fanny Gamgee. His inheritance came from both sides of his parentage; from his father he took his love of the classics and his scholarship; from his mother's family came his scientific gifts, his originality, and his touch of genius. Both families were poor in this world's goods, but neither of them was lacking in riches of the mind nor yet in physical beauty, and of each he inherited his full share.

The Thompsons came from Cumberland, from the harbour town of Maryport, where their Scandinavian forebears had settled generations earlier. They had kept the characteristics of their race—their blue eyes, red hair, finely proportioned limbs, and great height, while temperamentally they remained adventurous, self-willed, and sturdy, responding generation after generation to the challenge of a seafaring life. The tradition of the family was that all the menfolk went to sea, but none came home to die; it was in this tradition that in the early days of the eighteenth century William Thompson, master mariner, plied his little ship up and down the English coast and across to

Ireland; it was in this tradition that his son, also William, went farther afield and sailed to the China seas, bringing home fragile Chinese plates and tea caddies and gold lacquer cabinets with which to decorate his old house up the cobbled High Street; and it was in this tradition that both of D'Arcy's half-brothers lost their lives, one in a yachting tragedy in the west of Ireland, and the other commanding his own schooner in the Pacific.

Other strands were brought into the fabric of the family by intermarriage with the Skeltons in Cumberland—intelligent, sensitive, passionate people with a great appreciation of beauty —and enabled D'Arcy to trace a common ancestry with John Skelton, tutor to Henry the Eighth and later poet laureate, a cheerful, vital, full-blooded man and scholar who, for all his scholarship and his monk's calling, was not unmoved by femininity.

Into this rich stock there came a vital inheritance from yet another Cumberland family when in 1828 John Skelton Thompson married Mary Mitchell, a woman of outstanding wit and intelligence, who had been a friend of Hartley Coleridge and other Lake poets, and who had the gift of eloquence which is said to belong to the people of the Fells and Lakes. And with this last link the stage was set for the appearance of the first character of importance in this story—D'Arcy Wentworth Thompson (the Elder).

Maryport was for many years a busy place, but after the Napoleonic Wars its prosperity waned and bad times set in for the owners of small ships, and in the year of his marriage John Skelton Thompson was forced to take a contract for transporting convicts to Van Dieman's Land rather than see his ship 'rotting in harbour without employment'. His bride sailed with him in the *Georgiana*, of which he was master and part owner, and which was indeed the only home they were ever to know. The *Georgiana* carried a crew of forty men and boys and, as guard for the prisoners, a detachment of the 40th Regiment. The officer in command of the detachment was accompanied by his wife and sister. On 17th April 1829, within sight of Van Dieman's Land, the master's young wife gave birth to a son,

and glad indeed she must have been to see the shore. They had sailed for ninety days before even reaching the Cape of Good Hope, encountering storms and heavy gales; and during the rest of the voyage prisoners had fallen sick and died, sailors had run amok and attacked each other with knives, and the little company on board had endured both anxiety and discomfort.

Once the prisoners were disembarked and the prisons dismantled the master prepared to sail to Sydney, and there came on board as passenger a certain Captain D'Arcy Wentworth of the 63rd Regiment. He was connected with the Wentworth Woodhouse family in Yorkshire whose ancestor Thomas Wentworth, 1st Earl of Strafford, was executed by Charles I. Some younger members of the house had emigrated in 1791 to New South Wales, where they filled many important posts and greatly distinguished themselves. The young man was present at the baby's christening, and offered to stand sponsor for him and give him his name; and so my grandfather came to be called D'Arcy Wentworth.

The *Georgiana* did not reach home again until another two years had elapsed, by which time the Thompsons had a second son; shortly after, on a voyage to the West Indies, John Skelton Thompson died of sunstroke. His ship was sold and his widow eventually settled in Brussels, where the younger boy, James, went to school, and my grandfather spent his holidays. He had been sent to Christ's Hospital. His entry there is best described in his own words; it was the beginning of that 'dreary, weary boyhood' which made him so sympathetic to youth ever afterwards.

I was not quite seven and a half years old, when my dear Mother was presented with a free admission for myself, her eldest son, to the Grammar School of St. Edward [*i.e. Christ's Hospital*]. The offer was too valuable a one to admit of refusal. I was accordingly prepared for admission to my new home, by having my hair somewhat closely shorn, and by being clothed in a long, blue gown, not of itself ungraceful, but opening in front so as to disclose the ridiculous spectacle of knee-breeched, yellow-stockinged legs. After some laughter at my disguise, and much weeping at my banishment,

I said goodbye to my dear Mother. We little thought at the time that school was to be my home for twelve long years.

Sometimes he passed his holidays in Cumberland, where he would spend his days climbing or walking on the cliffs, usually alone and always hatless, which was considered a very eccentric habit. He had a great love of birds and animals and could attract them to him; on his cliff walks he would imitate a donkey braying and from far and near the grazing animals would gather round. He was looked upon as odd by his Maryport relations, with his love of books and scholarly studies and his quaint sense of humour which went curiously with his serious turn of mind.

At the end of his nineteenth year he went to Trinity College, Cambridge, with a scholarship in Classics, later moving to Pembroke College; he gained a medal for Latin Verse at the age of twenty and passed out sixth in the first class in the classical Tripos in 1852. Like many scholars he coveted a fellowship at his own College, and a story runs that he was not allowed to enter his name as a candidate on the ground that he had once appeared in chapel in his dressing gown, an eccentric, irreverent, undergraduate prank which accorded ill with his devout later life. Disappointed of the final honour at Cambridge, as his son was also to be disappointed a generation later, he considered the church and then the bar as offering attractive alternative scope for his gifts of scholarship and eloquence. Whether these were seriously considered or not we do not know; for the choice in the end was governed by necessity. The family had no funds for further study—his mother had parted with almost the last of her meagre resources in order to buy a grand piano for her favourite younger son who promised, and later proved, to be a pianist of no mean merit; so D'Arcy the Elder came to take up an appointment as Classical Master at the Edinburgh Academy, whither he went full of enthusiasm and new ideas to begin his years of experiment in the teaching of Greek and Latin.

Among his early pupils was Robert Louis Stevenson, who recalled the fact in 1885 by writing the Scots poem 'Their Laureate to an Academy Class Dinner Club', beginning with

the words 'Dear Thamson Class', but there does not seem to have been any special sympathy between master and pupil, and D'Arcy the Elder could barely remember R. L. S. as a boy. Sympathy he did, however, extend to others—and he became a teacher who fired imagination and commanded much affection, respect, and admiration from his pupils if not from those in authority over him, some of whom certainly distrusted his unorthodox methods and his disturbing, rebellious intelligence. Andrew Lang also belonged to his class and later paid tribute in the following words: 'One can never say how much one owes to a schoolmaster who was a friend of literature, who kept a houseful of books, and who was himself a graceful scholar and an author, when he chose to write, of poetic and humorous genius.'

In his full stature in early manhood he is revealed in the book he wrote and published in 1863 under the title *Day-Dreams of a Schoolmaster*. Here he stands out as a rebel against the dull, unimaginative scholastic grind, the discipline of which often had to be enforced by physical punishment which he found equally abhorrent. He was a firm believer in teaching the classics by what is known as the direct method. 'If', he wrote, 'by the adoption of a *viva voce* conversational method in elementary classes, a pupil once got a natural unconscious grip of Latin, style and polish would follow easily enough. . . . I should teach Latin and Greek as though I were not in the least afraid of them; as though there were no especial linguistic secrets wrapped within their mantle; as though they were simple, honest, straightforward languages like the one spoken without conscious effort by our own street ragamuffins.' Most of his views on education were revolutionary; many have since become widely adopted; he was for instance an ardent advocate of higher education for women. The book, in its original edition, is perhaps of value mainly to those whose interest is education, and especially to those who are fascinated by the technique of teaching, for D'Arcy the Elder by now was obviously heart and soul a teacher, and was to remain so for the rest of his life. Yet much of it also reveals the mind and character of the man

himself; much of it touches on intimacies that have little to do with school life; and one man, on reading the book, wrote that he 'felt the presence of a rare and noble spirit, and there was exquisite pleasure in the contact with one who could express with so tender a touch the light and shade of life'. Versatile in mind—mathematics came as easily to him as the humanities—he was as lucid in exposition as he was human in feeling. Such was the man whom Mary Mitchell had borne to the last of several generations of sea captains, in whom her spark had kindled the flame of scholarship, and who found his final haven in the quiet waters of academic life.

Six years after he came to Edinburgh, in 1858, he made the acquaintance of and fell in love with, Fanny, youngest daughter of Joseph Gamgee, a veterinary surgeon, called in his old age 'The Father of the Veterinary Profession'.

Of the Gamgee family nothing is known before the end of the seventeenth century when the name appears for the first time in the village of Elmdon, in Essex. It is believed that the first Gamgee came from the north of France, possibly from a village there called Gamache, and that he came to England at the time of the Huguenot persecution. Certain it is that there was a Joseph Gamgee born in Elmdon about 1720, and that the family (the only one of the name) has remained there ever since. For two hundred years the men were called by biblical names such as Joseph, Samuel, or John, and there was a deeply religious strain in their make-up. My great-grandfather—also named Joseph—was born in 1801; his mother, one of a large family from the nearby village of Hadstock, was the only woman in the neighbourhood who could read and write, and after the early death of her husband—a skilled craftsman and wheelwright—she became the postmistress in Elmdon. Joseph Gamgee maintained that it was through this remarkable woman that the touch of genius came into the family. Her two sons were brought up by their Gamgee grandfather who was foreman of a big farm. This man had a great love of living creatures and an instinctive gift for healing their ills, and he taught Joseph to use his eyes and his mind, and 'by his practical applications

and observances on nature was the inspiring spirit' of his youth. The boy grew up among horses and at nine years old was already earning his keep and working thirteen hours a day; he eventually found work in the Hertfordshire (Puckeridge) Hunt, where the Head Huntsman brought him to the notice of the M.F.H., Mr. Sampson Hanbury, a wealthy brewer, who was impressed by his wonderful horsemanship and handling of horses. Mr. Hanbury later recommended him to Prince Petrullo who had big estates in Sicily and wanted an Englishman to care for his hunters and race-horses. Joseph never forgot this kind act and acknowledged it by calling his eldest son Joseph Sampson after his benefactor.

In 1820 on the 2nd of May (a significant date in his life now and hereafter, as he liked to say in later years), he rode through Essex to Dover where he waited three days for a fair wind to carry him over to France. In Paris he had to have his horses shod and he found a farrier by the name of Boulay who had been with Napoleon all through his campaigns and had shod the Emperor's horses. This man had a technique different from anything Gamgee had seen in England, and he noticed that the horses stood up to the arduous travel across the Alps in a way impossible had they been shod in English fashion. Upon this topic he thought long and deeply; indeed it was to become his life's work and that in which he made his name.

Those were lawless days in southern Italy and during his sojourn there Gamgee had several adventures with brigands; once in the execution of an important mission he barely escaped with his life. He worked for Prince Petrullo for two years and became his trusted and lifelong friend, only leaving him in order to return home and enter the London Veterinary College of St. Pancras as a student of veterinary surgery. So as to keep his savings for his studies he returned home on foot, arriving in London after several weeks' continuous walking.

Gamgee had made full use of all his opportunities in Italy; he had learnt the continental farriers' methods, had studied new uses of physics and medicinal oils, and had learned to speak and read Italian fluently. With his practical knowledge and

scientific ability he soon became a favourite student of Mr. Coleman, the Principal of the College, and through him attended lectures at the Royal Institution by many eminent men, among them Brand, the chemist, and his then assistant, Michael Faraday, whose father was a master farrier. When the authorities gave him his Diploma in 1823 they told him that no student had come up under more disadvantages of early education and none had passed with greater distinction.

But Gamgee left the College dissatisfied with the work there, and critical of the methods of teaching that turned out young men as veterinary surgeons without practical knowledge of the farrier's art. He maintained that theoretical knowledge of anatomy was not enough for a man dealing with the prevalent evil of lameness which led at that time to 'more wastage of fine horses in this country than in any other on the continent'. In years to come he attacked the teaching of the School again and again, blaming his old teacher Professor Coleman for 'ruthlessly destroying the empirical knowledge of the old master farriers', and substituting for it false notions causing 'lameness, which damages and destroys more horses than all other diseases put together to which they are liable'. This was the problem to which he devoted his life and he lived to see his views and methods accepted everywhere in spite of great opposition by the profession. At the end of his life Joseph Gamgee was able to write: 'There are no more lame horses!'

Gamgee went back to Italy in 1828, taking with him his bride, Mary-Ann West from Honiton in Devon. After a year in Leghorn they settled in Florence where there was a considerable colony of English families; the British Minister, John, Lord Burghersh, kept a pack of hounds and the Marquis of Normanby instituted horse-racing and owned a racing stable. Gamgee himself possessed a beautiful Arab horse and made a special study of the breed. He built up a considerable practice which extended as far as Pisa and Leghorn, and included such clients as Victor Emmanuel, King of Piedmont, the Duke of Savoy, and the Marquise of Pamparra. Travelling to England constantly he visited the various horse-markets and the stables of well-known

breeders, among whom was Sir Tatton Sykes of Sledmere whose bloodstock owed much to his supervision. On these visits Gamgee bought fine horses to take back to Italy, riding them himself in convoy over the Alps.

Life in Florence was very pleasant, for the Gamgees were received by all the notable Florentine burghers. They lived in various apartments in the city, and latterly in the Palazzo Corsi, the most magnificent of the old palaces on the Via Tornabuoni. The children grew up in a cosmopolitan atmosphere, and the two elder boys were sent off to travel in Switzerland and Germany before settling down to their studies, Joseph Sampson in medicine at London and John in veterinary surgery at Lyons.

In 1848 revolution swept over Italy and Gamgee's practice declined; this, coupled with the fact that by now both boys were in England, made him decide to leave Florence and start afresh at home, and he took a house in Bloomsbury. Under the door-knockers 'Ring also' was often inscribed; 'What a common name *Ringalso* is in England', said one daughter to another! The girls were unhappy in the change of climate; the way of life was very different, with little music and no gaiety.

When John Gamgee was appointed to a Lectureship in the Edinburgh Veterinary College the family moved north to be with him. In 1858 he opened the New Edinburgh Veterinary College, an institution under his own direction—where he was joined by his father, who lectured and demonstrated on the Principles and Practice of Farriery. Joseph Gamgee at the same time started a horse infirmary at 206 West Rose Street where he turned part of a coach-house into a private dissecting room, and where he worked on the subject of all others that interested him, the diseases of the horse's foot. He visited tan-yards, breweries, and farms, wherever the big horses worked and died, and brought back the limbs and feet to dissect and examine.

A year later, in 1859, D'Arcy Thompson (the Elder) and Fanny Gamgee were married, shortly after my grandmother's twentieth birthday. They spent their honeymoon in a cottage on Loch Long in Argyllshire, with two maids to look after them and a Gamgee sister to keep them company! They

returned to 3 Brandon Street, Edinburgh, where for some time past my grandfather, with the help of one of the Maryport aunts, had run one of the boarding houses for the Academy.

Fanny brought with her the sunshine and gaiety of youth, but alas! for a twelvemonth only, for a week after my father's birth she died of puerperal fever, the appalling scourge of the time. In *Day-Dreams of a Schoolmaster* her young husband wrote of her death in poignant words.

> And once upon a time, Reader—a long, long time ago—I knew a schoolmaster; and that schoolmaster had a wife. And she was young, and fair, and learned; like that princess-pupil of old Ascham; fair and learned as Sydney's sister, Pembroke's mother. And her voice was ever soft, gentle, and low, Reader: an excellent thing in woman. And her fingers were quick at needlework, and nimble in all a housewife's cunning. And she could draw sweet music from the ivory board; and sweeter, stranger music from the dull life of her schoolmaster husband. And she was slow of heart to understand mischief, but her feet ran swift to do good. And she was simple with the simplicity of girlhood, and wise with the wisdom that cometh only from the Lord,—cometh only to the children of the Kingdom. And her sweet, young life was as a Morning Hymn, sung by child voices to rich organ-music. Time shall throw his dart at Death, ere Death has slain such another.
>
> For she died, Reader: a long, long while ago. And I stood once by her grave; her green grave, not far from dear Dunedin. Died, Reader: for all she was so fair and young, and learned, and simple, and good. And I am told it made a great difference to that schoolmaster.

For many months after my grandmother's early death my grandfather was completely broken in mind and health; he was barely able to continue his work, much less to look after his tiny baby, so my father was taken home by the Gamgee grandparents to 70 Lauriston Place. And now his unmarried aunt, Clementina, only twenty-five years old, devoted herself to bringing him up; in her he knew all the love and care of the most tender mother, and in return she had from him the devotion of a son. He called her Pam, and his dear Pam and the

grandparents were the background and the home of his childhood. As soon as he could walk his grandmother took him to church to be christened. 'I'll call him after his Father', she said, 'that cannot hurt anyone.' So D'Arcy Wentworth he too became, but Dadu was what he called himself.

The one house to which D'Arcy the Elder used to go night after night in his bereavement was that of his intimate friend P. G. Tait, who had been a fellow student with him in Cambridge, and was now Professor of Natural Philosophy in the University of Edinburgh. There he found sympathy and understanding. By degrees he came through the darkness of his sorrow and began to find joy in his little child; he wrote a book of rhymes for him called *Nursery Nonsense*, and the verses, dedicated to 'my Baby-Boy, my own Dadu' and illustrated by Charles Bennet, were found in every nursery in Edinburgh for many a long day. They had a merry jingling lilt and a whimsical turn of humour such as characterized all his writings.

A VERY ODD FISH

Granny and I with dear Dadu,
Went rambling on the shore;
With pebbles smooth and cockleshells
We fill'd his pinafore.

Beneath the stones and in the pool
We found, to our delight,
Shrimps, periwinkles, and a most
Voracious appetite.

Several of the rhymes are about a cockatoo; this was a bird which had belonged to my grandfather for many years, but it became so jealous of Dadu that it had to be given away. The child loved it and was greatly upset at its departure; ever afterwards parrots and cockatoos were objects of his deep affection.

Dadu began to learn a few works of Latin from his father almost as soon as he could speak, so that the language lived for him from the beginning; his pronunciation was like the Italian spoken in Tuscany, which gave it a richness of sound that is absent from present-day usage.

These were difficult days for D'Arcy the Elder, for, as more and more he went his own way in his methods of teaching and refusal to use corporal punishment, less and less was he understood or approved of. At last, successful in his application for the Chair of Greek in Queen's College, Galway, he left Edinburgh when Dadu was thrêe years of age. In the same year his *Day-Dreams of a Schoolmaster* was published, and this 'plea for the sympathetic teaching of the ancient languages . . . and passionate defence of the dignity of the schoolmaster's calling' was dedicated in Latin to the child whose scholarship was to emulate his own, and whose poetical prose was to be moulded on the style of this very book. Within its pages are these words: 'My fondest and most humble hope is that my boy may one day be a scholar and a devout and enthusiastic student of the poet' (by which he meant the author of the Odyssey).

By now the Gamgees had moved to 27 Alva Street, where they remained for the rest of Joseph Gamgee's life, and there Dadu had a little nursery looking out on to a back green. In it were to be found his rocking horse, a Noah's Ark, a little tin yacht with its pilot tied to the mast, and a china tea-service, the teapot of which still exists although it is close on a hundred years old. There was also a 'most wonderful top—while spinning it all broke to bits, and you had a dozen tops instead of one all spinning on the floor'. After his fifth birthday he was taken out of petticoats, given a knicker-bocker suit, and sent to Mr. Oliphant's school in Charlotte Square. He read easily by this age and could print very neatly between double lines. At five and a half he wrote to his father: 'Dear Papa Why did you not come and see us. I hope you are well Aunt Polly sent you a very nice book. We shall send it by post. I go to school and on Friday I was Dux. I give you my love and a kiss Dadu October 8.'

When he was six years old he had whooping cough and was very ill indeed—so much so that Pam never left him day or night, for his life was in great danger.

The beloved Aunt Pam was a young woman of character, courageous, optimistic, and generous. She was remarkably

gifted, as were all the Gamgee brothers and sisters, and her languages, her piano-playing, and the charm of her slightly foreign manner made a deep impression on the Edinburgh society in which she moved. She spent her life for her family, working for them in health, nursing them in sickness, and they all turned to her whenever they needed help. She had a gift for teaching, and generations of young people owed their love of Italian and their skill as pianists to her instruction and inspiration. She was upright in carriage, dark in colouring, and her large round eyes glowed with a peculiar and arresting intensity.

She loved pretty clothes and bonnets with feathers and flowers; she usually wore several brooches and rings and a heavy gold bracelet. I remember her in old age wearing little lace caps with bows of violet-coloured velvet ribbon, and handmade shoes of Russian leather; she wore a reticule of black satin and out of doors walked with a tall umbrella or a parasol, or in winter carried a little sealskin muff with a purse on the inside.

In the summer of 1866 Dadu won his first prize as dux of his class and Aunt Pam gave him a tool-box. He was not allowed to go to school the following autumn after a bad attack of bronchitis, from which he suffered all his life, but a tutor came daily for an hour to teach him, and his lessons advanced rapidly, geography being his favourite subject. He devoured all the books he could lay hands on, and when his father sent him a present of money he bought *The Boy's Own Book of Natural History*. By this time he had read *Sandford and Merton*, *Alfred in India*, *Paul and Virginia*, *Elizabeth or The Exiles of Siberia*, *Gascoigne or The Sandalwood Traders*, and *Ungava* (his favourite) for the second time, but being an active child as well as a reader, he mentions in one letter to his father how he is able to walk to Granton and Leith with his Uncle Arthur, a distance of about six miles.

At Mr. Oliphant's school there was a young master, B. H. Hossack, of whom Dadu wrote later with

very deep affection. He was a big, burly red-bearded Orkney man, redolent of the open air; his brother was a well-known and popular sea-captain and why our man was teaching school I never knew. . . .

As a labour of love, and as no part whatsoever of the school routine, he took us small boys into the country Saturday after Saturday, for all day long. We collected plants here, there, and everywhere, filled our little vasculums with them, and brought them into School on Mondays, where (but only after other work was done) we spent a happy hour with them. Hossack was a very competent botanist, and had learned his botany in the good old systematic way of John Hutton Balfour, or 'Woody Fibre' as half Scotland called him. He taught us the common English names of the plants, very seldom the Latin ones; and in the field he kept his eyes open, and opened ours, not only to plants, but to bird and beast and creeping thing. . . . We learned what the bee was doing in the flower and what the ant-people were doing under the stone. For many of us it was all a play, and nothing more, but those were memorable days for others, and they set my course in life for me.

At school he also learnt to play an old-fashioned game with cherry-stones which was called 'papes', the Scots word for 'pips'. The children laid the papes between their second and third fingers and shot them into a little hole scooped in the playground beside the wall, and the winner was entitled to a share of the loser's papes for extra shots.

One of the friends who is often mentioned in his letters is Jack Tait, the son of P. G. Tait. He writes: 'I went for a long walk with Jack Tait on Wednesday and took tea at his house', and years after, Edith Tait (Mrs. Reid) said: 'He used to come to tea as neat as could be, but Gus and Willie would set upon him, and ruffle his tidy hair until he looked as if his aunt wouldn't know him, but he never got cross.'

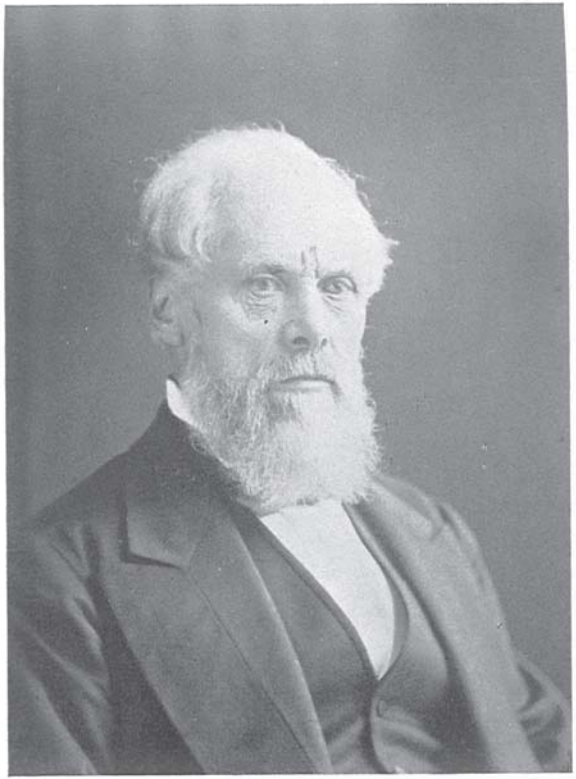
During these early years in Alva Street Arthur Gamgee, the youngest of the family, lived with his parents and took his medical degree at the University, later becoming assistant to Professor Maclagen of the Chair of Medical Jurisprudence. Once when they were studying poisons in the department Arthur brought home a poisonous cobra and it was kept in a box in the little drawing-room. One day to everyone's horror the snake was missing, and Dadu was forbidden to enter the room. After many hours it was discovered lying along the wainscot in the hall, which was papered with an imitation

marble effect of streaky green and yellow against which it had lain unnoticed. Whether the child was frightened by this occurrence or not, it was a fact that the only living creature that Dadu disliked all his life and could hardly bear to look at was a snake.

About the same time Arthur contracted typhoid fever from the bad drains in Alva Street, and Dadu was packed off to stay with a Belgian dancing master, Monsieur Vueghs, who was a friend of the family and lived in George Street. He and his wife kept open house to various foreigners who came in of an evening to converse, play the violin, and drink claret. Among them was a Polish *émigré* who lived at the top of a tall house and was haughty and proud to a degree. He gave the appearance of a well-dressed dandy, with his pale lavender gloves, fawn waistcoat, and elegant tightly-cut trousers. No one ever saw him in his garret, the reason being that he was desperately poor, had no clothes but those in which he walked abroad, and to save them lived in a dressing-gown and barred the door to all comers. Another *ami intime* was a certain Monsieur Chantrelle who later furnished a *cause célèbre* of the day by murdering his wife. To the Gamgees' house there came various well-known people, Professor Crum Brown of the Chair of Chemistry, with his little velvet skull-cap; Dr. John Brown, the author of *Rab and his Friends*, and Lewis Campbell, Professor of Greek at St. Andrews. John Gamgee brought more bohemian friends, actors from the old Theatre Royal, later demolished; Clark Stanton the sculptor, who married Clara Gamgee, brought Sam Bough the painter, and of them all he was the man whom Dadu loved most. He had thick brown hair, a reddish wavy beard, and twinkling eyes, and when Dadu went to parties at the Boughs' house he found more 'good fun' there than anywhere else.

The New Town of Edinburgh in the sixties was almost a suburb of the Old, and five minutes away from the Gamgees' house Manor Place ended in a narrow lane leading directly into the fields and woods of the open country. Rooks, which rarely build in a town, had a colony hard by in the Dean Cemetery and had but lately left their rookery in the tall trees in Randolph

Crescent. To get to the country towns near by, one drove in a coach and pair, parcels were taken by carriers who advertised their stances and hours of departure in the daily *Courant*, and the four-wheeled cab was the conveyance in town. The streets everywhere were cobbled and the noise of traffic considerable; straw was often laid down outside where any sick person lay to deaden the sound of the cartwheels and the horses' hooves. Princes Street was mostly residential, though a few shops had begun to take possession, among them Jenners at the eastern end, and the three-storied stone-faced houses had one flight of steps from ground level to the front door and another leading down to semi-basements. The Princes Street gardens were enclosed, and only privileged persons could have a key; smoking was not allowed within the railings and dogs were forbidden. The Gamgees were lent a key by some friend, and they felt it a mark of considerable distinction to take a walk there of an afternoon. Up in the Old Town where Dadu sometimes went with John Gamgee there were interesting things to see in the streets; there was the organ-grinder with his wheezy organ on its pole and his poor little monkey dressed in a red coat; there was the knife-grinder who made sparks fly off the steel; the old man who mended china and carried a little brazier of burning charcoal with him; and the Newhaven fish-wives in gay striped petticoats and coarse hand-knitted stockings with creels on their backs, crying 'Caller herrin'' up and down the street. There were Highlanders in tattered regimentals, and to the end of his life Dadu remembered 'two aged porters who wore suspended from their shoulders two straps, one in front and one behind, with which in their youth they had carried sedan chairs'. All was stir and bustle up here; there were heavy drays laden with barrels of beer and drawn by huge Clydesdales; carts and horses and covered wagons; barrows of produce, men with loads, lawyers in wigs, students in gowns, while down below in quiet Princes Street the fashionable folk strolled and sauntered along, stopping to bow to an acquaintance in a smart carriage and pair, or to admire a handsome rider on a fine horse.



1 (*a*). Joseph Gamgee

1 (*b*). D'Arcy Wentworth Thompson (the Elder)

11 (*a*). Clementina Gamgee

11 (*b*). D'Arcy in his school clothes

Dadu's initiation into the accurate ways used by the scientist in pursuit of his object began early in life. When he was nine years old his grandfather began a series of observations on the frequency of lameness in horses, and on the 14th of May 1869 he and Dadu took up a stance at the west end of Princes Street where two country roads came in, to watch the horses turning to strain up the long slope of the Lothian Road; out of 607 horses, 171 were very lame. Later they went to the Register House, where the old North Bridge was narrow and precipitous, and out of 50 cab horses 41 were lame. So it continued for weeks and results came from Paris, London, and elsewhere; Dadu helped to tabulate these and shared in all his grandfather's speculations and deductions. Joseph Gamgee's book *On Horse-shoeing and Lameness*, published by Longmans, Green, in 1874, is a remarkable one, not only for its scientific content but also for its historical background. Another subject in which Gamgee was deeply interested was the comparative speeds of various types of horses and their action in galloping, and, leading up to that, the structure of the bones of the leg. He used to take a race-horse down to the sands at Portobello on the Firth of Forth, to study its performance; he anticipated all that has since been proved by slow motion photography.

Some time during these early years Dadu went to his first auction sale to which he begged his grandfather to take him, for he had seen an advertisement in a newspaper of something that he desired. Off they went together and Dadu bid for a little mahogany cabinet with many narrow drawers for specimens; into these went his various collections and later his fossils.

A year or two after he had gone to Ireland D'Arcy the Elder made the acquaintance of Amy Drury, one of the daughters of Mr. William Drury, Recorder of the Court of Chancery in Dublin, and they were married in 1866 when Dadu was six years old. This second marriage brought great and lasting happiness to my grandfather and in later years made a very happy home for Dadu. He wrote constantly to his father and his stepmother, whom he called by her Christian name, and the letters,

many of which were kept, are touchingly spontaneous and affectionate. On the 5th of March 1867 he wrote:

My dear Papa I am so sorry that I have been so long without writing. Since Aunt Pam last wrote you I have had a little touch of bronchitis but now I am better and Uncle Arthur says I have turned the corner, and will soon get strong. I was much surprised to hear you are going to America; what a long way to go for twelve lectures. Granny is quite well, today is her birthday: Aunt Pam and Granny send you and Amy their best love, and I send you both 1000 kisses your loving little boy Dadu.

The visit to America was occasioned by an invitation to give the Lowell Lectures in Boston, Mass., and D'Arcy the Elder published them later under the title *Wayside Thoughts*. In these papers he is concerned with equality of education for women and men, and he pays tribute to those in the New World who have advanced towards this ideal. The journey, the subsequent friendship with Mr. John Amery Lowell, the meetings with Longfellow, Emerson, and Oliver Wendell Holmes were a landmark in the family circle. By the time his father returned from America Dadu had learnt to write in long hand, and the following letter shows his views on life at seven and a half years old.

5th April 1868 My dear papa, I cannot thank you enough for the beautiful book; it is the nicest present you could have brought me from America. I am very fond of school and try to learn all I can, because it is so interesting. I certainly should not like to be out-done by another boy if I could help it and try to keep a good place in my class, but I could not do this unless I liked the lessons.

With best love to you and dear amy,

I am,

Your affte little boy

Dadu.

It was taken for granted in the domestic age of Queen Victoria that a child should love its parents, but Dadu's relationship with his father was exceptionally close, and he loved him with a deep devotion.

Dadu's first visit to Ireland had been in July 1867, when he went over in the last of the wooden ships—the *Lord Gough*, and 'the captain made the carpenter make me a little windlass for my ship', as he wrote back to Aunt Pam. Three years later he went for the whole summer and he liked to remember how he spent it. He would take his father's newspaper and go to the row of little thatched cottages that lay behind the house, where lived the family of Stephen O'Rourke, the Thompsons' faithful servants for many years, and there the peasants would gather round him while he read aloud the news of the Franco-Prussian War, of Sedan, of Metz and Gravelines. And those long, hot, cloudless days, quiet under the Irish sky, with the rumours and noise of battle afar off, remained always in my father's memory and in that of old Stephen.

II

THE EDINBURGH ACADEMY
1870

The Child is father of the Man.
WORDSWORTH

Dr. Clyde's Class

In the autumn of 1870 D'Arcy put away childish things and entered the Edinburgh Academy, the school which he loved and returned to throughout his life.

The Academy had been founded in 1824 by various gentlemen of the town, among them Sir Walter Scott, for the promotion of classical education in Scotland. The fees were reasonable —£4. 15*s*. per term—and the instruction was sound. It was the Alma Mater of many famous men, among them Clerk Maxwell —'whose unique genius and exalted fame none who come after need dream of rivalling'—and Archibald Campbell Tait, later Archbishop of Canterbury; and on the teaching staff there were men of distinction both in Classics and Mathematics. As in other academies in Scotland the system of one master to a class was the practice in the School; the master taught all subjects through five successive years until the class was handed over to the Rector for a final year. Dr. James Clyde, into whose class of first-year pupils or Geits (from the Scots for progeny) D'Arcy went with sixty-four other small boys, was a man of strong individual character having a reputation both as a classical scholar and as an all-round man; it was said of him that the great point of his teaching was 'the extraordinary amount of general information which he contrived to impart', and that his influence was all for 'accuracy and honesty in intellectual matters, uprightness and

orderliness in general conduct'. He was respected and loved by his class throughout their school days and long after. In a little essay on 'The Invention of the Blackboard' my father wrote these words about his master and his teaching:

> We schoolboys were taught this little byway subject of classical geography by the same schoolmaster who taught us our Latin and Greek, and many other things besides—by Dr. Clyde, the wise and learned father of a learned and most distinguished son. . . . I think I can understand why these lessons in classical geography so interested us boys. We felt, after a fashion, as Dr. Johnson did, when he said that 'The great object of travelling is to see the shores of the Mediterranean'; our little world of imagination and tradition was chiefly there. We had a classical training, and, into the bargain, a biblical upbringing; we knew extraordinarily little about Clive or George Washington or even Buonaparte, but we knew a good deal about Greek and Roman and Israelite; we had gone a-wandering with Jason and Ulysses and Father Aeneas. Moreover . . . Clyde understood thoroughly the great rule of teaching, that nothing is interesting by itself, but that things become 'interesting' as soon as we have stories to tell about them and begin to weave one thing into another. . . . We learned to follow (with equal confidence) from place to place, Hercules and Ulysses and Alexander and Hannibal. It was all very wrong, no doubt, and very mediaeval and absurdly antiquated; we ought to have been learning chemistry and physics and physiology, to get us ready to make our living, and to grow rich, in a scientific and technical world. But that was not our way. In all our seven years we never had a single lesson in science of any kind, physical or biological; we were never 'shown an experiment', never taught a single lesson in mis-called 'Nature-study'. But one after another we became 'scientific men'.[1]

D'Arcy sat on the first form with Johnnie Haldane, Jack Sinclair (later Lord Pentland of Lyth), and Alexander Campbell Fraser, nicknamed Gorilla, all three of them vying with Pat Robertson who was to be a future Dux of the School and whom they called Sheep. D'Arcy was called Daftie or Daft Thompson, and I think this must have been because he was not quite like the other small boys; he was always busy with his own ideas

and thoughts, and was apt to go off on his own to read and to search for answers to questions that interested or puzzled him.

Every day for seven years he went to school the same way and he loved to retrace his steps in later years; from Alva Street he cut behind the old Queensferry Street stables into Charlotte Square where he met Johnnie Haldane, born on the same day and his friend for nearly seventy years, and so down Church Lane, the old old road from the ancient Church of St. Cuthbert, through streets that knew no motor-cars and little traffic. Then through the village of Stockbridge where the barefoot 'keelies' were always waiting, ready for a fight with the 'cads' of the Academy.

The boys for the most part wore knickerbocker suits and balmoral bonnets, they carried their books in a strap over their shoulders, and they had one penny to spend on their lunch at the Janitor's Lodge, for which there was an interval of fifteen minutes between classes. There were no compulsory games, though they played a game peculiar to the School called 'Hailes', with ball and wooden bat or clachan on the gravel in the courtyard before the portico. There was also a game they played called 'the knifey game', but of what it consisted is not known. It is related that once in the midst of a game D'Arcy set upon his opponents with 'eyes aflame', for his quick temper had been aroused. This characteristic sudden flare-up was followed by an equally quick subsidence. In the winter the boys skated on the canal. Those winters of the early seventies were bitterly cold and the snow froze in the streets and Joseph Gamgee was often called out to tend a horse that had fallen on the icy cobbles. In 1870 Sir J. Y. Simpson, the discoverer of chloroform, died in Edinburgh and Gamgee took D'Arcy with him to the public funeral.

When he was eleven years old a menagerie came to the Vegetable Market for some weeks, and all the boys flocked to see the animals. There were lions, tigers, bears, wolves, zebras, elephants, in fact every kind of wild animal, and D'Arcy was very interested in them. His grandfather kept a book of cuttings from the newspapers and D'Arcy copied him and half a column

on Mander's Menagerie cut out of the *Courant* went into the scrapbook. This was the beginning of a habit which grew with the years.

One day the first horse-drawn tram came to the town, a great innovation; it had uncovered seats on top, ran on lines, and was drawn by two horses. When it made its first appearance the boys rushed out from school and spent every penny they had driving about the town in this wonderful up-to-date vehicle.

When D'Arcy was fourteen years old he spent the summer in Galway and just before the beginning of the new term his father decided to keep him at home and tutor him, partly on grounds of economy but mainly because he showed such aptitude for Classics. Here is D'Arcy's reaction.

Oct: 1874

My dear Aunt Pam,

You must have heard from Uncle Arthur by this time of the sudden and unexpected change in all our plans concerning me. I can hardly yet realise that I am to stay in Galway for the winter, and that I am never again to go to the Academy. Still, although it may not be a very pleasant change, I have no doubt that it will all be for the best in the end, and I am trying to get accustomed to it as much as possible, but as yet it is very hard.

For Pam the loss of her boy was like the loss of a limb and letters and parcels of sweets followed him to Galway. That he appreciated them is evident from one reply.

I have just received the parcel; I never expected anything so magnificent. Everything came perfectly, after all, and no wonder, when they were packed like that.

The autumn was spent in constant reading and study and letters could only be written after work was finished, which was sometimes eleven o'clock at night. ('I have so much work to do that I never seem to have a minute for anything else.') Devoted as he was to his father, and much as he loved his stepmother, he was homesick for the Edinburgh household. There he was the only child, the centre of Pam's and his grandfather's lives; in Galway he was older by eight years than the first of the

growing family of small children, and in his father's house there was little money and few comforts. And the Professor was a stern task-master, if also a loving parent. He promised D'Arcy two weeks in Edinburgh at Christmas if he finished certain books in time, so D'Arcy worked feverishly and wrote to Pam:

Galway. 7 : 12 : 74

I can do nothing but think of seeing you all at Christmas, but I really don't know how I shall be able to come away after being with you so short a time. Papa has got me a suit of clothes, a great-coat and a hat. I don't know what *you* will think of them, especially the great-coat. It is very long, very rough; and very stiff, and it is just like being between boards or in a tube.

In due course his father changed his mind and the boy stayed on in Edinburgh after his holiday and went back to the Academy. On the first day of the new term he ran all the way to School challenging Haldane to a race down the Lane; he thought he had an easy win, 'but puffing and blowing and using his arms as much as his legs, John won by a neck'.

The Gamgee house in Alva Street consisted of a first floor and a basement, and it was up the area steps that D'Arcy had to come every morning as he set out for school. This was a matter of deep concern to him in case another boy should see him and surmise that he slept below stairs where the servants had their quarters. At one time when Marianne Gamgee (Aunt Polly) came from Italy to visit her parents, D'Arcy was taken to escort her and Pam in their walks down Princes Street. This was pain and grief to him for Aunt Polly, dressed in Italian fashion and speaking in a rather loud high continental voice, attracted the notice of the passers-by who turned to stare at the little party as they walked along. Perhaps it was inevitable that he should suffer from being brought up as an only child, though suffer is no word to use for all the love that he was given by Pam and the grandparents. His Clark Stanton cousins at least found it odd that when he was given an apple in their garden and was asked why he did not eat it, he replied: 'I am waiting for a knife with which to peel it!'

The collecting habit started by Mr. Hossack in Oliphant's

School continued in the Academy among the boys who had so eagerly learnt it, and now they made a new friend in Charles Peach, the discoverer of the old Cambrian fossils of Durness, and father of the famous geologist Benjamin Peach. Of him D'Arcy wrote later: 'I will not let his name nor his son's pass, without paying something of the debt he laid me under. He was a famous naturalist of the old simple school. I and two or three others came under his spell when he was very old and we were boys; and what he taught us, and the love of living things he shared with us, has been worth much to me.'[2] And so these boys, joined by a few other classmates, twelve in all, founded what came to be known as the Eureka Club which 'spent its Saturdays botanising through the countryside, howking fossils in quarry and railway-cutting, grubbing in the rock-pools at Wardie, or searching the jetsam of Newhaven fishing-boats'.[3] There is an old photograph which shows the members in climbings boots and carrying geological axes. Of his friends who made up the Club four of them, John Scott Haldane, physiologist and biologist, Diarmid Noël Paton, physiologist, William Abbott Herdman, naturalist, and D'Arcy Wentworth Thompson, scholar-naturalist, became Fellows of the Royal Society. Far and wide they roamed on their expeditions; they climbed the Pentlands and knew the haunts of all the wild birds; they scrambled on the cliffs along the coast; and as they grew older they went on bicycles as far as Berwick-on-Tweed. Sometimes in their last year at school they took knapsacks and went off at the weekend, walking forty or fifty miles in the two days. On one such tour during a mid-term holiday D'Arcy wrote to Pam from Cornhill near Coldstream:

> Came here y'terday afternoon after seeing all that was to be seen in Berwick in the morning. Went in the evening to see Flodden Field. Am now going for a short walk by the Tweed, probably as far as Norham and in the evening shall perhaps go to Kelso. I find I can get a coach in from Lauder early on Tuesday morning so that I cd. be at School by about 11. Weather still keeps beautiful.

D'Arcy went to London for the first time when he was

fifteen, and spent the summer holidays with one of the Thompson relatives who lived there. His grandfather told him that to see London properly he must go out early on a Sunday morning and walk the town when there was no traffic and the roads were empty; only in that way could he see the lie of the land, and get to know the contours of the great city. He went to the British Museum and to the Zoological Gardens and was able to bring back ringheaded snakes, blindworms, and lizards for Diarmid Paton who had begged him to do so. History does not relate how they travelled nor what became of them once they reached George Square.

Among living creatures birds were D'Arcy's first love and he would often have two or three or more in his little room in Alva Street. Occasionally he would buy a poor bedraggled lintie or an uncared-for bullfinch, feed and tend it, then take the cage to the Dean Bridge, open the door and let it go free. In a letter to Aunt Pam during one holiday about this time, there are the most minute instructions for the care of a tom-tit.

Give him

(1) Biscuit and milk, fresh, twice a day, (biscuit is better than bread, for it is not fomented or doughy).
(2) At least two meal worms a day, in the meantime. When he has been longer in the cage he will not need so many.
(3) Fruit of any kind, including figs, nuts, etc.
(4) Anything else such as cheese, meat, pudding, etc.

Now, if he is fed upon that principle he cannot possibly fail to do well, and with the exception of the Calandra, there is no bird in the room I should be so sorry to lose.

He had a naturally orderly mind and an instinctive feeling for classification. While he was still at school he started a large notebook the title of which is 'The Fauna of Edinburgh'; but after listing Cheiroptera, Insectivora, &c., he goes on to 'Birds (after Yarroll)' and the book turns into a catalogue of birds seen in Scotland, where and when and by whom, each with Latin and English name, and with the addition of titles of books in which reference to each bird may be found. Here is the earliest instance of his lifelong habit of keeping a record of, and

making notes on, whatever interested him, and it was in this way that the notes for the great Glossary of Greek Birds started shortly afterwards.

About the time of his sixteenth birthday he joined the Edinburgh Naturalists' Field Club of which his friend Charles Peach was a member, and in the autumn of 1876 gave his first public lecture at the second of the winter evening meetings. The subject was Foraminifera, and it was illustrated with specimens supplied by Mr. Peach and Professor Williamson of Manchester.

As the years went by the Clyde class diminished in size until in D'Arcy's last year there were only five boys left. The subjects studied were Greek and Latin, Ancient History, English, French, German, and Mathematics. Dr. John Mackay, the mathematical master, was a scholar of wide reputation, and a man beloved by all his pupils. Many years later D'Arcy wrote about him in the following lines:

> I would not willingly lose an occasion to record in grateful words, some portion of the debt I owe this schoolmaster of mine. But let me say one thing only—that I am thankful to him for many and many a visit to a scholar's home. One found there a chair, a pipe, intimate friendship and earnest talk,—and books and books again. . . . The door was shut, the curtains drawn, and the air of the room was a very atmosphere of learning![4]

In July of 1877 D'Arcy left the Academy, having won the German Prize and the first Academical Club Prize, which was the highest honour of the School apart from being Dux. That he was not Dux did not disappoint anyone; neither his father nor grandfather permitted any coaching outside school hours, though this was the exception and not the rule among his contemporaries. They both hoped and expected him to achieve distinction, but would in no way encourage him to struggle to get to the top.

The following Testimonial from Dr. Clyde was as much valued as his prizes:

> D'Arcy W. Thompson who was my pupil at the Edinburgh Academy during seven years, left that School in July, 1877, taking

with him what I deem the most meritorious of all the Prizes, viz. the first Academical Club Prize for the best in a general Examination in Classics, Greek Testament, Mathematics, and Modern Languages. This achievement was all the more significant in his case, because the studies of the School, and consequently the subjects of examination, did not include Natural Science, which was all along his favourite pursuit. One day D'Arcy surprised me with a classified list of the Flora and Fauna contained within, and visible from, the Academy grounds, pointing out, I remember, a tiny fern growing in the chink of a pillar hard by us, which I had passed for years without noticing the speck of green, much less recognising a frond.

In respect of natural bent and power in a particular direction, D'Arcy is the only match I have met with to my old Ipswich Grammar School pupil, Cowell, now Professor of Sanskrit, Cambridge. The Edinburgh Academy recognised in D'Arcy a born Naturalist, just as the Ipswich Grammar School recognised in Cowell a born Orientalist.

I add that D'Arcy's power of expression corresponds to his insight and mental grasp; so that Natural Science may count upon finding in him an eloquent expounder as well as an original investigator.

Signed JAMES CLYDE.

D'Arcy was deeply attached to his old schoolmaster and a year later on hearing of his retirement wrote him the following letter:

1878 Edinburgh.

Dear Dr. Clyde,

The sad unthought-of news was brought to me today by a small troupe of little friends, that you had left the Academy, perhaps for ever—that you had left them to pass their remaining school days in strange company, to say the old word to strange ears, to do the old work in a new way. . . . And dare I tell you that I too was very sad and sorry for my old school and my young school-fellows, and that selfishly too. I rejoiced with great thankfulness that I myself and many more had passed down that long river of school life with you to guide us. . . . Pardon my writing thus to you, for to keep silence I cannot, yet I know not what to say.

By the time he left the Academy D'Arcy had grown into a

tall slim youth; his hair was red and his skin very fair; his eyes, like his father's, were a brilliant blue, and they were big and rather prominent and had a peculiarly intense and penetrating look. He had a singular charm of manner, was a lively conversationalist, and older men enjoyed his company. The scientific influences of his grandfather's house and the scholarly discussions and talk in his father's, had developed his mind in two directions, so that he set forth to probe, to question, and discover in a new world, equipped with the inheritance, the learning and the traditions of the old.

REFERENCES

[1] 'A Schoolmaster's Discovery', *Country Life*, 1923.
[2] 'Fifty years ago in the Royal Society of Edinburgh', 1934.
[3] John Scott Haldane, F.R.S. Obituary, *Edin. Acad. Chron.*, 1936.
[4] John Sturgeon Mackay, *Edin. Acad. Chron.*, 1914.

III

THE UNIVERSITY OF EDINBURGH
1878

He that enlarges his curiosity after the works of nature, demonstrably multiplys the inlets to happiness.

DR. JOHNSON, *The Rambler*

Medicine or Science?

D'ARCY spent part of the summer holidays after he left the Academy with his grandfather in the village of Comrie in Perthshire, exploring the hills and woods and making notes upon various natural history curiosities; they both shared a love of walking and covered great distances with ease. He went on to Arrochar in Argyllshire where his parents had spent their honeymoon, and where the Noël Patons had a house. Sir Noël was Limner for Scotland, and as well as being a painter was a great collector and connoisseur, and he and his wife treated D'Arcy as one of the family. One winter when many young people were skating on Duddingston Loch the ice broke and D'Arcy fell in and was rescued with difficulty. The Paton boys took him home to George Square and Lady Paton would not let him go until she saw that he was quite over the effects of the accident. Another house at which he often visited was Cloan, in Perthshire, the home of the future Lord Haldane and his brother John.

In the following October (1878) D'Arcy entered Edinburgh University as a medical student, to the delight of his grandfather who looked forward to another generation of medical attainment in the family. By this time the three Gamgee uncles

had made names for themselves; Joseph Sampson was a well-known surgeon in Birmingham; John, having founded the First International Veterinary Congress to consider the awful devastation of Rinderpest, had then discovered a cure for it and written his famous book on the subject (and had, by the way, been cartooned by *Punch*); and Arthur was on the way to distinction as the first biochemist. It seemed inevitable that D'Arcy should follow in their footsteps.

Of the little circle that had made up the Eureka Club at the Academy, Herdman had already been at the University for two years, Haldane for a year, and Noël Paton for one term; now D'Arcy with Arthur Laurie and David Bruce (later the great pioneer in tropical diseases), joined them in the Old Quad.

D'Arcy used to say that he got up early each day and *ran* to his lectures, so impatient was he to hear what new and delightful thing would be expounded. His first year classes were Natural History under Sir Wyville Thomson of Challenger fame ('the little fat man who came puffing and blowing up the steps'), Botany under John Hutton Balfour, in which subject D'Arcy took First Class Honours; Anatomy, in which he was awarded The Junior Mackenzie Bursary at the end of the session; and Chemistry under Crum Brown. Nearly sixty years later he was to tell stories of his early teachers that can best be told in his own words. He remembered

> Professor Turner (not yet Sir William), his sturdy figure, his rapid walk, his little shake of the head, the twinkle of his eye, his dominant personality. He was a trifle pompous sometimes, and fond of the old verbiage of the anatomists. He came along while I was doing my first day's work in the old dissecting room. 'Well, what have you got?' said he. 'An arm, Sir', said I, very timidly. 'Call it a superior extremity; it's so much more precise!' And so indeed it was from the point of view of the anatomist. As a demonstrator he was superb. One did not forget one's lesson in a hurry, when Turner held up nerve or artery in his forceps, and told their names with such a look and voice as if the whole world depended on them. With very tender memories, with a certain peculiar affection, we look back upon Crum Brown. . . . We students behaved none too

well during his lectures, from which we came across the quadrangle to sit as quiet as mice under Tait. But we learned afterwards how fine, how erudite, how prescient, how suggestive, how educative Crum Brown's lectures had been. . . . And then there was Peter Guthrie Tait, the great physicist. . . . In Tait's time we learned our physics in a garret; an old Thomson galvanometer and some lenses were almost all the apparatus we had. With the help of a few bottles, some carpenter's tools, bits of copper wire, ends of sealing-wax, and a little mercury we had to makeshift for the rest. We made and filled our batteries, made our resistance coils or Wheatstone's bridges, and planned and constructed our optical bench as we went along . . . and I remember as if it were yesterday the opening lecture which he gave. It was on the Rainbow and the Aurora; and the moral of it was to show how, of two phenomena, one may have been brought within the knowledge and comprehension of mankind, while the other, no less common nor less beautiful, remains a mysterious pageant beyond our ken. The days went by, and every morning Tait gave us of his best, and all he taught us seemed to be just what we most wanted to know. . . . And we who were his pupils . . . still think of him with love, honour, and gratitude; and know by a life-time's experience how rare, how rare and exceptional, were his qualities of heart and mind.[1]

And there were men on the Arts side too whose learning and personalities impressed themselves on the young students: Professor Blackie the Greek scholar who strode the streets in a highland cloak with his white hair flying in the wind; Campbell Fraser the metaphysician; David Masson of the Chair of English; Fleeming Jenkins, engineer, inventor, man of science, the friend of R. L. S. and Henley. D'Arcy sometimes went to his house in Great Stuart Street, joining in the theatricals, or the dinner parties which Mrs. Jenkins arranged with such lavish hospitality.

D'Arcy's great interest at this time was Palaeontology, the key to so many of the problems that were being violently discussed and hotly argued during those years of battle between the Darwinians and the non-Darwinians, and in January 1878 he lectured to the Edinburgh Naturalists' Field Club on 'Coal and the Coal period'. During this winter he was made Convenor

of the Lothians and Fife Palaeontological Committee of the Edinburgh Geological Society; one of his duties was to make a catalogue of the fossil plants of the district, a work after his own heart, and it led to his preparing a paper entitled 'Note on Ulendron and Halonia'. The discovery of these fossil plants in the bituminous oil-shales of Mid-Lothian had occupied him for many months. This paper was his first to be submitted to the Royal Society of Edinburgh, and was communicated by Sir Wyville Thomson in December 1878.

There was another side of life that D'Arcy had to face now and henceforth—the financial side. From the day he became a student at Edinburgh University he was expected to be self-supporting; his father had a small salary and a large family (he once said 'I have more children than I have hundreds of pounds') and life had never been easy for the Gamgees since they left Italy. The fortune that Joseph Gamgee made there had long ago been given away in a jointure to each child, added to which he had been unlucky in some investment, and now Pam and her teaching was the only support he had. So D'Arcy kept himself by coaching in Greek and by writing articles and reviews. 'A certain lesser encyclopaedia was a godsend to some of us younger men, even in our student days; for Knott was its scientific editor, and I and others wrote countless columns under his kindly guidance, in days when money was scarce and to earn it was the only way of getting it!'[2]

In his second year D'Arcy worked at Botany, in which he passed with a mark of 94 per cent. and the Class Medal; at Anatomy 'in Turner's old dissecting-room, the ways and appurtenances of which had scarcely changed in two hundred years'; and he then 'stepped across the street to see Lister turn up the cuffs of his black frock-coat and operate under the spray'.[3]

Sometimes he took exercise by riding with Jack Sinclair in some long-forgotten stables near Tollcross, but most of his leisure was spent in walking, and the following description was written many years later in remembrance of his student days:

When I was a student (here) I had a friend, a man from a distant colony, as good a chum as ever man had, able and lovable, stalwart

and true. And he and I had no means with which to travel, in the wider sense; but far and wide round Edinburgh we wandered on foot. We had the curious but very pleasant habit of walking by night, through the short nights of summer, and the long twilights and dawn. Many a time we started out on a Friday night, and by early morning we saw Tantallon and the Bass, or were over the Lammermuirs. A common walk was out and away beyond Dalkeith and Blackshiels to Lauder, near forty miles away; to Lauder, that quaintest of all neighbouring villages, with its strange land customs and privileges to which the historian turns. . . . Our furthest journeyings took us down by Carstairs and Moffat to Ecclefechan, to Carlyle's country, and the red battlements of Carlisle to Wordsworth's country, to Rydal and Helvellyn.

But it was not only in the country that D'Arcy walked; like R. L. S. before him, he prowled the old streets of Edinburgh, poked into dark closes, wandered up the narrow wynds and wrote in a lecture years later: 'Here De Quincey lived, there Darwin lodged during his student days. Turn the other way, and there where across the broad street, even in my own boyish memory, the College Wynd, a narrow alley lay, lodged Oliver Goldsmith, medical student in this University. Hard by Walter Scott was born, and up that same Wynd Dr. Johnson trudged and puffed, with Boswell at his heels.'[4]

In the summer of 1879 D'Arcy made his first trip abroad, and he went to Germany to improve his spoken German. It had become apparent in recent years that this language was absolutely necessary for a scientific man, and it was first through the influence of T. H. Huxley that this was recognized. Huxley had made it his rule to read the best of everything that was written on his subject both abroad and at home. (As his son wrote, 'deliberate consultation of foreign authorities was absent before his time'.) So D'Arcy set sail from Leith to Holland, travelling light and prepared to live very cheaply; in point of fact the whole journey of three weeks cost him £13. In middle life he wrote an article on 'The World below the Sea' in which the following passage occurs:

I remember when I was a boy, as it were yesterday, crossing the

North Sea from Leith to Rotterdam, on a hot summer's day in a dead calm. Hard by the Dogger Bank we passed through a big fleet of brown-sailed fishing boats, and just where they were fishing the sea was covered in huge patches with enormous jelly-fish (Cyanea). They must have been, many of them fully 2 yards across . . . and the skipper and I gazed at them together. He set no store at all by those we saw but he walked up and down the bridge to show me just how big were the largest that he, in his long experience, had elsewhere seen; and I am sure that the largest which that mariner recollected must have measured 3 if not 4 fathoms across.[5]

On the journey the following letters were written to his aunt and grandfather:

July 27th, 1879

My dear Pam,

We got to Rotterdam at 7 this morning after a remarkably calm passage. The only people on board were Mme. Traubei and a party, the French Master at George Watson's, a Medical Student, 2 Americans, and a Dutchman. There was also one man, who went to sleep as soon as he got on board and he was not awake when we arrived this morning. After seeing a little bit of Rotterdam, I came on to Delft, and thence to Schiedam, where I am scribbling this. In the afternoon, I shall go back to Rotterdam, and thence take train to Breda, where I shall sleep, and tomorrow I shall probably go to Cologne. . . . The Dutchmen are very funny indeed. As it is Sunday most of them are fishing in the Canals.

A couple of days later he wrote from Remagen am Rhein (29th July 1879):

I am going away by steamer to Mayence in 10 minutes. I stopped here last night instead of going straight on to Coblenz because it was growing dark and I should have missed a good many miles of fine scenery. This is a very beautiful place indeed in the middle of the great vineyards where the Rhine-Wine is made, and I have just been having breakfast in a very foreign kind of fashion, at a little table in the garden, under a vine-trellis, looking down upon the river. It's very hot, but not unbearably so, and perhaps the heat is if anything an advantage, for it heightens the contrast between this and Edinburgh. . . . I haven't seen a piece of soap since I left the steamer at Rotterdam and if I don't manage to buy a bit in Coblenz

I don't know what I shall do. Yesterday was the Feast of St. Appollinaris, and in the evening the streets were quite full of booths and tents full of crosses, and strings of beads, and prayer-books and dolls and gingerbread. They looked very fine—I wonder whether you are away from Edinburgh by this time—I hope you are—I have just written to Haldane to ask him to meet me at Nüremberg. Best love to Grandpapa and Aunt Polly—Dadu. I hope you haven't forgotten all about the Hedgehog.

A week later from Muggendort (8th August 1879):

I have been walking for three days in 'die Fränkische Schweiz' and am now on my way to Bamberg. After seeing the town in one day I shall go right through the Thuringian Forest to Jena. The country is very pretty and a vast deal cheaper to live in than the large towns. There are a great many wonderful caves here, with stalactites and fossil bones in them which I have been examining.

The weather was so hot that he bought a big white umbrella, and this accompanied him to Leipzig, Berlin, and home via Hamburg.

There is an amusing letter to Pam that summer while she was away from home.

27 Alva Street.

Sept. 2nd 1879. I'm of course very glad to hear that you're feeling stronger already, but I hope to goodness you're not thinking of coming home for a while yet. I think it would certainly be an excellent plan for you to go on to Crieff especially if you are tired of Dunblane. But if you did you would have to take care not to play more than 20 waltzes in an evening, nor to dance anything much livelier than a jig. Grandpapa didn't enjoy Dunblane at all, I think he was never so disgusted with a place before. This was chiefly owing to the fact that the roast-beef was tough; but even if it hadn't been, the fellows in white caps carving it would have taken his appetite away. . . . I went to the Cathedral on Sunday, where I think something was the matter with the Dean for he said one of the commandments twice over, and began the prayer for the Church Militant, while the Organist was in the middle of his prelude.

As the months went by D'Arcy found that advanced medical work did not appeal to him at all and it was soon obvious that

his gifts lay in another direction; all his interest was on the biological side, collecting was his passion and field-work occupied every moment of his spare time ('a naturalist is born a naturalist' as he used to say). So in consultation with his father and grandfather it was decided that he should try for a scholarship to Trinity College, Cambridge, and make biology his profession. As there was no alternative way of going to Cambridge except with financial aid he worked extremely hard all winter and sat his examination in the following March. He found it very hard and wrote back to Pam:

Cambridge 31.3.80

I think you may make yourself quite easy on the score of my getting the Scholarship for I have very little chance indeed. There are an enormous number of men up and the papers are more difficult than I had expected. I've made a very bad beginning.

But things turned out better than he had anticipated and he was awarded a Subsizarship of £100 a year, the qualification for which ran thus: 'Subsizars have to satisfy the Tutors that they are in need of assistance in order to enable them to pursue their studies at the University.' His father was delighted at this good beginning and started D'Arcy off with a sum of money ('not less than £50 and not more than £100') which he could repay at any future date, saying to him at the same time, 'I don't exact this, I only suggest it as a way which would enable you to take help without in any way sacrificing your independence.' Beyond this he was to be entirely responsible for his own expenses, and to this end he would have to rely on his coaching and writing.

He left Edinburgh University in the summer of 1880, but without having taken a degree there; he left with a sense of incompleteness and of 'being out in the cold', which was never resolved until fifty years later when he received from the University the Honorary Degree of LL.D. Then at last was fulfilled his desire to belong to the place where he had been given his first wide outlook on science, and to be one with the eminent men who had taught and encouraged him in his early days.

At Christmas (1879) he went to Galway for the first time in

five years. Since that early visit D'Arcy the Elder's affairs had altered very much for the better. As well as holding the Chair of Greek he had taken over the duties of Librarian of the College which brought him in a small but useful additional salary; this allowed the family a margin of comfort and the Professor to indulge his taste for books and beautiful things.

D'Arcy wrote to Pam for Christmas:

The Crescent, Galway.
Dec: 23rd. 1879.

Dear Pam,

I hope my telegram arrived as well as a preliminary letter, and now I am just going to write you a few lines for Christmas Day. We have really the greatest reason for thankfulness and gratitude for the great change. All is going admirably and we are already close friends. I was utterly amazed at entering the house on Saturday night. It is perfectly beautiful. . . . The furniture is exceedingly elegant and the walls are hung from floor to ceiling with old prints, and framed engravings and old china, etc. etc. . . . Papa and I go for a good long walk every day, and read and talk etc. the rest of the time. He came to church with me on Sunday, when we had the very worst sermon I ever listened to in my life. He said it was almost the worst he had ever heard also, except one or two from the same man.

I shall think about you all a great deal on Xmas Day, wh. as you say is the first on wh. I have ever been away from you.

And now, wishing you and Grandpapa a very happy merry jolly Christmas,

I remain,
Your loving boy,
Dadu.

This visit to Galway was a landmark in the lives of both father and son. It was the beginning of an exceptional relationship. No life of D'Arcy would be complete without a sketch of his father, who as parent, scholar, teacher, poet, and philosopher exerted so much influence upon him both consciously and unconsciously. He used to speak of him as 'The Governor', or sometimes as 'poor papa', but more often simply as 'm' father'. D'Arcy the Elder was severe to his children in their youth, demanding unremitting work and application to their studies,

but as they grew up this attitude changed, and he became to them, as to his students and friends, a man of infinite understanding and sympathy. He loved beauty, children, and animals; he would never go out for his long daily walks without his little dog to whom he talked as to a human being. One of his students, T. P. O'Connor, later editor of the *Sun* and *T. P.'s Weekly*, and at one time Member of Parliament for Galway, wrote of him many times and with great love. In 1913, when a new edition of *Day-Dreams* was published by Harrap, 'T. P.' wrote a little article upon its author and his wonderful gift of teaching in which he said:

> He had a peculiar but excellent method of teaching. Taking up a Greek book he would read out to us a translation in English. What wonderful English it was too; eloquent, poetic, picturesque, as fluent almost as if he were reading English instead of Greek poetry or prose. . . . I hear distinctly still the echoes of that rich voice, that wonderful vocabulary—that perfect reproduction of the thoughts of Greek literature and Greek philosophy. . . .

And of his lecturing:

> It is the first recollection of the influence of oratory upon me, and it is the most vivid of my life, except, perhaps, my recollection of the first time I heard John Bright. . . . He was not a man of energy—or perhaps I should say of initiative; fortune had come to him with her gifts; he was not the man to set out on daring enterprises to snatch these gifts by violence. He became more and more a dreamer and he lived in an atmosphere that was only too well calculated to accentuate such tendencies. He was a great walker and usually liked to walk alone. By and by he became one of the personalities of the town; picturesque, weird, solitary, and yet so palpably abounding in all the sweet affections that even these people, who knew him not, learned to love him, and looked up to him with that reverence for the scholar that has always been one of the best characteristics of the Irish race. . . . For he was one of the first of the Englishmen in modern Ireland who learned to know the Irish people, and sympathised with their inner life, . . . this fair-haired, fair-bearded, shy awkward Protestant Englishman living among those dark-skinned dark-eyed Catholic Celts.

As an orator D'Arcy the Elder had quite peculiar gifts. Once when there was a question of closing Queen's College, Galway, and a public meeting was held in the College at which a vote for and against was to be taken, he was asked to speak against the motion and his speech was so powerful, so brilliant, so impassioned, and so moving that he carried the whole audience with him and the College was saved.

Many of his characteristics were handed on to his son; his immense *joie de vivre*, his sympathy for lost causes and humble people, his quick temper and impatience with stupidity, his witty tongue, and his oratory; lastly, the inward loneliness that set them both apart from other men.

In this year when they met for the first time as man to man D'Arcy the Elder found in his son a scholar after his own heart, and D'Arcy the Younger discovered in his parent not only the mirror of his own personality but a beloved companion who understood his inmost thought. His father was his ideal, his hero whose words and opinions he was to quote throughout his life. When they were together they walked and talked and read; and when they were apart they corresponded continuously. D'Arcy kept all his father's letters; dozens of them are still extant, written in a beautiful hand in his own inimitable style, but alas! all D'Arcy's, treasured for a lifetime, were destroyed not many years ago.

From now on he had, in his father's household, a second home, though this did not mean any lessening of the deep ties for his grandparents and Aunt Pam, merely an additional source of affection. It is extremely important here to stress the influence of this Irish home, and to notice how the two sides of D'Arcy's personality were nurtured at different stages by two exceptional people; how the years of his boyhood were influenced by his grandfather, Joseph Gamgee the scientist, and the years of his young manhood by his father, D'Arcy Thompson the scholar-poet.

D'Arcy's relationship with his stepmother was of the happiest, and there were now two brothers and three sisters with whom he was on the closest terms; when the youngest sister

was born a year or two later he stood godfather to her for she was called Fanny after his mother.

And Galway came to take first place in his heart: he once wrote: 'I used to think that were I dropped blindfold into Galway I should know where I was, for the town had a smell of its own, a dear familiar one; it was made of turf-smoke from the cabins and seaweed from the Bay, and Atlantic gales and sweet Connemara air; it was *sui generis*.'[6] He roamed all over the countryside and knew where to find the little bee-orchis, the blue gentian, and the maiden-hair fern in the deep dark crannies of the rocks; he tramped the bogs, watched the herons, and little wondered that his father, 'eating of the Irish lotus', had no desire for another life than this.

Galway was as it had been for 200 years, though changes when they did come came rapidly. But in those long-ago days it was quiet enough and country people drove into market in tiny ass-traps or jaunting cars and sat all day beside their baskets of eggs, their ducks and geese and clean potatoes. The Claddagh —the fishermen's village by the harbour where the descendants of the Armada men lived—was still a collection of whitewashed cabins with barefoot children in red petticoats playing among the pigs and hens. And the quick wit of the Irish peasant delighted the heart. D'Arcy had occasion to ask a man the distance to a certain place, and looking him up and down, the old fellow made reply: 'Well Sorr, 'tis twelve miles there and back, but with them legs, 'twill be but a small matter of eight or nine!' And he went to the fair and saw time-honoured games which he stored up in his mind and brought out again many years later for a little essay called 'Games and Playthings'; there he wrote: 'When I was a boy in Ireland I went to many a fair and race-course, and saw there the three cards with their elusive Queen and the three thimbles with their all too nimble pea; and I saw also another cunning game, played with a winding strap and a wooden pin, and this was the game of trick-in-the-loop.'[7]

A lifetime later describing the Naarder Meer in Holland, whither he had gone with my sister to see the bird sanctuary, he

wrote the following passage in remembrance of former days of bird-watching:

I could see a pair of harriers—Montague's, in all probability—circling over the marshy ground; they took me back across a lifetime, when I used to watch them hunting the bog at Menlo, the Friar's Cut, on Corrib lake and river . . . the mere is very like the shallows of the Old River, the backwater of the Corrib, and its bulrushes and water-lilies are just the same. That Old River is a great place for birds also; and there I once saw a white heron when I was a boy. It stood in the bulrushes, unimaginably beautiful; I floated past it and it did not fly away. I have believed ever since that it was no less than the Great White Heron itself; this happened all but sixty years ago.[8]

Then there were the friends he made among his father's colleagues, all scholarly men. There was Rowney, the chemist, King, the geologist, Allman writing on the Greek Geometers (and forestalling D'Arcy's old master, Dr. Mackay, by a matter of weeks in his publication), J. F. Davies editing the *Eumenides*, and to the houses of all of them he eagerly came and went. Of one of them (Allman, I think) he wrote:

In my early boyhood I owed much in many ways to a certain old mathematician celebrated in his way as an old historian of Greek Geometry. He was extraordinarily fond of shells. From the Naturalist's side I should say that he knew little, or even nothing about them. He had no books concerning them; save for a few favourites, such as the Entle-trap and the Orange Cowrie, I do not think he knew their names; he neither knew nor cared how they lived or whence they came. But he seemed to take an intense pleasure in their beauty; he handled them and fondled them. I can only guess, I do not know, what he had in mind; but he found something at least in touch with his intelligence, something which a mathematician could enjoy and appreciate and understand.[9]

The summer of 1880 was spent in Galway and his letters to Pam best show how the time was passed.

Galway, June 25th. 1880.

Amy and Papa go to Dublin tomorrow, taking with them Willie who is the most mischievous of the children; and I shall be left in

charge of the rest, together with the dog, cat, jackdaw and a whole garden of hens.

Galway, August 4th. 1880.

Diarmid Paton came over last Saturday, and will stay for a week or ten days. On Monday we sailed over to the Co. Clare, and he and I walked home round the Bay. Today we are going to the Races, and tomorrow and the rest of the time, I haven't a notion what we shall do. One of my Edinburgh pupils, the elder of the two Ellisons is coming on Friday to stay for six weeks or two months. We get twenty guineas out of him for that.

Galway, August 17th. 1880

I went away by myself for three or four days last week to the Aran Islands at the mouth of the Bay, chiefly for the purpose of botanising, and also to see the place for it is very queer and out of the world. The people don't wear boots, but only bits of skin with the hair on, tied under their feet, and they sail about in things like clothes baskets covered with canvas. The place was crawling with priests who eat up everything, and I got nothing but potatoes. They brought me forty-five for dinner the first day. The priests were there because the bishop was coming next day. All bishops are as like as two peas, so you know what he looked like. And he came in one of the clothes-basket boats. I came home in a sailing boat and tho the voyage shd. only have taken 4 to 5 hours I was a day and a night. They didn't give any bill at the hotel but told me to pay just what I chose. And when I gave the boatmen 5/- for the journey home, they thought it too much and gave me back part. So the excursion was a very economical one.

Boden Park, Dublin, Sept. 1880.

I have fallen in clover and am enjoying myself greatly here. The place suits me to perfection. The garden is full of fruit, and the house is crammed full of amusing and beautiful books, which I spend all day among. Mr. Drury is certainly a man of the highest taste and judgment, and I admire his ability more and more every time I see him.

This was written from the country house of Amy Thompson's parents, Mr. and Mrs. Drury, who, with a family of nineteen to bring up, found it necessary to run two houses—not

an impossibility for a legal man of moderate means in the nineteenth century, when the pound was worth twenty shillings.

REFERENCES

[1] *Fifty Years ago in the R.S.E.* (Address to The Royal Society of Edinburgh), 1934.
[2] Ibid.
[3] 'Sir David Bruce, K.C.B., F.R.S.', *Nature*, 1932.
[4] Lecture on Edinburgh.
[5] 'The World below the Sea', *Country Life*, 1923.
[6] 'Galway today', *Glasgow Herald*, 1934.
[7] 'Games and Playthings', *Science and the Classics* (1940).
[8] 'Spoon bills on the Naarder Meer' (unpublished).
[9] 'The Shell of the Nautilus' (Lecture).

IV

TRINITY COLLEGE, CAMBRIDGE

1880

And from my pillow, looking forth by light
Of moon or favouring stars, I could behold
The antechapel where the statue stood
Of Newton, with his prism and silent face,
The marble index of a mind for ever
Voyaging through strange seas of Thought, alone

WORDSWORTH, *The Prelude*

Natural Science

A VISITOR to Cambridge in the middle of the nineteenth century found the town much as it had been for many centuries before. Green meadows enclosed it, lines of tall poplars led the eye into the far distance, graceful aspens and willows trailed their leaves in stagnant ponds where the blue of darting kingfishers flashed in the sun: it lay like a bright jewel in this setting of flat fields, its towers and bridges reflected in the sparkling river. The narrow streets were quiet, though on market days country carts came in and yokels in smocks and straw hats clattered by on horseback, and flocks of sheep would bleat their way along Trumpington Road—otherwise the men of learning in their black gowns had it to themselves. In the centre of the town round Peas Hill and Petty Cury stood little old houses two or three stories high leaning drunkenly against each other, their lattice windows blinking solemnly at the changes which were foreshadowed around them. To the westward behind the Corn Exchange were a few low buildings fenced in by a wooden railing with the Pig Market at the adjacent corner, and

across the street was the green park belonging to Downing College with its beautiful avenue of old trees. But Cambridge was on the threshold of a new age and soon the cobbled streets would be macadamized, the old houses pulled down, and the open spaces covered with the buildings of the most important medical school in the country.

In 1865, as the result of the wave of new scientific thought that had surged up everywhere, the University built the Museum of Zoology on the former site of the Botanical Gardens in the corner of the Corn Exchange and Downing Street. The following year Alfred Newton was elected first 'Professor of Zoology and Comparative Anatomy'. In 1870 two important things occurred: first, Michael Foster was appointed, on T. H. Huxley's recommendation, as Praelector of Physiology at Trinity College, and second, Francis Maitland Balfour of Whittingehame, younger brother of A. J. Balfour and nephew of Lord Salisbury, came up to Trinity as an undergraduate.

Foster was a man of outstanding and delightful personality who inspired his students with his own enthusiasm for his subject while uniting them by strong bonds of loyalty and affection. His lectures covered a very wide field—physiology, embryology, and elementary biology—but in course of time he initiated various schools of research which were taken over by some of the younger men who worked under him, Sydney Vines, Francis Darwin and, later, F. M. Balfour. After some years the department outgrew the small space allotted to it and in 1879 a new building known as Fawcett's Building was erected hard by the Museum; into it went Foster's Physiology on the first floor and Newton's Zoology on the second. A beautiful old tree (*Sophora japonica*), the last remnant of the old Botanical Gardens, spread its shady branches here for many years more until these small beginnings were merged in much greater projects.

In the meantime F. M. Balfour was making his name. Starting with a Natural Science Scholarship in his first year, he had later shown such brilliance in his original researches that he was made a Fellow of Trinity College and, shortly after, Lecturer in

Natural Science. Three years later he was a Fellow of the Royal Society and in another three years he was publishing his great work on Comparative Embryology which made him the authority on the science. Not only did he show extraordinary scientific gifts but, eager in mind, active in body, gentle and retiring in manner, he had a peculiar and elusive charm which drew all men to him.

Such was Cambridge when D'Arcy 'came up' in the Michaelmas Term, 1880, in his twenty-first year. As he passed through Trinity Great Gate, saw the velvet-green lawns, heard the gentle splashing of the fountain, he knew an exultation of spirit that blossomed into a great love of the place that never left him. Years later he wrote: 'It is something to dwell in the court where Newton dwelt, to look up at the windows of his rooms, to dine in the hall where Milton dined, to pace the cloisters that Erasmus trod.'

During the first week he wrote to Pam as follows:

7.10.80. I have got two little rooms in College and shall flit there on Monday. You may address my books D.W.T., Master's Court, Trinity Coll.

8.10.80. I've bought my cap, gown and surplice, so now I'm all complete. Most of the furniture is in the rooms and I have just to buy a very little extra, wh. I am now setting about. I have £10 from Galway. I am not to begin Zoological work at once, but shall work for a while at Chemistry, Physics and Mathematics.

Oct. 10th. I've been twice to Chapel to-day in my surplice! and between services I dined with the O's.

Oct. 12th. I am very busy indeed. To-morrow I shall begin to go to lectures, and shall at any rate finally decide wh. I am going to take. There are several wh. are more or less compulsory, and they're all bad. . . . I saw Jack Tait to-day but only for a minute. I dine in Hall every day. They don't give you a very good dinner and you have to eat it in a tremendous hurry. The noise is just like a street sweeping machine.

His first letter to his grandfather a fortnight after his arrival gives an account of his work:

24.10.80. I ought to have written to you before now, but I suppose you make allowances for my constant occupation. I am particularly busy this term, and about work which is not very directly useful, for I have a good deal of preparation to do for the examination in Classics and Mathematics in December. In fact much the greater part of my time has to be given up to it, and I have no leisure for Natural History work. I give 3 or 4 hours, however, most days in the week, to the Physical Laboratory, for I don't know half enough Physics, and I am also attending Lord Rayleigh's course on Electricity. Next term I shall continue to work at Physics, and also take up Chemistry, for coming here obviously gives me a chance of picking up all those things that I have done very badly or not at all, and would in the ordinary course at Edinburgh have passed by. I like the place exceedingly and all the students and others that I have got to know. The amount of energy and hard work about the place is prodigious and the competition at Edinburgh is a perfect trifle in comparison with this. The standard of the men is without prejudice a long way higher, and their general education of quite a different kind. They could never have dared to set such a Preliminary Examination in Edinburgh as we have here in Dec. for they would keep out almost all the men. You will certainly have to come before very long, for you never dreamed of such a place. This college alone is like a town, 600 men dine in Hall every day. The kitchen wld. hold a small University. The cook has several thousands a year. The mails come in and the posts go out, like a town, and the College Chapel is like a Cathedral. There are about six courts or quadrangles in Trinity of wh. the largest wld. hold the Quadrangle of Edin. University about eight times over. Beside which there is the large park through wh. the river flows at the back and the Fellows' gardens beyond that. The country round about is delightful and the climate wh. I had been led to believe was very relaxing and nasty is as yet all that cd. be desired. By the way though I go for long walks into the country, I have never seen a horse drawing a plough or doing any other work in the fields. Everything is done by steam, from the first processes to the last.

And to Pam he says: 'I never enjoyed myself more, and I'm delighted with the place.'

That he settled down and found his leisure as pleasant as his work is evident from the following letter to her:

Nov. 7th. 1880. To-day's Sunday, and I've spent it in quite the Cambridge manner, very pleasantly. I've been twice to church, in my surplice. I went out to breakfast in the morning with the late Senior Wrangler and some other Mathematical men at St. John's College. I lunched with the Oldakers; dined in Hall; went out to tea, and finished off by a musical evening at Oscar Browning's. He 's a Fellow of King's and a very great swell. You have no idea of the magnificence of his rooms, and the music too was capital. We had Gompertz, and a lot of first-class amateurs. Nobody bothers you, and nobody tries to talk, but you just lounge about the rooms and listen to the music, and dip into books, and look at pretty things all at once. Among other things, his collections of old Italian work are superb. Isn't it a nice way to spend a Sunday? You should have heard the anthem in Chapel this evening. It was one of Händel's, and in the morning we had an equally fine one of Mozart's. They never seem to sing any of the old Psalms and things in the service twice to the same tune, and yet they're always perfect. Our organist is Stanford.

The winter was spent in divers ways, chemistry and physics being his main studies. In the Christmas vacation he visited a cousin of his father's in London and describes his visit thus:

Feb. 2nd. I was so much taken up with fellows calling and that kind of thing last night that I cldn't keep my promise and write to you. I am sure you will be impatient to hear of my doings in London. We did not do a great deal. We only went once to the theatre, viz. to the Princes, to see Booth in Othello; and my chief occupation was walking about, looking into shop windows. I bought several things for my rooms, and they now look very nice. I got some very pretty china. . . . On Sunday we went twice to church; in the afternoon to the Temple.

All spring D'Arcy worked very hard in order to try for a Scholarship, knowing what a difference it would make both in his present position and to his future prospects if he could gain one. At last he sat the Examination, succeeded, and wrote home with the good news.

May 1st. 1881. The Prize-Lists of our last exams were published last night, and you will be delighted to hear that I stand at the top,

and become a Scholar of Trinity. I am no richer, but on the contrary somewhat poorer in money, but very much richer in honour and position. . . . My four keenest competitors came to supper last night at ten, and we had great fun. I gave 'em champagne, and two or three other fellows came in also.

May 8th. I have had a great many congratulations both from men here and by letter on my recent success. The Scholarship gives me a good many small privileges. You have a special table in Hall if you choose to avail yourself of it; and special stalls in Chapel next to the Fellows. And you are freed from a good many rules and restrictions. I think I shall change my rooms next term. As a Scholar I have my choice of the lot.

He spent much of his leisure exploring the country round Cambridge; he walked long distances through the Fens to Ely and along the Ouse, 'looking for plants, butterflies, birds' nests, etc.' and he rowed many miles down the Cam. Of one expedition he wrote enthusiastically to his aunt:

22.5.81. I went off with two other fellows yesterday afternoon for an excursion to the Fens or what remains of them. We returned this afternoon after five after having great times. We slept at Upware 9 miles off, and I was afoot before 6 this morning. We bird's-nested, collected plants and saw all manner of fine things in the way of butterflies, beetles, etc. We supped last night with the landlord, and a shoemaker who collects the rare insects of the district and sends them all over the country. They were both very intelligent men, and gave us a host of information about everything.

He also played games for a short period while an undergraduate, a thing he had never done before and rarely did again. In one letter to Pam he asked her to make down a pair of old trousers into knickerbockers which were the regulation garment for hockey. He bought a second-hand tricycle on which he was soon able to do a mile in six minutes, and went to Saffron Walden and lunched at the Rose and Crown, but he never got as far as Elmdon though his grandfather wrote minutely describing the roads which he had not seen for thirty years.

In May 1881 D'Arcy was elected a member of the Cambridge Natural Science Club and the following November he read his first paper; it was entitled 'Joints and Ligaments'. In the minutes of the Meeting we read that 'the conclusions were based on a series of original observations by the author. The paper was followed by a discussion, in which additional evidence was adduced in favour of Thompson's statements. There was a very large attendance of members and visitors.' During the next three years D'Arcy read three more papers, the last of these, on 27th October 1883, had the title 'Aristotle on Cephalopods', and it was the first of his lifelong studies and translations of his beloved scholar-naturalist.

In the summer of 1881 he went to Galway, at that time a focal point in the unrest that was prevalent all over Ireland caused by the Great Famine; the days of eviction were in full swing. He wrote back to Edinburgh thus:

> I have just seen an extraordinary but now common and characteristic sight;—a long train of military waggons each holding 20–25 policemen with rifles, bayonets, etc., and drawn by 4 horses, with dragoons for postilions, and outriders, mounted officers etc. etc. all going off full speed to Connemara. Similar expeditions go every day or two in various directions by sea or road.

His father was deeply concerned with the Irish problems and felt the situation keenly; a year or two earlier he had written a plea for mercy for political prisoners that roused public opinion everywhere and nearly lost him his professorship. But D'Arcy was much more interested in dredging in the Bay before dawn, reading in the College Library, and studying German with the Professor of Modern Languages. There was plenty of gaiety in Galway too; the Drury uncles came from Dublin and there were parties, or all the friends would go picnicking up the Corrib, and there was talk, endless talk, for there was nothing much to do and all the time in the world to do it in. During one of these holidays two little nieces of Amy Thompson's came to visit the family; they were the children of her brother William Drury and his wife Sophia Chaworth-Musters who had died

when the children were babies some ten years earlier. The only notice D'Arcy took of Maureen, the elder, was to give her a box of chocolates and to take it away again when he saw a barefoot child looking longingly at it, but many years later he was to take a more romantic and lively interest in her.

When he returned to Trinity as a Scholar he was given new rooms in the Great Court. His father, in writing to congratulate him, told him that he had never known these beautiful rooms occupied by any but Fellows or Fellow-commoners. They are in the corner between the Chapel and the Master's Lodge on the second floor approached by staircase B. Their deep window embrasures are panelled by heavy oak shutters and the windows are paned with little squares of old glass. Without, delicate mauve clusters of wistaria cover the grey walls, to which the trunk of the tree, gnarled and bony like an ancient hand, clings tenaciously.

Among D'Arcy's friends, men of his own year, were Alfred North Whitehead, philosopher and mathematician; C. S. Sherrington, physiologist; H. H. Turner, mathematician; and W. R. Sorley, philosopher. But the man who came to mean most to him, whom he loved and revered, who was his guide, philosopher, and friend, was Frank Balfour. There seems to have been a rare sympathy between the two men, coming as they did from the same locality on the East Coast, both imbued with a like eager spirit, sharing the same enthusiasms, and single-hearted in the love of their subject. D'Arcy sought his advice, relied on his judgements, shared his liberal views, and followed where he led.

In the Michaelmas term of 1881 D'Arcy settled down to work in the new Museum of Zoology at the things that came first with him. It was a record year in the Science Laboratory, for there were sixty students and with Balfour directing them they 'fell under the glamour of morphology' as A. E. Shipley wrote. Balfour was immensely popular with all the undergraduates; it has been said that his own special class 'regarded him with a veneration that it is the lot of few teachers to inspire'. In comparing T. H. Huxley and F. M. Balfour, D'Arcy

once wrote that the latter allowed credit for everything to go to his pupils and they were many and brilliant, while the former had few pupils and took all the credit to himself.

During the same term D'Arcy was elected to the Cambridge Union Society; he spoke often and led the debates on several occasions, and his gift for speaking became more pronounced as wider opportunity presented itself. Six months later he was elected to the Committee to which he was subsequently re-elected several times.

In January 1882 the publishing house of Macmillan and Co. approached him (and his friend Corry who died shortly after), commissioning him to translate one of two German botanical books, Focke's *Hybridization of Flowers*, or Hermann Müller's *The Fertilisation of Flowers*.[1] The latter work was chosen as it had a wider appeal than the former, but, as D'Arcy often speculated, if it had been the reverse he might have anticipated the discovery of Mendel by a couple of decades. Charles Darwin was asked to write a preface, which he did, and D'Arcy was delighted and wrote home: 'Darwin has written and sent me the preface for my book; it is very good and written in the best style.' This was almost the last of Darwin's writings as he died the following year before the book was published. The translation took eighteen months to complete and it may be interesting to add here a few lines of D'Arcy's preface showing what the work included.

In this edition I have incorporated a large mass of Dr. Hermann Müller's observations, of which he sent me full notes; and I have also added further details where it seemed necessary, taken from his own and other writings. Many new figures from Dr. Hermann Müller's other works have also been inserted here. The systematic part of the book . . . has been re-arranged according to Bentham and Hooker's Genera Plantarum. . . . I have been at pains to compile a list of all the works relating to the subject of this book; and so far as in my power lay I have added an Index of genera to the list. . . . I have inserted in this (Bibliography) all books, papers, and notes dealing with the subject of the fertilisation of flowers, which I have been able to find.

The Lent term was extremely busy for the Tripos was in sight and D'Arcy's letters were full of such observations as 'my work to the end of the month is of the hardest, and all next term also will be very severe'; 'my work keeps me so busy that I have done little or nothing to my book for some (time) past'. The plan of his day at this time was to get up at 7 a.m. and work till 7 p.m. with a short break for lunch; half of each day was spent in Balfour's laboratory. But there were relaxations as can be seen from the following letters.

Feb: 1882. Our Science Club are to have a dinner in the Hall of Downing College on Sat: March 11th. It will be very swell. Michael Foster is to be in the Chair, and we expect old members to come up from all over the country, even from Ireland. Ray Lankester and Marshall of Owens College will probably come. I am down for one of the few speeches.

March, 1882. Tonight a small cookery club meets in my rooms. We are to cook a soufflet and an omelette aux oranges, perhaps something else. One or two members are admirable cooks. I hope to improve rapidly. I don't see how a man can get through life well, especially if he is to be a traveller, unless he knows how to handle a frying pan.

He passed the Tripos successfully and wrote home:

30th May 1882. I have got my First Class in the Tripos all right. I left Balfour's dinner party last night with a box of matches and a candle-end, and climbed over the railings of the Senate House to see the list which was posted up at 11 o'clock.

After this there was a week-end of entertainment; dinner with Balfour, Sunday breakfast with Professor Colvin, lunch with Reuter, a fellow-student, and dinner with Professor and Mrs. Fleeming Jenkin from Edinburgh. And now he joined the Cambridge Lawn Tennis Club and wrote home:

If seeing me in Cap and Gown would surprise you, I think you would be still more amused to see me in a flannel suit with a bright red and white striped jacket and cap.

As soon as the Tripos was over he made arrangements with

Baron Nordenskiöld, the Swedish zoologist, to work on the zoophytes of the Vega Expedition which had lately returned home, and upon these he wrote a paper which was published in Sweden at the end of the year. At the same time he continued a piece of research that he had started in Edinburgh under Sir Wyville Thomson on the hydroid zoophytes of the Willem Barent Expedition, the memoir for which was published in Amsterdam in 1884.

Three months later in the middle of the Long Vacation when D'Arcy was on his way to Edinburgh he heard that Frank Balfour had been killed climbing in the Alps. It was almost unbelievable, and seemed inexplicable for Balfour was an experienced climber, but it was one of those tragic accidents that do occur even to those who take no risks. D'Arcy returned to Cambridge where the funeral took place ten days later. The University was plunged in mourning and the world in which Balfour had moved was shocked and stunned. It was but three months since the Chair of Animal Morphology had been created for him; only a year had elapsed since he had acted as General Secretary of the British Association at York; he was already a Member of the Council of the Royal Society and now at thirty-one years of age his work was over. T. H. Huxley had said of him: 'He is the only man I know who can carry out my work'; Sir Richard Owen wrote: 'I know of no fellow-labourer who could be so ill-spared'; and Joseph Gamgee's feelings were those universally felt when he said: 'No loss outside my own family has ever affected me so deeply.'

To D'Arcy personally Balfour's death was a crushing blow; apart from his friendship Balfour had already shown his great interest in the younger man's career, for when—shortly before his death—he had been offered and had refused the Chair of Natural History in Edinburgh he had said: 'D'Arcy, if only you were a couple of years older and had your degree, we'd put *you* in!' His influence and his death were without doubt two of the decisive factors of D'Arcy's youth—his influence as all-pervading and his death as perhaps the greatest loss he could have sustained at such a time.

D'Arcy spent the summer in Cambridge working in the laboratory and at *The Fertilisation of Flowers* and also drawing up an account of Balfour's work for his uncle, Dr. Arthur Gamgee, who was to pay tribute to him at the British Association the following month.

In the autumn he was put on the Committee of the Balfour Memorial Fund which it was proposed to raise to Balfour's memory for the furtherance of biological research. A large meeting of undergraduates took place in the Union Society's rooms (the first time they had ever been used for a public meeting) and each of the speakers had something to say of Balfour's gifts and powers, his inspiration and his youth. D'Arcy spoke of him as a beloved teacher as he was to do many times again, for this friendship had kindled a great light in his life and the flame of affection and remembrance never died.

One of the immediate results of Balfour's death was that the advanced students were without lectures in the higher branches of Zoology, so the seven or eight men concerned each took a subject and lectured upon it to the others. D'Arcy wrote of this 'co-operative lecture scheme' to his grandfather, saying: 'I have been at pains to make a very large number of diagrams. I gradually acquire the knack of rough, but rapid drawing.' Apart from his lecturing he spent the winter on a variety of subjects. There was the Tripos Final ahead of him the following spring, and there were the proofs of *The Fertilisation of Flowers* to read, and by now another book had been begun. This was a *Bibliography of Protozoa, Sponges, Coelenterates, and Worms*, undertaken at the instigation of Professor Alfred Newton and with the aid of grants from The Royal Society and The British Association. The *Bibliography* covered the years 1861–83 and meant a vast amount of reading and documentation; D'Arcy dedicated it to J. Victor Carus, historian and Professor of Zoology in the University of Leipzig. It was published by the Cambridge University Press in 1885.

He had also been asked by the Rev. James Stormonth of Edinburgh to read the proofs of a second edition of his *Dictionary of the English Language* which Blackwood's had published

in 1871. When it appeared the following year a paragraph in the Preface acknowledged his work:

Mr D'Arcy W. Thompson, a distinguished science-scholar of Cambridge, has read the whole proofs, and again the revised sheets, chiefly with the view of securing the accuracy of the very large number of new scientific terms which have been introduced. The great object has been to give popular and intelligent definitions to such terms, which may yet be in accordance with scientific accuracy—a thing not always easy to do.

At the same time he and his father were corresponding on the possibility of together translating Aristotle's *Historia Animalium*, the one to concentrate on the Greek, the other on the natural history. This work was actually begun and D'Arcy the Elder's share more or less completed, but nothing came of the project for many years.

It is well to remember that D'Arcy was only twenty-two years of age at this time. Already his faculty for doing many things at once was showing itself. This versatility and love of variety was one of his characteristics, and it was no effort, indeed only a pleasure, for him to turn from natural science to translating German, preparing a bibliography or reading Greek.

In May 1883 he passed Part II (Zoology and Comparative Anatomy) of the Natural Science Tripos with First-Class Honours and he graduated B.A. on 19th June. 'It makes no difference to me here', he wrote, 'except that I wear a long gown instead of a short one.' In order to have a short rest he packed up and went off to Belgium for a few days.

June 29th 1883. This is the cheapest and not the least delightful of all continental trips, and the whole journey has cost a little more than the return ticket to Edinburgh. I breakfasted in Antwerp last Sunday, and have divided my time between Antwerp, Malines, Brussels, and Louvain. . . . There is there as you know, a great University, and I met some students at the table d'hôte, and afterwards spent the evening with them. They gave me a great deal of amusement, and much information also. . . . The only thing bearing on my own subject that I examined was the Zoological Garden at Antwerp. It is at least as fine as our own and very remarkable for

the great number of young animals of all kinds that are bred there. The sail down the Scheld was very delightful, and we made the quickest run on record from Flushing, arriving in Harwich at ½ past 3 in the morning. You may be interested to know that all these Antwerp boats carry vast quantities of eggs, about 100 or 150 tons each trip, most of them come from Italy. Last night there were long trains of trucks full of eggs alongside the steamer wh. had come direct from Turin.

But before this, on the 12th of June, T. H. Huxley gave the Rede Lecture in Cambridge and thirty years later D'Arcy described the memorable scene in his lecture 'The Shell of the Nautilus':

The Senate House was filled with a very great gathering, for Huxley was at the height of his fame; the walls were hung with diagrams and the Museums had brought out their stores; shells great and small, old and new, the inhabitants of our seas and the fossil relics of all the ages were spread out upon the table; and Huxley stood before us with this shell of Nautilus in his hand. As he stood there with the shell in his hand we young men listened to him with tingling ears. His message was as plain as thought and reasoning could make it, and his words came clear as a bell to unfold and enforce his meaning. He spoke as one having a mission and his theme was in fact a recapitulation of the great effort and purpose of his life, the chief of all his multifarious activities, the defence and advocacy of the Theory of Evolution. . . . It was no small subject (he said) that he had chosen, but a very great one indeed; for it was no less than the Origin of all forms of life soever, of all things on land or sea which make up the living population of the world. In short Huxley was fighting his battles over again, the battles that he had fought again and again since Darwin's book was published more than 20 years before; the victory had indeed been won, won to all intents and purposes in Cambridge 20 years before, and in place of battle we had a sort of review, a day of triumph; but as Huxley led us slowly, step by step, over the old battle-ground, he looked and spoke as one who had borne a great responsibility, and was penetrated to the marrow of his bones by the gravity and importance of his task.

So it was, from the text and parable of the Nautilus that Huxley strove to teach us once again the great lesson of his lifetime, the

lesson that Darwin and Spencer had learnt before and that he himself had fought and striven to impart to the world.

In July *The Fertilisation of Flowers* came out, and in due course reviews appeared in *The Times*, the *Westminster*, the *Saturday Review*, *Pall Mall*, and others, and were all very favourable. His grandfather was delighted with the work and the comments and he wrote thus:

> We have indeed had an unusual, not to say unparalleled pleasure of its kind in the result of your splendid book this morning. I had seen the work grow into form in your hand, and to a great extent in its later stages through the press, and I felt certain of the finished work being of special excellence; but altogether, including the printing and whole get-up it surpasses my most sanguine expectations. I will not attempt to express myself more fully today but ask you to accept my congratulations of your work, and the assurance of affection of your Grandfather, J.G.

By this time the Cambridge Science School had been greatly enlarged, a Chair of Physiology had been created, and Michael Foster had been appointed the first Professor, Francis Darwin was the new Professor of Botany and Adam Sedgwick succeeded to the Chair of Animal Morphology. There were more than 200 students in Professor Foster's Course, and out of the fifteen who gained First-Class Honours two were women. In the Michaelmas term Foster offered D'Arcy the post of Junior Demonstrator in the department which he gladly accepted, for it brought him in £30 a term. Throughout his years in Cambridge he coached in Greek, and occasionally had pupils for biology coaching, among them Michael Foster's son, but this did not bring him in much and expenses were considerable.

In April 1884 he was invited to read a paper at the British Association in Montreal on 'Vegetable Life in the Deep Sea'. But he decided against it after consultation with Thiselton-Dyer, the Assistant Director of the Royal Botanical Gardens at Kew, who was later to become his close friend and correspondent. He wrote to his grandfather that the expenditure would not be prohibitive but that time was precious and the subject

too little in his own line. His grandfather replied: 'As the Italians have it, "Chi troppo abbraccia nulla stringe" (*He who attempts too much achieves nothing*). But how few men observe and follow that wise precept, but rather thrash at shadows, and miss the more substantial things.'

During the years at Cambridge, Joseph Gamgee and D'Arcy kept up a correspondence of mutual interest on scientific matters of the day. D'Arcy sent home everything he wrote and every book or pamphlet that interested him, while the old man, though now over eighty years of age, never failed to give his opinion on, and put his mind to whatsoever was sent him. A few of his letters are worth quoting in order to observe how great was his influence on D'Arcy's development, and to show the love and respect each felt for the other. After reading an address of Huxley's in *The Times*, Gamgee writes, 'He is a Judge, the servant of no man, or party, but of Science, Truth, his Country and all that these command.' He comments on D'Arcy's opportunities under the great teachers of science of the day and says:

> What a mighty combination of teaching power presides at Cambridge in Michael Foster and Macalister. You know that I conceive no course of teaching of the two halves of one subject (I mean Anatomy and Physiology) that will not suffer as whole things all do when split into halves. *The new fangled idea of subjects being so great that only parts must be undertaken by one man is a consummate absurdity*. It is like saying it is not the business of an admiral to understand how to row a boat or tie a knot in a rope. Is not Michael Foster an anatomist and is not Macalister a physiologist, and is it not because each of these excellent men is both, that they are what they are, unsurpassed and unequalled in anything in this kingdom?

Over and over again he gives D'Arcy some point to think over, it may be 'The Progression of the Horse or Motus Animalium', or the geological formation of the bed of the River Tweed, or the structure of the ant-hills they had seen together at Comrie, or his own theories on 'How a bone is built', but ever and again the old man shows that insatiable curiosity, that desire for more

knowledge, that he handed down to his grandson. In later years D'Arcy was to quote his words—'When the mind is awakened and is intent in the furtherance of an object, opportunities are made', and again—'inquirers honestly bent on the pursuit of truth seldom investigate in vain'. He loved to go over his grandfather's life, and tell the story of the simple peasant lad who raised himself to a unique position in the veterinary world with a schooling that had only taught him to read and to write, and to add but not to multiply; and with his feeling for the reality of the past D'Arcy reached out through his grandfather to the Battle of Waterloo, when a coach and six brought the news of the great victory to Elmdon and young Joseph was in the village and held the horses' heads.

There is one more aspect of D'Arcy's character that must be considered here—his desire to help those in less fortunate circumstances than his own, and his sympathy for other men's distress, suffering, or misfortune.

In the second half of the nineteenth century the great awakening of the corporate social conscience led to many schemes for helping the poor in the slums of the large cities; the one in which D'Arcy was interested was that which founded the first University Settlements in East London. The originator of the scheme was the Rev. S. A. Barnett of St. Jude's, Whitechapel, and his aim was to open one or two houses in the district where university graduates could live for long or short periods, giving their time, wholly or in part, to the poor in the slums around them. The first house to be opened was (the later famous) Toynbee Hall, and on 24th May 1884 a meeting was held in the Guildhall, Cambridge, to enlist support and funds for it. H.R.H. Prince Albert Edward, Mr. Chamberlain, and many important people were present, and Professor Michael Foster, Professor James Stuart, and D'Arcy—one of the prime movers amongst the younger graduates—all spoke. D'Arcy's plea was for the working boy who earned not more than 10*s*. a week and on that had to support himself; who, having no occupation in his leisure, was so often subject to bad influences, and was therefore in great need of the help and encouragement of

just such young men as themselves. He had been to Whitechapel and had seen and heard for himself; he told the audience that though they might find it hard to believe, there was no difference at all below the surface between their own sons and brothers and the dirty ragged rapscallions of the East End! After the meeting a Cambridge Committee of the Universities Settlement Association was formed and Sidney Vines was made Honorary Treasurer, D'Arcy Honorary Secretary.

At the same time he was nursing a project of his own which he brought into being a month or two later. He and a few of his friends in Trinity had read an article by C. G. Leland on the teaching of handicrafts to young boys and girls who spent long days at work, and they bethought themselves of their own laboratory boys. Under D'Arcy's direction an empty carpenter's shop was rented in Jordan's Yard, Bridge Street, and with each member of his little group of friends subscribing a pound, tools were bought and wood provided and a skilled carpenter from the Museums employed after hours as teacher. 'The Boy's Workshop' started with six boys who were taught simple carpentering and wood-turning and 'became quick and eager and skilful' beyond all expectation. By October there were a dozen boys, and in an article in the *Cambridge Review* of that month, D'Arcy wrote that it was hoped to double the number and start a class for technical drawing as well. His energy and enthusiasm carried the scheme shoulder-high and within a year it had become a registered Society with a busy workshop in the basement of the Union Society's buildings, owning carpenter's benches, a lathe, and a fret-saw. Orders were taken for specific objects and the boys were given a certain percentage of the prices obtained. Eventually after about ten years, the School Board took over the whole scheme, for it had proved a complete success and had become the pattern for other ventures of the same kind. A lifetime later a highly skilled technician in one of the laboratories that D'Arcy was visiting in Oxford made himself known to him and told him that he had been the first and smallest boy in the workshop, adding that all that he had done since had been made possible by that early training.

In the summer vacation D'Arcy spent some days visiting factories and technical schools in order to see various up-to-date methods of education. He wrote:

Cambridge. Sept. 1884

My dear Grandpapa,

I spent Thursday in Birmingham. . . . The new Technical School opposite Uncle Joseph's house is very fine. The chemical laboratory is large and sumptuously filled, and the little students, 12 to 14 years old, were doing excellent work. Next day however, I found the Central Board School in Sheffield as far ahead of that in Birmingham, as it was of any I had seen before. I left for Sheffield at 11 o'clock at night, and at 8.30 next morning was in the chief school there. . . . I never knew that any boys or girls in the country got an education so practical and so enjoyable.

During the summer D'Arcy had been working on a thesis for a Natural Science Fellowship at Trinity. A year earlier, when his friend W. R. Sorley had got his Fellowship, he had written, 'He is now at the height of his ambition', and for himself it was what he desired more than anything else. But he was unsuccessful; no Natural Science Fellowship was awarded that year. He tried again in 1885 but failed; another man was ahead of him. There is an interesting letter from Professor Foster in the November of 1885 in which he says: 'I want to urge you to *complete* one or other of your pieces of work. The chameleon seems the most important and I am giving you not only my own expressed judgment but the heavier one of others, that your position in your paper wants supporting by a larger amount of evidence, wants more thoroughly working out. I should urge you to put all your strength into this.' And again a year later in 1886 when D'Arcy was immersed in affairs in Dundee, but had evidently tried yet again, he wrote: 'I duly received your first paper, and this morning the other, but these are abstracts. Are you not going to put in your whole paper? Why have you not sent in your old paper? or do you not mean to?'

It seems as if his failure to get the much-coveted Fellowship was because he was too much occupied with too many different projects; the very fact that he was so versatile and had so many

interests was against him, but the disappointment of never becoming a Fellow of his beloved College was one that he never got over.

His scholarship came to an end in the summer of 1884 and in the autumn he began to look for a post in all earnestness. In November the Chair of Biology in University College, Dundee, was advertised and he wrote to Pam:

Cambridge.

2:11:84. You will be excited to hear that I am going to compete for the Chair of Biology in Dundee. I had determined not to do so, on the ground that a man called Pat Geddes seemed certain of the place, but yesterday Foster urged me to try. It will not hurt me if, as is more than likely, I am beaten.

He had two books of excellent testimonials to which Professor Michael Foster and many others contributed. Among them Alfred Newton wrote of 'his extraordinary knowledge of Zoological literature', and Professor Macalister, the anatomist, said, 'I have often been struck, in converse with him, by the forcible and lucid way in which he can explain obscure and difficult matters.' Professor W. K. Parker of the Royal College of Surgeons summed up his teaching by saying: '. . . when he speaks, I am very willing to be silent'. His friend Thiselton-Dyer praised his bibliography in *The Fertilisation of Flowers*, in these words: 'Had you done nothing more than this you would have earned the genuine gratitude of English-speaking biological students.' And there is an interesting letter from Professor Ray Lankester in which he says that he cannot give all the candidates the testimonials they are asking for but 'I feel however bound to state in your case that I have recently had an opportunity as Examiner for Fellowships at Trinity College, Cambridge, of forming a judgement as to your work in the science of Animal Morphology and that I reported on that occasion that in my opinion your work shewed originality and capacity of such merit as to justify your election to a College Fellowship.'

In the foreword to his testimonials D'Arcy writes:

I have done all in my power to become acquainted with the conditions of technical and scientific education in this country and elsewhere. In applying for this, a Chair of new foundation, whose work no preceding holder has defined, I venture to state my conception of the duties it involves. I imagine that a very great part of the business of the Dundee Professor of Biology must be the free and popular teaching of his subject, in a manner quite apart from, though not exclusive of, the higher training of advanced or specialist students.

His qualifications were that he had been a Scholar of Trinity, he had graduated with First-Class Honours in both parts of the Natural Science Tripos, he was one of the University Demonstrators in Physiology, he was twenty-four years of age. His publications included one book and one in the press, and eight papers on varying subjects of zoological interest, the first published at the age of nineteen.

At the end of November the Council of University College wrote privately to his uncle Dr. Arthur Gamgee, to Professor Michael Foster and Professor Ray Lankester requesting them to report upon his suitability as a candidate. On 22nd December, after a wearisome delay, he and four other candidates were called to Dundee for an interview; they all travelled together in high spirits, resolving that whosoever should be successful would give the others dinner afterwards. D'Arcy was chosen and went at the appointed time to the Royal Hotel to meet his vanquished rivals. Alas for the dinner party! D'Arcy alone was gay, high spirits were his only, and it was a sorry affair indeed and quite unlike a former hilarious celebration in Trinity. But there was great rejoicing in Galway and Edinburgh, and D'Arcy himself could hardly believe his good fortune in having secured this Chair in a new College, with all its opportunities for 'making a spoon or spoiling a horn'.

REFERENCES

[1] *Die Befruchtung der Blume durch Insekten*, H. Müller. Translated and edited by D. W. T. with a Preface by Charles Darwin. Macmillan.

V

UNIVERSITY COLLEGE, DUNDEE

1884

A man of boundless curiosity and unwearied diligence.
BOSWELL, *Tour to the Hebrides*

The Young Professor

THERE is an old map of Dundee drawn in 1776 which shows the town as a cluster of buildings around five main streets; from the High Street in the centre radiate the Overgate, the Murraygate, the Seagate, and the Nethergate. To the north stretches out the long straggling Hilltown and beyond and to the east and west are meadows, fields, and woods. To the south lies the river Tay sheltered on one side by the promontory of Fife and on the other by Buddon Ness, its shore as beautiful a site for a city as one could wish to find.

The buildings of this ancient town, which was granted its first existing charter by Robert the Bruce at the beginning of the fourteenth century, were tall 'lands' many of them timber. Some faced small courtyards and had panelled rooms and carved mantels, one had a beautiful piazza on the street, others had rounded gables and outside stairways, and all were solidly built with workmanship and taste. Most of the bigger houses had gardens, stables, a pigeon-house, and a well.

In the centre of the town stood the Town Hall, built in 1732–40 by William Adam the father of the famous sons, a building of fine proportions with a handsome arcade which the townsfolk called 'The Pillars'. The streets were narrow, and busy with horses and vehicles, and between the houses ran wynds or

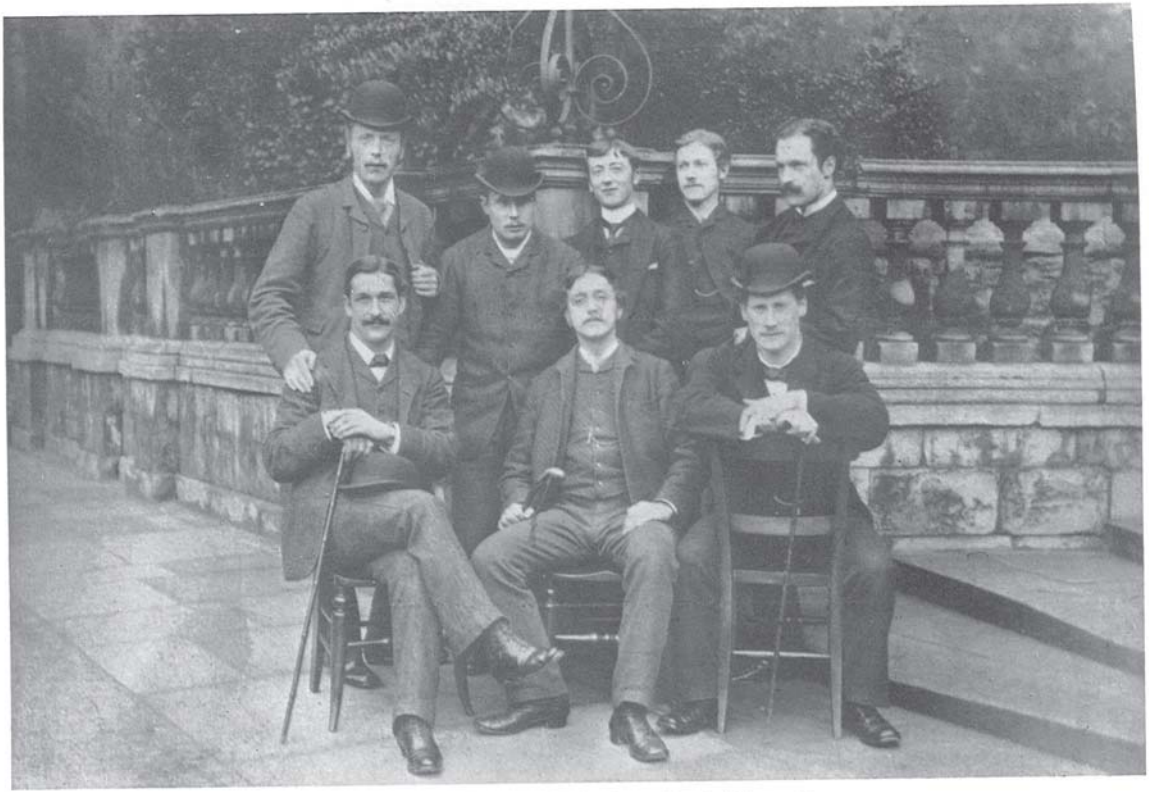
vennels with ancient names—Harry Ogilvy's Close, Horsewater Wynd, Bucklemaker Wynd. Down by the waterside were the Fish Market and the Flesh Market thronged with fishermen and sailors, and in the harbour were tall ships, merchantmen and whalers, fishing boats and coasters. Linen weaving was the staple industry of the inhabitants, and flax and hemp came in from the Baltic to be made into fine fabric.

A hundred years later the picture was very different, for Dundee with its historic past—the city of weavers and spinners—had turned into a 'textile town'. The dignified merchants' houses had become squalid slums, the well-stocked gardens were covered with mean dwellings; in place of fields were sprawling factories with high chimneys belching filthy smoke, and the teeming population was hungry and in rags. The factories had been built on the edge of the old town but the town had flowed out beyond them, and they were no longer on its fringe but within it. With the coming of the jute mills the population had increased enormously; country folk from the depopulated Highlands had come in to make a living, boatloads of Irish Catholics had been brought from the west, and the old houses and the newer tenements were unable to hold them all. They shared dank cellars with the rats, they huddled in attics without windows; babies were born, while others died, in slums where there was neither water nor sanitation; children went barefoot in the streets and women hurried through the grey dawn to the mills with shawls over their heads. Drunkenness, dirt, and disease were everywhere. The year 1885 was one of the worst on record, for to Dundee had come the realization that her monopoly of the jute trade was at an end: competition from Calcutta was cutting her out and two jute firms had had to close down: workers' wages were lower than they had been for five years, hands were paid off, and the people starved. Even the shipyards were slack; few ships were on the stocks and orders had practically ceased. Soup kitchens were opened and the out-of-work were given a bowl of soup with a lump of bread a day and for many there was no other food; those who had

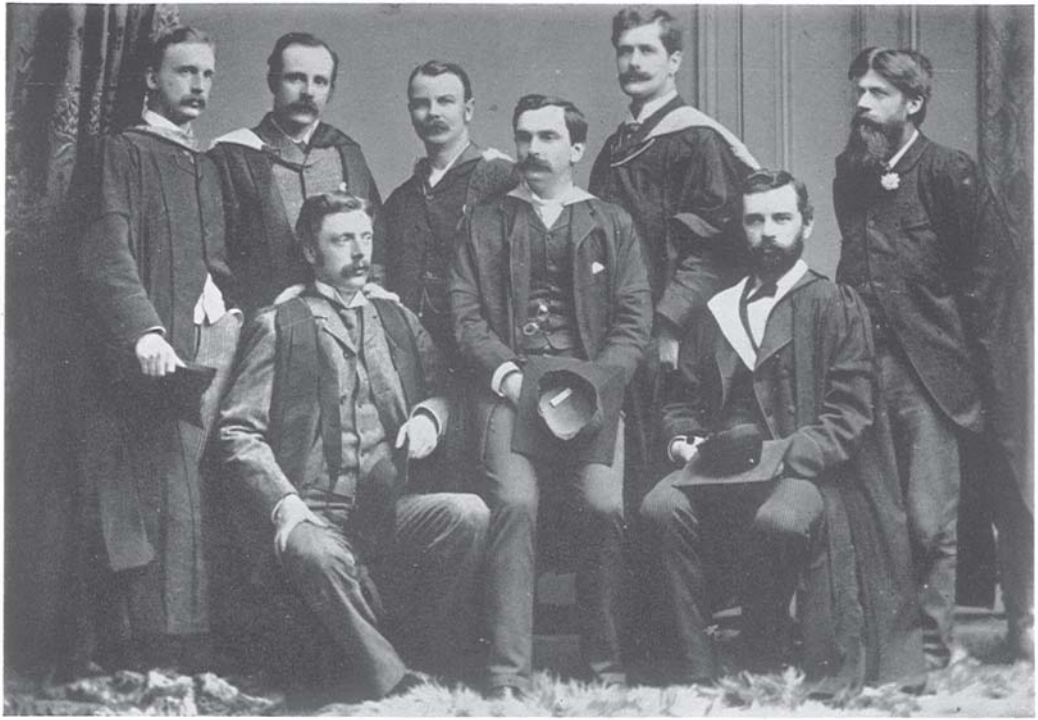
work were not much better off, for they lived on potatoes and broth made out of fish bones.

But there was another and an inevitable side to the picture. From small beginnings a few families of flax-spinners and linen-weavers had risen from being master-craftsmen at their own hand-looms in sheds and work-rooms to the ownership of factories and the control of thousands of workers. Some of the mill-owners still lived beside their works as did the Coxes who never left Lochee, but others moved out east and west and built themselves fine houses in the Perth Road or West Ferry; these kept their carriage and pair, their gardeners and maidservants, and constituted a new society on the banks of the Tay. In these rich houses there was everything that money could buy, sometimes combined with good taste and sometimes not, but there was hospitality and kindliness, and it was not uncommon to find the grandmother in a corner by the fire wrapped in a shawl, unaffected by the change of fortune which sent her grandsons to great public schools. Dinner parties were the principal mode of entertaining; they were lavish and lengthy affairs of eight to ten courses, each with its appropriate wine, served by tablemaids in black dresses with starched caps, the tables decorated with trailing maidenhair fern or stephanotis, and followed by music in the drawing-room. There were also balls, to which one drove in a hansom cab or in a friend's carriage, and in summer tennis and croquet parties with tea in the garden under the trees. But in this town where great wealth and great poverty lived cheek by jowl, where the middle class hardly existed, there was little culture. No life could have shown a greater contrast to that which D'Arcy had left in Cambridge than that to which he now came, and in spite of his pride in his new position and his much desired financial independence, there was surely some slight misgiving in his mind.

Nigh forty years ago, I first stepped out on the east-windy streets of a certain lean and hungry town, where it was to be my lot to spend thereafter many and many a year. And the first thing I saw was an inscription over a very humble doorway, 'hic mecum habitant Dante, Cervantes, Molière'. It was the home of a poor



111. F. M. Balfour and his class. Cambridge, 1883
D'Arcy is standing on the extreme left



IV. The staff of University College, Dundee, 1887

D'Arcy is seated on the left, Principal William Peterson in the centre; Patrick Geddes is standing on the extreme right

schoolmaster, who as a teacher of languages eked out the scanty profits of his school. I was not a little comforted by the announcement.[1]

University College, Dundee, was endowed by Miss Baxter, a member of a wealthy firm of Dundee linen manufacturers; a relative of hers—John Boyd Baxter—had been one of the original advocates of the plan, but had died before the scheme could come into being. He had visualized a Science college on the lines of that in Newcastle lately established by the University of Durham, an institution where instruction, both scientific and technical, was to be on lines suitable to meet the new demands made by the advances of the last thirty years. Therefore out of five endowed chairs in Dundee three were in Science—Mathematics, Chemistry, and Engineering—and only two were in Arts—English and Classics. The Chair of Biology was given a year later, thus bringing the emphasis down even more heavily on the side of science.

Four dwelling-houses in the Nethergate and the Church of Free St. John's were bought; in front of the villas on a slope to the south lay their gardens with pleasant trees, among them a beautiful strawberry tree, the whole comprising about three acres of ground. The Church was used as the College Hall, and the houses, linked up by a long corridor, were reconstructed as the Departments of Natural Philosophy and Mathematics, Arts, and Engineering. Behind these the Chemical Laboratory was built.

The Council of the new College set about the selection of the professors and they chose wisely and well, putting the best men they could find into the new chairs. (It is interesting to notice that the oldest among them was thirty-one years of age.) As Principal they nominated (Sir) William Peterson, Professor of Classics, who later became Principal of Montreal University; the Chair of Engineering went to (Sir) Alfred Ewing, later Principal of Edinburgh University; that of Mathematics to J. E. A. Steggall, Second Wrangler; and those of Chemistry and English respectively to Thomas Carnelly and Thomas Gilray. This brilliant staff was increased in course of time by the

appointments of (Sir) D'Arcy Thompson to the Chair of Biology, (Sir) Patrick Geddes to the Chair of Botany, and in 1894 (Sir) James Walker to the Chair of Chemistry. It must be remarked upon in passing that no college in the kingdom started out with such promise for the future, at least with regard to its professorial staff.

The movement for University Extension that had led to the founding of Owens College, Manchester, and similar foundations in Liverpool, Sheffield, and other English towns, had been largely due to the extraordinary ability and energy of Professor James Stuart of Cambridge, a great pioneer in education, and to the co-operation of the University of Cambridge. When University College, Dundee, was opened in 1883 Professor Stuart was invited to give the Inaugural Address.

D'Arcy's appointment was made a year later, in December 1884, and his Inaugural Lecture was given on 25th January 1885 in the former St. John's Church. A large gathering came to hear him, among them Joseph Gamgee, now in his eighty-fifth year, who had travelled from Edinburgh by way of the Granton and Tayport ferries, for the Tay Bridge was not yet completed. Principal Peterson in his introductory remarks observed that this Chair of Biology was peculiar, at least as far as Scotland was concerned, in that it combined two departments, Zoology and Botany, and that D'Arcy Thompson had been chosen to fill it because he seemed to show the wide outlook that was necessary for the holder of such a chair. D'Arcy's address was notable for his fine tribute to the work of F. M. Balfour and for the statement in his concluding paragraph in which he binds himself to no one course of action and to no laid-down rules.

> A pupil under F. M. Balfour, I learned the power of a really great teacher, which is a rarer thing even than a great discoverer. There was a magic in his manner that made itself so felt that it cannot be forgotten, and there was a contagion in his own enthusiasm in which every pupil shared. For he lived in an atmosphere of discovery, he was in the forefront of science and his teaching left the textbooks behind. It is a rare good fortune for a man to get his early teaching in a time when his science is new or beginning to make a new spurt

of progress. It is the good fortune that befell the pupils of Black the chemist in Edinburgh in the first years of the century; that befell the pupils of Sharpey the physiologist in London in the middle decades. But it was almost more conspicuously our good fortune under Balfour, for one great branch of biology actually grew up in his hands into a science—the science of embryology. He gathered up all the scattered knowledge that was hidden in books and floating in men's brains, and he, for the first time, wove it together, and entwined with it the thread of his own originality and genius. In every group of the animal kingdom he discovered new facts and vivified countless others. He did no work of merely plodding industry; he touched nothing that was not of critical importance, and contained the source of some luminous idea. After twelve short years of work Balfour died, but there remained behind him not only his work but something of his spirit. . . . The conception of evolution has not only illuminated our science, but has thrown a sidelight upon every other. But it is a mistake to suppose that evolution has yet settled down into a consolidated scheme or that those who work by its light are pledged to the stereotyped clauses of an evolutionary creed. . . . There can be only one truth in the fulness of knowledge, and he who works humbly and sincerely to let in light works not for himself but for all men.

So had his grandfather taught him in childhood and so had he written to him at Cambridge, 'Seek Truth and you will find it'.

Thus a new chapter opened in D'Arcy's life, a chapter that was to last for thirty-three years. From the beginning of it several lines of action emerged, each the result of what had gone before and each illustrating a different side of his personality. First came the work of his own department, his lectures and practical demonstrations to his students, and running concurrently with his teaching work was his creation of University College Museum, a unique place and a connoisseur's museum, made with great personal delight out of his love of collecting, cataloguing, ordering, and enjoying the treasures of animate nature. Second, the development of the College fired his enthusiasm and called forth his energy and his organizing ability. Third, there was his lifelong interest in social conditions and the active work he did in the early days for the poor of Dundee.

Last, and yet first in importance, came his own original contribution to science which was conceived, developed, and brought to fruition after years of work and thought in this provincial college.

When D'Arcy put on his cap and gown and went into his class-room for his first lecture he was discouraged to find only two students, one man and one girl, each occupying their own corner of the room, but in the following term (March to June 1885) he was able to write to his grandfather: 'My classes increase—my Botany class of 21 or 22 is now the most numerous in the College.' In his Report to the College Council in the July of that year he stated that in his Botany lectures he had aimed at an advanced standard with examination questions not easier than those of the first part of the Cambridge Natural Science Tripos, and that the answering was very good; that already the space provided for him was too small and the laboratory classes had had to be subdivided; and that three scientific friends from St. John's College, Cambridge, had made use of his laboratory for research, S. F. Harmer, W. F. R. Weldon, and R. N. Goodman.

Of the beginning of the Museum he wrote:

> Considerable progress has been made towards the creation of a Museum. But I must point out that, though I hold the development of a Museum to come within the sphere of my own duties, yet such work entails heavy expenses, quite apart from those connected with the equipment and maintenance of a teaching Laboratory. About 600 permanent specimens have been prepared by me, and some rare and valuable ones have been purchased; several hundreds of microscopic sections have also been prepared and are now preserved in the cabinet. Those preparations would even now form a useful type collection, had I room and cases for their proper display. The urgent need of my Department is a separate Museum and Library Fund. If my Museum is to take substantial form a skilled Museum Assistant is a necessity. Such a man would hold the same relation to my Department as a College Mechanic to the Departments of Engineering and Natural Philosophy; and I believe that the preparations made with his help would amount in actual value to many times his wages.

Shortly after this he advertised for a laboratory boy and over 100 applicants came the first evening. The job carried only 5*s*. a week, but there was the perquisite of admittance to the Biology classes and any others for which a professor gave permission. The first boy chosen became, in due course, a fully qualified doctor; the second, Aleck Rodger, was D'Arcy's right-hand man for many years and was eventually appointed Curator of the Perth Natural History Museum.

By October 1885 D'Arcy's students had increased to thirty, 'of whom nearly one half (and some of the best) are girls'. His lectures and classes comprised Elementary Biology, Comparative Anatomy and Zoology, Vertebrate Morphology, Botany, and Comparative Embryology; and his small laboratory included an aquarium, made up of two slate tanks, for the rearing of marine embryos.

The following letters to Joseph Gamgee give a picture of the beginnings of the Museum.

10:10:85. I am now very comfortable in my lodgings and glad that I made the change. It will facilitate my work a good deal, besides tending to economy. The food is well cooked and the place clean. . . . Additions to my Museum are numerous. Within the last week I have had a porpoise, two mongooses, a small shark, an eel 8 ft. long and 150 lb. in weight, a young ostrich and two bagfuls of monkeys: all dead of course.

28:12:85. I continue to get large numbers of beasts. Today a tapir came. I have some hopes of an accession of funds for my Laby. shortly wh. wld. enable me to improve very much.

30:12:85. On Saturday evening the Dean wants me at a Social Meeting in connection with his Church. . . . There was another young lion waiting for me on my return, besides many other animals.

7:2:86. I yesterday received a chimpanzee, one of the most manlike of the apes; it is the rarest and most valuable specimen I have yet had and it came like most of the others from Liverpool. One of the young doctors came and helped me to remove its brain at 11 o'clock at night. It was in beautiful condition. I shall be able to

make a whole series of preparations besides cleaning the skeleton and stuffing the skin.

2:5:86. The Museum grows abundantly. Last week I had a lion-cub, a leopard, a vulture, a gazelle, and some others.

By this time D'Arcy had gone down to the harbour to make friends with the whaling skippers so that they might help him with specimens of beasts and birds from northern waters. The harbour was a lovely place, crowded with great wind-jammers and four-masted Indiamen home from Calcutta, wooden whalers built in Dundee, and little river-boats carrying coal and sand. In those days Dundee was known as 'the city of jute, marmalade and whale oil'. The whaling brought in anything from £100,000 to £150,000 a season. A fleet of sixteen ships sailing from Dundee all had famous names—the *Active*, *Arctic*, *Nova Zembla*, *Terra Nova*, and others. They sailed in January for the early seal-fishery in Newfoundland, and after a refit at St. John's went on to Davis Strait and the whaling grounds, returning home in the autumn with their oil and whalebone. Years later D'Arcy was to write of the whaling captains that 'they have always been the best friends of the Museum', and from them he got numerous additions for his Arctic collection. Captain Robertson of the *Balaena* gave him a skeleton of the rare musk ox from Siberia, Captain Adams a young whale's head complete with whalebone, Captain Milne brought home birds, and others filled his spirit bottles with specimens of all kinds. When they came on shore they went to his lodgings and talked whaling and fishing, and D'Arcy was as much at home with them as his own seafaring forebears would have been. By the end of the 1885–6 session he was able to report:

Great and important progress has been made. . . . We have stored in garret and cellar many hundreds of valuable spirit specimens, illustrative of all the chief animal types and including many elaborate anatomical preparations. A donation of £100 from Mr. Martin White, though to a large extent required for pressing current expenses, has enabled us to add to these many objects which we could not of ourselves find or prepare. We have now over 200

skeletons in process of making. While circumstances still oblige me to teach Zoology without a museum, I have also to teach Botany without a garden. My small laboratory in which every nook and corner is full, has proved so inadequate that my efforts to teach a practical class in Botany this summer have failed.

D'Arcy by this time was learning what he was wont to call 'The Gentle Art of Begging'. He begged for the Medical School, he begged for the Museum, and he went on begging for the needy and distressed all his life. For many years he was on the Board of the Murdoch Trust of Edinburgh which made timely and generous grants to naturalists, no matter whether professional or amateur, who fell into poor circumstances. No one in difficulties or trouble ever asked his help in vain; his right hand gave while his left hand knew it not. But in his University work he never had enough money to do what he wanted; his Department was ever cramped for funds even fifty years later when grants were to be had on all sides. He learnt throughout his life to make shift, to economize, to give one thing in exchange for another; to throw nothing away in case a use for it might be found. 'Aye gie a bit o' your cake to the wifie wha's bakin' a pie' was one of his favourite sayings. Yet this carefulness was not of his nature but was born of necessity. Of University College Museum, which housed the finest collection of Arctic zoological specimens in the country, D'Arcy wrote in 1902: 'The Museum possesses no endowment and receives no annual grant; save for certain special grants amounting in all to under £1,000, both it and the Library annexed may be looked upon as the result of savings upon the annual grant for the upkeep of the laboratory, which grant has varied between £80 and £120 during the last eighteen years' (1884–1902). In the face of such financial difficulties many a man of less enthusiasm and less optimism would have given up long before.

Apart from its great value as a teaching asset the Museum was well worth the attention of specialists. Every main zoological group was worthily represented, the collection of crustaceas, certain families of insects, molluscs, starfishes and their allies, and birds, being uncommonly rich in the number and variety of

species. (This happy condition lasted until D'Arcy left Dundee to occupy the Chair of Natural History in St. Andrews, when a combination of unfortunate circumstances during the next few years led to the neglect of the thousands of small specimens preserved in spirit. Later attempts to remedy this neglect met with only partial success. Matters were brought to a head in 1956 when the stone-built pleasing victorian villas that housed the Natural History Department and the rest of the College at their beginning, seventy-five years before, were scheduled for early demolition, and the Natural History Department for removal to temporary accommodation elsewhere. It was not a time for half measures. The teaching material, a rich store in itself, was retained at Queen's College, the big-game skeletons of elephant, giraffe, camel, and D'Arcy's favourite trophy, Steller's sea-cow, went to the Royal Scottish Museum, Edinburgh; and the huge whale head and the specialized collections to the custody of the systematists of the British Museum (Natural History), London. In this way valuable material is still readily available to specialists at home and from overseas. And, thanks to modern methods and the care of the specialists concerned, a good deal of the preserved material that had suffered through evaporation has been to a considerable extent restored. *Autres temps, autre mœurs!*)

A letter to an absent student shows D'Arcy's varying activities at the end of his second year in Dundee.

University College, Dundee 5th Nov: '86.

We seem to have more work than ever at College and the attempt to teach a little Physiology, without adequate apparatus or material, gives me a lot of worry and trouble. Still we pull through. The morning class is a good one of about ten, and when we settle down I hope they will do good work. There are two girls among them. On Monday afternoons the Lab. is populous with girls for our demonstration class in Physiology, and in the evening classes they also predominate. A lot of evening Lab work goes on now, and the place is usually alive till 10 o'cl. Additions to the Museum have not been quite so numerous of late. But last week I was made happy by the arrival of 9 little baby whales—the finest stock of whale em-

bryos, perhaps, that ever came under a naturalist's eye. . . . I also got a baby Ornithorhynchus, a classical specimen. Prof. Parker wrote a memoir on its skull, Prof. Howes on its shoulder girdle, and now I am to do its pelvis. Today we got a small bear, and yet another pelican. We have put up a good lot of skeletons, and a great lot of small osteological specimens.

Last night John Sharp gave me £20 to buy second-hand glass cases at the Edin: Internat: Exhibition. It won't go very far, but it will do something.

Nov: 9th. There is nothing new since then. I have been working all day on the baby Ornithorhynchus, and it is more interesting almost than I expected. You have forgotten (but it doesn't matter) the long story I used to tell you all, about the homologies of the Marsupial bones with the pre-pubis of the fossil bird—like reptiles. Well, I think our baby proves that to be all true.

I'm bewildered with popular lectures. I have about 12 engagements fixed (all gratuitous). . . . As to original work, tho' I tear my hair and rend my garments, yet it never gets done.

There were two societies to which D'Arcy was elected during his first spring in Dundee, the one, still a flourishing organization, The Dundee Naturalists' Society, at which he read several papers in the course of years, and the other, The Dundee Working Men's Field Club. This second club attracted his particular interest; it had a small membership and met fortnightly to discuss field natural history, and in summer on Sundays and holidays its members went on botanizing expeditions in search of rare plants in out-of-the-way districts of Forfarshire and around Ben Lawers. To this club belonged some of the scientific working men that Dundee has reason to be proud of—John Ramage, conchologist; James Fulton, mill-hand and botanist; and John Hood, brass-worker and authority on rotifers. Of the latter D'Arcy wrote later:

I had no sooner come to Dundee than he (John Hood) came to see me; and among the few letters of his that I have kept, the first was written a very few weeks later, in March 1885. It was to tell me that he had been finding *Conochilus volvox* in abundance, a rare and very beautiful free swimming colonial Rotifer, and to send me

a colony or two of the same. . . . Hood lived in a small working-man's house, or flat, in Dallfield Walk; a tall, oldfashioned microscope, made (save for the lenses) with his own hands, stood in the window, and the table and its books were those of a scientific man. He had at this time steady employment in a Dundee foundry; but he eked out his weekly wage by supplying Professor McIntosh and me with living specimens for our classes and by sending in like manner his rarer or undescribed Rotifera to such experts as Dr. Hudson, Mr. C. Rousslet, or Mr. E. R. Dixon-Nuttall.[2]

D'Arcy also became a member of the Homeric Club, a society of classical enthusiasts who met to read and discuss Greek plays and poetry. Once a year they went out for an expedition to the country, and upon one occasion they visited the village of Glenfarg in Perthshire and lunched at the Inn. As they stood about the yard two of the local lads approached D'Arcy and asked who the distinguished and bearded company might be. He replied that they were the Homeric Club from Dundee. 'Oh!' said the fellow, 'is that so? Whaur's yer doos?'

D'Arcy was elected a Fellow of the Royal Society of Edinburgh in March 1885, though his attendance at Meetings had dated from 1878 when he was eighteen years old.

In the summer vacation he went to the Zoological Station on Loch Fyne which was run by Professor Cossar Ewart of Edinburgh University, there he had the use of a little boat in which to go dredging every day. In September he read two papers at the British Association—'On the Hind-limb of Ichthyosaurus', and 'On the Morphology of Vertebrate Appendages'—and during the same month his *Bibliography of Protozoa* came out and received good notices in the scientific papers.

Early in the New Year of 1886 he was elected to the Savile Club which had lately moved from Savile Row to Piccadilly, and among whose members were R. L. S. and W. E. Henley. One day he entered the dining-room of the Club where all members dined at one long table. The only place he found empty was beside Herbert Spencer, philosopher and author of *The Principles of Ethics*. Spencer was renowned for his brusque manners and in his ears he wore little ivory plugs so

that he might be spared the conversation of his fellows. On this occasion, however, D'Arcy's resonant voice must have penetrated even beyond the ivory plugs for, shortly after, Spencer rose from his place, and, taking his plate with him, finished his meal standing at the sideboard.

D'Arcy was now twenty-seven years of age, 'a young tall slim man who seemed, I think, not too robust', as one of his students wrote; actually he weighed little more than eleven stone though he was 6 ft. 3 in. in height. He was gay, loved society, and his whole personality radiated vitality and joy in living.

The year 1886 was one of endless and diverse activity as the letters to his grandfather show:

7:2:86. I am having several popular lectures to give about this time. On Thursday I lectured at Falkland in Fife. Tomorrow night I give my usual College lecture, and I have popular lectures in different places on all three following nights! After that I have only one more before me. Fortunately they require no preparation. I have also been to 3 or 4 dancing parties lately—the first I ever went to and enjoyed.

19:5:86. I have to speak on 'The Future of our Universities' on Saturday.

27:5:86. I have so many kinds of things to attend to and so much routine business that I often feel almost overworked. Still we make progress. The present of books of which I told you arrived from Agassiz (son) yesterday. It is a very splendid gift. I persuaded the Naturalists' Society to spend about £50 on books for me last week. So our Zoological Library is making progress.

21:6:86. Alfred Russel Wallace, the naturalist, was here with me last week and stayed with me. He was a great friend and fellow-worker with Darwin, and you will find all about him in 'Men of our Time'. He is an old man now, but is very active. He sat talking with me till one o'clock in the morning, and then left by train at 6! Three valuable parcels of specimens are on their way to me; one from Naples, one from Berlin, and one from Prague.

7:12:86. Canon Tristram was here on Friday last. He lectured to my students in the afternoon, and afterwards lectured to the public

in the evening. His visit was a great success. He has promised me a lot of birds for my Museum. His own collection contains 20,000 skins, and he sold his collection of eggs for £1000.

There is a point to be noticed here with regard to his lack of 'original work'. The only paper he wrote in 1886 was an article on John Ray for the *Encyclopaedia Britannica*. It is evident that others as well as himself thought his lack of productivity was serious. There is a letter from Michael Foster in 1888 in which he says: 'I hope you will be able soon to throw off these administrative activities. Time is getting on—and if you don't take care, the research will become difficult and in the end impossible. Seriously consider whether you have not done enough and can now do something for Science.' The 'administrative activities' mentioned in this letter were those undertaken by the small body of professors of University College in connexion with their efforts to found a Medical School. Plans were already afoot when D'Arcy came to Dundee and he threw himself wholeheartedly into the project. Having secured the Chair of Biology, efforts were now to be made towards one in Anatomy and later there must come another in Physics and so on; interest and enthusiasm must be kept going among the rich men of the town and their money must be made to support the College. The little band of enthusiasts looked back at the Cambridge Science School raised from nothing in sixteen or seventeen years and saw no reason why something of the same sort should not happen in Dundee. The idea also appealed to other feelings; it should be a place to which 'the lad o' pairts' could come, a Dundee College where the Dundee boy of ability would find higher education, and would in turn give back what he had received in this or another such town of slums and disease. They saw the poverty, they saw the wealth, and their vision was of a Medical School that would heal the sores of the one through the medium of the other. They felt that the whole enterprise of planning and extending this young college lay in their hands, and no time and trouble was too great to achieve that end.

D'Arcy made friends with the editor of the local newspaper,

the *Dundee Courier and Argus*, and by the end of the year he was writing occasional leaders for it on the subject of the Medical School. He was also entrusted by the College authorities to go to Glasgow and seek the help of Professor Gairdner of the Faculty of Medicine there. Gairdner agreed to give the address at the closing of the session in June 1886. His speech was an exhortation to found a Medical School with particular advice on how to do it; he urged that theoretic and applied study should go together, that the student should walk the hospital step by step as he learnt his theory in the class-room; he pointed out that Dundee had ample opportunity for practical work with its Royal Infirmary, asylum, and workhouses. This advanced idea was taken up by the *Medical Journal* and the *Medical Times*, both declaring that there was plenty of room in Scotland for another medical school and that surely the townspeople could be counted upon to raise such a sum as was needed for this worthy object. Later on in the winter Sir Andrew Clark, who many years before had taught in the Dundee Royal Infirmary when it was a small hospital in King Street, was entertained at dinner by the Dundee medical men and leading citizens, and he spoke in the strongest terms of the duty Dundee owed to herself in this matter.

In the first two years of the life of University College the only examination for which students were eligible was that of Bachelor of Science of the University of London and other English universities, though the lectures in Zoology were recognized by Edinburgh as qualifying towards graduation in Medicine. By the end of 1885 the authorities of St. Andrews 'in a spirit of generous co-operation' came to recognize the three-year Science course in Dundee, and agreed to admit students to its examination for the B.Sc. D'Arcy wrote a leader in the *Dundee Courier* to express publicly the thanks of University College to St. Andrews. 'Her real gain', he said, 'is the honour of lending a helping hand to a young school, and of endowing it with a great privilege. The vague and impossible notions of rivalry with St. Andrews that were rife in Dundee when University College was endowed are already forgotten and St.

Andrews has taken the first step in linking the fortunes of the two schools. The new connection with St. Andrews should be the greatest possible encouragement for the extension of the work of University College, Dundee.' It can well be understood what a great step forward this was felt to be by the young professors on the north of the Tay.

And now the begging and the pamphleteering were beginning to bear fruit. As a contribution to the Jubilee of Her Majesty Queen Victoria in 1886, Mr. Thomas H. Cox of Maulesden endowed a Chair of Anatomy. Two years later Mr. Martin White of Balruddery gave a sum of money for the development of a Botany department under D'Arcy's supervision, and that brilliant personality, Patrick Geddes—scientist, visionary, dreamer of practical dreams—was added to the staff. At the end of that summer £6,000 was placed in the hands of the College Council by the members of the family of the late Mr. James F. White of Balruddery to endow a Chair of Botany in his name; Geddes now became the first Professor of Botany. From this date the Chair of Biology became that of Natural History. In 1889 the last chair necessary for the two-year Medical Course was given, that of Physiology, while the Chair of Zoology was made secure by a gift of £12,000 from the trustees of the late John Boyd Baxter, a sum sufficient to build a new laboratory and a museum. D'Arcy had worked ceaselessly for this and it was a great reward. In the *College*, a students' paper published for the first time that autumn, there appeared the following: 'The Biological department has emerged from darkness into light. It has now, instead of the worst, certainly one of the best positions in the College. Professor Thompson is to be congratulated on now possessing every facility for advancing this noble study.' Certainly the change from one room and a 'narrow dark cell' where the practical work was undertaken, to a lecture room, two laboratories, a library, and a professor's sanctum was a remarkable metamorphosis.

At the beginning of the following session (1889–90) D'Arcy gave the opening address and spoke of the situation:

We were very sanguine indeed, my friends, we were bold with the hot courage of the young, when four years ago or so we laid before the people of Dundee our scheme for the establishment of a Medical School. We drew up, as perhaps you know, a little Pamphlet (I wrote it myself) in which Chairs were spoken of as though they were mere upholstery, and thousands of pounds were talked of with the airy freedom of impecunious men. We received much encouragement from many friends, who never meant to give us anything, and candid critics of our demand coincided in wishing we might get it. But lo and behold, the months passed away and the critics with them; and the years came, and brought friends and helpers. . . . We have attained a platform from which we thankfully look down on solid and wellnigh unexpected progress and look upwards confidently to the prospect of an easier climb. This ledge on which we stand and take breath was wrapped in clouds only the other day. All that was most difficult, and most costly, and most urgent, we have actually attained. What we seemed credulous to expect, the revolving days have brought us. . . . Let me reiterate our gratitude for the help vouchsafed us; our half-wondering thankfulness at the new stability of our position; and the profound encouragement we feel to do our best and faithfullest in the management of our new inheritance.

In 1897 came the incorporation of University College with St. Andrews University. D'Arcy's comment for the future partnership was not reassuring: 'We are at last incorporated with St. Andrews University and I and my colleagues are members of the Senate thereof. Much good may it do us!' From now on his letters refer to 'crossing and recrossing jealousies', to difficulties of one sort and another, and to 'a Senatus meeting wh. resulted in a row royal, such as we have not had for a long time past'. But in point of fact he now began to take less part in the affairs of the College and to throw himself into his own work.

In the autumn of 1890 yet another outstanding man was added to the staff of University College. This was William McCormick, who succeeded Thomas Gilray as Professor of English, and who later became chairman of both the Carnegie Trust and the University Grants Committee and controlled the

government's contributions to all the universities, except Oxford and Cambridge, and to Scientific and Industrial Research. For many years he and D'Arcy shared lodgings at 3 Roxburgh Terrace, Dundee.

Of the little band in University College, there was not one who was not moved by the poverty of Dundee, by the ragged children and the filthy slums; each one did what he could in his own way. Alfred Ewing founded a Sanitary Association on the lines of that started in Edinburgh by Fleeming Jenkin, and it in turn led to the far greater scheme of the Social Union in which he was joined by Professor Steggall and others. Thomas Carnelly, the chemist, was interested in the new theory of disease-carrying germs (it was only twenty years since the last cholera outbreak in the town), and took his ideas to the Biology Department where D'Arcy became an enthusiastic helper and associate; he started to equip a part of his small laboratory as a pathological annexe and invited his old schoolfellow John Scott Haldane to come and work on this research. He later reported to the College Council that 'the pathological work carried on by Dr. Haldane makes a very important extension of our College work on biological lines and I have been entrusted with a sum of over £50 subscribed by the medical profession towards further prosecution'.

Haldane was a brilliant physiologist and an eager experimenter. He devised an apparatus through which air was drawn in and the invisible germs which it contained were isolated, in a jelly substance in which they grew so that their colonies became visible. Then he and Carnelly went through the slum tenements each night guided by a policeman, and filled their tubes with the foul and fetid germ-laden air of the dwelling-houses. This was the first of Haldane's researches on respiration in which he made all manner of discoveries concerning the air in coal-mines and submarines and, in the First World War, on the effects of poison gas. Carnelly drew attention to the results of overcrowding by his subsequent papers on 'The air of dwelling houses and schools', and soon the young doctors in the town became so interested in the research in the annexe that many of

them spent their leisure working there. D'Arcy wrote to his grandfather:

28:10:85. Haldane and two young doctors are working in it, and this afternoon I had five doctors altogether.

Within six months the work was found to be so important that D'Arcy was asked to join the Board of the Dundee Royal Infirmary to plan a pathological laboratory on similar lines and transfer the research there. At the same time he found there was no library in the hospital and he collected enough money to start one for the patients. He often spent his Sunday afternoons in the children's ward, making little toys, and amusing them with endless stories. This, he said, gave him more relaxation from his worries and anxieties than any other occupation, and he wrote:

I spent this afternoon in the Hospital where I often go when I am more worried than usual, for I love to see the little children in their red flannel night-gowns, for they are always merry when I see them.

But his main contribution to the social problems of Dundee was to come later, when he became one of the influences behind the Social Union. The outstanding personality in this great work was Mary Lily Walker, ever beloved and long to be remembered by the poor of Dundee. She came to University College in the autumn of 1885 as a student of Biology for which she had a great and natural gift and she worked under D'Arcy for several years. She was an excellent student and artist and published some outstanding papers, but in spite of her unusual aptitude she gave up science and turned her gifts to the service of the poor. She went to London to train as a social worker under Octavia Hill, one of the great women of the nineteenth century, pioneer in Housing Reform, saviour of Open Spaces, co-founder with Canon Barnett and Sir Robert Hunter of the National Trust. Mary Lily Walker became a member of the Anglican Sisterhood of the Grey Ladies and returned to Dundee where she began to put Octavia Hill's principles into

practice. Under the auspices of the Social Union various slum properties were bought up and improved, reasonable rents were charged and paid weekly to Miss Walker who visited each household and came to know all the families; good tenants were encouraged and bad ones put out. Before long many other schemes were initiated, among them a Restaurant for Nursing Mothers, an Infant Visiting Scheme (both the first in Scotland), and a Dispensary for Women. D'Arcy and Lily Walker were close friends until her early death in 1913, and he remained concerned in the Dundee Social Union (which eventually became the Grey Lodge Settlement Association) all his life. As its President in the year of its Jubilee in 1938 he gave an address entitled 'Fifty Years Ago' which described the conditions in Dundee as he remembered them when he first came from Cambridge.

D'Arcy became a Freemason at some time during these early years in Dundee. All that the Order stood for, its principles of brotherly love, tolerance, and understanding appealed to him greatly and he was in complete sympathy with its charitable aims.

In the summer of 1886 he went to Norway with the Scottish Alpine Botanical Club in a party of fifteen; they visited Vick and Hardangerfjord finding many rare and beautiful plants. He then travelled to Bergen to make the acquaintance of Fridtjof Nansen, a meeting which initiated a lifelong friendship and correspondence. Among other things that Nansen showed him was a leper hospital, of which at that time there were three in Bergen alone. Forty years later, in 1927, Nansen was elected their Rector by the students of St. Andrews University.

He attended the British Association in Manchester in 1887 and read a paper to Section D (Zoology), which is mentioned in the following letter.

4:9:87. Manchester (to M. L. W.). It was exceedingly good of you to do the Penitho drawings. They came in the nick of time. I did not read a special paper on the matter, but I brought in the points in my paper on the Cetacean larynx. We have an enormous number of fellows here. In fact for us Biologists it's the best meeting we ever

had. Yesterday afternoon I went with Weismann, Wiedersheim, and Hübrecht to Chester. We talked shop all the way. In the morning I fell in with Carnoy, the Catholic embryologist of Louvain. No one knew him here scarcely, so I introduced him all round. He is to lead a big discussion on Tuesday on the Ovum. Tonight about 9 or 10 of us are to give a dinner to all the foreign Botanists. Ray Lankester and I are the only zoologists admitted. We are to have a curiously aristocratic lot of Botanists. Saporta is a French *Marquis*, and Solms-Laubach is a German Count; moreover he is not Graf *von* but Graf *zu*, wh. makes a tremendous difference, and is almost royal. I am not sure that he is not even 'geboren'. Tomorrow night we entertain the zoologists. I was talking a little while ago in the smoking room to Macnab the Dublin botanist, and a man sitting beside us and overhearing our talk, offered to send me a large case of Permian fossils for the Museum. Wiedersheim and Weismann are coming to Edinburgh and perhaps to Dundee. . . . 'I am staying with some very hospitable Philistines', I said to a man yesterday. He said, 'I think I'm with the *I*vites or the *I*ttites'.

The following two letters tell of journeys in the summer of 1888, one to the new Plymouth Marine Station and the other to the French Marine Laboratory at Roscoff in Brittany. D'Arcy's eager mind was always stretching out to new experiences, and he spent his vacation in a variety of ways in a variety of places, learning all he could and showing 'boundless curiosity and unwearied diligence'.

3:7:88. Savile Club. (to M. L. W.). I have been driven from Plymouth by stress of weather, after flattening my nose for a day and a half against rain-beaten window-panes. I was too cowardly to attempt the long crossing, and so throwing economy to the winds (as usual) I came here tonight, and shall go tomorrow to Paris, en route for Roscoff. I send you the paper with an account of our doings of last Saturday. We had great times. The station is magnificent and Plymouth was all hospitality. When I arrived on Friday, I went to the Hotel, and dined off a bad steak, vile soup, and infamous wine. Next day a Samaritan put me on his own beast, and took me to the Club, where I remained; there I fared sumptuously every day, and had the best of talk and companionship. I and a few others had a delightful trip in the Admiral's yacht on Sat. and on

Sun. a man took Ray Lankester, Thiselton-Dyer and myself a 40 mile drive into Dartmoor. We saw Wiskins Wood, the oldest piece of almost primeval forest in England, we explored primeval villages, investigated Rocking stones, and in short saw more queer things in a day than I ever saw in three before. I met a host of friends, and made several new acquaintances. The zoological station, when it gets all ship-shape, will be very fine. There are any number of tanks for the fish, and the nicest possible little cages for the naturalists. I think it will have a great effect on British zoology. It ought to show the fellows the need for faunistic work who have never done anything but slice paraffin. . . . The Council of the Royal Society say civil things about my editing of poor old Parker.

18:7:88. Hotel Meurice, Paris (to M. L. W.). I am now going to pay a visit to Tramond, the skeleton man, and on then to Collin, the great instrument maker. After that back to the Hotel to dinner, to talk American to the curious folk who frequent Meurice's famous inn. The life at Roscoff is very pleasant and amusing. One could not find oneself among a pleasanter set of fellows. We breakfasted at 11, and I had to lie in bed longer than was decent to avoid the pangs of starvation. But when breakfast came it consisted of from 12 to 14 courses, of wh. any five would have knocked me up for a week. We dined at 7, on a scale of corresponding magnitude, and afterwards smoked cigarettes and talked till bedtime. Very fortunately the wine was of such a kind that I never drank less in my life. Both breakfast and dinner always began with periwinkles wh. one extracts with a pin. Now I wouldn't eat periwinkles at 2d. each. These were always followed by shrimps, and as a Frenchman brandishes a shrimp in his hand, you wd. wonder how much he can talk about it. An Englishman cd. not get half as much talk out of a large lobster.

D'Arcy the Elder had always stayed at the Hotel Meurice in his youth (at the cost of five shillings a day) and D'Arcy wanted to do likewise. He wrote to Galway that owing to a 'great epistolary effort and "Salutations bien empressées"' a room was to be kept for him there at the modest sum of 'six francs par jour'.

A year later in 1889 he was made a Foreign Member of the Moscow Academy. ('On the strength of this I think of ordering a new suit of clothes!')

And now at last D'Arcy seems to be thinking of some original

work, as is shown by the following letter, although in point of fact the textbook mentioned did not eventually materialize.

30:3:89. Galway (to M. L. W.). I am building my castles in the air for research and other work. I have a strong idea we shd. start on a big Text-book of Mammalian- or even Vertebrate-Anatomy. There is no doubt we must stand or fall by Vertebrates. There are too many people working at Invertebrates, who know more about them than we do.

But a more significant letter follows in the autumn.

18:10:89. Dundee. (to M. L. W.). I have taken to Mathematics, and believe I have discovered some unsuspected wonders in regard to the Spirals of the Foraminifera!

D'Arcy had found a new path and was beginning to grope his way along it; it was to be almost thirty years before he reached the end of it, but at the age of twenty-nine the spark of his genius had at last been touched off and he had discovered what was to become his life's interest and work. That he was very much absorbed in what he later described as 'the mechanical, critical and mathematical principles involved in the conformation of organisms' must have been apparent in these years, for Dr. George Petrie, who was a medical student under him in the session 1890–1, wrote: 'I shall never forget his description of the triradiate spicules of the calcareous sponges with their rays forming coequal angles of 120°, because for the first time I became aware that mathematics may be applied to give precision to biological observations and thus to open up a fascinating vista of speculations.'

By 1894 D'Arcy was submitting some of his theories on the form of Spicules to Michael Foster and it is worth quoting extracts from three letters of Foster's with his views on the work. He wrote to D'Arcy in June of that year, 'To be candid I think this is too polemical and in so far as polemical too scrappy. . . . I would not, I think, publish it in its present form. How far it would be wise to spend time in elaborating it is a matter about which I have doubt. I suppose everyone must admit that there are "laws of growth" (forms of expression of

the Urmolecules) but after all one does not feel sure how far this is really admitted—and it might be worth while to insist upon it. But if so the argument should be cumulative, pointing out in case after case, that something behind natural selection is at work.' Again on 31st October 1894: 'I confess I am not very much attracted by the line of work, and doubt if it's likely to be very fruitful. The biological interest attaching to the causes of slowing or quickening at this point or that, far outweighs that attaching to mechanical results.' The last letter is on 5th November and he says: 'I shall be willing to present your paper —but if I were you I would get some mineralogist to overhaul your work first. But does your result wholly destroy the diagnostic value of the spicules? If the form is constant in a group—it does not matter how the form is brought about.' D'Arcy's letters to Foster are unfortunately missing.

There was another use to which he had put his mathematics during these early years, one in which he grew more and more interested and which he developed in many connexions; this was his use of statistics. Just before the Chair of Anatomy was given to University College in 1886, D'Arcy wrote a letter to the *Dundee Courier* tabulating a number of figures to show the great advantage it would be to Dundee to have a Medical School in the town. He wrote:

So long as we are forced to send our young men afield to be educated we are depleting our own town and district of wealth annually to an amount that amazes me when I examine it. I have lately made a search in the matriculation rolls of Edinburgh University, from which I gather the following facts:—(I take the year 1883 for my illustration.) In that year, of 1748 *medical* students at Edinburgh, 104 came from the Counties of Forfar, Perth, and Fife—that is to say, one in every seventeen came from our own near neighbourhood. Adding in Aberdeen, Inverness, and the Northern Counties, the proportion rises to *one in ten*. But the case is still more remarkable when we take into consideration the whole number of matriculated students in all the faculties. In 1883–84 3371 students attended the University of Edinburgh. No less than 58 came from the town of Dundee: 88 came from the rest of Forfarshire, and 109

from Perthshire. Thus from the two counties of Forfar and Perth alone 255 students went to Edinburgh, or one-thirteenth of the whole body of students there. On a very low estimate indeed, allowing only £80 a year for the whole expenses in fees and living of a student, these men were taking annually over £20,000 from our immediate neighbourhood to Edinburgh.

This method of tabulating figures, interpreting their meaning, and investing them with interest was exactly what he was to do for the statistics of fisheries twenty-odd years later when, as Chairman of Statistics in the International Council for the Exploration of the Sea, he brought the Bulletin Statistique to the highest point of perfection.

During the summer of 1889 D'Arcy went to Paris to the International Congress of Zoologists, which he describes hereafter.

11:7:89. Hotel Meurice, Paris. You have no conception of the lovely time I have been having. The kindness and hospitality of our friends is boundless, and half the zoologists of Europe are here. I made my speech about Zeuglodons on Thursday and had an unexpected success. Le président m'a dit à sa réception du soir, 'M. D'Arcy Thompson, vous avez prononcé un discours parfaitment académique', and some more to the same effect! It has been a continual round of fêtes. One of the first was an evening at Prince Roland Bonaparte's. He has a splendid house in the Cours la Reine, and a small army of large lackeys. The explanation is that Monsieur married Mlle. Blanc, whose papa keeps the roulette tables at Monte Carlo. Son Altesse le Prince de Monaco also entertained a few of us to unlimited champagne. On Wednesday I breakfasted *en famille* with the Inspecteur Général des Finances, and saw the inside of a big French household:—rather a rare piece of hospitality on the part of a Frenchman. The Inspecteur lives in an old house in the *Rue de Varennes*, a mean-looking street in the Faubourg St. Germain. Next door is Mgr le Duc de la Rochefoucauld, and Bourbonnists perch all the way down the street like sparrows. The Inspecteur has a very pretty daughter. I go to the reception at his house tomorrow night. On Thursday night I went to a reception at Milne Edwards, and afterwards to another at the Hotel de Ville. Next night to the Ministère des Travaux Publiques; but I cannot attempt to tell you all about them. The great salons, the lights, the

gardens, the diamonds,—they bowl me over altogether! Today I breakfasted *en petit comité* with a little Baron: tonight as every night, I dine out again. . . . Things can't go on like this for ever. . . .

The paper on the fossil mammal Zeuglodon which he showed to be related to the seals and not to the whales, as had hitherto been supposed, was published the following year (1890) in 'Studies from the Museum of Zoology in University College, Dundee'—a series of twelve papers on the morphology of vertebrates written and edited by himself, M. L. Walker, and Professors W. K. Parker and H. Leboucq. The money for the publication had been given by Mr. Hugh Ballingall, a former Provost of Dundee, to whom the volume is dedicated. This was to have been the first of several volumes, but, as no other funds were forthcoming, it was the only one to appear.

The session opened poorly in October 1889 and D'Arcy wrote: 'Our classes are very so-so, but I have started an evening class of fifty lectures at the full day fee (£3. 3.) to wh. about 16 or 18 schoolmasters and mistresses do me the honour to come.' And a month later—'My evening class is now I believe, over 20. The morning do: at the same fee contains 4 only! excluding A. C. and Bob. A. C. is shortening my life—I die daily, as the Apostle remarked, in trying to elicit from her some reminiscence of the day before. The Chemistry Laby. is said to be nearly empty. Of other classes I know little, and information is not volunteered.'

The following winter D'Arcy was seriously ill with bronchitis followed by pleurisy, and was in his aunt's care in Alva Street for two months. It was during this time that he grew his beard; it was as red as his hair, and he was inordinately proud of it. By Christmas he was better and able to dine with Mr. and Mrs. Maitland, his lifelong friends, in Broughty Ferry. 'The dinner was a very merry one', he wrote. 'I shall never think of the Maitlands as grave, as I used to. On coming into the drawing-room after dinner, M. seized me, Clayhills grabbed McCormick, Mrs M. played the piano, and we danced a reel! only tell it not in Gath!'

In 1892 he served for the first time on a Government body,

an inquiry by the Board of Agriculture with Sir Herbert Maxwell as Chairman, on a plague of voles that was devastating large areas in the south of Scotland. This involved touring Roxburghshire—'mouse-catching' he called it—and a visit to London to consult Oldfield Thomas, the authority on rodents. While in London he was given permission to take home a great collection of material from the British Museum for University College. He worked eight hours a day 'in shirt sleeves' in the British Museum and took home '2000 bird-skins, besides creeping things innumerable, both small and great'. Other gifts for the Museum at this time included the fish, *Lepidosiren* of the Upper Amazon, only half a dozen specimens of which were known in museums; birds and eggs from the Falkland Islands; a valuable collection of shells, and a gift from Borneo of the skull of a Borneo elephant. D'Arcy also bought from the Dublin Zoological Gardens the skeleton of an old elephant which he had ridden on his first visit there when he was six years old.

In January 1893 he took into his Department a young man of twenty years of age who was to make his name as an international authority on Crustacea, and later become a Keeper of the British Museum (Natural History). This was W. T. Calman, at that time insurance clerk and amateur naturalist, who had discovered an unknown species of Rotifer in the tap-water in his mother's kitchen, and had lectured on it to the Dundee Naturalists' Society where D'Arcy had heard him and been struck by his brilliant gifts. D'Arcy reported upon his work to Professor Ray Lankester, who wrote: '(Calman) seems to be one of those rare and exceptional cases of in-born natural aptitude. I venture most strongly to urge the authorities of U. C. Dundee not to let such a promising student cease his work. He will do great credit to the College hereafter.' D'Arcy procured a grant for him from the College, and Calman came into the Department as Steward, and later Assistant-Lecturer and Demonstrator and remained working for D'Arcy with deep devotion until 1903 when he obtained a post in the British Museum. In Dundee he had been responsible for the type and crustacean collection, and these and the groups of smaller

vertebrates and invertebrates came to be by far the best and largest collections in Scotland. D'Arcy constantly mentions him in letters, and in 1893 writes, 'I have handed over the Pycnogonida to him and he is doing them capitally. He has a wonderful eye for structural characters.' Again later, 'I had a particularly nice letter from Calman today. Really that boy is too clever, he turns the science of zoology round his fingers, and he will presently do the same with a certain professor.' With regard to Pycnogonida, or Sea Spiders, there is a letter of an earlier date:

28:4:91. Dundee. (to M. L. W.). Last week I spent with Canon Norman near Durham, talking shop and examining Pycnogonida. I got back to Edinburgh on Saturday, after a cold journey due to my having brought away the Canon's coat instead of my own, and to my own shyness wh. prevented me from wearing that garment even in the Ry. carriage.

In the summer of 1893 D'Arcy took Aleck Rodger and four students to Norway for a couple of weeks. They were all hard-working, all enthusiastic, all hard-up, and the foray was a complete success.

10:8:93. Hardangerfiord, Norway. (To M. L. W.) We are getting on famously. The 5 boys behave capitally, and work hard and all goes well. We had a pretty rough passage in a little Norwegian steamer from G'mouth (Grangemouth) to Egersund, where we arrived at 4 a.m. Leaving the others at the Inn, Bob Smith, Tom Marr and I went up the hills, and had collected about 90 species of plants by breakfast-time. After breakfast we travelled by express train to Stavanger,—40 m. in 3½ hrs, and spent the day in the company of a hospitable Norwegian officer who bored us to death. We had a long row in the harbour very late in the evening, and left for here about 4 a.m. on Saturday morning, having not been properly to bed since Tuesday night. Here we are off the tourist track, though quite near it. We live in a little wooden Hotel, full of Norwegians, at the rate of 2½ krone, or 2/10 a day each. Even at this scale our finances won't hold out long. On Sunday we had a quick walk in the woods, and since then we have dredged daily, but we are badly off for a good boat. The results are as yet only moderate,

and we have only found one specimen each of the two rarities, *Rholdophieum* and *Niomenium*. The boys behave excellently. Beesley keeps us full of fun, but I fear the botanists carry off the palm for enthusiasm.

At mealtimes my heart aches for the landlord's wife and family, whom we are rapidly eating out of house and home. At night we dance, and the boys sing student songs. The politeness of these people is marvellous. The first Norse word one learns is *Tak*, thank-you! If you give a child sweets, you at the same time take off your hat, and shake hands. As to the Landlord, the brim's worn off my straw hat with bowing to him. A girl asked me last night, in German, if I was really and truly a Professor, or was only called one for fun. This I took as a great compliment. I wish we could stay here all summer, instead of going back to the vinegar bottle. Now I must go to 'Tea' wh. consists of bread-and-cheese, sausages and beer.

Little mention has been made in this chapter of either the Galway or Edinburgh households, but D'Arcy of course, as always, visited and corresponded with both. A great tragedy had occurred in the Thompson family in 1887 when John Skelton Thompson, D'Arcy's eldest stepbrother, a brilliant student at Queen's College, was drowned with two friends in a boating accident on Lough Corrib. D'Arcy hurried to Galway to give such comfort as he could to his stricken stepmother; he found the best way to help his father was to take him for long walks and bring him home exhausted. Apart from this great sorrow the holidays in Ireland gave him immense pleasure; he read with his father—Gaboriau, du Boisgobey, Aristotle; built a hen-house in the garden ('as a delicate attention to my stepmother'); attended church on Sunday, and occupied himself with the children ('of whom I quite lose count; and every morning at breakfast there seem to be more than there were at supper the night before'). One summer a party of botanists visited Galway and D'Arcy

marched them about all day. We first proceeded to the Promontory, to gather *Gentiana verna*, *Dryas octopetala* and the *Bee Orchis*. . . . Then to the shore for *Carex*, *Juncus* and *Statice*

bahusiensis. In the afternoon we went inland to the limestone, for *Ceterach*, *Rubia*, *Alisma ranunculoides*, *Sparganium simplex* etc. Altogether they got in the day 47 plants they had not found on the tour in Connemara, and many of which they had never seen in their lives. Next day was as wretched as the first was pleasant. We went over to Clare against a strong headwind in a small boat; got sick, wet, weary, and cross and our poor botanist, unaccustomed to the sea, was horribly frightened.

Another summer D'Arcy took Calman and two sixteen year-old boys (one of them, Charles Sommerville, later became a medical missionary in China) to Roundstone Bay to look for Amphioxus, a small creature like a sand eel, the link between the invertebrates and vertebrates. The party rode in a bean-kenny car to Recess, and then in a jaunting car to Roundstone. They hired a sailing boat and dredged each day until they at last found the little creature they were looking for. It had never been found before in Britain though it was known off the coast of France and in the Mediterranean.

In Edinburgh affairs had not gone well for some time. After D'Arcy got the Chair in Dundee he made an arrangement to finance his grandfather and his aunt, the first mention of which is in a letter of 1887.

19:2:87. (to J. G.). All that your letter tells me I am thoroughly alive to and concerned for. For a few days I can do nothing, but before very long, I hope to be able to give you all needful help. I took the first step a few days ago. I enclose a small cheque with all love. Assure Pam that all will be put right in a few days.

From now on he took upon himself to see that the Alva Street household should never be in financial difficulties, for the Gamgee uncles shared a family characteristic of thriftlessness, and they were unable to help their father in his old age. Joseph Gamgee died on 5th February 1895 aged ninety-four years: his death was a great grief to D'Arcy for he had been a fountain of knowledge, the inspiration of his early work, and the giver of endless encouragement and love. It was only a few years since D'Arcy had written to him:

Tomorrow is your birthday. I just send you a line to send you my loving wishes; to tell you that I shall be thinking of you all day long, and shall pray earnestly that you may be with us in health and vigour to the utmost natural limit of old age. You bind together a very big and scattered family, of whom none come to you more thankfully than I to tell you of difficulties or boast of progress.

After her father's death Miss Gamgee opened a small school in Alva Street, a school which many years later had a fine scholastic reputation, and grew to a fair size, but in the early days without capital it was constantly in difficulties and D'Arcy's commitments multiplied. There is no doubt that he put his desire for a wife and a family and a home of his own completely and unselfishly out of his thoughts while his responsibilities to his aunt lasted. There is one letter to her without a date but probably about 1897 in which he says:

I am terribly sorry I cannot send you the £30 right away, but I shall manage to let you have it within a couple of days. I knew you wd. want it, and if I had had it, you shd. have had it before. It is only yesterday that I paid the final instalment of S's old debt to the bank, for wh. my father and I were responsible, and only a little while ago that I gave Nellie £25 towards her wedding outfit.

Yr. affte. boy Dadu.

There is one last and most important piece of work that belongs to this period—*The Glossary of Greek Birds*. D'Arcy began making notes for this in his undergraduate days by following his usual habit of keeping a notebook for every subject that interested him. With his wide reading and unfailing memory he noted down every myth, allegory, fairy-tale, and legend that he found on birds in Greek literature and it was soon apparent that the notebook was turning into a fair-sized glossary. Later, becoming sceptical of many of the sources of identification in both ancient and modern writers, he turned his attention to Astronomical and Semitic and Egyptian origins of bird-names. The first mention of his interest in Egyptian Astronomy is in a letter dated 9th September 1893 when he wrote: 'I am deep, rather out of my depth in Egyptian

Astronomy, with a view to finding out the unsolved mysteries of the Halcyon Days; and I really believe I've got to the heart of the matter.'

The Glossary of Greek Birds was published by the Oxford University Press in 1894. D'Arcy called it 'the apple of his eye' and dedicated it to his father: in spite of splendid reviews it did not sell well. (A year later he wrote: 'It is my ambition to deal someday with the whole animal kingdom after the same comprehensive fashion as my Gl. of Gk. Birds.')

It is characteristic that, while Professor of Biology and maker of a unique museum in a small provincial town, D'Arcy should produce as the fruits of his leisure a classical glossary, the like of which had never been compiled before. Surely this is yet another proof of 'his boundless curiosity and unwearied diligence'.

REFERENCES

[1] 'Aristotle the Naturalist', *Science and the Classics*, 1940.

[2] 'John Hood of Dundee', A. D. Peacock and D. W. T., *Scots Magazine*, 1939.

VI

THE BEHRING SEA COMMISSION

1896–7

The beaches of Lukannon—the winter wheat so tall
The dripping, crinkled lichens, and the sea-fog drenching all.
The platforms of our playground, all shining smooth and worn!
The beaches of Lukannon—the home where we were born!

. . . . .

I meet my mates in the morning, a broken scattered band.
Men shoot us in the water and club us on the land;
Men drive us to the Salt House like silly sheep and tame,
And still we sing Lukannon—before the sealers came.

RUDYARD KIPLING, *The Jungle Book*

D'ARCY was thirty-six years of age and had held his chair for twelve years when an event occurred that changed the course of his life and led to important results. It involved him in novel situations and new responsibilities, brought him into a position where great diplomacy and tact were needed and led to the development of unsuspected qualities in his personality. The situation was an international one, namely, the Anglo-American Commission of Inquiry into the Behring Sea Seal Fishery, a matter that had already caused much discussion and upon which both political and scientific feeling ran high. In order to understand what was involved we must go back and trace the history of the Russian and American fur industry in and around the Behring Sea.

From the beginning of the eighteenth century Russian explorers and traders had pushed northwards and eastwards through the swamps and forests and mountains of Siberia. They were urged on by the imperialistic designs of Peter the Great, who had visions of an even greater empire than that over which

he already ruled. Among Peter's trusted sailor-men was a Danish captain, Vitus Behring, who had served in the Russian Navy for eighteen years, and was a man of experience, initiative, and organizing power. To him the Tsar turned to prove his theory that across the eastern sea beyond Kamchatka would be found the coast of America. Behring was ordered to take an expedition across Russia to the Sea of Okhotsk and there construct ships and sail eastwards. Peter the Great died, but the plan went on. Under almost impossible conditions two little ships were built and fitted out and stood ready to sail into the unknown. As the expedition was a scientific one, two well-known scientists accompanied it; Steller the German naturalist sailed on the *St. Peter* with Behring, and Delisle de la Croyère the French astronomer went with Chirikov on the *St. Paul.*

From the first the fates were against the expedition; wind and weather were adverse and after a fortnight at sea a fog parted the vessels and they never came together again. Behring reached the Alaskan coast and named it Cape St. Elias, and Chirikov at the same time found Cape Addington a few hundred miles to the south. Terrible trials were in store for them as each turned for home; impenetrable fogs wrapped them round, hunger and thirst assailed them, scurvy decimated their ranks, and there was no help in the pitiless northern winter weather. The *St. Peter* drifted for endless days and nights helpless in contrary winds, at last finding shelter in an island (later to be called Behring Island), and there Behring died in 1741, worn out and sick of the scurvy; nine months later Steller led home the remnant of the surviving sailor-men. The *St. Paul*, too, suffered fearful hardships on her return voyage past the Aleutian Islands, the chain of submerged mountains that stretches across the Behring Sea for hundreds of miles with a climate of treacherous fogs and icy winds.

But others followed in the tracks of these pioneers and for over a hundred years the coasts on each side of the Behring Sea were peopled by Russian trappers and traders, adventurers and missionaries. On land the fur-bearing animals were mercilessly killed and magnificent pelts of sable and fox went home to St.

Petersburg where they furnished wonderful cloaks and rugs for the Imperial Court; at sea the seal and the sea-otter with its priceless fur paid the penalty for man's cupidity and were slaughtered in their millions.

In 1786 a Russian sea-captain sailing 200 miles to the north of the Aleutians came upon a low-lying rocky island which he named St. George after his ship, and a year later forty miles away a second island was discovered which he called St. Paul, the two together being known later as the Pribiloff Islands after their discoverer.

Here the weather is so thick that the islands are almost perpetually shrouded in mist, rain falls frequently, and the temperature is below freezing-point all the year round except in the three summer months. The islands, bleak, desolate, and wind-swept, were uninhabited by man at the time of their discovery, but every year in the breeding season from May to September, great herds of the fur-seal (*Otaria ursina*) would take possession, and the islands would be peopled for a while by these strange and interesting creatures. Thousands and thousands of them had converged upon these lonely isolated shores from time immemorial, travelling northwards up the west coast of British Columbia in the summer migration and leaving again for warmer waters as soon as the ice-drifts formed.

St. Paul, the larger of the two islands, is fourteen miles in length by seven miles in width and is almost flat except for the peaks of the two extinct volcanoes Polovina and Bogosloff, with sandy beaches and some rugged boulder-strewn foreshore and steep cliffs to the north. St. George is much higher, one peak rising to 900 feet, and all the coastline is rocky and the cliffs in some places high and precipitous. The islands are volcanic in formation and the low-lying land is covered with blocks of basalt and black lava-sand; they are completely treeless and the vegetation is tundra-like; in summer the meadows a few miles inland are full of flowers, primulas, gay Iceland poppies, blue lupins, and delicate gentians. Hundreds of cormorants, gulls, and other sea-birds breed on the cliffs, and little

sandpipers, mallard ducks, and phalaropes are numerous inland. All round the shores are the rookeries or seal settlements, an astonishing and wonderful sight.

The fur-seal, like the walrus and the sea-lion, is related to the bear and must not be confused with the true or earless seal of the North Atlantic. It was first described by Steller in 1741 and he called it a 'sea-bear'. Only its front limbs or flippers are used for swimming, the hind flippers being pressed together sideways to form a kind of rudder. On land these posterior limbs, jointed at the knee, are used like feet, and the great clumsy animal can propel itself along over any kind of surface at a considerable speed. In the water it is graceful and travels over immense distances, following with ease a ship sailing at 12 knots. About the beginning of May arrive the old grey bulls who grow to a vast size and weigh anything up to 700 lb., and they spend the next five weeks fighting for places on the shore and waiting for the rest of the herd. In June *holoschiki* or young bachelors up to five or six years old arrive, and haul out on a separate part of the beach and at the same time the cows come in, singly and quietly, and take their places on the rookeries where they are appropriated at once by an old bull or 'harem-master'. Within a few hours or at most a couple of days of their arrival each adult female gives birth to her single pup. This she nurses and tends until it is able to look after itself; mother and child recognize each other by smell and voice, and no cow will nurse any pup but her own, and if she loses it after she has been down to the sea to fish she will go calling through the rookery, making a curious sound like the hoarse bleating of a sheep. Many pups die from a variety of causes—from being trampled upon, from starvation, and from the depredations of the killer whale which drifts along the shore; those surviving take about two weeks to learn to swim and thereafter they become independent of their mothers.

Life in the rookeries is very exciting and the noise and bustle and confusion is tremendous for there can be as many as forty or fifty thousand seals on a three-mile stretch of shore. Each old bull has his harem to look after and it consists of any number

of wives from fifteen to thirty or forty (harems of over a hundred have been known in the best days of the herds), and these he jealously guards day and night without rest. Not once all summer does he go down to the sea to fish, so afraid is he of marauding idle bulls or bachelors that are growing to maturity. Arriving sleek and fat, he leaves in the autumn gaunt and emaciated, a very shadow of his former self. His body will be covered with scars of battle for he defends his property with all his strength, and when the *holoschiki* go looking for wives they have to fight for them; this may mean death for one or other of the bulls and sometimes even for the cow over whom they are disputing.

In the early days of the Russian fur trade, seal-hunting at sea was the method of procuring the skins and indeed during the early part of the eighteenth century between two and six million seals were thus killed. But after the discovery of the breeding-grounds on the Pribiloffs, the Russians and the Americans, who had formed a company called The Russian American Fur Company, found it easier and cheaper to kill the animals on the islands. This led to such losses that the matter became serious and in 1835 a law was passed prohibiting the killing of cows in order to conserve the herd. In 1867 Russia sold Alaska and the islands of the Behring Sea with the exception of the Kommandorski Islands to America, and all the rights of sealing in the Pribiloffs were leased by a new company called The Alaska Commercial Company, which laid down strict regulations for their employees with regard to methods of slaughter. But the pelagic sealers, both those legitimately employed and also raiders, continued to take their toll at sea, and by 1890 the herd had decreased so seriously as to cause anxiety among the various Powers who had interests in the fishery. Three years later, in 1893, a conference was called in Paris between the United States of America and Great Britain (including Canada), at which it was agreed to enforce a neutral zone of sixty miles around the Pribiloff Islands and to prohibit all pelagic sealing during the months of May and June when the females were nearing the breeding-grounds. These regulations did not,

however, satisfy the U.S.A., the government of which presented a case to the United Kingdom a couple of years later with the result that the British Foreign Office and the Colonial Office jointly decided that the best way of investigating the matter was to send a Commission to the Behring Sea to report first-hand upon the state of the herd and to bring back suggestions for a solution of the problem.

In looking about for a suitable man to send to the Behring Sea the attention of the Foreign Office was directed to D'Arcy: there were several reasons for this. He was a zoologist with a special knowledge of marine mammalia; his paper to the Congrés Internationale de Zoologie in 1889 on the fossil Zeuglodon had been very important; the Dundee Museum was already known for its collection of Arctic zoology, and D'Arcy had done good work for the Department of Agriculture on the vole plague and had shown that he could handle people as well as problems. There was one more fact which may have had a bearing on their choice, and that was that the Prime Minister, Lord Salisbury, knew that D'Arcy had worked under his nephew, F. M. Balfour, at Cambridge. Lord Salisbury was himself a fine botanist and had been President of the British Association in 1894. The objects of the mission to the Behring Sea were, first, to collect statistics with regard to the working and effectiveness of the Regulations for the fur-seal fishery prescribed by the Award of the Paris Arbitration Tribunal in 1893; second, to estimate the number of seals on the islands and investigate the causes of the mortality of the pups; and finally, to collect information from interested persons in Victoria, Canada, and to create good relations with the American authorities in Washington.

So it happened that in the early spring of 1896 University College, Dundee, was asked to release D'Arcy from his duties for the summer session in order that he might proceed to the Behring Sea upon Her Majesty's Mission. D'Arcy's delight knew no bounds. For some time he had felt the limitations of Dundee cramping and frustrating; he longed to get out into a larger world, to use his powers in a wider sphere, and just at

the psychological moment this wonderful opportunity offered itself. W. T. Calman was put in charge of the Department and D'Arcy set about preparing for his journey as quickly as possible, for he was only given a few weeks in which to get ready. He provided himself with a couple of portmanteaux, a big leather bag called an 'overland', a hat-box for his top-hat, a card-case, thick jerseys such as the whalermen wore, heavy boots, and a tweed cap. So much for luggage; the Foreign Office provided him with a camera, a pair of Zeiss binoculars, and a telescope, and he himself took a couple of guns, skinning tackle, and innumerable bottles for collecting for the Museum as time and opportunity permitted. Among his books was a copy of Captain Cook's voyages. ('Of all the great captains and explorers he is my favourite, and the man for me. I had his book with me up in Captain's Harbour, in Unalaska, where he and his little convoy lay, just before he sailed on his last cruise to meet his death in Otaheite.'[1])

G. F. Barrett-Hamilton, a young Irishman from the Natural History Department of the British Museum, was nominated as assistant naturalist to work under D'Arcy and he was given a sapper from Chatham Barracks as servant and photographer. The little party sailed from Liverpool on 23rd May 1896. The following letters tell of the first couple of weeks of the journey.

R.M.S. Lucania (at sea) *23.5.96*. This is not altogether a joke, I left L'pl this afternoon with a pile of official letters to write such as I never had before; and a dose of neuralgia even to split a log. I had to get well dosed by the Dr. before I cd. do anything; but all is well now and I have peace, I hope till we get to N.Y. My proper title is Commissioner: but not H.M. Cmmr: There is a fine distinction. I travel under orders from Lord Salisbury but not with the Queen's Sign-mandate.

R.M.S. Lucania *29.5.96*. The world seems to have enlarged a little in the last few days. I am growing out of my clothes, and my hat ceases to fit!

Washington D.C. *3.6.96*.

This letter is only an epitome of news, and you must on no account

speak of anything that it contains. 'Not he that goeth out to battle boasteth' etc.

Saturday. Arrived in Washington. Called at the Embassy. At 3 p.m. the Ambassador and Lady Paunceforth, and a daughter came to take me for a long drive in the country. Dined at the Embassy at 8.30, *en famille*.

Sunday. Dined at the Embassy. German Ambassador drove me home in his carriage to my hotel, wh. lay in the opposite direction to his own house. The dinner was excellent.

Monday. Sir Julian called at the Hotel at 11 a.m. to take me to the White House, thence to call on several of the Ministers. One of the latter the Hon: C. S. Hamlyn, called at 7 p.m. to drive me eight miles into the country to his place where he had invited a party to meet me. I omit a thousand trifles, and merely add that the Sapper is at the moment packing my portmanteaux, to leave at midnight for Quebec, where we are to spend a couple of days quietly with the Aberdeens. I no longer speak of OUR Government but of MY Government. Here in the Hotel, I have a sitting-room, bath-room, and 3 bedrooms *ensuite*, for myself, my assistant, and my servant! Verily, I have the loan of the purse of Fortunatus.

The first notes D'Arcy made of the journey across Canada were scribbled on the back of the bill of the Arlington Hotel in New York where the party had stayed so sumptuously. He notices 'dark groves of cedar, villages of pine wood, white palings, clover, common wayside weeds in sandy fields, maples, shady trees along roads, here and there black cherry, *Osmunda regalis* common by wayside', and twenty-six miles from Montreal a very graceful birch was growing along the fences.

In Quebec D'Arcy was met by John Sinclair, his old school-friend of Academy days, now Secretary to the Governor-General, the Marquis of Aberdeen. D'Arcy told of his visit to Government House in a letter to his father.

Union Club, Victoria, B.C. June 19th 1896.

I leave here tonight for Seattle, Washington Territory, to join S.S. Albatross, wh. is to take us north. I had hardly left Washington D.C. when the Yankees appointed a Commission of 3 naturalists and

2 other men to check my moves. Otherwise I would have been off on Monday last, immediately on my arrival here. I have been kept very busy, seeing people and writing reports. The Lt. Governor is away but I lunched with his wife. . . . The visit to the Governor-General at Quebec was an especial success. He and his wife sent me off with a batch of letters in their own handwriting to all the chief people here, and on my leaving on Monday night, His Excellency broke up the dinner-party to see me himself to my cab.

The journey across the Continent was delightful, and I enjoyed every minute of it; but I was sorry to have to come post haste without stopping for a day at any one of the beautiful places en route.

His Excellency comes west to his country place on October 2, and it is understood that I go to visit him on my way home.

The American Commission consisted of Dr. David Starr Jordan, President of Leland Stanford University of California, his assistants, Dr. Leonhard Stejneger, Jr. and Mr. Frederick Lucas from the Smithsonian Museum, Washington, and Mr. Clark his secretary. As Canada was also interested in the seal fishery it too sent an expert on its behalf, and this was Mr. James Macoun of the Geological Survey of Canada from the Museum in Ottawa. This young man had already had much experience of travelling in the north, and was a well-known botanist as well as naturalist. He had visited the Pribiloffs in 1882–3 and had made a collection of the flora, discovering two new species, a poppy and a primula, both of which bear his name. He proved a delightful and interesting fellow-worker. All the delegates met on board U.S. Fish Commission Steamer *Albatross* at Seattle and they sailed north to Sitka, the capital of Alaska, where they went ashore to pay their respects to the Governor.

Thirty years earlier Sitka had been in Russian-America. Then the stockaded town had been surrounded by the primeval forest, and an Indian settlement had lain outside its walls, its box-like tombs and totem poles gay against the green of the spruce trees and the snow of the distant mountains. But this had now disappeared, leaving traces only of the old language among the inhabitants.

After ten days sailing the *Albatross* reached Dutch Harbour, Unalaska, where she stopped for four days to coal. Unalaska is the largest island of the Aleutian Chain and it is dominated by the 5,000-feet-high volcano Makushin, snow-capped and magnificent. Round Unalaska village on that summer day the hills were green and fertile, the meadows gay with brilliant geraniums and anemones, and in the midst of the wooden houses stood the tall timbered Greek Orthodox Church with its green cupola and belfry.

The Aleuts are a mixed race, half Esquimo and half Russian from intermarriage with traders in the eighteenth century. They are a short, sturdy, thick-set people with straight black hair, flat red faces, slanting eyes, and voices loud and guttural. In the early days of the settlers they were used and treated as slaves and had absolutely no redress against the ill-treatment of their Russian masters, but by the end of the nineteenth century their conditions had improved though most of their old primitive customs had died out. There were still a few barabaras, or underground huts with sod-roof to be seen, and D'Arcy managed to procure one *kamleika* to bring home. The *kamleika* is a three-quarter-length overdress with hood, made out of the intestines of the seal, completely waterproof and extremely durable; this and a curious boat-shaped hat made of bark and embellished with walrus hairs was the costume of the people until a hundred years ago. The skin of the sea-lion furnished their baidarkas or canoes and these are still used. After the discovery of the rookeries on the Pribiloff Islands the Russians moved several hundred Aleuts there to work the seal fishery and so populated the islands.

From Unalaska the *Albatross* sailed due north for 200 miles passing Bogosloff Island with its rumbling volcano. On the 8th of July St. George Island was sighted rising out of the mist and fog. Over the water came the strange smell of the seal breeding-grounds, unmistakable, all-pervading, but not unpleasant, and with it the roaring, bellowing, crying voices of the seals, strange eerie music continuing through the long summer nights and days.

From now until the middle of August the Commission was hard at work in one island or the other—photographing the rookeries, counting the breeding seals, examining the dead pups, watching the drives and the methods of selection and killing, of skinning, of salting-down the skins, and all that is involved in the fur-seal industry. D'Arcy was given quarters on shore in one of the wooden houses belonging to the Company where he was fed on seal-meat and a kind of bully-beef washed down by tea and occasional vodka.

At first, observation of the rookeries had to be done from off-shore in small boats or from the tundra-land behind the breeding-grounds as the bulls were too fierce to allow anyone near, but later it was possible to go among them and take the necessary photographs. These are very remarkable indeed, showing low stony beaches sloping back to a hinterland of iris-like plants, coarse rushes and lichen-covered rocks, and, as far as the eye can see, hundreds of thousands of seals—the great old bulls that guard the rookeries, black and gigantic in comparison with the small light-coloured cows and the pods (small groups) of little dark pups around them. In the background the low-lying bays of the island are only shadows, misty and hazy, and in the middle distance are the bachelor quarters from which the drives to the killing ground are made.

D'Arcy observed several drives and was able to report favourably on the conditions, for he found they were done carefully without undue haste, and 'with no more hardship than is entailed in driving a flock of sheep'. The work begins before dawn when the natives, under the supervision of an inspector, approach the hauling-grounds of the *holoschiki* or bachelor seals, and drive them silently and slowly to the killing-ground; when the way is over a rocky surface the seals get along fairly easily for they lollop over the rocks and boulders, but when the path is sandy it is far harder for them and they have to stop continually for breath. Once they have arrived, they are rested for half an hour to cool off, for otherwise their fur will suffer, and then they are dispatched by a blow on the head with a wooden club and there is never a case of bad aim.

Cows and those too young or too old are rejected and return to the sea at once. The carcasses are skinned on the spot with the help of the women and the skins are placed in salt in the salt-house and the meat is taken for use. Only about 40 per cent. of each drive is killed and in this year, 1896, 30,000 seals were killed on the two islands. Mule teams were used to bring in the skins to the village and later D'Arcy hired these to transport walrus heads, blue foxes, and various specimens that he secured for his Museum. A little laboratory was set up in the village for working on various problems connected with the seal-pup mortality and for preparing and preserving specimens.

While D'Arcy was on the island an event occurred that gladdened many men's hearts: the great Norwegian explorer, Fridtjof Nansen, who had disappeared for three years with his little ship *The Fram*, and whom everyone thought was lost, appeared again. ('Some of us remember well, and all of us have heard, how Nansen disappeared into the far North. I was in an out-of-the-way part of the world myself just then, on an island in Behring Sea. One day a ship came in, bringing us supplies and news, and before ever the ship's boat reached the shore her men shouted across the waters in their haste to tell us that *Nansen had come home*.'[2])

About the middle of August H.M.S. *Satellite* came to the islands to take D'Arcy and Dr. Jordan on board. They were to proceed 800 miles westward to the Russian-owned Kommandorski or Commander Islands off Kamchatka for a short investigation of conditions and also to pick up Barrett-Hamilton who had spent the last weeks there. The weather, as it had been all summer, was shocking, with perpetual gales and frequent fogs making the landing for the ship's boats precarious, there being no harbours in either of the Pribiloff Islands. After a couple of days' delay the little ship was able to sail but she ran into such severe storms that she was hove to for several days with the result that there were only two days left for the inspection of the great rookery of Glinka when the party eventually reached Copper Island. Here the conditions were very different to those on the Pribiloffs and D'Arcy was amazed and

horrified to see the land over which the seals were driven. The island is high and precipitous. Great gullies and steep hills take the place of the gentle slopes of St. Paul, and D'Arcy wrote: 'no description can render justice to these drives, where the seals are driven up steep and slippery inclines over passes from 800 to 1,200 feet high. A single visit to these drives is enough to convince one that the drives practised on either of the two American islands are trifling in comparison.'

Now the Commission turned for home, and once arrived again in Unalaska D'Arcy transferred to U.S.R.C. *Rush* to sail south to Victoria. In his notes on what he had seen during these weeks D'Arcy mentions (apart from seals) hundreds of Blue Foxes on the islands, Killer Whales in the shallows of St. Paul's, little Ringed Seals, the larger Spotted Seal of the northern Pacific, and the huge lumbering Pacific Walruses which lived on Walrus Islet, many thousands of which had been killed by the early Russians for their tusks and the tragic skeletons of which made a foundation for the salt-house on St. Paul's. In his final report to Lord Salisbury, D'Arcy made a very strong plea for the protection of other animals as well as the seal; this was exceedingly important as it focused attention on a vital question of natural history, and it was the first time that official notice had been taken of the wanton destruction of the sea-otter which was all but exterminated, and of the whale which had suffered so much and still does at the hands of the whaling companies, greedy for profits and careless of animal life. D'Arcy wrote:

> Among the collateral points of interest in relation to the case is the circumstance that the United States' authorities have this season relaxed, and all but swept away the Regulations, always at best inadequate, for the protection of the sea-otter. The principal regulation formerly in force and now abandoned, precluded white men from engaging in the chase. Some 600 sea-otters have, in consequence, been taken beyond what the already nearly-exhausted stock should reasonably furnish. This action on the part of the United States Government is directly contrary to the recommendations made by Mr C. S. Hamlin, Assistant Secretary to the United States'

Treasury, after his visit to Behring Sea in the summer of 1894, and I am assured by the Governor of Alaska (whom I called upon in Sitka) that the change was brought about through the influence of the North American Commercial Company, the very company that clamour for further protection of the seals. Their motive in this case is said to have been jealousy of the older Alaskan Commercial Company, who possess greater influence with the native Indians, and accordingly obtained nearly all the sea-otter skins. This episode seems to me of very great interest, in so much as it shows that the whole fur-seal controversy is not simply a matter of right and wrong, of protection versus destruction. The fur-seal is diminishing, just as every other marine animal is diminishing that is hunted in the north—the whale, the narwhal, the walrus, the Greenland and Newfoundland seals. But the case of the fur-seal differs from all the others in that the seals are finite in number and open to inspection; their numbers and their diminution can be continually advertised, whether on the basis of accurate or inaccurate computations, and the rich Company that lease them have exceptional influence, both in politics, and on the press.

D'Arcy and Sapper Marrett reached Victoria at the end of September and remained there ten days, after which D'Arcy made his way across Canada by stages, seeing various people on the way and staying once more with the Governor-General and the Marchioness of Aberdeen. He sailed from New York on the 24th of October and was in Dundee again in November.

The winter was extremely busy, for as well as writing the final and accurately documented Report for the Foreign Office and several journeys to and from London, there were pressing things to see to in the College and the Museum. All through these months there was much correspondence between D'Arcy and F. H. Villiers and Francis Bertie, Under-Secretaries of State for Foreign Affairs, and it was soon apparent to them that it was useless having sent over a Commission for one season only: a second was needed so that comparisons of statistics could be made. In the New Year of 1897 Mr. John Anderson of the Colonial Office asked D'Arcy to send in an estimate of expenses for a possible second journey to the Behring Sea, this time travelling through Japan and visiting the Russian islands

first for which permission was being requested from St. Petersburg. D'Arcy sent in an estimate, asking that he might take Aleck Rodger with him as photographer.

In March his Report on the previous season's work had been read by the Colonial Office and he was congratulated on 'having presented a Report the temper and style of which are as excellent as its order and lucidity'. In it he drew the conclusion that the alarming statement of a vast decrease in the herd was overdrawn, but that there was 'abundant need for care and prudent measures of conservation for the margin of safety is narrow. We may hope for a perpetuation of the present numbers, we cannot count upon an increase.'

A fortnight later D'Arcy received a wire from Whitehall saying that the Treasury had been asked for a grant for a substitute in the Zoology Department in Dundee, and that the Foreign Office was prepared to make formal application for his services 'to which they attach the greatest importance. It would be impossible for us now to secure anyone else of your standing and experience in time.'

D'Arcy's success in the first mission had been in the main diplomatic. He had made such friends with the American scientists and representatives in the islands, and had established such cordial relations with the government officials in Washington that they were eager to see him again, and were ready to discuss problems of the utmost delicacy with him. The Hon. C. S. Hamlin, Assistant Secretary of the U.S. Treasury Department, had written to him on the conclusion of the Commission: 'I have heard golden opinions of your work from all who come into contact with you and we hope to have the pleasure of seeing you here again.'

After receiving official leave of absence from University College D'Arcy began to pack up a second time, though with less eagerness than on the first occasion. However, in two weeks' time, when he and Rodger were on board the P. and O. *Oceania* bound for Marseilles, he was again quite delighted to be off a-travelling. In Marseilles they transferred to a French ship, the S.S. *Armand Bétric*, and in so doing D'Arcy had the

ill-fortune to be robbed of his pocket-book and official cheques: otherwise the voyage was easy and pleasant. By the first week in May they had reached Colombo and the weather was unbearably hot, but they still had the energy to dance occasionally, and one evening enjoyed a cotillion. The cooking was excellent, as good as in a Paris hotel, and D'Arcy talked French all day long. The ship called at Bangkok and Formosa where he paid his respects at the British Embassy and on the 22nd of May they arrived at Hong Kong. Here he posted this letter to his aunt:

Hongkong, *22.5.97*. I ought to have had a letter ready before arriving here, but it has been so unbearably hot I have been very lazy; and here we have only a short while to stay. I got up early this morning as soon as we arrived to go and buy fish in the fish-market at 5 a.m. I have now had lunch, and we sail at 5 o'clock. We have still 10 days to Yokohama, but we feel as if we were at the end of the journey.

All through his life whenever D'Arcy visited a new town there were three things he invariably did. The first was to visit the local museum and call upon the director; the second was to get up early and go down to the fish-market (if there was one) whereby he discovered innumerable interesting things about local fish and fishing; and the third was to visit the market-place, see what the people ate, how much it cost, and how they lived. This eager curiosity about life and people made him friends among all sorts and conditions of men.

Among his notes is a long letter written earlier in the voyage but never posted, to his friend Dr. Stalker of Dundee. It is interesting as showing how his mind was reaching out towards speculations that became familiar as time went on.

S.S. Armand Bétric, S. of Cape Spartivento. *27.4.97*.

My dear Stalker. It was a real disappointment to me not to see you to say goodbye, and to be so overdriven for days before I left that I could never find a single evening to come and pour out libation to the Twins. We left Marseilles on Sunday, Aleck and I; and have had so far all sunshine and fine weather. The Straits of Messina

looked lovely beyond all words, Scylla and Charybdis showed neither tooth nor claw. And now we are hugging the Italian shore, with its clustering red-roofed villages among the olive-terraced hills, while Etna still towers over us on the starboard quarter. . . . I bought in London, in consequence of a eulogistic review in the Times, 'The Will to Believe' by James of Harvard. This book you must immediately purchase for the Club, it is one of the most delightful I have read for a long time. It contains an Essay on *Determinism*, which has interested me a great deal, and since reading it, I am groping after no less than a new theory of Chance. I don't know whether I can put it in words yet, but I am going to try. I might describe my theory as a theory of *Interference*. The astronomer deals with the orbits of heavenly bodies firstly by themselves and secondly as perturbed by natural influences, and their mutual interferences are of all grades, from cases when the orbits are so similar in range and period that interference is a frequent and constant factor, to cases (like some in Comets) where interference may ensue only after millions of years, and subject to the synchronism or anachronism of a thousand other interfering actions. A case so rare depending on so many incalculable elements is a veritable accident. In the ordinary affairs of life we are dealing with a complexity arriving not so much from the diversity in range or period of the different orbits, as from the infinite number of orbits and their innumerable permutations of period. Your orbit carries you along a certain course, but is perturbed by a million other orbits outside you or inside you. So is mine. And if we meet this day or that, at this or that street corner, the event, it seems to me should not be treated as a simple question of antecedent determination but as an infinitely remote consequence of the mutual perturbations of a million operating causes, a mere difference between the calculable and the incalculable. The question is perhaps theoretically a question of degree but of degree so immense in its range of difference as to be to human intelligence a difference of order or kind. The crude notion seems to me to foreshadow many corollaries. The simple village life with its comparatively few interesting forms, the complex life of a very ancient civilisation with its multitude of harmonised orbits, both have a guarantee of stability, in the consonance of their vortices, and the absence of dissonant notes. But strike a new note, import a foreign element to work and a new orbit, and the one accident gives birth to a myriad. Change in short breeds

change, and chance—chance. We see indeed the sort of *evolution* of chance, an ever increasing complexity of accident and possibilities. One wave started at the beginning of eternity breaks into component waves, and at once the theory of interference begins to operate. We draw out in imagination each wave along a base-line of Time, and see their imaginary intersections simple or multiple, frequent or few. This is at least a poor shadow of what I am trying to make clear to my own mind, but I shd. like you to try and find some grains of sense in it.

The *Armand Bétric* docked at Yokohama on the 3rd of June and D'Arcy put up at the Grand Hotel on the Bund. Here there was more to do and see than the short fortnight's stay allowed and D'Arcy was so busy and so enchanted with everything that he hardly had time to go to bed at all. He visited all the wonderful little natural-history shops, the Butterfly and Insect Merchant, the Japanese Birds'-egg Merchant; he sent home to his half-sister Fanny in Galway a Japanese girl's dress in delicate rose-coloured brocaded silk with under-dress of ivory and obi of heavy padded satin; he called on Mr. Chang Chow, the naval tailor, and ordered for himself a 'dinner-coat, a suiting and a tie'; he took a train to Tokyo, visited the University, and was entertained by Japanese colleagues to dinner about which he wrote: 'I have often eaten raw fish myself in Japan, as every stranger who has dined with a Japanese has at least been invited to do. Whalemeat, it may be an ancestral food, is more rarely come by, but it is a still greater delicacy.' He bought *kakemonos*, a few little *netsukis*, and longed to buy more; from this moment dates his great love for, and interest in, Japanese prints and bronzes and all the beautiful things that the Japanese artist-craftsmen produce.

Many years later D'Arcy looked back to those days in Japan and wrote a little article called 'Goldfish' from which is quoted this passage:

A good many years ago I happened to pass a few weeks in Japan, and part of the time I spent with one of the best of friends and the very best of guides, Kituchi Mitsukuri, then Professor of Natural History in the University of Tokyo. I had met him of old in Cam-

bridge, and again in Washington. He was a traveller and a scholar. He was learned in our Western science; he was filled with the great earnest love of living things and of all natural beauty which abounds in the hearts of his countrymen and runs through all their folklore and their art.

He was a big bearded man of ancient family; he belonged both to the Old Japan and to the New; he was a Sumurai of the Sumurai. The days I spent with him were all too few and the hours all too short, for he was a busy man and it was only when his teaching day was done that I used to meet him. But to walk with him through Tokyo was a not illiberal education in natural history—and in many other things besides.

As we walked through the narrow by-streets of Tokyo we would peep in, perhaps, to some bird-catcher's shop, and see in their beautiful bamboo cages, exquisitely clean, the host of Japanese birds, some so like our own and some so strange and different, the thrushes and warblers, the long-tailed jays, the Pekin nightingales, and that sweetest of small cage birds, the little white-eye or zosterops. If we turned again into a bird-stuffer's, it was to chat with some grave old man squatting on the floor with his children around him, all making up countless bird-skins with amazing neatness and almost bewildering rapidity. Day after day I bought scores and hundreds of them, till I had got together no mean collection of Japanese birds, and all for trifling sums in sen and yen. The street-hawkers came by with their barrows, and among these again there were strange things for the naturalist to see. Here, for instance, is a vendor of something very curious indeed, something that our own people neither buy or sell—a strange collection of half-horny, half-leathery, seaweedy things in bright colours, some like little bits of honeycomb, some like long chains of tiny bladders. They are the eggs, or rather the egg-cases, of big sea snails, like to our own whelks and lamp-shells. The children of the poor, the little girls especially (I think), buy them for the tiniest of coins. They suck them between their pretty lips, they squeeze them between the tongue and the roof of the mouth, they whistle through them and make a squeaky noise. They are half toy, half sweetmeat, and the multitude of happy children create a commerce in these worthless things.

Even the goldfish industry . . . is all for the children's sake; they are the customers *par excellence* of the goldfish breeder, and it is for them that every year millions upon millions are bred. . . . A very

pleasant sight for the naturalist is a barrow-load of cricket-cages, each with its tiny singer and the tiny slice of cucumber for his food. There are many kinds. Some sing by night and some by day; some are sold in little fairy birdcages made of the slenderest leafstalks of bamboo, and others in gloomy little tents of blackened gauze; and they have their several well-known songs or tunes, just as singing birds have. For in Japan men listen to the chirp of cricket and cicada as Virgil and as Theocritus did; it is the woodland music of the Old World and of the East, a song that to the ears of the older peoples is far better than the nightingale's.[3]

On the 17th of June D'Arcy and Rodger, now in the charge of H.M. Navy and on board H.M.S. *Centurion*, sailed for Hakodate where Admiral Fuller handed them over to Captain Tisdall in H.M.S. *Rainbow*, and they became members of the wardroom for the next two months. From Hakodate he wrote to his aunt:

25.6.97. Hakodate.

We're off again to Korsakofsk in Sughalian. All goes well. I'm very busy now collecting information and sending it home in long letters. We celebrated the Jubilee in great style, with a picnic, a dinner-party, an illumination and a concert. I have a great big cabin with a brass bedstead, a writing table, and lots of room, and a sentry in a red coat outside the door. I have also a Chinese servant to attend on me. He has a very long pig-tail. This is the last letter you will get from me for a very long while.

H.M.S. *Rainbow* was a corvette carrying sail which she used when coal was scarce on long cruises. She was based on the China Station and part of her work was to patrol the eastern stretches of the Behring Sea. Occasionally she would board a British sealer and examine the pelts to see that the seals had been harpooned and not shot, and her duty was also to see the schooners out of the Behring Sea at the end of the summer before the ice finally closed down. The commissions were long in those days, three years stretching to four with few mails from home, but for the young men there was the compensation of excellent sport. There were duck, teal, snipe, grouse, not to speak of fox and bear, and on the Alaskan side cariboo to shoot,

and wonderful salmon and trout fishing. Apart from fresh meat shot in this way the 'grub' consisted of salt pork and salt beef from the harness cask, ship's biscuit, potatoes, and a ration of rum. Lime juice was issued daily to all hands to prevent scurvy.

Living on board H.M.S. *Rainbow* was an experience on which D'Arcy looked back with the greatest delight. He loved the sea and ships and was happy in the company of all those who go about their business in great waters.

It took ten days to reach the first of the Russian islands, Robben Reef in the Sea of Okhotsk, and there the Commission found the Russian corvette *Koraietz*, which had arrived the previous day, landing a lieutenant and a party of blue-jackets to guard the island as was the custom during the breeding season. This island was but a large rock, and the seals occupied an area of about 25 square yards of the shore upon which could be counted 400 cows and 8 bulls and about 23 idle bulls. These seals were of a slightly different breed from those in the Pribiloff Islands and from those in the Commander Islands; the three herds of the Behring Sea each had their own colourings and markings, and migrated to different summer quarters, never mingling or overlapping. The bulls here were exceptionally large and the cows a dark chocolate colour without any silver colouring on the belly; there were no bachelors to be seen and the whole herd seemed to be in a very depleted condition. This turned out to be the result of poaching, both by Japanese sealers and raiders, and also by the Russian commander of the island a couple of years previously. This man and his associates had killed off for their own profit not only all the bachelors but hundreds of cows both mature and immature, and had in fact caused indiscriminate slaughter to be done with fearful results to the herd. When it was discovered there had been a great outcry in Moscow and the men were sent for trial to Vladivostock, but the damage was done and could not be undone.

Leaving Robben Reef the *Rainbow* nosed her way cautiously out of the Sea of Okhotsk round the south of Kamchatka with a north-east gale blowing and incessant fog. Arriving at last at Copper Island D'Arcy was able to amplify all that he had

written the year before of the shocking conditions in the seal drives. Following one drive from Zapadni the observers found it 'rose from the stony beach between two towers of rocks, climbed the gorge of a little brook, an excessively hard, rough little gully, very difficult for a man to climb there being small cascades and wet clay in its course . . . the final ridge is 760 feet above the sea'. On another drive one hill was 'as steep as a man can climb, and one who goes up it must cling to the grass'.

There were three villages on the island, but communication between them was only possible by boat and this was dangerous and often impracticable owing to the storms and weather conditions, and the lack of any kind of harbour.

The houses of the Russian officials were built on the pattern of the wooden houses of Siberia and the Aleuts were far more primitive than those on the Pribiloff Islands. They wore a modification of Russian dress, long thigh-boots, short jackets, and round caps, and the women were dressed in voluminous ankle-length skirts, with kerchiefs on their heads. Here D'Arcy saw the men performing typical Russian peasant dances, squatting low on their haunches and jerking their legs out violently.

It was on Copper Island that D'Arcy procured the most valuable of all his specimens for the Dundee Museum—the skeleton of Steller's Sea-Cow (*Rhytina stelleri*). This extraordinary animal was discovered and first noted by Steller; it proved so useful as food for the Russian traders and sailors that within thirty years it was totally exterminated. It was a most interesting creature, twenty to thirty feet long, in shape somewhat like a seal, with jointed fore-flippers and a split upper lip with which it gathered up great mouthfuls of sea-weed, upon which it fed. Occasionally the skeleton of one would be found in the peaty ground of the island, and a Russian by the name of Tephan Sennitsen sold this specimen to D'Arcy for 200 roubles. Later he managed to procure a second, but the Governor of Siberia heard about it and indicated that it was his by rights, and D'Arcy had to part with it.

In the middle of July the *Rainbow* moved on to Behring Island where Barrett-Hamilton had been working all summer

with Dr. Stejneger of the United States National Museum. D'Arcy was met by the Cossack officer in charge, and he made a note in his official letter that 'both here and on all the other Russian seal-rookeries we were welcomed with the greatest courtesy'. Photographs of Nikolsky village show the Orthodox church with its round tower and belfry, and fair-sized timber houses built high off the ground with steps up to the door to keep them dry and warm in winter. There was no cultivation of the land round the village and the coarse grass or 'winter wheat' grew everywhere. Here the natives used dog-sleighs for transporting the seal-meat and skins down from the killing-grounds, and Dr. Stejneger and D'Arcy hired these dog-teams to take them about the island, for the snow was deep in spite of the season being mid-summer.

By the end of July the investigations in Behring Island were finished and D'Arcy went on to the Pribiloffs where he spent most of the month of August. While he was there he had a message from his young half-brother Willy Thompson who had landed up on a sealing schooner in Unalaska. Willy was about nineteen years old, a handsome, daring boy with a restless adventurous spirit, which carried him from one wild scheme to another all his life. At this time he was on his way to the Yukon to dig for gold and hoped to see D'Arcy, but the distances were too great and they did not meet. A year later when D'Arcy was made a Companion of the Bath for his services in the Behring Sea, his father received the news with characteristic humour, saying: 'Well, it's a wonderful thing for a man to have two such sons; the one becomes a C.B., while the other remains an A.B.'

By September all the work was done and both the American and British Commissions left for home. Macoun and Barrett-Hamilton were brought down to Esquimalt in the *Bear*, a little wooden ship which has since made history. She was built in Dundee in 1873 and after sailing the Behring Sea for fifty years was finally transferred to the Antarctic for service in Admiral Byrd's Expedition in 1936.

D'Arcy left the Pribiloffs in H.M.S. *Amphion*, a cruiser sent

from Esquimalt to fetch him, and years later he wrote of a wonderful experience that he had on this part of his journey. He saw

> the grey whale of the Pacific, *Rhachianectes glaucus* of the naturalists. This whale is excessively rare in our museums. It is said to be at times a savage and dangerous whale, a terror in former days to the whalemen; yet it was vigorously hunted by the San Francisco men, and has grown scarce where it was once abundant. I believe that it was this very whale which once gave me one of the great sights of my life. We were coming down the Pacific in the old Amphion, just to the westward of Vancouver Island; it was Sunday morning and we were having service on deck. Gradually we drew into a vast shoal of whales. The sun was shining, the sea was like a mirror, there was no breath of wind. The great beasts lay alongside; the sea was covered with them as far as eye could see. They showed no fear of us as the old cruiser steamed slowly and quietly along; they only lay and rolled and tumbled and grunted and puffed and blew. They were big whales, long-bodied, sharp-snouted; I have seen a great many whales, but never the same sort before or since. They were I think, almost beyond a doubt, the Californian Grey.

D'Arcy reached home towards the end of September, and a month later left again for Washington on what was perhaps the most difficult part of the whole Commission, the final meeting of the experts, when he spoke for three hours at the Conference between the officials of the two Powers. By the middle of November a conclusion had been reached and a joint statement signed and issued, by Mr. Hamlin and Dr. Jordan for the United States, by D'Arcy Thompson for Great Britain, and by James Macoun for Canada. This was presented to Parliament in January 1898. It was to the effect that the diminution of the herd was far from the stage which threatened extermination as long as it was protected on land, and although the fur-seal herd was decreasing so was pelagic sealing and therefore the owners of pelagic fleets must be compensated financially for the losses in their returns.

After the Conference D'Arcy went once more to Ottawa for a farewell visit to the Aberdeens, and returned to London at the

end of November. His work on the Behring Sea Commission had taken him almost twice round the world; he had brought to a happy conclusion a difficult piece of work; he had made many new friends; and he returned to Dundee with a new outlook on the world.

One month later in the New Year's Honours D'Arcy was made a Companion of the Bath. This news came to him in a letter from Lord Salisbury who wrote in his own hand: 'It is extremely agreeable to me personally to be the means of making this communication to you.' At the same time the government gave him a handsome gratuity over and above the fee he had already received for his part in the conclusion of the Behring Sea Inquiry.

REFERENCES

[1] 'The Study of the Sea', Lecture, 1920.
[2] Fridtjof Nansen: *Journal du Conseil int. Explor.*, 1930.
[3] 'Goldfish', *Country Life*, 1923.

VII

THE INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

1902

We can understand the mathematics used by Copernicus, and appreciate the zeal for experiment shown by Galileo. But what seems to us so strange is the unity of culture which in those days bound together the classical scholar and the scientist. Galileo studying the planet through his telescope is a phenomenon with which we feel quite familiar, but Galileo using classical allusions in a scientific sense seems beyond words bizarre. For the humanist and the scientist of our times very rarely, if ever, use the same language.

SIR ROBERT BIRLEY, *Greek or Chemistry or both* (1954)

The Fishery Board for Scotland, 1898
Marriage, 1901

In the next ten years the fruits of D'Arcy's mind came to maturity, and certain facets of his complex character led him to make decisions that finally laid down the pattern of his future life.

Returning to the confines of Dundee after the freedom of the Behring Sea he began seriously to think of a move elsewhere. All of his colleagues had done, or were to do, the same with the exception of Patrick Geddes, who remained on nominally for thirty years, pursuing his great and creative work all over the world during that time. There was something in Dundee that caused a discontent, a restlessness, a disinclination to

put down roots. Was it perhaps the lack of tradition, or the close proximity of the mills and the sordid slums, or the seeming disregard for the advancement of the intellectual life of the city by the rich business men, or was there missing some *esprit de corps* to bind the professors together?

The main reason why D'Arcy had not tried for promotion earlier was that during the twelve years since he had left Cambridge no Chair of Natural History had become vacant. But there were other reasons why he had not bestirred himself, the most important being the influence of his father's doctrine that 'to struggle for place or promotion, only led to scheming, jobbery, unfairness, and all sorts of things that may be left to others, but that a gentleman, a pukka Sahib does not do'. It is impossible to know if the philosophy by which his father lived his life was meant to influence D'Arcy as much as it did, but whether or no he had certainly made it his own. Years and years later in old age he wrote to a very young friend: 'It is very hard to combine ambition with perfect scrupulousness and integrity; in fact it can't be done. It is not so much the ambitious man, but the man trying to get rich who has all the nasty things said about him in the Gospels.'

In 1898 on the resignation of Sir William Flower as Keeper of the British Museum (Natural History) D'Arcy made up his mind to apply for the post. He went to London to see how the land lay, and wrote home that 'there are many eagles gathered about the carcase'. He was backed by Arthur Balfour and Canon Ainger, Master of the Temple, who had been his father's lifelong friend, but their support was not enough and he was passed over to his great disappointment.

Up to now D'Arcy had written very little, and nothing of outstanding interest or importance (for *The Glossary of Greek Birds* meant nothing to his scientific colleagues). He had failed to get a Fellowship at Trinity College, had no degree beyond that of the Natural Science Tripos, and many people must have thought along the same lines as his old friend Professor Alfred Newton of Magdalene College, Cambridge, when he wrote in January 1898: 'for your own sake . . . I most strongly recom-

mend you to do something in the scientific way, and that before long. The merit of your assistant (W. T. Calman) will not be credited to you—nor will any proficiency in Greek *much* serve your turn. You must show that all the waters of the Pacific . . . have not washed the science out of your composition', and again: 'Let me suggest to you that you should *now* shew up some more scientific work. I am sure you would find it very useful, to take even a low point of view.' A few months later the Oxford Chair of Natural History seemed likely to become vacant on the transference of Ray Lankester to the British Museum, and although D'Arcy thought of it with interest, and even went to Oxford to talk the matter over with his old friend John Haldane, he did not eventually apply for it, for he was told frankly by Professor Michael Foster that his support and that of other eminent men would be for another candidate.

It is probable that the lines upon which he taught were against him at this date, for neither then nor at any time would he conform to a conventional pattern. D'Arcy the Elder had rebelled against prevailing methods of teaching in his day and had made his own way along his own path, and his son did the same; what was right for the one was right for the other. It must also be remembered that D'Arcy had been brought up by Joseph Gamgee who was a man of the widest outlook, and that he had had his first training under various great Edinburgh teachers; it was hardly surprising that he would not tie himself down to the narrow 'type-system' zoology then in vogue in the English universities. Added to which the whole realm of nature was his province, nothing was too small, too insignificant, too unimportant for his notice. In his philosophy nothing could be isolated in a narrow groove; each and all combined to the ultimate purpose; everything must merge to the creation of the whole. In his teaching the infinite variety and the infinite beauty of life was his theme then as always, and he embroidered it with his ever-widening knowledge of history, classics, and mathematics; but this approach met with no approval in 1898.

There is one other point which had considerable bearing on his relationship with other scientists and which certainly

v. Ada Maureen Drury and D'Arcy Wentworth Thompson, shortly after their marriage

VI (*a*). D'Arcy carrying his home-made butterfly net

VI (*b*). D'Arcy and Barbara looking at beetles on the Perthshire moors

affected his success until after middle life; this was an attitude of mind that he inherited from the Gamgee uncles, and which kept him, while still a young man, from making many friends among his contemporaries. Two of the three uncles, Joseph Sampson and John, with whom D'Arcy had been much associated in his youth, had arrived from Italy in the eighteen-fifties after an upbringing there broader, freer, and more ample than that which most of their contemporaries knew in England. They could pass from Italy to France and Germany speaking the language of one as easily as the other; their own cosmopolitan education and their father's contacts had caused them to meet medical and scientific men of high repute on the Continent whose views were diverse and advanced; and Florence, beloved of artists, poets, and musicians had cradled them. Added to this they were of striking appearance, and Arthur, the youngest, was quite unusually handsome. They did not disguise their views about the insular English, and they would hold forth with assurance and easy flow of language and a conviction of their own rightness, on any subject in hand. As a youth D'Arcy had been encouraged to talk as the uncles talked, but it did not always serve him well. Soon after leaving Cambridge, when he questioned some pronouncement of Darwin's in a lecture, an old don took him aside and said: 'D'Arcy, you may think these things, but you must not say them. It is not the time, and what is more, it is not the way to get on.' Professor Michael Foster once said to him 'You know you haven't got very many friends', and he was quite taken aback. But it was true; as a student he had many acquaintances but few intimates. His old class-mate from Edinburgh, David Bruce, once said of him: 'He was a queer fellow—there was always something about him we couldn't understand.'

In 1899 the Chair of Natural History in Aberdeen was vacant and D'Arcy applied for it, but did so in an unorthodox way; he sent in no testimonials but trusted 'to Providence and the Secretary of Scotland'. After some delay Lord Balfour of Burleigh offered him the Chair but by that time D'Arcy had reconsidered its advantages and disadvantages and to everyone's

surprise refused it. His father was greatly distressed and wrote from Galway: 'I dare not proffer advice about Aberdeen. For my own part I would rather have £500 in Aberdeen than £600 (or perhaps £700) in Dundee.' But D'Arcy had made his decision, though in after years he was to see that it had not been a very wise one. He evidently felt that Aberdeen was even more out of the world than Dundee, and he knew there was more drudgery of teaching there and little increase in salary, but there are indications that he could not bring himself to take what seemed only second best after London and Oxford, and that he thought that the half-loaf was not better than no bread. This attitude did not help him when two years later the Chair in Glasgow was vacant; he sent in his application, but the appointment was again in Lord Balfour of Burleigh's gift and it went, naturally, to another man. D'Arcy tried later for both the Directorship of the Museum of Science and Art in Edinburgh, and for the Keepership of the Natural History Museum in London, but for one reason or another did not get either.

These difficult years were complicated by his far from strong health, and his constant bronchitis. Now a great change came into his life from another quarter. In the summer of 1900, spending a holiday in Galway, he met, after an interval of many years, Maureen Drury, his step-mother's niece. 'Little' Maureen Drury as she had called herself in childhood, was five feet two or three inches in height with a waist measurement of eighteen inches. Her face was oval in shape, her eyes grey; her hair, which stood up from her forehead, was chestnut brown, and her expression was one of gentle goodness. There was a suspicion of a brogue in her soft Irish voice which became more pronounced when she was excited, and she had a vivid and romantic imagination. Her ancestress Mary Chaworth was the love of Lord Byron's youth—his 'bright morning star of Annesley'—and Maureen's first name, Ada, was given her with the line from Childe Harold in mind 'Ada, sole daughter of my house and home'. (In the following years D'Arcy was to make a little collection of Byron first editions for her, and in her bedroom hung an engraving of Mrs. Musters, the famous

beauty whose son, Jack, Mary Chaworth had preferred to Byron.)

Maureen and her sister had been brought up by a faithful governess after the death of their mother; the disappearance of their much-loved father after a financial débâcle was a tragic loss when the girls were still in the schoolroom. Maureen was by nature of a delicate constitution and her fragility made her shy and retiring, but she had a strength of character which belied the limits of her physique; staunch to her principles she had an uncompromising sense of right and wrong, and sincerity and loyalty were the marrow of her bones. She was frank and direct in speech and her religious faith was almost puritanical in its simplicity.

When D'Arcy met her again she was staying for the summer with an aunt in Salruck, a village in Connemara within sight and sound of the Atlantic, far from a railway station and only reached by jaunting car. He fell deeply in love with her, invited himself to stay at the house, and was furious because on all their expeditions Maureen insisted on taking her sister with them. After an ardent courtship he proposed to her, but she did not accept him for some days, during which time he was said to have neither eaten nor slept. His engagement present to her was, characteristically, a necklace of green and brown beads which had come out of an Egyptian mummy's tomb and was far too fragile to wear! Their engagement was announced on Christmas Day and they were married in July 1901 from the house of Maureen's guardian near Bristol; John Sinclair was D'Arcy's best man.

Their married life started in an old cottage, Gowrie Cottage, in Barnhill, a country district some miles from Dundee. In front of the little house deep rhododendron shrubberies surrounded a heart-shaped lawn from which one saw the river Tay; beyond were the fields of a nursery garden gay in spring with daffodils. D'Arcy planted bamboos and irises in the big garden and made a rockery which was inhabited for many years by an old toad. Within the cottage were small low-ceilinged rooms lit by oil lamps and candles; the banisters of the tiny staircase were

brilliant with scarlet paint and the nursery had a jolly wallpaper of Caldecott illustrations of nursery rhymes. Maureen had no experience in housekeeping and her little Norwegian maid-servant had even less, but it was a period of great happiness and D'Arcy rejoiced in his home; when his first child was born in the summer of 1902 he was proud beyond measure. She was christened Ruth after the last of the Maryport aunts who had died that year, but D'Arcy liked to say that the true reason for her name was to be found in the Book of Ruth, chapter 4, verse 15, where it is written that Ruth was better than seven sons. The baby was three weeks old when D'Arcy wrote to her for the first time; the letter was in verse ('Poor Sam' being the little dog):

> My Babs, I'd intended a letter to write,
> But you wouldn't, I'm sure care a rap
> So I send for your dear little head
> Instead,
> A funny wee little nightcap.
>
> Poor Sam would look nice in another perhaps,
> And so I send one for him too;
> In fact I had better send three little caps
> For Sam and your Mummy and you.
>
> And when you are all of you snug in your beds,
> Oh how I should like to look in;
> To see three little caps upon three little heads,
> With the ribbons tied under the chin.

Six months later he wrote to Mary Lily Walker: 'All goes well with us. The Babby is in the best of health, and developing in intelligence marvellously. She now hugs her Dolly like a real little girl. We scrutinize all the other Babies critically, and try to be lenient to their obvious defects. . . . All goes well in this once distracted College; but there are more important things than Colleges,—and the blessed Babby is the principal thing now!'

Maureen had no especial gifts of learning and did not share in D'Arcy's work, but she shared his sense of humour, his love

of animals, his delight in the novels of Dickens, and his gift for friendship with humble people. And he leaned upon her in many ways all their life together. One of the first things he said to her after their marriage was: '*You* must always make the difficult decisions for both of us and say the hard word.' And so it was; she was the core of their relationship and a support he could not do without. He used the old English 'thou' in addressing her (and later his children), and he never came into the house without shouting for her as he opened the door, nor went out without bidding her farewell.

For a great part of her life Maureen suffered from violent headaches and attacks of asthma, and, after the birth of her two younger children, from an extreme nervousness which was found to be due to ophthalmic goitre. This disease was little understood at the time and was treated by keeping the patient lying up in complete inactivity. After some years an operation removed the cause of the trouble, though it took much longer to restore Maureen to even approximately normal health. But D'Arcy had accepted her delicacy before they married and he had written to an old friend when announcing his engagement: 'I thank God that my marriage is not, at least in a worldly way, to be a selfish one; but that with the desire for my own happiness there is to be linked the desire to give happiness to one who has had very little.'

D'Arcy's great love of children overflowed his own in every direction (sometimes perhaps not wisely!) and in their innocent eyes he was Colossus astride the world, going everywhere, knowing everything, gay, handsome, unpredictable, temperamental, and infinitely loving. Ruth as the eldest was brought up according to his own unconventional theories. He taught her the colours of the rainbow's spectrum and the geological strata by the time she was six years old, and she learned to write with, and always used, a quill pen. She was allowed to leave unlearned those things for which she had no inclination, and to do those things for which she showed an aptitude. Therefore she learned no mathematics and no Latin, and was allowed to play the piano to her heart's content. D'Arcy's wishes as to what she should or

should not learn were faithfully carried out by his aunt and his cousins in Edinburgh under whom she went to school, and by whom she was given the wide and liberal education of a previous generation with no examinations to worry her. That her upbringing resulted in her becoming a musician was hardly to be wondered at, for Clementina Gamgee, inspiring teacher as she still was at seventy-five years of age, gave the child a piano lesson every day. She would send the head-housemaid to the schoolroom with the message 'Miss Gamgee's compliments and may she have Miss Ruth', whereupon Ruth would slip from her desk and not return until she and her great-aunt had spent a glorious hour of music-making together. Aunt Pam's love for, and influence on, D'Arcy's child was as deep and lasting as it had been on him.

Ruth was encouraged to read anything and everything, and D'Arcy would buy her a book of poetry or an historical novel every time he took her out from school. Her two younger sisters were much more conventionally brought up after the first experiment, both doing the usual examinations, Barbara, the youngest, specializing in Classics until she left school. In uncountable ways all three children learned what few others have the chance to learn, for D'Arcy talked to them constantly on every imaginable subject and opened their eyes and their minds from the earliest age. Their vocabulary was widened by playing, at meal-time, the game of saying everything three times over in different words. For instance, 'Do not procrastinate, dally, or put off eating your dinner', or 'You have eaten so much that you will become fat, later corpulent, and finally obese.'

There was the story-telling game which was played on Sunday-morning walks with him on the shore or through the country lanes. Molly, at five years old, was easily able to keep up the interest for an hour on end. He taught the children the names of wild flowers and birds, of trees and stones, and made them observe wherever they went. When one child found something that the others had missed she used to shout sarcastically, quoting the title of one of their natural history books,

'Eyes and no eyes!' Barbara was by far the best at this game, for, like D'Arcy in so many ways even to the colour of her hair, she could see the tiniest insects under a stone or in the weeds of a pond. The children learned that ant-people, spider-people, indeed all the living creatures around them had just as interesting family lives as their own, and were to be treated with the same care as the puppy-dog or the kitten-cat; even the earwig was worthy of respect with an old Scots rhyme about it that said:

> The hornagolach's an awfu' beast,
> Souple and scaly
> Wi' twa nippers, a han'fu' o' feet
> An' a wee bit taily!

Whenever D'Arcy went abroad he brought home wonderful toys, not expensive but always quite different from anything other children had; from Holland came dolls' hand-made gloves, and galoshes two inches long; from Copenhagen came sets of tiny china animals, families of tigers, horses, and cows. Ruth had built for her when she was six years old a doll's house in the garden big enough for her to play in; it was called Lilac Cottage and was an exact replica of Gowrie Cottage even to the paint on the windows. Inside were tiny chairs and a table and endless small household furnishings with which to delight a child's heart. Later he made for, and with, the younger children, a village of great beauty and perfection out of scraps of this and that, everything to scale even to the pillar-box and the weathercock on the church steeple. He used to write verses for them as his father had done for him. The following was to teach Ruth simple words at a very tender age:

> I get up at break of day,
> And run about the house and play,
> I play as long as it is light
> But always go to bed at night.
>
> But if I were a little mouse,
> All night I'd play about the house,
> And eat the crumbs and bits of bread
> And in the morning go to bed.

Soon after D'Arcy's marriage his father died; he fell dead in the street as he was returning home from lecturing on Thucydides to his students. D'Arcy's great grief was tempered by the thought that had this happened earlier he would have had no one of his own with whom to share his loss and no home he might call his own. But throughout his life there was never a day when he did not turn back in thought to the remembrance of the father whom he had so dearly loved.

In these years he was constantly travelling upon work that had nothing to do with his professorial duties, but which was the direct outcome of his interest in, and his knowledge of, the Science of the Sea.

During the summer of 1898 Dr. Murray (later Sir John) whose work on the Challenger Expedition had brought him into prominence, resigned from the Fishery Board for Scotland upon which he had served as Scientific Expert. The Secretary for Scotland offered the post to D'Arcy who accepted it eagerly in the midst of the frustrations and disappointments of Dundee, little realizing at the time that it would lead to a most important part of his scientific work, and one in which he would continue for nearly fifty years—indeed to the end of his life.

The Fishery Board for Scotland had been instituted in 1882 in order to deal with the many problems that arose between the trawling and the lining interests after the early development of trawling in Scotland. At the beginning the work of the Scientific Expert was mostly advisory and was not at all considerable; the position was limited to a term of three years and there was no salary attached to it. But in the year following D'Arcy's appointment there took place in Stockholm the first International Conference for Oceanography, and thus a most important event affected the whole conception of the post.

From time immemorial the study of tides, winds, and currents had been of the greatest importance to navigators all over the civilized world, but scientific research upon them did not begin until the sixteenth century when Magellan recorded his

soundings of the Pacific Ocean in his voyage round the world. Over 150 years later in 1699, Edmund Halley, Astronomer Royal, made a voyage to extend the knowledge of longitude and latitude and the variations of the compass, but it was Captain Cook in 1772 who initiated scientific investigation of the ocean as it is known today. On his voyages depth-soundings reached to almost 700 fathoms and temperature observations were taken by which it was found that the temperature of the ocean differed at the surface and below it. In the Antarctic Exploration Expedition of 1839 Sir James Clark Ross and Sir Joseph Dalton Hooker were pioneers in the use of the deep-sea dredge for the first time; with this they reached to 400 fathoms and even recorded depths between two and three thousand fathoms. About the same time a young American naval officer, M. F. Maury, was studying the winds and currents of the Atlantic Ocean and two of his innovations are of special interest. First, he urged that all captains of American ships should be issued with specially prepared log-books in which they should enter observations each day on the direction of the wind, the course and flow of currents and every detail that affected sailing, so that 'the navigator may find the best paths at all seasons'. Second, he was instrumental in 1853 in calling an International Meteorological Conference in Brussels to inaugurate a system of international observations for research of the sea. In 1854 he produced the first bathymetrical map of the North Atlantic with contours drawn in to four thousand fathoms, and a year later he published the first modern book on Oceanography entitled *The Physical Geography of the Sea.*

The second half of the nineteenth century was full of scientific expeditions, the most important British one being the Challenger Expedition directed by Wyville Thomson. Two went out from Norway—Michael Sars in a ship of the same name and Nansen in the *Fram.* Victor Hensen sailed from Germany; the Prince of Monaco explored the Mediterranean; the Agassizs (father and son) charted the coasts of Central America, and so it went on till the year 1891 when Otto Pettersson and Gustav Ekman explored the coastal waters

of Sweden. Pettersson was chemist, physicist, and oceanographer, and his

> interest in oceanography was in the strictest sense scientific. All the resources of chemistry and physics were to be brought to bear on the study of the sea, and its biological phenomena were to be correlated with, and explained by, the results of the physical sciences. . . . But he had at the same time an open mind to all the related practical and commercial problems. The wasteful destruction of young fish by the trawl distressed him, and he experimented on means to avoid or lessen it. He suggested new methods of life-saving at sea. But above all, and from the very outset of his hydrographical work, Pettersson was obsessed by the idea that this was work not for the narrow waters but for the open sea, and in due time for all the oceans of the world. The three Swedish pioneers, Pettersson, Gustav Ekman and Cleve, shared their enthusiasm with Nansen in Norway, and with Martin Knudsen in Denmark. King Oscar II gave countenance and encouragement to the idea, and the first Conference for Oceanography met in Stockholm in 1899. Svante Arrhenius was there, John Murray and Otto Krümmel; Victor Hensen came from Kiel and Friedrich Heincke from Heligoland; and Johan Hjort and Martin Knudsen and I who wrote these lines were among the younger men. It was an honour and an education to be there.[1]

So wrote my father in the *Journal du Conseil* in his obituary of Otto Pettersson, for many years his friend and colleague.

The meeting in Stockholm was a remarkable one, consisting of delegates from all the Powers whose countries bordered on the northern seas, Germany, Denmark, Great Britain, Norway, Russia, and Holland. During the week in which the conference took place they worked together to lay the foundations of a scheme of research to which each country present would contribute, and from which each would benefit. Great Britain desired investigations that would help the home fisheries and increase the knowledge of the coastal waters, and to this end proposed two main branches of work—research at sea and in marine laboratories, and collection of market statistics and measurement of fish on shore. The following summary of that important initial work was written by D'Arcy in an article to

The Times twenty-five years later on the occasion of the Jubilee of the Council.

(The programme) was in the main hydrographical; it took it for granted that we must learn the natural history (so to speak) of the sea before we could understand that of the fishes which live in it; . . . Of the North Sea we knew nothing at all, or next to nothing, save what the charts showed—the deeps and the shallows, and very imperfectly the currents and tides. But as to the manner in which the waters of various temperature and salinity were stratified or interstratified, and how they came and what they brought with them from Atlantic Ocean or Baltic Sea—all these things were hardly known or very imperfectly understood; moreover, it was known, but in the merest outline, that these various phenomena were subject to periodic changes, to regular seasonal fluctuations, and also to changes of longer period or seemingly of irregular occurrence, as the currents of the ocean swelled and poured with greater or less volume into the shallow waters of the narrow seas. Nor could it be doubted for a moment that these phenomena, if only one could unravel and comprehend them, would throw light on such crucial problems of the fisheries as the migrations of the herring, or the causes of its fluctuations in abundance, even of its notorious disappearance at long intervals from certain coasts, bringing now wealth, now utter poverty.[2]

Early in 1901 there was a second meeting of the International Council of Oceanography, this time in Christiania, and H. R. Mill, geographer and hydrographer, Walter Garstang, naturalist at the Marine Biological Association at Plymouth, and D'Arcy were sent as 'experts', with Sir Colin Moncrieff as chief delegate. This time D'Arcy's duties were considerable for his senior British colleagues spoke no German and upon him rested the responsibility of communicating with the various other delegates who spoke no English. It was at this meeting that the International Council for the Exploration of the Sea came into being, and plans were drawn up, first, for the conduct of scientific experiments, and, second, for the discussion of regulations whereby protection of the fisheries might be exercised by the various Powers concerned. The Foreign Office instructions of 1899 to the delegates read: 'You should make it clear that

the principal object which Her Majesty's Government have in view is to secure a careful inquiry into the effect of present methods of fishing in the North Sea, and you should give every facility for determining whether protection against overfishing is needed, and if so, where, when, and how protection should be given.'

Six months later Great Britain pledged herself to participate in the Council for three years and Parliament voted a sum of £42,000 to be spent in connexion with it. An Inter-Departmental Committee representing the Treasury, the Board of Trade, and the Scottish Office was set up in London, with Mr. (later Sir James) Dodds, who became one of D'Arcy's most staunch and valued friends, as representative for the Scottish Office. The work for the Council in Great Britain was divided between the Marine Biological Association in England, and the Scottish Fishery Board in Scotland, and D'Arcy was made responsible for the latter.

At the end of the same year Dodds wrote to D'Arcy as follows:

I have now sent a Mem: for Lord Balfour's approval proposing that you should receive £250 plus £50 for the superintendence of the Fishery Board scheme, and for attendance at the Central Council, and I hope you may in the course of the present week be in a position to draw your arrears: if you are 'absolutely content' as you say, I shall think I am making acquaintance with a new species as my experience of contented folk hitherto has been but small!

D'Arcy was reappointed to the Fishery Board for Scotland after each term of office for forty-one years, until the Board was taken over by the Department of Agriculture and Fisheries in 1939.

During 1902 the first meeting of the fully constituted International Council for the Exploration of the Sea met in Copenhagen, and D'Arcy went as co-delegate. The following extracts from letters to his wife show him in high spirits.

Roskilde *21:7:02*. This is a little town ¾ of an hour from Copenhagen, with a famous cathedral. So I have stopped on the way for a couple of hours, there being time to spare to see it. The Cathedral

is a brick one, like all in N. Germany, and very fine in its way, but most of its beautiful treasures have been spoiled. You would be amused by a wonderful old wooden clock in the Town. It has a big St. George and the Dragon, and a man who strikes the hours on a big bell, and a woman who strikes the quarters on a little bell; and whenever the man strikes the hours, the horse of St. George tramples on the Dragon and the Dragon gives a most horrible squeak, einer jammerlichen Schrei! Later I called on my friend Professor Hensen.

Copenhagen. *26:7:02.* We were taken to dine near Elsinore, 2½ hours off by sea. Today we meet at 9 and go at 11 to be presented to the King.

27:7:02 Copenhagen. We went to our meeting at 9 in the morning, all in dress clothes! Then at 11 we went to see the King. It was all exactly like in Stockholm. We stood in a circle round a big room and waited for His Majesty. The doors were thrown open and he stepped in by himself in plain clothes, bowed and walked round the circle shaking hands with everybody and stopping to say a few words to each. He spoke to us Englishmen about the King. And it was all over in a quarter of an hour. He looked so nice. He looks only about 55, when he is 84! At 6.30 we had a truly magnificent banquet at the Foreign Office. I have kept the menu for you to study. It will be useful when we next give a dinner party! Everyone was blazing with orders, and the flowers and lights were lovely.

The various Powers pledged themselves to support the Council for three years and each contributed a certain sum to this end, but in 1904 there were moves in high places to put pressure on Parliament not to renew the grant. The Board of Trade, which was especially interested in the Small-fish Bill (that is to say the restriction of the sale of plaice and flat-fish below a certain measurement), urged that the money spent on the Council would be better spent on fishery matters at home. A letter from D'Arcy to the Scottish Office shows how he felt about the matter.

We must not now forget, what was in the beginning one of the chief motives of our participation in the Council, namely, to appreciate the fact that all foreign countries, to a greater degree than we ourselves, trust to scientific investigations and the conclusions of scientific men as their basis of action. It seems to me that the impres-

sion likely to be made upon foreign governments by our withdrawal from the Council is not at all unlikely to be that we wish to enforce a policy of our own irrespective either of their consent, or of further development of knowledge, or of any general agreement as to facts. . . . It is quite well understood, I think, that the International Council has the double function of planning and conducting Scientific experiments, and also of serving as a sort of preliminary tribunal, in course of time, for the preliminary discussion of regulations: its power under the latter head being limited to discussion and the reporting of accepted facts.

If our object be to break away from any chance of European concord and to postpone indefinitely any International agreement on the subject of North Sea Fishery regulations, we could not achieve that object better than by breaking up the International Council and alienating the sympathies of all who belong to it. . . .

I cannot urge too strongly that there are two separate points at issue, two separate factors in the total expense; firstly, the contribution to the Bureau, and secondly, the cost of our own National undertakings. It is the former that is the pressing question just now. Can we afford, in order to save £1,250 a year, to forego all the advantages that the Council gives us; guidance in scientific matters from a committee of specialists; increased activity in investigation on all sides, owing to the stimulus of frequent discussion and friendly rivalry; a clearing house for the frequent discussion, adjustment and balancing of all statistical information, a meeting ground for the preliminary discussion of questions open to dispute. The cost of maintaining the International centre is so trivial that it cannot be held to be a real obstacle; and it seems to me that the onus is thrown upon those who desire to abolish it, of proving that its doings are unwise, its policy obstructive and its existence mischievous.

The eventual outcome was that the critics of the Council did not get their way and H.M. Government renewed its membership for a further two years.

The same kind of difficulties arose in 1907. This time many politicians, among them Mr. Austen Chamberlain, held that the abandonment of international participation by Britain would be injurious to her best interests, and a deputation waited upon the Chancellor of the Exchequer. D'Arcy wrote privately to

his friend and fellow-zoologist, Fridtjof Nansen, who was Norwegian Ambassador to London at that time.

Dundee. 2nd January, 1907

My dear Nansen,

Can you do anything in the way of influencing our Foreign Office with regard to the continuance of our International North Sea Investigations?

We are at an extremely critical moment. The matter lies in the hands of the Chancellor of the Exchequer, who will give his decision within the next ten days or a fortnight. I tell you in confidence, though I believe you are already to a great extent aware, that there is a party in this country very hostile to continuance, who are doing all they possibly can to prevent it. . . . I have done my best to urge our case upon a higher plane, and to show that such differences of opinion are of little importance in comparison with the whole range of the international work, and the desirability of preserving a bond of co-operation that has been valuable and successful upon the whole.

Anything that will help to keep our Foreign Office in mind of the importance attached by foreign countries to the work will be likely to do good, and I write you in the earnest hope that you may be able to use your influence.

In the meantime a committee had been appointed to consider and advise the government and the existing grant was renewed for one year. This uncertainty and hand-to-mouth existence went on till after the First World War, and did not make for the smooth working in Great Britain of those engaged in the scientific research required by the Council.

But to return to the early days; at the second meeting of the Council in February 1903, the Bureau was enlarged by the addition of two elected members, of whom D'Arcy was one, and of Nansen as Director of the Central Laboratory at Christiania. The work of the Council was now divided in two committees, one hydrographical and the other biological, and the latter was to concern itself with two main points, (*a*) the migration of herring and cod and its influence on the fisheries, and (*b*) the overfishing of plaice, sole, and flat-fish. Most of the data

needed for this research was to be procured from voyages of investigation by specially fitted ships carrying a small staff of scientists, and these would ply to and from the various countries on specially designated routes. £4,000 was allotted by Parliament for two British vessels and D'Arcy was entrusted with the purchase of the one for Scotland. He wrote thus to his wife:

Nov. 10th, 1902. Boston, Linc. In the afternoon I inspected another trawler at the docks, and now in a few minutes I go on. To-morrow I shall have a busy and rather anxious day; I mean till I see how the Scottish Office people approve of my doings at Grimsby. On Tuesday I lunch with the Fishmongers, see Garstang's ship in the afternoon and dine with the Zoo Club.

Nov.—(*later*)—Grimsby. I've made my bargain for the ship! £1,200 a year for three years, with option of purchase for £2,000 at the end. So you see I'm dealing in big figures!

This little ship was F.C. *Goldseeker*. She was overhauled and fitted out for the naturalists who were to work on board and the following year she set sail for the Faroe-Shetland Channel and the northern part of the North Sea, the area for which Scotland was responsible.

Hydrographical observations were taken not only by the Fishery Board vessels, but by other ships trading around the coasts of Scotland, and all observations of surface temperature and water samples for determination of salinity were sent to D'Arcy at University College, where a trained graduate and one or two clerks worked for him, and where a certain amount of analysis was done by the Chemistry Department.

One of D'Arcy's objects at this time was to simplify the results, both on the hydrographical side and in the fish statistics, with as clear a presentation as possible of the tables, followed by an enumeration of the results and his own conclusions on their bearing for future work. Throughout he related the mathematical to the biological side of the picture. In the fisheries statistics each species of fish was considered separately, its food, growth, multiplication, and, most important, its migrations,

also the prevalence of different fish on different grounds. At the end of one report D'Arcy wrote: 'If we succeed in reducing the complicated migrations of fish to simple rules, as I believe we are within sight of doing, and of showing the causes which govern them, and the means by which they may be in part foreseen, such a result will be in chief part due to the many laborious discoveries which the fishermen themselves have made.'

Questions which exercised him greatly during these years were those of the herring fishery and the effect of the trawl and steam-drifter fishery on the line fishermen of the Scottish coasts.

At the beginning of the century great changes were taking place in the fishing industry, especially in the north and north-west of Scotland. Hitherto in Caithness and Sutherland generations of fishermen-crofters had gained their livelihood by cultivating their little crofts, attending the herring fishing for a couple of months, taking in the harvest, and sailing again for the winter fishing. But with the advent of trawlers and more especially steam-drifters these simple people could not make a living; not only could the drifters sail many times farther than the little sailing-boats, but they could carry their cargo quickly to port and so get the market. These drifters were usually the property of a combine of business men on shore with the advantage of capital behind them. Every year the drifter fleet increased in number and sometimes in the herring season it would form an unbroken line across the Moray Firth, blocking the entrance of the fish to the harbour, so depriving the linesmen of their fishing. Added to this, there had been several bad herring seasons and the great shoals had disappeared from their former breeding places. As a shoal numbered about ten thousand million fish, and the nets used in Scotland if pieced together would cover London, it could be seen how important the question was for Scottish trade. One of the very urgent points that Britain brought before the Council was the legislation of the three-mile zone around the coast, inside of which no trawler might fish.

In the meantime there were constant articles in the press, arguments in the House, and political meetings in the north of

Scotland over the rights of the trawler-men versus the line-fishermen. An inquiry was held by the Secretary for Scotland and D'Arcy went to London to take part. Always on the side of the individual, D'Arcy fought for the fisherman and his sailing-boat, and up and down the coast he was known as the fisherman's friend. In one of his most important lectures, that on 'The North Sea and its Fisheries' given at the Royal Institution of Great Britain in 1912, D'Arcy said:

> On one (question) I must say a word. We have seen in many ways that the industry as a whole tends towards concentration, to the use of larger boats, to the need of greater harbours; tends, in the case of line and trawl fishing, to gravitate towards the great centres of population and the great highways of traffic. And we have seen that an overwhelming proportion of the gain goes to those who work the fisheries on this larger scale, and that from their labours comes an overwhelming proportion of the supply. But there are still some 6,000 small fishing boats in England and 8,000 in Scotland, and . . . I think that about one seventh or one eighth of the 35,000 fishermen in Scotland and a somewhat larger proportion of those in England still live, as their fathers lived, by a petty industry, an industry closely akin to that by which thousands of men in Norway and Denmark live. With us they are the men who have been left behind, sometimes from lack of energy, often through poverty or the remoteness of their habitation, by the tide that has carried so many of their fellows to wider efforts and to comparative wealth. They are the fishers of crab, and shrimp, and lobster, the hand-line fishers of plaice and haddock and codling, the men who take, now and then, a day at the lines, a night at the herring, the dwellers in the antiquated harbours and in the tiny creeks of outlying coast and distant island. The kindliest of Scotch proverbs tells us that 'it tak's all sorts to mak' a world' and these men have their claim upon us and their right to live.[3]

But there was a time when his sense of fair play caused him to champion the trawlers. There had been a series of court cases against trawlers for poaching within the three-mile limit and D'Arcy considered that the evidence against the men was unfair. He wrote to Dodds:

Sept. 1905. I spent a week of my holiday, along with my wife, on board the 'VIGILANT', which captured two Norwegian trawlers, off Ailsa Craig, during that time. The skipper of one of them refused to give himself up, and though the usual steps were taken to have him arrested at his own port I have not heard that he has yet been heard of. I learned a great deal by this cruise, and what I learned took me utterly by surprise. In a word, I believe that the methods in use by our skippers are utterly inadequate to the correct determination of the position of the accused vessel. The 'VIGILANT' had not even a sextant aboard, and the determination is made by the most rough and ready use of compass bearings. It is all very well where there is a clear and wide margin, but I am perfectly certain it is quite impossible by such means to determine the position of a quarter or eighth of a mile, as our skippers in a prosecution often and confidently do.

He wrote again in 1907:

May 13th, 1907. I am utterly mortified by the recent wholesale prosecutions of trawlers round Fair Isle. At the period in question the Fair Isle Bank was perhaps the best fishing-ground in our Scotch waters owing to the presence of migratory shoals of cod, etc. There is no shadow of reason to believe that the men were doing any harm. As to the evidence, I look upon much of it with the greatest distrust, and I think it positively wrong that these cases dealing with positions at sea as determined by amateurs should be conducted without the presence of a nautical assessor.

During the early years D'Arcy did much travelling for the Fishery Board; he inspected fish-markets and harbours, he intervened in disputes, he interviewed trawl owners who threatened to withhold statistical information from the Board because of its attitude over the Moray Firth, but the journeys he enjoyed most were those he took in F.C. *Goldseeker* or F.C. *Vigilant* to inspect fishing-grounds. In July 1904 he wrote to Maureen from Shetland:

July 26, 1904. I have just seen enough whales to last me my lifetime. We visited a station last night where they had just caught fourteen and the great beasts were all lying piled up in a heap, sixty feet long or more every one of them. And this morning just after we had sailed, we met a steamer coming up with two more in tow.

July 28th, 1904. We caught a lot of fish last night and were hard at it till well past eleven. In the last great haul there was one Halibut nearly seven feet long; we also had several large Turbot.

When Ruth was about twelve years old she sailed with her father in F.C. *Minna* around the Outer Isles visiting a big whaling station in Harris. There the great whale carcasses lay out on the shore and the smell of them was pungent under the hot sun. D'Arcy told her that the whale, for all its great size, has no voice with which to cry out when it is harpooned and lacerated by the whalermen, and that no man can tell what suffering the poor creatures silently endure as they die of their wounds.

On the same voyage they met the little French sailing-ship, the *Pourquoi-pas*, in the harbour of Stornoway and exchanged calls with those on board, Captain and Madame Charcot, and Monsieur le Danois. This famous ship went down with all hands save one in 1936 when on a French polar expedition, and D'Arcy then paid tribute to 'the wise and learned and most gallant man, than whom none knew better the oceans of the world nor loved them more, who now with his brave companions found a sailor's grave in the sea'.[4]

Ruth's first acquaintance with a whale had been the design that D'Arcy made for the whaling steamers' flag when no one else could do so. He wrote to James Dodds:

Dec. 1907. ... poor Robertson has been in the most extraordinary state of fuss, telegraphing and telephoning continually, because he had given notice, with the B. of T's sanction, that the mark for the whaling steamers should be a whale, 18 inches long by 9 inches broad; whereupon the Salvesens immediately complained that they did not know how to draw a whale of those proportions! No more did I, but I have made a shot at it, and send you the result; my baba is quite satisfied with it, and you may submit it to your small boy for his approval; pasted on a large sheet of white paper or card it doesn't look half bad.

Actually the flag with the little whale was very presentable and was used for many years by the whaling fleet.

D'Arcy was always preoccupied with needless suffering caused to animals, and in the same way as he had brought attention to the extermination of the sea otter in the Behring Sea so at one of the International Council's meetings in Copenhagen he drew attention to the cruelty and unnecessary suffering caused to seals in northern waters in the seal fishery of the Finns. This was debated in Council and a resolution passed that the particular methods in use were to be radically altered.

One of the very important pieces of research that the International Council undertook was that upon plaice and flat-fish. Plaice had been decreasing both in number and size over a considerable period and instructions were issued to the members of the Bureau that especial statistics were to be taken at all the chief ports on the quantity, size (large, medium, or small), the place and season of capture of flat-fish in general. Many small fish were marked and transplanted in spring from inshore to the Dogger Bank, and it was found that they increased in size and weight much more rapidly than those left behind. It was also found that females grew to greater size than males, and migrated farther; one marked female travelled over two hundred miles in three months. D'Arcy worked at these problems for many months; and among other things he found that more female fish were caught than males; and that increasing quantities of extra small fish were coming in for the market. His opinion was that both points, especially the latter, were detrimental to the fisheries, and that the fishermen must be prohibited from catching the small fish for sale. He was called to give evidence to a Select Committee of the House of Lords in 1904.

In June 1907 the International Council held its annual meeting in London for the first time, and a big programme was arranged for the delegates and experts from the Scandinavian countries, Russia, Finland, Germany, Holland, and Belgium. There was a reception by H.M. King Edward VII, banquets by the Fishmongers' Company and the Lord Mayor and Corporation, visits to various marine stations and to Christ's College, Cambridge, whose Master, A. E. Shipley, was President of the Marine Biological Association.

By 1909 D'Arcy's work for the International Council and the Scottish Fishery Board was to all intents and purposes a full-time post, and the only reason that he was able to undertake and perform it was that his duties at University College, Dundee, were extremely light and for the greater part of the year almost nominal. But it must be stressed that during these years D'Arcy worked early and late and except for the trips abroad to the annual meetings of the Council took no holidays. A cryptic letter to Sir James Dodds in 1907 says 'G. has gone to Egypt and A. tells me he has been much run-down with overwork. A good many other people find themselves in the same condition, barring the trip to Egypt.'

In a statement to the Scottish Office about this time he summarized his work. In connexion with the Fishery Board for Scotland he was responsible for the management of F.C. *Goldseeker*, her cruises, and the work to be done thereon, and the appointment and direction of all the assistants and clerks in Aberdeen and Dundee. He supervised the statistical, hydrographical, and biological work undertaken in the Fishery Office in Aberdeen and in his own department in Dundee, the latter by arrangement with the authorities of University College. He edited and to a large extent wrote the Reports which were later published as Blue Books upon the results obtained, tedious and lengthy work, for most of his assistants had neither literary training nor experience. He also administered the annual Treasury Grant of £5,500 for the Scottish share of the Council's Investigations.

He was one of three, the others being Professor Otto Pettersson of Norway and Professor Krümmel of Germany, who composed the Publication Committee of the International Council, the work of which consisted in judging what was suitable for publication, in arranging the form thereof, and in reading both in manuscript and in proof a large part of what was to be published. Over and above this he had a great deal of correspondence and general business with the compilation of evidence, statistical tables, and so on, involving travelling to and from London, as well as attendance at meetings of the Marine

Biological Association and, occasionally, parliamentary committees. In another letter of about the same date D'Arcy wrote:

> The conditions under which we work, against time, in the midst of controversy, and with everything about us insecure, are so worrying and laborious, so different from the conditions under which scientific work ought to go on, that the toil and responsibility are greatly increased.

In 1913 the British delegates were instructed to lay before the Council a proposal that the several governments should be asked to notify their adhesion to the International Council for a period of five years and this proposal was adopted.

In 1914 D'Arcy took part in the great Sprat and Sardine Case and was 'on the side of the sprats' as he put it. This was the case in which the Norwegians sought to sell tinned sprats under the name of sardine, and an action was brought against them by trade interest. D'Arcy upheld the Norwegians and brought evidence to show that innumerable other fish such as catfish, monks, witches, and megrims are ultimately sold to the consumer under other names, and he contended that 'Norwegian Sardine' was a perfectly fair trade designation provided the adjective was used.

With the 1914–18 War the actual investigation of the sea naturally came to a stop, but statistical and other work in the various countries went on. D'Arcy, as well as being concerned with problems arising out of the changed conditions for the trawling industry, continued his statistical work on data from Aberdeen and the other larger ports, dealing in the main with the average catches per hundred hours; this was of considerable interest owing to the altered conditions and the crowding of the fishing fleet into specified areas.

As we have seen, his work for the Council was of varied kinds, statistical, hydrographical, and meteorological and there was one piece of pure fishery research in which he was specially involved, the age-determination in fish. Before the First World War the Norwegians claimed to have discovered a working method of age-determination in fish, the idea being that the

annual growth of the scales of a fish was marked by the appearance of a ring on the scale in the same way as rings in the wood tells us the age of a tree. D'Arcy was not convinced by their evidence and demanded more scientific documentation, which at first they could not produce. The controversy went on for many years; to the Norwegians, with their great dependence on coastal fisheries, it was a very important matter, and they needed the money and the help of the Council to carry out their schemes. In 1930, after long discussion and argument, D'Arcy was at last convinced that their method was scientifically sound and he publicly stated so at a Council meeting, and he and Dr. Johann Hjort shook hands upon it. This is cited to stress one aspect of his importance upon the International Council, namely that he was a man of independent views, who would invariably take a critical line in whatever came up for discussion. He demanded the highest standard of scientific inquiry and would tolerate nothing that could not be proved by scientific evidence. He has been described elsewhere as the 'mentor' of the Council.

Apart from preserving these standards D'Arcy's most important work for the Council, which covered almost all the years of his membership until his death, was as editor of Statistics and Chairman of the Statistical Committee. He prepared the annual *Bulletin Statistique* for publication, nursed it into shape, and went to great pains to clothe it with interest. He showed that it was possible to illustrate biological and technical trends by means of mathematical curves derived from the tables, and to present the facts of the year and decade with clarity, and he commented upon the whole in his own simple and beautiful style of writing, so that the Bulletins formed a series of statistical publications unique among works of that type.

In the same way as D'Arcy used statistics to record the size and number of fish, so he now used them to record sea-temperatures. He made three-dimensional charts and used them for observations of water temperatures on the surface, at various depths and over a certain period of years, in order to make it possible to delineate the annual march of temperatures in sine

curves and to investigate these curves. Many years later he applied the same idea with superimposed isobars to illustrate weather charts, and the Meteorological Office adopted it for their monthly summary of weather. These charts are still in daily use but few people who study them in their newspapers have any idea who invented them.

Another curve that interested him was that of the periodicity of tides, and some of his tables were used by the Ordnance Survey and pronounced 'exceedingly useful'. Sir Joseph Larmor wrote to him from Cambridge in 1912 saying: 'I was not aware that added to your other wide accomplishments you added that of a tidal expert.' Yet another of his curves—that on currents—was a practical one, and was found by the Admiralty to supplement their hydrographical charts during the First World War, especially for use in the laying of mines.

In the early days of these three-dimensional charts they were familiarly known in fishery circles as 'D'Arcy's Isopleths'.

It will thus be seen that D'Arcy's activities in connexion with fisheries both on the Fishery Board for Scotland and the International Council were wide and varied. It must be added that his published papers between 1902 and 1939 number twenty in all, running into hundreds of pages complete with plates, diagrams, and charts.

But there was something else of importance, though of an intangible quality, that D'Arcy took with him to the annual meetings of the Council, and that was his pleasure and enjoyment at being abroad and meeting old friends. He threw himself wholeheartedly into the social gatherings, the dinners and the receptions, and wherever he went unconsciously drew a little circle round him where the talk was good and where everyone was made especially happy. He was much beloved by the staff at Copenhagen, to whom he would give a small dinner party each year, and by many simple people on the fringe of the Council's work of whom he took kindly notice and to whom he gave his friendship.

In the light of the past history of the International Council it is interesting to note that in the summer of 1955 the Inter-

national Law Commission completed one of its major tasks in approving the draft articles on the régime of the High Seas, and that those included all the major proposals laid down by the meeting in Stockholm in 1899. Among them are the following measures:

1. the High Seas are open to all nations;
2. scientific evidence shows that there is an imperative and urgent need for measures of conservation; (of fish);
3. that the measures to be adopted are to be based on appropriate scientific findings;
4. that such measures do not discriminate against foreign fishermen.

D'Arcy would have been very proud and happy if he had lived to see the results of his work and that of his fellow-pioneers', the foundations of which they had laid so securely and with such vision half a century before.

REFERENCES

[1] Otto Pettersson. Obituary: *Journal du Conseil*, 1914.
[2] 'Exploring the Sea: Twenty-five years' work', *The Times*, 1927.
[3] 'The North Sea and its Fisheries', Lecture, 1912.
[4] Address of Welcome, Union géodésique, September, 1936.

VIII

ON GROWTH AND FORM

1917

Man can achieve much by using his individual faculties appropriately, he can do extraordinary things when he begins to combine them, but the supreme achievements only come when all his faculties are united.

GOETHE, *Essay on Winkelmann*

Historia Animalium, 1910
British Association in Dundee, 1912
Lectures between 1913 and 1919
Fellow of the Royal Society, 1916
On Growth and Form, 1917

IT is now necessary to return to the early years of the century and trace D'Arcy's doings in other affairs than those of the Exploration of the Sea.

During this period he did not produce much original work of importance, but it must be remembered that he was absorbed by various and widely differing interests. He had a home of his own for the first time in his life, he was busy with the Fishery Board and the International Council, and he was brooding on problems of relationship between biology and mathematics, though he took many more years to bring out the results.

Between 1900 and 1910 his one classical paper of importance —with a mathematical bias—was on 'Plato's Theory of the Planets'. This he read to Section A (Physics, Cosmical Physics and Mathematics) of the British Association when it met in

Cambridge in 1904. The paper was later published by The Observatory (Greenwich).

In 1909 he contributed a chapter on Sea Spiders for *The Cambridge Natural History*, volume IV, edited by (Sir) Sydney Harmer, and, most important of all, brought to a conclusion the translation of Aristotle's *Historia Animalium* which he and his father had begun together in his Cambridge undergraduate days. This volume was published by the Clarendon Press, Oxford, in 1910, and was one of a series of translations of Aristotle's works under the editorship of J. A. Smith and W. D. Ross. In D'Arcy's Preface he remarks that this work 'has been compiled at various times and at long intervals during very many years'; actually it was nearly thirty years since the translation had been begun, but during those years D'Arcy's knowledge of, and love for, Aristotle had grown until he had become one of the great commentators on the Greek Master Naturalist. It is said that his beautiful translation far outstrips the original Greek. The work was dedicated to Henry Jackson, Classical Scholar and Fellow of Trinity College, Cambridge, in the following words:

Henrico Jackson
Philosophi discipulo condiscipulus
philosophiae triunculus primipilari.

Later he wrote of the older man who was his dear friend and with whom he corresponded for many years:

> Jackson's was a great life, made up of little things. He wrote no big book, he planned no great achievement; but daily, without thought of fame, he sought after wisdom, and day by day he did generous actions without thinking of them at all. He had learning, wisdom, kindliness to spare and give away, and all he got from them was honour and troops of friends. It was some years after I left Cambridge before I knew Henry Jackson. I wish I had known him, I wish I had been his pupil before.[1]

In 1911 D'Arcy was asked by his old friend, William Herdman, at that date Secretary of the British Association, to be one of the local secretaries for the Dundee meeting that was to take

place the following year. He wrote personally to his many friends abroad, scientists on the International Council and in various German and French universities and in the larger museums, and invited them to attend. He then took infinite trouble to find the right hospitality for everyone; hosts and visitors of like interest were brought together and the meeting in 1912 was particularly happy and memorable, with a larger body of foreigners attending than ever before.

In the previous June he had received his Doctorate from the University of Cambridge—in letters, Litt.D.—not in science. Henry Jackson, who presented him, had urged D'Arcy to apply for the degree and to base his claim on his original contributions to the history of Greek Science with *The Glossary of Greek Birds* and translation of Aristotle. D'Arcy wrote to him:

15th March 1912. But for you and my trust in your sympathy I should never have applied for it. I really value this degree very much indeed, apart from, or over and above the titular honour. I know perfectly well I struggle along with my Greek after the fashion of an amateur; I am often doubtful enough of the result; and the degree will give me a great deal more confidence and help me to peg along.

It is interesting to read the following description of D'Arcy in middle life written by Clifford Dobell, his friend and disciple, when they met for the first time at the Darwin Centenary Celebrations in Cambridge in 1909, whither he went as delegate for The Royal Society of Edinburgh, '. . . in this gathering, where I saw more famous biologists collected together than I can ever hope to see again, he was an outstanding personage. With his huge frame (he was well over six feet in height), his massive head with its fine chevelure, his big red-tinged beard, and his bright blue eyes, he was then a very Viking of a man. Even the characteristic little wrinkles round his eyes suggested the reflected glitter . . . of an unknown sunlit sea.'[2] In the following years a deep friendship grew between my father and Dobell, and they corresponded constantly and upon every kind of

subject. To the younger man D'Arcy was an 'Elder Brother', to whom, in 1932 and coupling him with Paul de Kruif, he dedicated his book on Antony van Leeuwenhoek, with the words *fratri carissimo*.

Now began a period in which D'Arcy was much in demand as a public lecturer. In his early days in Dundee he had lectured to many societies and in many parts of Scotland, but in 1913 came a first invitation from The Royal Geographical Society to lecture in London. He spoke on 'The North Sea and its Fisheries'. In the same year he gave the Herbert Spencer Lecture before the University of Oxford, on 'Aristotle as a Biologist', leading up to his main theme with a prooemion on Herbert Spencer. He spoke for the first time at The Royal Institution of Great Britain in 1914, on 'Natural History in the Classics'. Before this lecture he went to try out his voice in the hall of Burlington House, and he asked the janitor if he would kindly sit at the back and tell him if he could be heard. When he had finished he said to the man 'I'm afraid you must have found that very dull', and the reply came without hesitation, 'They're all of 'em that, sir.'

His old friend, Sir Oliver Lodge, invited him in 1917 to give the Huxley Lecture in the University of Birmingham and he spoke on 'The Shell of the Nautilus'. The theme was one of his favourite subjects—the mathematics of the logarithmic spiral seen through the eyes of the scholar-naturalist and woven through with his own philosophy. The words of the final paragraph made a deep impression on the audience as D'Arcy delivered them leaning forward on his hands with his eyes alight:

> What is it that the physicist and the mathematician and the biologist alike, resting from their labours, see looking out of Mother Nature's eyes? They see dimly what Plato and Pythagoras and Aristotle and Coleridge and Wordsworth saw clearly and many another whose eyes are anointed with a divine clay. You may call it what you please! You may call it Entelechy; you may call it the Harmony of the World; you may call it the *élan vital*; you may call it the Breath of Life; or you may call it as it is called in the story-

book of Creation and in the hearts of men, you may call it the spirit of God.[3]

In the summer of 1918 D'Arcy gave the Chadwick Lectures, the first on 'Our fisheries and the food supply', and the second on 'The great Herring Fishery'. In the following December he gave the Christmas Lectures for Children at The Royal Institution and this he enjoyed immensely. There was nothing he loved so much as talking to children and now he held them silent and enthralled while he told them stories of jellyfishes, of starfishes, and 'of cuttlefishes great and small, and how some of them are very big indeed; how some sorts of whales eat the little ones and some the big ones, and of the battles between them; and about the sea serpent'. In December 1921 the University of Edinburgh started a series of lectures for children on the same lines as those at The Royal Institution and D'Arcy gave the first—on 'Soap Bubbles'; a few years later he gave another on 'The Pendulum'.

D'Arcy prepared a lecture with the greatest care, writing it out first in pencil and revising it many times. When it was typed he read it aloud, pruning and polishing it, and then he would retype it. He would next commit it to memory as he walked up and down the dining-room at night; finally, all notes were put away and there only remained a few scribbles on scraps of paper. After this came various rehearsals—to his class and to friends who walked with him on the cliffs or sands. He knew to a second the timing of a lecture, and he used his beautiful voice with great effect, letting it rise and fall over the phrases according to the stress and meaning. On the day of the lecture itself he would go to the hall and prepare everything with the greatest care; shells, fishes, exhibits of all kinds were laid out in order, the blackboard was tested, the chalk put in exactly the right place; he would walk up and down the platform trying out his voice from one side or the other, nothing was left to chance, and even his gestures were rehearsed. The performance was carried through with the utmost stage-craft, and until it was over D'Arcy was keyed up with the nervous tension of the artist; for days beforehand he would lose his appetite and

sometimes even take to bed. In a letter to George Greenhill in 1917 he wrote:

> Oh dear me; I find lectures now-a-days very like dinner parties; I love to be asked to dinner, but I hate going out to dine. The height of happiness would be to be asked everywhere and go nowhere. It is the same with lectures. The invitation flatters me, the fee comforts me; but giving the lecture is the very devil.

In 1914 (Sir) Henry Stuart Jones, then editing and revising Liddell and Scott's *Greek-English Lexicon*, asked D'Arcy, among a number of other scholars, to read the proofs. The labour of love lasted over a period of many years during which time he made a large number of additions, especially to the zoological and botanical entries. Years before, in an early paper —'The Emblem of the Crab in relation to the sign Cancer'— D'Arcy wrote, 'the paper deals with a leisure-time study of mine', and under such a heading he might have put all his classical writings; they were his relaxation, his pastime, and his hobby. His classical researches were characterized by the same independence of thought as his scientific ones, for he accepted nothing that anyone else said without verifying it, and his penetrating mind sent him searching for the origin of Greek words to Egyptian and other sources where the Oxford scholars would not follow him—his ideas were too provocative and too original. In the early days of the century his papers were rarely accepted by the *Classical Review* until a change of editor produced a change of policy. During that period, when asked by a friend whether a certain paper would be well received, he answered, 'When you ask me what the scholars will say about it, I reply with great confidence that they will take no notice of it whatever.'

D'Arcy was by now over fifty years of age and had at last and finally outgrown his father's philosophy that worldly success is of no importance and recognition of little value. He refused to push for himself or pull any strings, but being very much aware of his own gifts he was frustrated by the lack of opportunity to use them in the narrow circle in which he lived

and worked. He hovered, as it were, on the fringes of both the scientific and the classical worlds, making, apparently, no deep impression on either. Perhaps the characteristics that he inherited from D'Arcy the Elder partly accounted for this. Gifted, volatile, impulsive, and individual, neither could suffer a fool gladly, and they spoke their minds freely when occasion demanded and sometimes when it did not. They both went their own way; they would not 'run with the pack'; they despised the instinct that leads men to say what others say because it is easier, or do as others do for fear of being thought different. Alike in demanding the highest standard of integrity in behaviour and work they spared no man who was slovenly in either; critical of their own achievements they were equally so of other men's. D'Arcy, tactful and diplomatic and most sensitive to the feelings of men, could yet be brusque in manner and devastating in speech. Completely unaware of these traits in himself, he felt he had missed success for one reason or another and he was disappointed and embittered. He was, in addition, deeply worried; for there were domestic difficulties of all kinds at home with three small daughters to bring up (two hardly more than babies) and his wife an invalid. That he felt his isolation in Dundee acutely is shown by the following letters to George Greenhill:

Dundee, 28th Dec. 1915.

I work under immense difficulties for want of books. One can do a lot by borrowing, and I borrow continually, but one has to send books back, and so to depend on the scanty notes that one has made for them. And one is again up a tree when one wants to verify or expand a reference.

Dundee. 7th Nov. 1916.

Writing articles for 'Nature' is a curious form of amusement—or of dissipation! It is a little like going out to dine at the Savoy. That is to say, one can't really afford it, and one does not really enjoy it very much. But one snobbishly imagines 'it is the thing to do'. As one's aunts and grandmothers used to say 'one meets nice people'! One half supposes (for an hour or so) that one is in the swim; and forgets (for an hour or so) that one is really a Toad-in-the-Hole.

The outbreak of war in 1914 brought new anxieties; he was frustrated at being too old to take an active part, and appalled at the losses of fine young men in his immediate circle.

But soon there occurred an event which seemed to presage a change in the course of his life: in 1916 he was elected a Fellow of the Royal Society, when he had all but given up hope of achieving this distinction. He was proposed by (Sir) Sydney Harmer and backed by (Sir) Arthur Shipley, Sir J. J. Thomson, and seven other eminent scientists as well as by his two friends Lord Walsingham and Sir Clifford Allbutt.

His election followed hard upon the publication of a paper entitled 'Morphology and Mathematics' in the transactions of the Royal Society of Edinburgh; this brought him considerable publicity and in the words of one biologist was 'profoundly interesting'. This paper was the last in the long line of work which was to culminate in D'Arcy's supreme achievement—*On Growth and Form*. In it he applied mathematical methods to the morphology of living things and to the comparison of related forms. He wrote: '. . . if diverse and dissimilar fishes can be referred *as a whole* to identical functions of very different co-ordinate systems, this fact will of itself constitute a proof that variation has proceeded on definite and orderly lines, that a comprehensive "law of growth" has pervaded the whole structure in its integrity, and that some more or less recognisable system of forces has been at work'.[4] Three years earlier at the British Association meeting at Portsmouth in 1911, in his Presidential Address to Section D entitled *Magnalia Naturae or the Greater Problems of Biology*, he had made his first important pronouncement on the subject that occupied his mind. He wrote:

> While we keep an open mind, on this question of Vitalism, or while we lean, as so many of us now do, or even cling with great yearning, to the belief that something other than physical forces animates and sustains the dust of which we are made, it is rather the business of the philosopher than of the biologist, or of the biologist only when he has served his humble and severe apprenticeship to philosophy, to deal with the ultimate problem. . . .

The first point then, that I wish to make in this connection is, that the Form of any portion of matter, whether it be living or dead, its form and the changes of form that are apparent in its movements and growth may in all cases alike be described as due to the action of Force. In short, the form of an object is a 'diagram of Forces',—in this sense, at least, that from it we can judge or deduce the forces that are acting or have acted upon it; . . .[5]

But D'Arcy's interest in form and growth had begun very early in life as has been noted in a previous chapter, his first paper having been given in 1894 at the British Association in Oxford on 'Some difficulties of Darwinism'. He published nothing more until 1908 when he wrote an article for *Nature* on 'The Shapes of Eggs and the Causes which determine them'. The following year Doris L. Mackinnon (later Professor of Zoology at King's College, London, and the first woman to hold this post) came to Dundee as D'Arcy's assistant. She tells that at this time he had no thought of writing what was in his mind, and that he would walk up and down the Laboratory thinking his thoughts aloud and discussing his 'heresies' with her. She was deeply impressed with the originality of his ideas and begged him to publish them. At first he would only say, 'No, everyone will say they have read it all before', but over the years a book took shape and in 1915, when it was finally finished, he sent the following letter to his old friend A. E. Shipley in Cambridge.

A good while ago (some three years I think) I promised to write a little 1/- or 2/6 book for the (Cambridge University) Press on 'Form and Growth'. This promise I never performed for the simple reason that I found it beyond my powers in spite of many trials. The subject did not seem ripe for boiling into small compass. Now, however, I have practically finished a book on the same subject, which should run into about 450 pages or thereby. It represents a great many years' work and I am particularly anxious to have it published. . . . Will you do anything you possibly can to help me and secure the acceptance of the book, unless, of course, war conditions present an unsurmountable barrier. . . . I have tried to make it as little contentious as possible. That is to say where it

undoubtedly runs counter to conventional Darwinism. I do not rub this in, but leave the reader to draw the obvious moral for himself.

After a certain amount of delay the book was accepted and arrangements made for an edition of 500 copies to be brought out. D'Arcy was delighted and wrote to his aunt saying: 'The writing of this book has been long contemplated and often postponed. Nor would it have been written yet, had I waited till I felt sure of my fitness for the undertaking.' He knew that certain of his statements would give rise to controversy, and that his mathematics might be unacceptable to biologists. One of his letters to Sir Joseph Larmor of St. John's College, Cambridge, is interesting:

Dundee—March 20th 1916

In my early boyhood I had the advantage of spending long holidays in a cheerful household in Co. Dublin, where Mr. Drury (Recorder of the Court of Chancery) kept twelve clever sons in something like order. Whenever anybody made a statement across the table in somewhat assertive or categorical terms, he was pretty sure to be met by 'say, *you think*'! I have taken the lesson to heart ever since and if I can find words to express myself in a suitable and conventional form I shall probably explain in my preface that, for the sake of brevity and to avoid excessive enlargement the words *I think* have been omitted throughout.

D'Arcy was a severe critic of his own writing and rewrote whole portions of the book even after the manuscript had gone to the Press. A letter to the assistant editor in the autumn of 1915 runs:

When I sent you my MS a fortnight ago I was dissatisfied and am still more dissatisfied now, with the first few pages of my introduction. It seemed to me like Pharaoh's chariots in the Red Sea, 'it drave heavily'. I think you had better let me have the first chapter back, for I think I can now improve, and also curtail it.

After surmounting many war-time difficulties, *On Growth and Form* came out in the summer of 1917, nearly thirty years after D'Arcy had first begun to meditate upon its problems—

but then, as his father liked to say, 'it takes time to form an elephant or a poet'. This, his greatest work, shows him for what he was, a scholar-naturalist; and under scholar one must group together the classicist, the mathematician, the philosopher, and the poet. The book made an enormous impression at the time of its publication, for D'Arcy's knowledge of the classics, his wide general reading, and his style, influenced by his love of Bunyan and the Bible, were a revelation to other biologists. It is perhaps of interest to quote here some of the reviews. Professor J. Arthur Thomson writing in *Nature* said, 'This book, at once substantial and stately, is to the credit of British Science and an achievement for its distinguished author to be proud of. It is like one of Darwin's books, well-considered, patiently wrought-out, learned and cautious—a disclosure of the scientific spirit. It is an application of some of the concepts of physical science and sundry mathematical methods to the study of organic form.' The *Observer* reviewer wrote: 'Professor D'Arcy Thompson is not only a most widely experienced and competent anatomist and naturalist and versed in important mathematical methods: he is also a ripe philosopher and a scholarly historian, possessed of artistic and literary gifts of no mean order. Consequently his book contains many pages of delightful reading. It is remarkable for the abundance of references to and citations from all those who in ancient and modern times have occupied themselves with the problems with which he is concerned and for appreciative discussion of their views.' The *Scotsman* said: 'From the beginning to the end, readers will be divided between the interest of the immediate results and the access of insight which accompanies them.'

By 1922 the edition was sold out and the Cambridge University Press wished to reprint, but D'Arcy would not agree, for he considered that many alterations were needed. He proceeded to add, enlarge, and amplify, and although he was ready to reprint during the early nineteen-thirties there were delays of one sort and another, and it was not until 1942, twenty-five years after its original appearance, that the second edition of *On Growth and Form* at last came out. In the meantime the

first edition had become so scarce that second-hand copies had risen to ten times their original price.

It has often been said that this book was the work of a great amateur and that no professional scientist would have written it. But it was both D'Arcy's strength and his weakness to work at, and write upon, only that which interested him. The things that he loved absorbed him, the things he did not care about he glossed over. He and his book were one; it was his *pilgrim's progress*. And because of this many a man has carried *On Growth and Form* with him into far corners of the earth when other scientific books have been discarded, for in it one breathes 'an ampler ether, a diviner air'.

It is a matter of speculation whether it would ever have been written if D'Arcy had not spent thirty years of his early life 'in the wilderness'. It is possible that had he achieved his wish for promotion and found himself in a chair with more teaching, more organization, and the press of society upon him, he would have used his gifts in a different manner.

REFERENCES

[1] Memories of Henry Jackson, 1926, from *Henry Jackson*, by R. St. John Parry.

[2] D. W. T. Obituary by Clifford Dobell, F.R.S., *R.S.* vol. vi, November, 1949.

[3] 'The Shell of the Nautilus', Lecture, 1917.

[4] 'Morphology and Mathematics', *Trans. Roy. Soc. Edin.*, 1915.

[5] Magnalia Naturae; or The Greater Problems of Biology. *Brit. Ass. Rep.*, 1911.

IX

THE UNIVERSITY OF ST. ANDREWS

1917

St. Andrews by the Northern Sea
That is a haunted place to me!

ANDREW LANG

Home Life

IN 1917 Professor W. C. McIntosh of the Chair of Natural History in the University of St. Andrews retired, and D'Arcy was translated to the older foundation in his place. This pleasant move, crowning, as it were, the publication of 'G. and F.', was materially and psychologically beneficial for all the family. There were many advantages—St. Leonards School was near by for the children, the University Library was at hand for D'Arcy, and the social life both within and without the University circle was totally different from anything we had known in Dundee.

Of D'Arcy's colleagues several were outstanding scholars, men of European standing; there was John Burnet, Greek scholar and historian; A. E. Taylor, Moral Philosopher and Platonist; and G. F. Stout of the Chair of Logic. There was also Wallace Martin Lindsay, the Latinist, whom D'Arcy had known since Edinburgh Academy days, and with whom he corresponded in Latin on post-cards which usually began thus: 'Dic mihi, tunc etiam hunc poteris mihi solvere nodum?' On Sunday mornings he would often walk on the cliffs with Taylor or Stout. On one of these perambulations Stout seemed to be limping badly, and at the end of the Abbey Walk he turned to

D'Arcy and said he felt too lame to go farther. As they turned to retrace their steps the limp disappeared, not unnaturally, for Stout had been walking with one foot in the gutter.

The Bell Pettigrew Museum, which includes the Zoology Laboratories and the Natural History Museum, is in the middle of South Street close by our house, so that D'Arcy was able to come and go at will instead of being away from home all day as hitherto. There he happily spent his days in term and out of it, unable to understand what his assistants did or where they went to, if they also did not appear in the vacation. He was never known to wear a white coat or overall and his large pocket-handkerchief was the only duster or mopping-up cloth he ever used. The laboratories were shabby and dusty, and there was, as usual, no money with which to do them up, but as he 'was only interested in things as they fitted his ideas, so he was content to take over old McIntosh's shell, and live in it as a hermit crab does, scuttering here and there with his illuminating mind' not really affecting, or being affected by, the material side of his surroundings. But the impress of his personality was there; the Museum took on new life and before long there was a shell collection that is one of the finest in the country. The passages were hung with pictures, and the art class from St. Leonards School was invited to paint murals of fishes over the doorway and penguins waddling up the stairs.

In preparing his lectures D'Arcy made notes on the backs of old envelopes or scraps of paper, but it was rarely that he lectured on the syllabus as set out; one theme followed another, and the diversity of subjects over which he ranged and the language in which they were delivered made his lectures a liberal education to Arts as well as to Science students. One of his favourite sayings was: 'If a man's mind be open to culture in any degree or form, he will find not a little of it within his own profession although it may be a technical one.' Once, when a hoopoe found dead on the sands was brought to him, he gave his morning lecture on *The Birds* of Aristophanes; another time, seeing a boy in the class who was a classical scholar, he finished his lecture in Latin. One of his pupils wrote:

You didn't learn Zoology, but you were educated. You learnt a smattering of Latin tags, and you appreciated the immeasurable beauty, both material and aesthetic, of the tiny Foraminifera, whose minute chalky shells make so much of our ocean floors. You learned of Aristotle's views on the sea-urchin: and the story of the Palolo worms that congregate regularly in the warm seas off Samoa was a fairy story, not merely a useful reference to the migratory habits of the lower animals. Even anatomical differences had their beauty; the fourth tooth of a crocodile fitting into a notch in the upper jaw, and not into a pit as in the alligator, was a fact to be gloried in, not merely to be learned. One felt that God was the Creator, and the wonder was never lost. One knew the beauty of the whole animal kingdom, and one was not limited to learning minute details about single animals.

Not unnaturally his assistants were often horrified to discover what he had not taught the class of the anatomy of the frog, but it was just that quality of extemporization that made him the inspiration he was. And D'Arcy's practical skill was there too. Another pupil wrote: 'I remember as a third year student demonstrating with moderate if somewhat slow efficiency the course of the femoral artery and sciatic nerve in the rabbit to some first year students. D'Arcy approached and said, "Let me show you how to do that", and with a speed and dexterity worthy of a surgeon he stripped the flesh off the vessels and nerves with forceps and scalpel without once damaging the nerve or cutting an arteriole.' It was this sensitivity of touch in his hands, so broad and shapely with their square-tipped fingers, that enabled him to use the most delicate instruments in the laboratory, and to fashion toys and models, or use carpenter's tools at home. His examination papers were as unconventional as his lectures; he once set the question 'Name and describe the fish that you would see in a fishmonger's window.' On one occasion he took a nervous girl round the Museum encouraging her to talk about the birds and beasts she saw in the cases. When he left her, he said, 'Oh by the way, don't worry about your oral, you've passed very nicely this afternoon.' In a paper he wrote for a teachers' magazine he said, 'I had a thousand times

rather have a schoolboy know a tiger-beetle from a burying-beetle, or a moonwort from an adder's tongue, than that he should learn about xylem, and phloem, or mesoblast or even protoplasm.' He loved to take his class for rambles on the shore, teaching them as he went, or to go occasionally farther afield to the May Island or the Bass Rock to see the great colonies of sea-birds that breed there.

But his eyes were open to the difficulties of the modern world as this letter will show:

> St. Andrews. *27th March 1919.* There is one thing certain, and that is that there will be mighty few men in the coming generation ready to go in for an Academic life, save only in the applied sciences. I had a letter this very morning from a schoolmaster in Dundee, asking my advice about his boy, who has a passion for Nat. History and wants to be a Zoologist. I had to answer him, as I have answered many others, that a penniless man who goes in for that or any other such calling, and expects to live by it is out of his wits. The thing can no longer be done.

He was a great teacher, but it was the quality of his humanity and his understanding of the mind of youth that made him beloved. To the end of his life he was young in spirit (in one of his notebooks I find this quotation, 'Oh to fly away the last years with the companion of our childhood, and recover youth in the fields where we once were young'); his heart ever went out to a clever boy and a pretty girl, and it was a joy and pleasure to him to talk with the one and dance with the other. A characteristic gesture was to put his arm round the shoulders of a student and say 'Now what have *you* been doing today?' An Honours student was once summoned to see him about some work that was not up to standard. She had been to a party the night before and was almost too tired to care, although the prospect of the interview was not pleasant. On arrival she was surprised to be greeted with 'Was it a good dance?' She replied that it was. Then, 'Is it a good floor?' and lastly, 'Got a boy of your own?' On another occasion D'Arcy asked a girl student why she was not going to a certain dance that night, and after

a moment's hesitation she replied that she had no shoes. After watching her at her microscope for a few minutes he laid his hand on the bench and said, 'Buy yourself some shoes', and walked away leaving a few coins behind. The girl did not actually want to go to the dance but was embarrassed to know what to do; at last she wrote a note, enclosed the money and laid it on D'Arcy's desk. Some time after, when he again found her alone at work, he gave her a little of his own philosophy to think over: 'My child,' he said, 'a great many people have helped me in innumerable ways throughout my life, whom I can never repay. One can but pass on the benefits to others.'

It was not only on his own students that D'Arcy left his impress. One cold snowy day a bejant loitering outside the College Chapel fell to pelting the clock face on the Tower with snowballs. He felt his shoulder gripped and there behind him was D'Arcy muffled in cloak and scarf looking very fierce. His words, however, belied his expression for all he said was, 'm' boy, it's no use trying from here. If you want to hit it, you'll have to come back on the pavement on the far side.' With that he stalked away and the boy, experimenting as directed, found that D'Arcy was perfectly right.

He rarely forgot a student and never one in whom he had been interested. After years of interval he would remember a Christian name, details of a student's home, his work and achievements. A student of twenty years earlier writing to congratulate him on his knighthood received an answer, 'You speak of what I have done. You don't tell me of what you are doing.' No boy or girl ever asked his help in vain; he would write testimonials, recommend them for jobs, or offer a railway fare for an interview. He was scrupulous over testimonials. At one time he had an idle laboratory man whom he had not the heart to dismiss for he had a large family of small children, but the man applied for another job and D'Arcy was asked for a reference. He longed to get rid of the fellow but wrote an honest account of his failings and resigned himself to having the man permanently on his hands. What was his surprise when the applicant was successful—the other department could not

believe that anyone could write so devastating a testimonial unless he wished to hold on to the man at any price. Another testimonial ran thus: 'The job is the one for X and X is the man for the job.'

At the end of the First World War St. Andrews was still an old-fashioned town with cobbled streets and gas lamps, four-wheeled cabs and small shops—a place of quiet and unhurried ways; in the harbour there were fishing-boats, and round the narrow confines of the little town were green fields and country lanes. We moved from Broughty Ferry in January 1918 to the old house in South Street which my father had found and fallen in love with. He wrote to me at school, 'J'ai acheté la maison,—LA MAISON! C'est la maison au pays des rêves. Je ne puis t'exprimer comment je m'impatiente à l'occuper.' In a street where there are many beautiful houses ours was plain and unadorned, but its foundations are those of a guest house of Cardinal Beaton, and there is a shilling a year of tax on it paid now to the town but formerly to the Cathedral Chapter, 'for the music that is no longer heard, for the mass that is said no more, for the altars that are crumbled away, in the church that for 400 years has been a ruin open to the sky'.[1] The garden is long and narrow, full of old trees, a gnarled and twisted mulberry and a great pear tree both planted by the monks who tended these gardens, and a weeping elm which grows and spreads out of all proportion, but which my father would not allow to be touched—for to lop a branch was to him like amputating a limb. The house itself, the winding staircase, the long Adam dining-room opening on to a little terrace, the gentle unobtrusive ghost on the top floor, soon became so much a part of our lives that it was as if we had never lived anywhere else. As the years went by it reflected more and more of my parents' personalities, my mother's with her eye for old furniture, and my father's with his habit of collecting, and both with their inability ever to throw anything away. There was no corner that did not hold something that they cared for; Japanese embroideries, inlaid boxes, bits of china, Eskimo curios. Every wall that was not

lined with books was hung with pictures and engravings. At one time when my father was in the habit of haunting picture sales he never came home from London or Edinburgh without one under his arm, which he would bring out in triumph saying, 'What d'you think of that now? Only paid a few shillin's for it!' These purchases were hung on a wall in the drawing-room which we called the 'five-shilling wall' until it was covered and then they were stacked on the floor. My mother loved auctions too, but her buying was more discreet and less on the impulse of the moment.

My father's bedroom was lined from floor to ceiling with books; they covered the chest of drawers, the tables, and lay upon the floor in heaps, but he knew where each one was. When he lay ill at the end of his life he would ask for such and such a book to be taken out or put alongside a certain other. There was a glass-fronted bookcase which was filled with the most precious volumes and sometimes a visitor would be taken upstairs to see these treasures. D'Arcy's buying of books was one of the most important occupations of his life; his knowledge of books and bibliography was prodigious. He was made a member of the University Library Committee almost as soon as he went to St. Andrews, and in 1923 was appointed Convenor of a Senate Committee to consider what should be done to bring the Library into line with modern requirements. His report on the matter resulted in the appointment of G. H. Bushnell as Librarian the following year, and the complete reorganization of the Library. He had a fine library of his own but it would have been much greater if he had had money in his youth to pick up what he found. In his student days he used to see old herbals and early works on botany and natural history, costing a few shillings, but lacked even that with which to buy them. In *Old Books and New Prices*, one of the last of his writings, he tells how he had to refuse a fine copy of an early botanical work for thirty-six shillings in Berlin in 1886; later the price of the same book rose to £100. Wherever he went he would poke about among the second-hand shops and stalls, and all was grist to his mill, the older Naturalists, Astronomy,

Travels, Mathematics, and so on. Once, prowling on the quays in Dublin, he bought a shabby little book with the title *Arithmetica absque Algebra aut Euclide Demonstrata*, published in 1707, without an author's name. After paying two shillings for it D'Arcy jumped into a taxi and went to Trinity College Library to see if they possessed a copy. They did not and he showed it off with great pride. It was a rare book by G. Berkeley of Trinity College, and after D'Arcy's death went back there. When I was at school we often went walking through the old streets of Edinburgh, and once, stopping at a very shabby bookstall, D'Arcy nosed among the dusty volumes outside. Suddenly his eyes lit up and soon I was the possessor of a first edition of Palgrave's *Golden Treasury*. When we went into 44 South Street bookcases were built to fit all the odd corners and shelves were put into the most unlikely places on stairs and landings. In course of time even our bedrooms were invaded and from moderate beginnings the books accumulated till they clothed the walls. D'Arcy's technique of bringing home new books varied according to what he had bought. If the parcel was very large and heavy he would say confidently, 'Oh, those are for College': if a book was one that we could appreciate, with a beautiful binding or fine illustrations, he would show it off with pride; if it was one that was out of our orbit or had cost a little too much, he would put it in a shelf or take it upstairs without a word, and we would only know of its purchase when some interested visitor arrived and the treasure was shown off.

After the move from Broughty Ferry my mother's health improved gradually, and in a few years she was again able to lead a quiet though fairly active life enjoying the old garden where everything bloomed in profusion for her in riotous unconventional borders. In good weather she and D'Arcy walked daily on the sea-shore or by the Lade Burn, for he liked to do the same thing every day at the same time when he was at home.

He used the drawing-room as his study and therein stood the little piano upon which I practised. It was evidence of his amazing power of concentration that he wrote, read, and

thought while I played, entirely oblivious of any sound. After I grew up and went to the Royal College of Music he moved into the dining-room. This big room now became the centre of the house as it were; in it the family lived, dined, and entertained, and at night it was my father's study. In the curve of the french window stood the rosewood dining-table that my parents had bought for a pound on their honeymoon; near a second window to the west was an inlaid Italian table that had come from Florence with the Gamgees; in a corner was a Dutch chest in which each child had a drawer for her own possessions, and close to it was my mother's desk. On the walls were engravings in heavy rosewood frames that D'Arcy had had in his rooms in Trinity, and in the bookcases were big dictionaries—French, Latin, Greek, Hebrew—a set of Aristotle, D'Arcy's own works, and many other books.

D'Arcy spread himself over everything, including on occasions the sideboard. Sometimes the dining-table would be covered with pieces of fine cardboard of different shapes and sizes which he fitted together to make little boxes of intricate mathematical design; at one time there lay about innumerable pine cones stuck with coloured pins and thread to show the hexagonal pattern on their scales; for months, indeed years, the tea-trolley that had long since lost its original use moved to and fro with a load of paste-pots, pins, pencils, and paper and was covered with the proof sheets of the new Liddell and Scott. He used to complain half-heartedly that he was an ill-used man with no study of his own, but the fact was that he loved to have his family round him and to be in the midst of all that was going on. It was pleasant to be able to say 'Put that in the waste-paper basket, my child', or to turn and take part in the conversation that was going on round the fireplace—sometimes to the embarrassment of the speakers, who thought him safely engrossed. D'Arcy had the faculty of doing two things at once, reading and listening, or of taking part in two conversations going on simultaneously.

In the evenings he put on a grey alpaca jacket and a pair of cross-stitch slippers that my great-aunt Pam had embroidered

for him (when they were worn out he would have no others, but padded about the house in his socks), and after supper would sit down to play backgammon with my mother. To his rage and disgust he hardly ever won a game, and he would stamp about the floor calling down Heaven's wrath upon his bad luck, never giving my mother the credit for being by far the better player. Some years later she put away the backgammon board saying that it was the cause of too much strong language. After the game, when peace had once more descended, D'Arcy would sit down to work till midnight. About ten o'clock he would take out his big watch (it could not be regulated, so he was always adding and deducting the minutes it lost or gained), and say, 'Well now, how goeth the enemy?' that being a gentle hint that anyone still up and about should go off and leave him alone. Surrounded by his books and papers he would sit at the typewriter, or would slowly pace the room smoking his pipe and stuffing down the tobacco with the little finger of his left hand on which he wore his big wedding ring. As the years went by the pipes, on doctor's orders, became smaller and smaller until one day he left off smoking and never went back to it. With his hands in his braces he would walk up and down, intoning to himself, often in French or perhaps in Greek; one would hear him repeating a phrase over and over again, or the word 'professor' which evidently held great significance for him. I think that the sound of words was as music in his ears, for sometimes he would put out his hand and wave it about as if he were keeping time to an unheard melody. Occasionally he would give an evening to his scrap-books, to paste in and index the innumerable cuttings he kept on everything that interested him. There were fourteen miscellaneous scrap-books and many others for especial subjects, autographs, travels, book sales and prices, as well as those he kept for his own published articles. He also kept notebooks for jotting down notes on everything that interested him. It was a kind of game and of it he wrote:

To collect something or another, stamps, coins or butterflies, is a universal pastime, and it needs no explanation or excuse save the satisfaction which it brings. One may play the same game in another

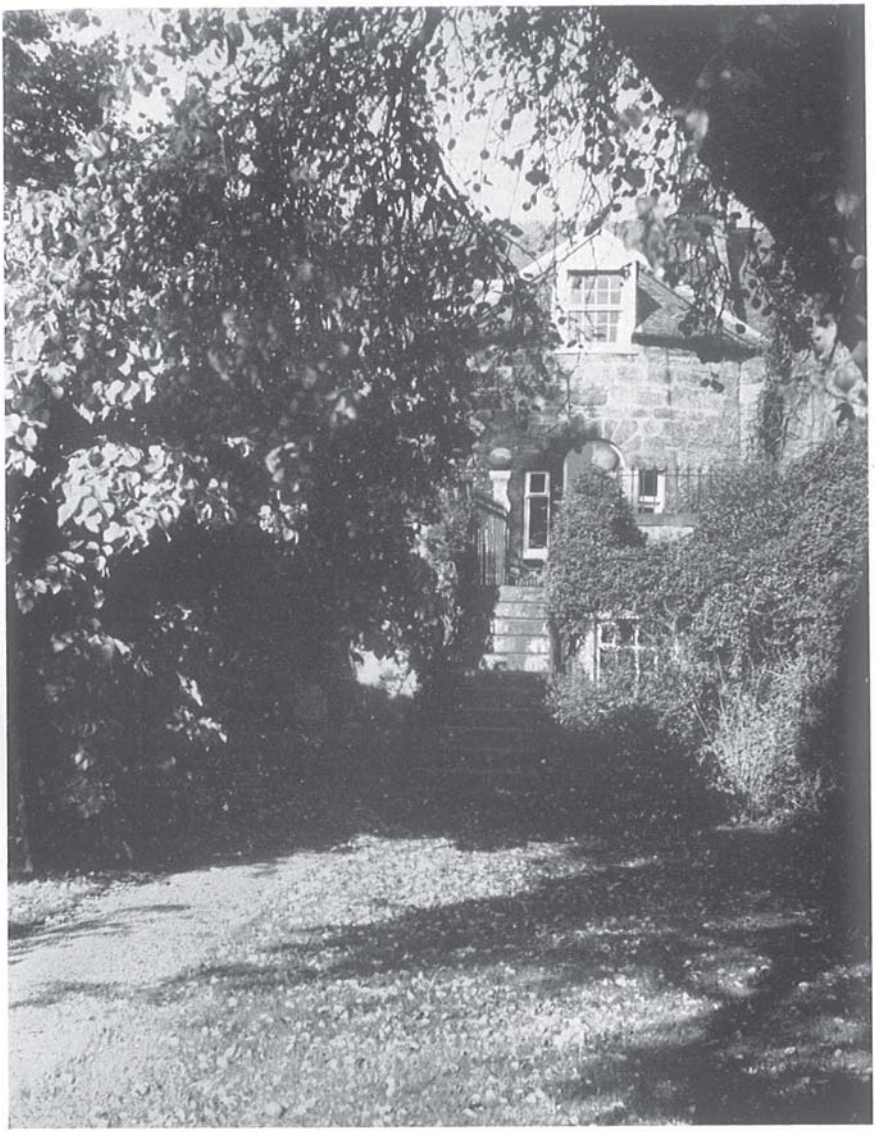
way, by collecting *information*; but the facts which one accumulates must be remote from one's duty and avocation. An old scholar taught me the game more than fifty years ago and I have never stopped playing it; it is such an easy and engrossing game. You choose some subject or other which takes your fancy, you buy a notebook and label it with the title of your theme; and you keep jotting down therein whatsoever bears upon your subject, as it comes your way, in all your reading, observation and reflection. I have had many such notebooks and some I have soon grown tired of but others have lasted long and served me well. . . . Your subject opens out wonderfully as time goes on, it tempts you into by-ways, it carries you afield; if you play the game aright it never comes to an end. It grows in interest continually, for things are *interesting* only in so far as they relate themselves to other things; only then can you put two and two together, and see them make four or even five, and hear them tell stories about each other. Such is science itself and such is all the knowledge that interests mankind.[2]

Often while he worked, even while he wrote, he would have the wireless playing, though he was quite unaware of what sound it was producing. His papers seemed, on the surface, to be in chaos—letters, books, journals, cuttings all strewn about in disorder, but in point of fact he knew where everything was and could lay his hands on whatsoever he wanted. There were, of course, times when papers did get lost and then the house was in turmoil. His correspondence was enormous, and he loved writing letters and even more receiving them; he felt neglected if a day passed without some interesting post. The ending to his letters was individual, for he signed himself invariably 'Yours truly' or 'Yours faithfully'.

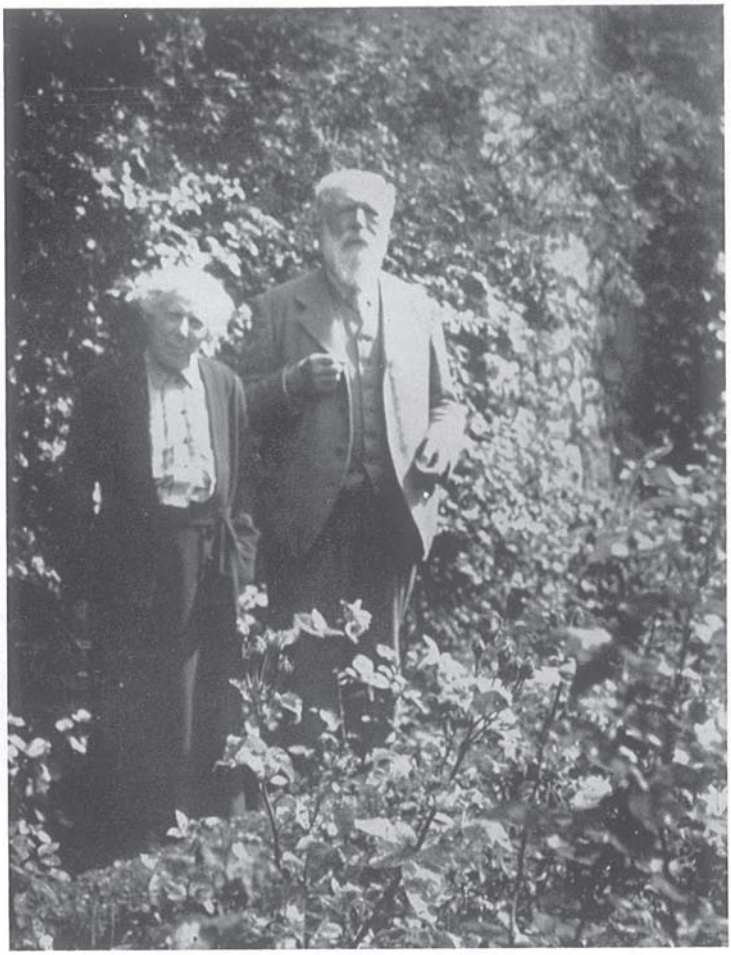
The reason that D'Arcy got through the enormous and varied amount of work that he did was that he was occupied with something all day long. Except on rare holidays he never rested; the words which he once used in writing of P. G. Tait applied equally to himself, 'play there might be but idleness never'. It is hardly possible to think of him without a book or notebook in his hand, and certainly not without one in his pocket unless there was a journal or bookseller's catalogue bulging out already. He read phenomenally fast, skimming over

the pages with a glance yet gleaning every fact as he went; this allied to his exceptional memory accounted for much of his vast knowledge. And to the end of his life he was learning; his mind, his eyes, and his ears were always open; 'we learn and learn and never know all about the smallest humblest thing'[3] he once wrote. His bedside table was covered with an assortment of books, a *Pilgrim's Progress*, a Greek Testament, a tattered *Pickwick*, one or two volumes of Dr. Johnson, a French edition of the *Arabian Nights*, and several detective novels. He always read at meals and as children we followed suit, but after he bought us an old Swiss musical-box we played that instead. It had six tunes of which our favourites were The Waltz Song from *Faust* and 'I dreamt that I dwelt in marble halls'. When cross-word puzzles came into vogue we spent all our meal-times unravelling their problems.

Once we had settled down in St. Andrews Sunday tea-parties for students were instituted, and every week a bevy of tongue-tied boys and girls came for an hour or two. In summer tea (and bread and honey) was on the lawn under the pear tree, and in winter round the dining-room table, with D'Arcy holding forth and stimulating the conversation—or monopolizing it—and my mother gently encouraging the shy ones to some kind of confidence. Sometimes we waited and nobody came for D'Arcy had forgotten to invite anyone, and on other occasions half the class streamed in for he had absent-mindedly asked them all. If he brought in any of his students on a weekday he would first press a few coins into their hands and bid them run along to the baker and get a 'cat's face' and some 'flies' cemeteries'. He was very unpunctual for meals. He would work until the gong rang and then go into the garden 'for a breath of air', or he would return from College ten minutes before a meal and immediately start out for a walk to the harbour or the end of the pier. If the hour was changed to suit him he also advanced or retarded his time-table by so much. He did not mind if his meals were cold, though he enjoyed good food and good wine. Whenever dinner was over he would sleep for half an hour; this was his invariable practice, and to it and his daily cold



VII. 44 South Street, St. Andrews, from the garden, D'Arcy's home after 1918



VIII. Maureen and D'Arcy Thompson, 1944

bath he attributed the energy which was characteristic of his long life.

D'Arcy loved simple music and would beat time and sway to a tune he knew and enjoyed. It was his lifelong regret that he could not sing in tune; when he was happy he would whistle about the house or hum to himself but always just off the note. His feeling for rhythm made him a beautiful dancer, and he never missed a chance of dancing, always saying 'I must dance just once more before I die'. To waltz with him was an experience. He held his partner firmly with the right hand while the left floated out in mid-air, then swaying in perfect time, he whirled lightly round the room without a pause till the music stopped. He possessed the quality of vitality that seems inherent in men of great achievement. Till late in life he could dance half the night, and yet come down early in the morning showing no trace of fatigue. He rarely went to a concert, but would go again and again to the opera, for in the Gamgee household he had been brought up on melodies from Italian opera. He loved *Aïda* and *Faust* and *La Bohème*; Mimi's death affected him deeply, and the tears would well up in his eyes during the finale of *Madam Butterfly*; *The Magic Flute* with its undercurrent of Freemasonry interested him immensely. He was visibly moved by beautiful acting, or the recitation of noble words, or by some simple innocent story. He had a deep love of the theatre, and a great sympathy for all 'strolling players', for circus people and gypsies. After the little repertory Byre Theatre had been established in St. Andrews in an old barn, he and my mother went regularly every Friday night. When the company was in difficulties for want of support he wrote articles for it in the local press and cajoled his friends to take tickets. If a circus came to the town he never missed it, and he was delighted when the gypsies in their caravans lined the streets for the Lammas Fair. He used to bring the brown-eyed children into the garden and give them cream cookies and sweets.

Children adored him; he never talked down nor made a fuss of them, he treated them simply and naturally as if they were grown-ups. He would escort little boys round the Museum and

point out various things of interest and encourage them to come again. A young friend once remarked how a children's party always took on new life when 'the Professor' came in. In 1924 he presented the prizes at Bedales School near Keswick. The Head Master wrote: 'He charmed his audience with anecdotes of Cumberland, preached on Sunday on Old Age, made intimate contact with several members of the School (including a small boy of 11 who was becoming a wireless fan and for whom D'Arcy bought some item of equipment which young Tony was eyeing longingly in a shop window), played in his bath with my small daughter's floating toys, and generally became a member of our family.' He knew all sorts of tricks to amuse children, and many must remember how he made an old woman's face with a handkerchief wrapped round his thumb and forefinger; how he could knot bits of string in his mouth; cut a mouse out of an apple pip; fashion a little lady from a fuchsia flower or a granny from the stamens of a pansy, or draw a puppy-dog on an india-rubber and pull it sideways to make a dachsund (no child realized that this figured in *On Growth and Form*). For years he carried a bag of sweets in his pocket for distribution in his progress down the streets, until war-time rationing made it no longer possible. He was once seen standing outside a second-hand bookstall on George IV Bridge in Edinburgh accompanied by three small ragamuffins who were gazing eagerly at a tattered copy of *Robinson Crusoe*. D'Arcy was heard to say that if they read him half a page the book would be theirs; this they did and were soon darting down Candlemaker's Row with their trophy. The curious thing was that it was the very copy that D'Arcy himself had read as a small boy. In St. Andrews there was hardly a child or a working man whom he did not know by name, and he had the habit of relapsing into the vernacular when conversing with these friends, out of natural sympathy and brotherliness. On one occasion when D'Arcy was about to set off for a journey, the horse-drawn station bus—a box-like vehicle with solid wheels—did not turn up, and rushing down the street he saw our neighbour Mister Ireland, the upholsterer, in his little car.

'Hi! Brother, Hi! tak' me to the station or I'll lose m' train', shouted D'Arcy. So in he was bundled and duly arrived at the station, but alas for the Austin Seven; D'Arcy was so firmly wedged that the train had to be held up until, with porters pulling and the upholsterer pushing, he was at last extricated and sent on his way.

We were never without animals at home. When I was a baby we had a little dog called Mister Sam; later came Mister Ming the big pekinese whom my younger sisters loved so dearly that he was always in their little skinny arms, hugged and mauled while his feathery tail swept the ground. When he died my father wrote to me: 'You can hardly realise how great a sorrow poor Mister Ming's death is to your Mummie and me. At the bottom of our hearts we are half ashamed to feel it so deeply and bitterly.' There was a cat called Chitterabob, and Gus, Molly's guinea-pig, bought for *1s. 6d.* at the Caledonian Market in London; he lived under the dining-table when on holiday in St. Andrews, travelling to and from London in a shoe-box. Years later there was Polly the Parrot, a fierce grey lady who bit anyone of her own sex who approached her, flirted with all men, and adored D'Arcy. He would take her down the street in St. Andrews on Sunday mornings and the old bird would snuggle into his neck uttering the softest tenderest little sounds while gently tweeking his hair or nipping holes in the collar of what became known as 'the parrot coat'. When Polly fell ill just after the Second World War, my mother sat up at night to nurse her, only keeping her alive on the finest old brandy, and when she died a shadow fell upon the household. Sometimes the fishermen would bring up a maimed bird they found on the beach, and once we had a seagull with a broken leg in a box under the sideboard for a couple of weeks. There was only one occasion when I remember my mother remonstrating about D'Arcy's attention to 'mice, rats and such small deer'; it was when she found him with his younger daughters on hands and knees beside a mousehole in the dining-room wainscot feeding a tamed mouse and its family with crumbs. But birds were his first care, and he never missed putting out food and water for

them before breakfast. In Broughty Ferry we had had white pouter pigeons on the lawn, and now in St. Andrews he built a little aviary on the terrace for twenty or thirty coloured budgerigars. He was not often roused to great anger, but thoughtlessness towards an animal, the robbing of a bird's nest, the tormenting of a dog or cat would cause his eyes to blaze, and he would take a guilty boy by the scruff of the neck and pour a torrent of words over him. He hated the destruction of magpies and so-called vermin by gamekeepers and continually wrote letters to the papers on bird protection. He used to say that horse-racing was one of the cruellest of sports, and he would inveigh against the whipping of a three-year-old to the post and the almost inevitable result of curvature of its spine by exertion and over-work.

One of his conspicuous characteristics was the way he gave himself to people: seeing a friend in the street he would bear down upon him like a ship in full sail, fling his arms open as if to embrace him, call him 'Brother' and make him feel as if there was no one else in the world he would rather have met. At a party he would throw himself into helping to make it a success, entering into everything with a light-hearted gaiety. But he was full of little contradictions; he could not bear to waste time with anyone who did not interest him, and, occasionally, when someone had been especially invited to meet him and it was necessary to be gracious, he would appear quite uninterested, and would obstinately give all his attention elsewhere, even turning his back upon the important guest! He gave without thought to all and sundry, to those who had claim on him and even more to those who had none; the grace he taught us and which he said daily ended with the words: 'keep us ever mindful of the wants of others', but he set his face against organized charity and rarely, if ever, put his name to a public subscription.

He was patient and impatient. Patience he had and to spare on big issues and for the most unlikely people, and he would explain a problem point by point to the slowest learner if he had a mind to; but impatience overflowed on trivial things and

at a show of stupidity or clumsy carelessness, especially in someone from whom he had expected otherwise. He was both just and unjust, and on occasions his volatile temper would flare up unreasonably, if for instance he found an unpaid bill on the household file. He paid all bills the day they came in and refused to hear any excuse if one was overlooked or forgotten. He could be both light-hearted and full of care. When he was gay he carried the family with him on a wave of good spirits, and when he was depressed nothing would rouse him. He could not bear to hear of great suffering, and it was forbidden to speak of malignant disease, for that was something too terrible to contemplate. If one of us was even slightly ill it was difficult to reassure him; often when my mother was laid up he would be unwell or take to bed too. But when faced with a blow to his hopes, a real disappointment, his true spiritual courage emerged; he would gather himself together, put all remembrance aside, and go on without another thought on the matter. Defeat never defeated him. The following characteristic letter was written to a young friend going through a time of depression during a difficult convalescence:

Cheer up, like a good girl.—and do it quickly. If you could only come down here, and breathe the air on the links and the shore and watch the snow-buntings and the oyster-catchers etc. as I've been doing today, you would pick up in no time. . . . Remember,—and this is the most important thing I have to say to you—, that heaps and heaps of men and women suffer the same kind of thing at times, —but never show it, and *never give in*! I can't say more in a letter but if we were talking together I might say more. There are times when all the troubles of the world seem to have broken on one's head; times when *fear* all but gets the better of one,—fear of poverty, fear of disease, fear of death. And yet nothing happens! One comes down to breakfast and eats ham and egg. For safety lies, and honour lies in winning the battle, even though Apollyon straddles all across the road. Heaps of people have done it, heaps of 'em do it every day.

Your affectionate friend.

Birthdays were a source of pleasure to him, and the older he grew the more he enjoyed them, but Christmas, on the other

hand, was only a time to be got through somehow. About a week before he would begin to feel ill and would take to bed, and we learned to call this 'Christmas-itis'. He felt that he should acknowledge all the letters and cards that poured in; he longed to give presents to so many people—to the children, the old, the sick—but there was neither time nor money, and the frustration being too great he would take to bed. On Christmas Day he was up again (for by this time it was too late to do much anyway) and he was usually very cheerful and would go to church to please my mother. During the sermon he gazed steadfastly at the hymn-board, doing arithmetical problems with the numbers. Once a term he went to College Chapel and read the lesson. He loved especially to read the great poetry of the Old Testament and the Chapel echoed with dramatic splendour as he declaimed it.

D'Arcy was a true Victorian in many ways. His manners were gracious and courtly and he bewailed the slipping standards of a later age. Idleness he considered as one of the worst vices only to be equalled by avarice. And so we children learned at a very early age to occupy ourselves and to be always busy and immersed in some ploy; we might otherwise have earned the epithet 'Idle Pig'! He loved beautiful hair and admired it long and flowing and carefully brushed; it caused him great grief when one by one all three daughters cut off their pig-tails. He was very proud of his beard and used to stroke it and smooth it between his two hands. At one period after the First World War he grew it until it was massive and shaggy like the well-known Edward Lear picture, but luckily this phase did not last very long. While the 'beaver' game was in vogue he was a great prize. On one occasion three divinity students were standing at the entrance to St. Mary's College when D'Arcy passed; they shouted 'Beaver' and quickly hid themselves behind the gate. D'Arcy retraced his steps, and taking off his hat to the young men said: 'Were you calling me, gentlemen?' One small friend, on having the word 'ancestor' explained to him, said he was sure the Professor's ancestor must have been a lion. He used various Victorian pronunciations and sayings such as 'hun-

derd' for hundred, 'weskit' for waistcoat; he would refer to the 'Dook of Wellin'ton', and some of his milder expletives were: 'The Deuce take it!' 'Flesh and blood can't stand it!', and 'God bless my soul!' When he was tired he would say, 'I don't feel an inclination to do any manner of work', or if anyone said there was no time to do so-and-so, he would reply, 'Well, you have all the time there is.' Another favourite saying was 'If you want a thing done get someone to do it for you; if you want it well done, do it yourself!'

It was difficult to make him wear an overcoat, for such garments were not fashionable in his early days, and until late in life he wore a starched white shirt and stiff collar; he never carried gloves and his hands were always warm. His large grey hat, made for him by Scott's of Bond Street, grew larger and larger as the years went on until it resembled a cowboy's wide-a-wake; in a restaurant or club he would place it on the very top of the hat-stand remarking: 'Well, no-one will take *my* hat!' When asked if he had also had a top hat made for him, he replied: 'Yes, but it never fitted me well, and I've never been able to enjoy a funeral since.' He refused to have any passport photograph taken without his hat and somehow or other it was always accepted without protest. As a young man, after he got the chair in Dundee, he took very great trouble over his appearance, had his suits made by Poole's in Savile Row and was correct in every detail of attire. About that time, travelling on a tram-car (one in which the seats faced each other and everyone could see everyone else) he found himself addressed by name by a very drunk man. In his embarrassment he made to move, but he was held in a vice-like grip while the workman shouted in a piercing voice, 'You're the Professor and ye think ye ken a' things but I ken something ye dinna ken. Ma wife's your washerwoman, and I'm wearin' ane o' your shirts!'

During that same period he went to London and preened himself in the Club for he was wearing, as he thought, a new and well-cut frock coat. But on his return home his landlady greeted him with: 'I beg your pardon Professor for sending you off with your old coat.' In old age he was not worried about his

appearance. He found that sand-shoes were comfortable for the feet, so he wore them in the streets of St. Andrews or on the country roads when he felt like it, and he once gave an important lecture with a paper clip doing service as a tie-pin. He liked to wear his grandfather's redingote in bad weather (it was made about the year 1855), and he boasted that the overcoat he wore most often was the one he had bought when he first went up to Trinity.

After the move to St. Andrews we began for the first time to have holidays away from home. For several years we rented a small house in the village of St. Fillans in Perthshire, and moved in on the 1st of August with the dog, two maids, and sometimes a French girl to encourage us to talk French. We climbed the hills, had picnics by the loch, and went for long walks with my father. It was impossible for him to walk and come home empty-handed. As he walked and talked he was looking here, there, and everywhere, missing nothing. He would see tiny ferns in the chinks and crannies of walls, a wild flower or its leaf in a ditch, he would stop and peer at ant-people under the boulders on the roadside, or stand motionless watching water-hens and dab-chicks in a stream. The ferns came home wrapped in his large handkerchief, the flowers were laid in a notebook or in a much-used Bentham and Hooker, and insects were put into match-boxes and little bottles carried for the purpose. His umbrella was a useful receptacle into which to shake seed pods or larvae, and it could even be manipulated into a butterfly net on occasions. On the shore his pockets were filled with shells and sea-creatures wet and slimy, and in out-of-the-way places like Roundstone in County Galway, little envelopes were filled with sand, for there the shore is of a brilliant whiteness with sand composed of exquisite microscopic shells from the bed of the Atlantic. And periodicity or number meant so much to him that he was always observing it: counting the petals on a flower, the ripples in the sand, the feathers in a bird's wing, the steps in a church tower.

I look back on a succession of hot summers with the smell of heather and bracken in the sultry air, and see a picture of my

father striding over the moors, his old-fashioned spy-glass in hand, followed by his two younger daughters, carrying home-made butterfly nets and jam-jars full of water-boatmen. In memory the sun is always shining, but one year when we went to Inverness-shire it rained from the day we arrived to the day we left. My sister had lately returned from a Paris studio and she spent the time painting us all in turn. D'Arcy wrote to a friend: 'My Mollo has been painting the family portraits and has just done her Daddy in oils in two sittings . . . (it) is quite amazingly good and I am fearfully proud of it.' This was indeed praise because we were rarely allowed to think that we could do anything well! Both our parents were perfectionists, and in whatsoever we did we were always shown how to do it just that much better by either one or other.

Our home life was of the simplest imaginable, and my father's views can be clearly seen from a letter written to me shortly after my eighteenth birthday:

> Remember that we live very simple lives and you must do the same,—with reasonable pleasures and a good many of them, but *no splash*! It is better to be a little old-fashioned than obviously new-fashioned; but there is just room to stand in between, and if one can find that narrow place, it is the place to be.

REFERENCES

[1] 'St. Andrews', *Science and the Classics*, 1940.
[2] 'Games and Playthings', *Greece and Rome*, 1933.
[3] *On Growth and Form*, 1917.

X

RECOGNITION

Having a mind stored with a vast and various collection of learning and knowledge which he communicated with peculiar perspicacity and force, in rich and choice expression.

BOSWELL, *Tour to the Hebrides*

Writings, Travels, Lectures, 1918–39
President of the Classical Association of Great Britain, 1929
President of the Royal Society of Edinburgh, 1934
Jubilee as Professor, 1934
Honorary Degrees: Aberdeen, 1933; Edinburgh, 1934;
Trinity College, Dublin, 1934
Lowell Lectures, 1936
Second Edition of *The Glossary of Greek Birds*, 1936

D'ARCY was over sixty years of age when he began to come into his own. *On Growth and Form* brought him into the forefront of scientific thought and 'the Brethren', as he used to call the other men of science, at last accepted him. He found himself and his book consulted, referred to, and spoken of at home and abroad and especially in the United States. And by now a generation of younger scientific men had grown up who admired him whole-heartedly, to whom he was the last of the great Victorians—this man of many parts, this scholar-naturalist whose scholarship was as important to him as his natural history, who had used all his gifts, all his faculties, all his learning to create his masterpiece.

He used to say that the happiest decade of his life was that between his sixtieth and seventieth birthdays, but the decade

lengthened out, and I believe that happiness was his (except for such ills as all flesh is heir to) from now onward. His earlier disappointments were largely forgotten and his predominant mood was to rejoice in this best of all possible worlds, and his natural zest for life carried him on without sign of increasing age. As he mellowed in old age so he changed in appearance; his hair and beard turned white, his weight went up and he became the patriarchal figure familiar to many people.

Now he began to write for the pleasure of writing, though, master of understatement as he was, he often said: 'I, like my own father, write with difficulty, slowly and reluctantly.' In 1919 he made the acquaintance of P. Anderson Graham, then editor of *Country Life*, and for the next five years wrote more than a dozen articles for him. The odd guineas that came to him from such writings gave him a satisfaction out of all proportion to their amount. The various subjects included 'The Art of the Esquimos', 'Clouds', 'The Invention of the Blackboard', and 'St. Andrews'.

One of the essays—'Sunday Morning'—was occasioned by a visit D'Arcy made to the Foundling Hospital before it was moved from Bloomsbury to the country. In his scrap-book under a copy of the article are written these words: 'Five years after my visit the Foundling Hospital with all Captain Coram's Estate was sold for some thirty million pieces of silver'; to his way of thinking it was a betrayal which the financial gain could not justify.

In 1921 he wrote a chapter entitled 'Natural Science: Aristotle' for *The Legacy of Greece* edited by R. W. Livingstone for the Clarendon Press. It was later reprinted in *Science and the Classics* under the title 'Aristotle the Naturalist'. A very characteristic piece of writing of a later date (1935) was that on 'Jinglin' Geordie (or George Heriot)', published by *Blackwood's Magazine*, but originally delivered as a Founder's Day Speech at George Heriot's Hospital in Edinburgh. This was detective work such as D'Arcy loved to indulge in, speculative, provocative, but enthralling. The case he makes out is that George Heriot was in truth the scion of a foreign banking

family named Herwart, and that only thus was he able to lend King James I (or VI of Scotland) the sums of money that led in turn to the amassing of his own great fortune. The theory is ingenious, and, as told by D'Arcy, convincing, but it did not please the School's governors. Among other essays are 'How to catch cuttlefish' in the *Classical Review* in 1928, 'Games and Playthings' in *Greece and Rome* in 1933, and 'On some Greco-Egyptian Bird and Beast Names' in *Studies presented to E. Lloyd Griffith*, edited by S. R. K. Glanville and published by Oxford University Press in 1932.

Some of his most beautiful writing is to be found in the many obituaries of his friends which it fell to him to write. He seemed to penetrate a man's mind and bring out in few words the essentials of his character. Of Nansen (1930) he wrote:

> What was it that made him great as well as famous? I do not think it was his eloquence or his learning or even his spirit of adventure, nor was it his political ambition nor his statesmanlike insight and skill. It was rather a certain quality of his, a force of character, an air of high distinction which he wore to a degree unmatched in all my experience of man. He came into a room and men gathered round him, he went out into the world and men followed him, he spoke and we all hearkened to him! Moreover his courage never failed, his faith moved mountains out of his way, and his friendship was of the kind that lasts forever.[1]

And of Sir Thomas Little Heath, '(the end) came after eighty years of singular happiness, and after sixty years of unstinted and unwearied work, all done for the love of it'.[2]

D'Arcy reviewed many books for such journals as *Nature* and the *Classical Review*; they were on very varying subjects, including Greek Reptiles, Mathematical Biophysics, Veterinary Parasitology. He took immense trouble in reviewing a book, contributing much that was new, sparing no pains in reading up a subject before writing on it, and drawing upon his own memories as in his review of *The Centenary of the Athenaeum* by Humphry Ward. (Added in pencil to his own copy is the following verse which he used to repeat and to chuckle over as he approached the Club,

Here are two Owls of the Athenaeum
You cannot hear, but only see 'em.
But there are others sitting near 'em,
And you can see and also hear 'em.)

In 1936 *A Glossary of Greek Birds* came out in a new edition. In the forty years that had elapsed since its publication D'Arcy had greatly enlarged it and he had made many discoveries as to the origins of bird-names. He wrote to George Sarton in November 1937,

My dear Colleague,

I hope you will like my book. *You*, if anybody, will see that it is something more than a mere compilation! The use I have made of the bird names in Prov: Italian is quite new,—and so is my ascription of several words (rightly or wrongly) to an Egyptian origin.

D'Arcy was to go on adding to it till the end of his life, by which time his author's interleaved copy was again full of photographs, cuttings, notes, and corrections. He played his game of 'collecting information' to the very end.

He wrote many letters to *The Times Literary Supplement* and to *The Times*, upon such subjects as Johnson's Letters, Misprints in R. L. Stevenson, The Examination Evil, The Cock's Egg of Polonius. A very early anonymous letter to the *Scotsman* between 1900 and 1910 on A great Zoological Garden (Hagenbeck's Thierpark in Hamburg) gave the start to the project for the Zoological Gardens in Edinburgh.

In 1918, after the Armistice, he went out to Cologne on a lecture tour to the troops but fell ill with a severe attack of influenza and was sent to a military hospital. In November 1920 he was invited to lecture in Belgium: in Brussels and Liége he took as his subject 'Les Mathématiques dans la Biologie'. It is worth quoting *La Libre Belgique* to show the impression he made: 'Dans une langue française, d'une richesse, d'une souplesse et d'une précision insoupçonnée, sa dissertation d'abondance, sans une note, sur la "Coquille de Nautilus" fut une émerveillement. Le savant rejoignait le poète. Du biologiste au mathéméticien le lien était, peut-on dire tout artistique et tout

littéraire.' Years later, in 1940, in a letter to George Sarton, he wrote:

> That lecture (in Brussels) of mine was one of the best I ever gave, and was more appreciated than any other. The whole audience (which was a large one) rose to their feet when I had finished; and that's a big thing for a Brussels audience to do. I had a letter only a few weeks or months ago from Dalcq, in which he recalled that lecture, and told me (to my pride and satisfaction) that he owed to it his leaning to the physical and mathematical side of biology.

In Ghent he spoke on Joseph Plateau and his work.

A lecture given at Liverpool University in 1920 on the invitation of Sir William Herdman was called 'The Study of the Sea'; he told story after story, of Pythias the sailor-scientist, of Sinbad the Arab merchant-traveller, of Prince Henry of Portugal and many another, and made Oceanography come alive for his audience. Another of his Royal Institution lectures was on 'Charlotte Brontë in Brussels'. One of his oldest friends was Monsieur Paul Héger, son of 'Paul Emmanuel' Charlotte's 'Professor', and *Villette* was one of D'Arcy's most beloved books; he knew every step that Lucy Snowe had taken in the old town before the Pension Héger disappeared and the Rue Royale was modernized. There were innumerable other lectures that he gave in different places at various times, on Magic Squares, on Sir Thomas Browne, on Robert Burns, on The Birds of Diomede. His lectures to students' societies, mathematical, classical, philomatic, biological, are too numerous to mention, but a member of one such society tells the impression he made.

> We began with a supper and I recollect we were able to offer our distinguished guest a glass of white wine. This he accepted with evident pleasure and great courtesy, remarking that, not knowing what sort of a supper he would be given he had taken the precaution to fortify himself with a glass of sherry! Then came the great part of the evening, when the Society assembled in its Hall—in the Old Quad—and the Professor proceeded to read us a paper that he took from his pocket, apologising for offering us this which was the

proof of an article he had just finished. It made a great impression upon us all, young and immature and unlearned men as we were,—not for its learning which was accepted of course, but for the beauty of the language and the perfection and style of its delivery. I have never forgotten the occasion, the paper, or the magnificent figure of its author, representative in more ways than one of an age of learning combined with elegance that I doubt we shall see again.

In the years after the First World War he travelled much, sometimes as representative of the Royal Society and the Royal Society of Edinburgh, or the University of St. Andrews, and every year to attend the International Congress in the Scandinavian countries.

In 1919 he was chosen by the Students' Representative Council of St. Andrews as their delegate when the Belgian Government invited various British universities to send delegates to meet representatives of the four Belgian universities and discuss the possibility of the exchange of professors and students. The Mission was entertained by the King and Queen of the Belgians, by Cardinal Mercier, and by Burgomaster Max in the magnificent Hôtel de Ville in Brussels. The following week the delegates proceeded to the inauguration of the new University of Strasbourg on the return of the University to France, and among those whom D'Arcy met were the three Marshals of France, Foch, Joffre, and Pétain.

In 1923, representing the Royal Society of Edinburgh, he went to Clermont-Ferrand where the University was celebrating the tercentenary of Pascal. The following year he travelled to Toronto for the British Association meeting, and with the Association travelled across Canada to Vancouver and Victoria. Whenever the two special trains halted the entomologists and botanists eagerly jumped out to collect and D'Arcy was of course among them. After one of these occasions at White River, Ontario, he started tight-rope walking on the railway lines. (This was a game he used to play with us children on the branch line from Dundee to Monikie on a Sunday morning walk.) One of the party wrote: 'Soon there were a dozen

eminent scientists wobbling up and down. A disgraceful spectacle! J. and the porters had the greatest difficulty in getting us back into the train again.'

In the summer of 1922 Barbara was dangerously ill with pneumonia and the following winter Sir James Mackenzie, who had 'watched the child as tenderly as though she had been his own' and had seen 'clearly and confidently, a little while before the other doctors had, the first indications of recovery',[3] advised that she should go south, and so D'Arcy asked for leave of absence from the University and the family went to Portugal for two months. They stayed at Mont' Estoril and later in Cintra.

In September 1925 the Russian Academy of Sciences in Leningrad held its two-hundredth anniversary and about 150 men of science from all over the world were invited to be present. Sir Henry Miers, Professor W. Bateson, and D'Arcy were among the British delegates. D'Arcy as usual kept a file of notes, addresses, programmes, and menus from the trip, but it is not as comprehensive as sometimes and many of the notes are in an almost undecipherable shorthand; there is, however, a fragment of description of the crossing of the frontier:

We entered Russia half an hour ago. The frontier station of Rajajoki, on the Finnish side, was clean and gay; the waiting-rooms, as in any German or Swedish town, were incomparably better than are any of ours at home, at Carlisle or at Crewe; there was tea for us in bright clean tumblers, and hot meat and delicious fish was ready for us in a few minutes. Three miles of No-man's land, and we were in Russia, at Belo Ostrov. The station was a wooden shed, and we and our baggage were crowded into a little room, with rough doors and table, and with the paper hanging in shreds upon the walls. In a corner was a hole, behind which, in a dark cupboard, sat an old man changing money; and the light of a tallow candle shone upon his bearded face; a tall young soldier, in white undress uniform and long jack-boots, examined our baggage. All was of the roughest; but the young soldier was politeness itself, and the old money-changer did not stint us of a farthing. As to the soldier I heard him speak seven languages myself; and he told me afterwards of two or three others which he knew. Russian, Finnish, Swedish,

German, English, and all the common tongues seemed alike to him; and of such strange tongues as Lettish and Esthonian, he said he knew enough to get along.

The train drew out, and we passed into the woods, of larch mostly, with birch and alder in the swampy parts. There are log-houses every here and there, with a few cows, and many children, and the latter look as fat and well and happy as all children should be. We pass a tiny shop, and never did I see before a shop so like those of the toy-shops long ago. There is the open front, the single counter, and the toy-like stock of groceries; even the scales upon the counter are precisely those which the toy-shop used to sell. Beside the shop sit a little company of women some of them bare-foot, some with red kerchiefs and some with white. Over the muddy road a peasant drives her ancient gig, the horse with the curious Russian yoke, or arch over the collar, uniting the shafts.

The celebrations for the first five days took place in Leningrad, where there were banquets, two wonderful performances of ballet in the Théâtre de l'Opéra, visits to museums, libraries, scientific institutes and schools, besides receptions and speeches. On all formal occasions the arrival of the delegates was attended by a guard of honour with fixed bayonets, and the proceedings always started with the singing of the *Internationale*. On one occasion they were addressed by Kalinin, the President of the Soviet, by Karpinski, the President of the Academy, who spoke first in Russian and then repeated his speech in French, and by Oldenburg, the Secretary, who spoke on the history of the Academy, and members of the government also took part in order to stress the part that Science had taken and would take for the good of the people. The man who interested D'Arcy most was Lunacharsky, the Minister of Education—'dark, small beard, spoke easily with hands in jacket, talked of Revolution, Communism and Science, and it seemed to me that the audience looked rather blue'. After five days the party went on to Moscow where the most sumptuous of the banquets was held, the tables set for more than 1,000 persons and laid with china and glass from the Imperial Palace. In spite of the poverty, the tumbled-down houses, the poor clothing of the Russian professors and their families, D'Arcy came home enthusiastic

for what was being done by the men of science; the drive, the energy, the activity impressed him greatly.

In the summer of 1927 D'Arcy did a series of broadcast talks on 'Nature and her limitations', and several on varied subjects, on 'St. Andrews', 'A walrus in the North Sea', and one on Upsala in which he described most lovingly the little town where Linnaeus lived, worked, and died. He also read the Sunday night Epilogue several times on the National programme; this item—a passage from the New Testament—was read anonymously, but many people recognized his voice and wrote to tell him so. He did not greatly enjoy broadcasting; having to submit his manuscript days before and keeping to it word for word irked him, for he liked to work on it and possibly change it up to the last moment.

The American Academy of Arts and Sciences in Boston enrolled D'Arcy as a Foreign Member in 1928 and his pleasure can be seen from his letter of thanks:

St. Andrews, 1928.

Dear Mr. Bigelow,

Let me hasten to acknowledge with pleasure and with gratitude, the news of my enrolment as a Foreign Member of the American Academy of Arts and Sciences. My satisfaction and pride in receiving this notable distinction are enhanced, if possible, by one or two personal considerations. First of all I am proud to enter the Academy under the Presidency of Dr. E. B. Wilson from whom every living biologist has learnt part of his lesson,—and not a few have learned all. I am peculiarly gratified further owing to a reason which harks back to my childhood, and brings my Father's memory very near. I was some seven or eight years old when my Father was invited to Boston to give the Lowell Lectures. It was one of the greatest events of my childhood, more than sixty years ago, and the invitation and journey remained a landmark in my Father's quiet and scholarly life, even unto the end.

D'Arcy went to South Africa to the British Association meeting in the summer of 1929 and in Cape Town stayed with Dr. and Mrs. Skaife who looked after him with the greatest kindness. There he met General Smuts—whom he had always

greatly admired—for the first time. He gave one public lecture —'Anatomy from an Engineer's point of view'—for which every seat was sold out hours before the doors opened. At the last moment the hall was exchanged for a larger one without D'Arcy's knowledge. He had spent the day on the sea-shore and when he returned with his pockets full of seaweed and his handkerchief full of shells he found he had barely time to dress and rush to see that all was in order, but after an hour or so of utmost panic he came on to the platform and gave one of his most triumphant lectures. He also took part in the discussion on 'The Nature of Life' with General Smuts and Professors Hogben, Baly, and Barger. This meeting was packed to the doors and many people were turned away. When the Association visited Johannesburg D'Arcy was given the Honorary Degree of Doctor of Science by the University of Witwatersrand; among the other honorary graduates were Professor J. S. Haldane, Professor J. L. Myers, and Sir Charles Parsons. He travelled home on an Italian merchant ship carrying six or seven passengers, stopping at various places on the way. From Walvis Bay off the coast of West Africa he wrote to my mother:

17:8:29. This is a poor place and ugly,—but with one or two extraordinary interesting things. The great thing is a lagoon, about half-a-mile off, where there are flamingoes by the *thousand*. I have been out twice to see them, and wanted to go again today: but there is a dust-storm blowing and unless one is absolutely forced to go one stays indoors. . . . Well, the flock of flamingoes are so wonderfully beautiful that no words can describe them. The whole lagoon, two or three miles, is coloured pink with them, and they go, line by line as far as the eye can see, while the near ones let you get almost close by and just go stalking solemnly along. Here and there there is a group of great pelicans; and a million of cormorants, of two kinds, and various other birds. There is a Penguin Island not far away, but unfortunately one can't manage to get to that.

The boat docked at Naples and D'Arcy travelled home through Italy which he had never before visited. The following letter was written to my sister, at that time painting in Paris:

St. Andrews, *10:10:29*. Well, I had a great time; and I think the last part, the hurried run through Italy, was best of all. It is a very dreadful thing and I have known it too well all along, to have come to my age and never seen all these beautiful things. . . . Of course after all, there are only a certain number that are so utterly beautiful that they make you feel queer all over and want to cry . . . St. Mark's does; the first sight of it is the most beautiful thing I ever saw. And there's a lovely great room in the Naples Museum, with nothing in it but some exquisite tapestries, and the Farnese Atlas with the Heavens on his shoulders at the far end and a little hole high up in a corner through which a ray of sunlight comes down on a sort of great sun-dial on the floor,—the beauty of it all is undescribable. . . . We are wildly dreaming, but not really meaning it yet, of going to live in Florence.

In the same year the Société de Biologie (of Paris) elected him as Membre Correspondant, and the Classical Association of Great Britain made him its President for the year. At the Meeting in Cardiff he spoke on 'Science and the Classics' and later this little essay became the first in his collection of essays under the same title. It is one of the most beautiful of his writings, but in a letter only six weeks before it was given we find him writing these words:

I am worried over my Address for the Classical Association. The time is drawing very near, and I am still empty of ideas. I can work at anything else, *except* the blessed Address. It's getting very serious indeed. If I could only get a skeleton of it written I should feel happy enough, for I'm a good hand at polishing up; it's writing the first draft that is the trouble.

The opening sentence of the address is the key to D'Arcy's life and thoughts: 'Science and the Classics is my theme today; it could hardly be otherwise. For all I know, and do, and well-nigh all I love and care for (outside of home and friends) lies within one or the other; and the fact that I have loved them both has coloured all my life, and enlarged my curiosity and multiplied my inlets to happiness.'[4]

In 1931 he was elected a Vice-President of the Royal Society, which office lasted for two years. This was an honour of which

he was very proud, and when a few months later he took the Chair at one of the meetings he wrote of having 'sat up behind King Charles's gold mace. I never thought I should ever sit there! and even once is better than nothing!'

Two years later the University of Aberdeen gave him the Honorary Degree of LL.D.; the following year Edinburgh followed suit, and Trinity College, Dublin, gave him a D.Sc. My mother was so much stronger in health by this time that she went with D'Arcy to Dublin to take part in the ceremonies, after which they travelled to Galway for a very happy holiday.

The Royal Society of Edinburgh celebrated its 150th Anniversary in 1934 and at the request of the Council D'Arcy delivered an address entitled 'Fifty Years ago in the Royal Society of Edinburgh'. This was the kind of story he loved to tell, in which he could delve back into the memories of his youth and make live again the great men of an earlier time, Clerk Maxwell, P. G. Tait, and many another. A month or two later the Society elected him President. This was the climax to many years as a Fellow of the Society, for D'Arcy had been elected in 1885, had served first on the Council from 1892 to 1895, had been a Vice-President from 1916 to 1919, and Curator from 1926 to 1934. In 1938 the Society did him the great honour of having his portrait painted and hung in its rooms in George Street. The artist was David S. Ewart, A.R.S.A., and the presentation was made by Professor F. A. E. Crew, Vice-President of the Society. D'Arcy was immensely proud of the portrait and that it should have a place near to that of Sir Walter Scott and other eminent Presidents of the past.

In the same summer he attended the Malthus Centenary at Cambridge when many distinguished economists and statisticians met together with a few biologists to mark the influence of Malthus on Darwin's *Struggle for Existence*. Among those who spoke were Dr. James Bonar and J. M. Keynes. In October he flew to Catania as one of the Delegates of the Royal Society of Edinburgh, for the quincentenary celebrations of the University at which the King of Italy was present.

The following year, 1935, was as full of events and travelling

as D'Arcy could wish for. In January he celebrated his professorial jubilee, and the Senate of St. Andrews University recorded the occasion in its minutes, congratulating him 'not without a touch of envious admiration, for undiminished capacity and curiosity, and for all he has seen and heard, all he has learned and loved and enjoyed in 50 wandering and wondering years'. He was, shortly afterwards, elected President of the Edinburgh Mathematical Society; Honorary Member of the Society of Naturalists of Moscow (in which Society only one Honorary Member is elected each year); and the Polish Academy of Science made him an Active Overseas Member of the Mathematical Physical Society a few months later.

In June he went to Paris for the tercentenary both of the Muséum National d'Histoire naturelle and of the French Academy, representing, with Professor J. H. Ashworth, the Royal Society of Edinburgh. In November he was elected President of the Classical Association of Scotland and gave his address on 'Astronomy in the Classics'.

The first event in 1936 was a lecture to the Faculty of Science in the Sorbonne, when he spoke on 'L'Anatomiste et l'ingénieur'. In April he went to Buckingham Palace to present the loyal address of the Royal Society of Edinburgh, in company with 'those bodies which, for one historic reason or another, hold the ancient privilege of direct access to the King'. D'Arcy was immensely impressed with the ceremony, not least with the bearing and the speech of Edward VIII; he recorded his impressions later in a short but moving article in the *Glasgow Herald*.

In May an invitation came from the Lowell Institute in Boston asking him to lecture there in autumn to which he replied:

St. Andrews. 25th May, 1936.

. . . I am no longer young. I am within four years of fourscore. But I am humbly thankful to say that I am still doing my full day's work, as I have always done it. . . . Let me say once again, Sir, that it is a peculiar and extraordinary pleasure to follow in my Father's footsteps as a Lowell Lecturer, and to be welcomed by you as he was by your own people, seventy years ago.

D'Arcy went out to Boston in November. He spent five weeks in the United States, during which time he gave twenty lectures and many informal addresses to students and clubs. It is amusing to find that he kept a list of the birds he saw in one of his notebooks of the trip just as he did forty years earlier when on his way to the Behring Sea. He noted down 'Red-winged Blackbirds, many in small flocks. Song-sparrow, heard one. 1 black duck, 1 woodpecker, Grackles, enormous numbers.' His lectures to the Lowell Institute were six in number and their title was 'Growth and Form in Plants and Animals', but in the other places he visited such as Providence, R.I., Philadelphia, Princeton University, and many more he lectured on Soap Bubbles, on Aristotle, on Hexagons, and The Anatomist and the Engineer—in all seven different lectures. He was made an Honorary Member of the Boston Society of Natural History while delivering the lectures, and everywhere he went he had wonderful receptions (one of his great attractions was that he 'looked like a character that had just stepped out of Dickens'). He visited libraries, museums, fish-markets; he taught one man to draw a tortoise, and helped another to arrange the birds in his museum; he browsed over the beautiful books in the Library of the Natural History Museum in Boston; he spoke to the students in the Chapel of Union College where his guard of honour was composed of two St. Andrews men in their red gowns; and he was welcomed by old friends everywhere, Dr. Stejneger of Behring Sea days, Dr. Robert Chambers in New York, Dr. Conklin in Princeton. He ended up one of his letters to my mother saying: 'This is a very great country, I only wish we lived in it!' It was his last visit to America, but to the end of his life he always hoped there would come another opportunity to cross the Atlantic, for the old and new friends he had there, the warmth of their hospitality and the mutual understanding engendered, lay very close to his heart.

After 1930 our family summer holidays came to an end, and D'Arcy began to go abroad for a few weeks each year, sometimes taking me with him. Travelling in those days was easy and pleasant, boats and trains were uncrowded, one lived

cheaply and found accommodation where one wanted it. In 1931 D'Arcy planned to go to Paris, but a couple of days before we started he announced that he had changed his mind and we would go to Poland, 'after all', he said, 'they both begin with P'. When we sailed from Hull for Dantzig in a little ship called the *Lwów* the North Sea was at its worst, but D'Arcy walked the deck in the teeth of the gale with his hands in his pockets and his collar turned up, unconcerned with the weather. We passed through the Polish Corridor to Gdynia and eventually settled in the tiny fishing village of Hel on the farthest point of the peninsula which was Poland's only stretch of coast. There we found a hotel called Lwia Jama or The Lion's Den, among fishermen's cottages on a sandy road leading from a little harbour to miles of beautiful shore. We fell in with a group of Polish scientists and their families who centred for the summer round the small Fishery Research Station run by Professors Borowik and Demel—kindly folk who made us more than welcome. We spent the days bathing in the warm water of the Baltic and the evenings walking in the pine woods which so resembled those of Inverness-shire, and where we found nun moths, ant-lions, and sweet-smelling linum (*Linnæa borealis*).

The following year we returned to Hel, later visiting Warsaw where many of our friends lived and worked. The Polish Foreign Office then lent us a car and chauffeur to take us through 'Polish Switzerland' to Bydgoszcz and Wejherowo so that D'Arcy might see the research work in each of the fishery institutes in these towns. We passed through lovely scenery with gentle hills and lakes and small primitive villages where the women sat in the street doing gaily coloured embroidery of a special design. After a few days spent in the medieval town of Toruń with its massive fortress and red-brick churches, we flew home over Berlin.

Another summer we sailed up the Rhine from Rotterdam, visiting Cleve, whence came Henry VIII's wife, Anne the Mare of Flanders, and Cologne, but once as far as Coblenz D'Arcy tired of the little steamer and turned aside up the Moselle. We stayed at an inn in Cochem where each evening there gathered

a party of musicians with fiddles and accordions. On one occasion they played the Blue Danube Waltz and that was too much for D'Arcy who pulled me to my feet; we were soon giving an exhibition waltz alone on the floor, much to the delight of the company who clapped and cheered as we sat down, for it was an unusual sight for them to see such a venerable Herr Professor dancing. (It was only a few weeks since he had been at the International Council Meeting in Copenhagen and had written home:

> Last night I danced from 9 to 1 with a Polish girl, an absolutely perfect dancer. There was a S. American consul who tangoed to perfection, so she danced tangoes with him and Strauss waltzes with me all evening. And the bandmaster shook hands warmly with us at the end!)

We walked by the river and on the high rich plateau above the vineyards, and in Beilstein found an old house with a vine-covered arbour and a garden full of phloxes with which he fell in love and which he wanted to buy. He was always finding places where he wanted to live and was constantly threatening the family with a move, it might be to an Irish bog or to Portugal or Florence—wherever he had lately been and left his heart. We made our way through Trier with its beautiful Roman baths and amphitheatre, to Luxembourg where we arrived in a torrential downpour. We plodded about all evening in the wet, and next morning visited the museum and churches in a thunderstorm, taking our usual rest in the afternoon. At three o'clock D'Arcy burst into my room saying: 'I can't stand this a minute longer; there is a train to Brussels in twenty minutes. Pack the bags, I'll pay the bill.' We caught the train, but only as it was moving out of the station. Journeys were always adventurous in one way or another. He could not bear to make plans and if he was forced to do so made haste to change them as soon as possible. He was always very much affected by weather; holidays in rain were extremely gloomy but in good weather he was gay and light-hearted and absolutely tireless. At the end of a long walk when his young companion

was dropping with fatigue he would turn aside and spend half an hour looking at, or making notes upon, something that interested him. He talked to everyone he met, asked their advice, made use of their time-tables, wrote their addresses in his little notebook, and passed on in an atmosphere of geniality. He kept meticulous accounts, as much for the interest of the exchange as for any actual check on expenditure.

He had a special technique for finding an eating-place abroad. He would saunter slowly down a street and peer through the windows and over the tops of the curtains of restaurants, would study the menu outside with great care, then open the door and have a good look round before deciding finally if the place came up to his requirements; much patience was expended upon the whole undertaking. He loved to 'window-shop' and did it to such purpose that he always knew where to find curious out-of-the-way objects, and in foreign towns could find his way back to exactly the shops he wanted. Wherever he went on his journeyings people would appear who knew him, porters in stations, attendants in trains, and acquaintances whom he did not always recognize. In order not to give himself away and thus perhaps embarrass his friends, he developed a certain technique that went something like this: 'Well, m' dear fellow, what are you doing now?', then, 'Let me see, where did we meet last?' and so on until he found a clue that solved the problem.

We twice spent the summer in Inishmaan, the biggest of the Aran Islands. The first time we lived in the hotel in Kilronan where Mrs. Ganly fed us on deliciously tender mutton in such quantities that D'Arcy was able to carry away enough each day (in his pocket handkerchief) to feed three starving cats who lived in a tumbled-down cabin up the road. The second year we rented a tiny thatched cottage overlooking the Bay, from which the view across the sparkling water to the Twelve Pins on the coast of Connemara was unbelievably beautiful. The long days slipped into one another as we watched the peasants carrying their creels of seaweed up from the shore to make their simple gardens; or examined the ruins of the many Celtic churches —for Aran is rich in remains though they have been sadly

neglected—and making friends with the islanders. Sometimes we drove with Pat Mullen—'The Man of Aran'—to a far corner of the island to see the turf boats and the fishing curraghs come in from Connemara, or to watch a round-up of horses and cattle on the shore, before their shipment to Galway; or we would visit the weaver where he sat at his loom, surrounded by his twelve children, little boys and little girls alike in scarlet flannel petticoats with cropped heads. Often we would cross the flat acres of limestone to Dun Aengus (endless stone walls did not daunt D'Arcy and he was proud to surmount them at seventy-eight years without loosening a stone), and spend hours pacing it, photographing it, and taking its measurements. This great ruin was probably a fortress in very ancient times, and there are still to be seen its outer and inner walls, its abattis or *chevaux de frise*, its ledges or tiers of seats, and the doorways facing east and west. D'Arcy pondered on it and discussed it endlessly. He was convinced that it had an affinity to the great Elliptical Temple of Zimbabwe in Southern Rhodesia, but the paper he meant to write upon it was never done, though all the material was gathered together.

The holidays in Aran were among the happiest, for D'Arcy was truly at home in the slow primitive life of the islands, where the peasants still make their boats from the hide of their cattle, and cut the corn with a sickle; where the maidenhair fern grows in the limestone, the choughs scream over the cliffs, and time stands still.

REFERENCES

[1] 'Fridtjof Nansen', *J. Cons. int. Explor.*, 1930.
[2] 'Sir Thomas Heath', *Nature*, 1940.
[3] 'Sir James Mackenzie', *Sociol. Rev.*, 1925.
[4] 'Science and the Classics', Presidential Address to the Classical Association, Cardiff, 1929.

XI

LAST YEARS

His life was gentle, and the elements
So mix'd in him that Nature might stand up
And say to all the world 'This was a man'!

SHAKESPEARE, *Julius Caesar*

Knighthood, 1937
Linnean Medalist, 1938
Daniel Giraud Elliot Medalist, 1942
Sixty Years as Professor, 1945
Honorary Degree of D.C.L., 1945
Darwin Medalist, 1946
The Glossary of Greek Fishes, 1947
The End of a Long Life, 1948

THE last decade of D'Arcy's life was full of honour and tribute came to him from many quarters. The years of his sojourning in the wilderness had been well and truly accounted for and now brought him in a great reward; the older he grew the more men seemed to become aware of his stature.

In the Coronation Honours in June 1937 he was given the honour of knighthood. His reaction to congratulations was what might have been expected. Unwilling to show his own real pleasure he said to his children: 'Your poor dear Mummy will be as pleased as Punch!'; to the family doctor, an old and valued friend: 'It'll give the women-folk a lot of pleasure'; and to his students in the class-room: 'Well, m' dear boys, all I can say is that it is better late than never!' From now on our devoted servant Mrs. Butters referred to my mother as 'The Lady'; D'Arcy remained 'The Professor'. At the investiture D'Arcy found himself standing near Sir Hugh Walpole who

had omitted to bring a pair of white gloves with him without which he could not be admitted to the Throne Room. There was not much time to come and go between the letters T. and W. but there was enough, and Sir Hugh went in duly and decently arrayed in D'Arcy's gloves. After the event Barbara went to meet him at the railway station; the train came in early and an old porter hailed her as only a Scotsman would or could: 'Yer too late, yer dad's awa'.'

In May of the same year D'Arcy had attended the Coronation of King George VI in Westminster Abbey as representative of the Royal Society of Edinburgh. He wrote to Molly:

> The Abbey was a very great show yesterday, very great indeed, and far surpassing all my expectations. I saw nothing of the actual crowning—only the endless procession up and down the nave; but that was tremendous. I was there by 7.45, and many people had been there since 6! I got out,—slipped out—as soon as it was over at 2.30, and many people were still coming out at half-past six at night!

D'Arcy had made his exit characteristically. As soon as the main procession left the Abbey he stood up, left his seat and when approached by Black Rod bowed with great dignity and slowly and purposefully passed him by; he continued down the aisle looking very large and magnificent in his Court Dress and each official in turn bowed him on until he walked without hindrance through the Abbey doors.

On the 150th anniversary of the Linnean Society, in May 1938, D'Arcy was presented with the Linnean Medal. The Society was founded by Sir James Smith and Bishop Goodenough for the preservation of the Herbarium collected by the great Swedish botanist Carl von Linné, and the President, Mr. John Ramsbottom, in making the presentation, said it seemed fitting on such an occasion that a naturalist, who, more than any other of our time, had shown himself to be at home in both the new and the old learning, should receive their medal, for his scholarship was in the direct tradition of the eighteenth while his science was in the forefront of the twentieth century. The beautiful little medal bears the portrait of Linnaeus on one side and the arms of the Society on the other.

In the spring of 1939 D'Arcy went to Greece for the first time. He was invited by Sir Henry Lunn to go as one of the lecturers with the Hellenic Travellers' Club on S.S. *Letitia*. This cruise was arranged primarily for doctors and their families, and the other lecturers were medical men who had made a study of various aspects of Greek culture. Professor G. E. Gask who spoke on the cult of Aesculapius; Dr. J. Dixon Comrie on Hippocrates; D'Arcy lectured on the Greek Winds, on Aristotle, and on Greek Fishes, specimens of which he brought on board from one of the ports. His lectures had to be relayed from the deck where he gave them as there was not room enough for all who wanted to hear him; even the crew and stewards hurried with their jobs in order to attend. The weather was exceedingly hot, but D'Arcy revelled in everything, and bathed and walked and filled innumerable notebooks with jottings.

The last meeting of the International Council to take place before war broke out was in Berlin in June, and D'Arcy went once more as delegate. It was a curious time in Germany, outwardly everything was as usual; there was a great ball in the Haus des Fliegers given by Field-Marshal Göring; there were dinners and receptions as always, but over all there was an atmosphere of impending crisis and everyone sighed with relief when it was over. D'Arcy made the best of everything. One afternoon, in company with a party of delegates' wives he visited a girls' labour camp, and as they sat round at tea-time he gave them a botany lesson on the wild flowers he had picked walking through the fields. He was impressed with the organization of the camp, the apparent health and happiness of the girls, and he wrote a little article in praise of it in the *Glasgow Herald* on his return. It was one of his characteristics to be so open-minded and ready to think the best of new ideas that (as in the case of Russia years earlier) he was prepared to find some contribution to progress in Hitler's Germany.

With the beginning of the war many of his activities ceased and the journeys which he so much enjoyed naturally came to an end. He and my mother had to face the difficulties of black-

out, shopping queues, and domestic problems alone, for my sisters were on war service. D'Arcy was plunged in gloom by the war news and the German atrocities and persecution of the Jews shocked him beyond words; the death in concentration camps of several old friends, Professor Michael Siedlecki of Cracow University and Professor Hans Przibram of Vienna among them, shook him greatly. In the face of immediate danger he was calm and he did not appear to worry overmuch at the recurring air-raid warnings. On the night when German planes passed over St. Andrews and dropped a couple of bombs some hundreds of yards from the house he was not unduly upset though windows were broken and he and my mother were both knocked to the ground by the blast. Visitors who came next day to condole found themselves listening instead to a scientific explanation of the particular pattern made in the shattered glass.

Each summer they went north for some weeks to Nethy Bridge, a quiet village on Speyside where there was little sign of war and where they soon became familiar figures, my mother, wonderfully active in old age, and D'Arcy striding out bare-headed and walking easily ten miles a day.

After his eightieth birthday he wrote to his friend, Dr. George Sarton:

St. Andrews. May 1940

Your letter gives me quite unusual pleasure. It came this morning, and I hasten to reply. One thing only jars me! Why call me *venerable*? It is the last compliment I wish to deserve! I am no older, fortunately, than when you saw me last. I do my day's work as easily as ever, and I have resigned from nothing. I gave my morning lecture today, as I have done for some fifty-six years.

It is interesting to notice that his hand-writing never altered throughout his life, and that his signature at eighty was almost as it had been at eighteen. He remained in full physical health with his faculties unimpaired until two or three years before his death; his middle age was a long plateau of vigour with little sign of decline, and when old age came it came suddenly and

rapidly. But as he grew older and as he watched the world changing more and more and the cost of living rising and the value of money going down he became fearful as to how it would affect his family. His constant anxiety was that he had not provided enough for the future, and he was only persuaded with difficulty that his children had ability enough to make their way in the world.

The summer of 1940 saw the publication of *Science and the Classics*, a collection of his writings that had already appeared in print elsewhere. This old-fashioned-looking little book has a cover of maroon cloth and the title in simple gold lettering, for D'Arcy had the idea that he would like it to be the exact replica of *Day-Dreams* printed seventy-five years earlier.

In the same year he contributed a chapter on 'The History of Science in Scotland' to a symposium—*Scotland and Its People*—a publication of St. Andrews University Regional Committee for Adult Education.

Throughout the war he continued to review for *Nature*, contribute to the *Classical Review*, and write the obituaries of his friends (in one of which occur these words, 'I who am the last of the little band'). Two of his letters to newspapers are characteristic:

St. Andrews. 11.11.42.

A Police Court Penalty

Sir,

One does not criticise a Magistrate, but one may surely regret a law which fines a man five pounds for kicking a little child of three years old. A wiser judge suggested a severer penalty—after a millstone had been hanged about the offender's neck.

St. Andrews. 20.2.43.

A Rare Bird

Sir,

A beautiful specimen of that rare bird, the Bittern, has been sent in to the University Museum from nearby St. Andrews. I do not know who sent it to us, but I am not grateful to the giver. Our rare birds verge towards extinction, and the man who shoots one without rhyme or reason is cruel, silly, and contemptible.

In spite of war-time restrictions the second edition of *On Growth and Form* was published early in 1942. It was almost twice the size of the original volume, and had had twenty-five years of revision and new thought put into it. D'Arcy said in one letter to a friend, 'I hope you will think well of my new G. & F. It has taken a vast deal of labour; but every hour spent upon it has been a happy one.' The reviewer in the *Lancet* (who had previously reviewed the first edition) wrote '. . . I sincerely believe (it to be) the greatest contribution made to biological science in our generation'.

Hard upon the heels of the new edition came three tributes from the United States; the first, D'Arcy's election as a Member of the American Philosophical Society; the second, a high honour in the form of the Daniel Giraud Elliott Medal Award for the year, awarded by the National Academy of Sciences of the United States of America for 'Pre-eminence in Zoology or Paleontology'; and third, in 1943, his election as a Foreign Associate by the same foundation.

In 1942 he was elected President of the Royal Scottish Geographical Society for the period of three (later extended to four) years. This gave him great pleasure and afforded an excuse for travelling to Edinburgh. Upon one occasion when he was presiding at one of the winter lectures in the Usher Hall, the lecturer, the Minister of Civil Aviation, was delayed, his plane having been diverted by fog. D'Arcy announced that a telegram had been received from Biggar, some thirty miles from Edinburgh, that the Minister was on his way; he then proceeded to keep the audience enthralled for the period of waiting while he discoursed to them on the geography of the roads the lecturer was covering, and telling them stories of his youth when the only way to travel in that district of the Pentlands was by coach-and-three.

He celebrated his sixtieth anniversary as a Professor in January 1945. There was a paragraph in *The Times* mentioning this 'rare, perhaps unique, feat' and a photograph of him looking happy and totally unconcerned, wearing an old grey flannel jacket with the collar turned up and his blue tie under one ear.

The occasion had already been celebrated in St. Andrews by a dinner given in his honour by the University. The anniversary was marked by a flood of telegrams of good wishes from many parts of the world; from the United States came one from Providence from the Society for the Study of Development and Growth 'to its only Life Member', and others followed from Chicago, California, Brown University, and New York.

In the summer, and published for the same occasion, came one of the greatest tributes to his work that he could have received—the *Festschrift*, *Essays on Growth and Form*, edited by W. E. Le Gros Clark and P. B. Medawar. This was a collection of essays by a group of biologists whose work had been influenced by D'Arcy's mathematical approach to biology and who had followed on such analysis each in his own line. Included also is D'Arcy's Bibliography, more than 300 writings, collected by G. H. Bushnell. Professor C. H. Waddington said in his review of the book in *Nature* (26th January 1946): 'the production of a Festschrift is not a usual practice in Britain; but there are some whose influence has been so decisive in stimulating the widespread exploration of a scientific problem which they were unequivocally responsible for pointing out, that a tribute to their insight comes spontaneously to the minds of their followers when the occasion arises. Few British biologists who are concerned with the general problems of anatomy would hesitate to include D'Arcy Thompson in this category. . . .' It has been said that he founded no school of research such as did certain other great scientists of the same generation —the age of the most rapid advance in scientific thought of all times—but this book of essays is surely proof that his influence is beyond schools of research and the like, and is rather a pointer, a signpost, directing men on to distant places which were outside his own embrace. All his life he was a great teacher, but his teaching consisted more in opening the minds of those who sat at his feet, rather than in insisting upon any special road they were to follow.

Oxford University gave him its highest Degree in the same year, the Honorary Degree of Doctor of Civil Law, an excep-

tional honour for a man of science. D'Arcy was by now eighty-five years old, but there was little sign of age upon him as he stood in the Sheldonian Theatre, magnificent in his robes, a delighted smile upon his face as he heard the Public Orator call him *hunc tantum virum.* To the son of an old friend he expressed his delight at the honour done to him, and his eyes twinkled as he added that only events of singular moment could nowadays persuade him to dispense with his after-luncheon nap.

In 1946 the Royal Society awarded him the Darwin Medal for the year, in 'recognition of his outstanding contributions to the development of biology'. The Medal was presented to him by the President, his old friend Sir Robert Robinson. D'Arcy felt the award especially significant and he prized it all the more because Alfred Russel Wallace was the first man to receive it, and he had loved and admired Wallace in his young days, holding him in remembrance as one of the very great men he had known.

At the end of the year the Zoological Society of London elected him an Honorary Member, saying in their letter that such honorary membership 'has in the past been reserved for distinguished patrons of Zoology, rather than for Zoologists themselves and your only surviving colleagues at the present time are Sir Reginald Wingate and Winston Churchill. Council, however, felt that it was an honour they wished to confer on the father of all living Zoologists.'

The first meeting after the war of the International Council for the Exploration of the Sea took place in Stockholm in 1946. D'Arcy went as a delegate for Great Britain; he and Johan Hjort were the last of the original founders. After the long years of war he revelled in being abroad again, and he revisited Upsala, met many old friends, and travelled home in true D'Arcy fashion, escorted by a young friend he made on the journey who wrote 'of a stately old man whose charm and presence and splendid mind won all hearts and somehow gained him the right almost to ignore such things as queues and customs'.

On 8th November 1946 he lectured to The Royal Institution

at the resumption of the Friday Evening Discourses. In the same month he was Chairman at a meeting in London to enlist support from British men of science for the restoration of a scientific life in free Austria. He travelled to London for meetings three times during five weeks, and when he was at home he lectured to his students and continued to work in his department as usual.

During the autumn he had been invited by The Royal Society to go as one of their delegates to the India Science Congress which was to be held in Delhi in January 1947, under the Presidency of Pandit Nehru; the other delegates were to be Sir Charles Darwin, Sir Ronald Fisher, and Sir Harold Spencer Jones. D'Arcy was greatly elated at the invitation and told his family when they remonstrated with him as to the advisability of the journey that he was as well as he had been for years, which was in point of fact true. The only thing that would have prevented him from going was my mother's health, for she was just recovering from a serious illness, but on consultation with her doctors he was told that she was convalescent, and so he determined to go. He wrote to Dr. George Sarton on Christmas Eve 1946:

> It is a long journey for an old man like me; but the opportunity came, and the temptation was too great to be resisted. Besides the Taj, I want to see Fatenput Sikri, and the Lodi tombs at Delhi; and Tutankhamen as we pass through Cairo. And when I have seen all these things, and then the Pyramids and the Sphinx, I shall feel a little more like saying my 'Nunc dimittis in pace servum tuum'.

He left home on Boxing Day, walking to the station and carrying his small shabby attaché case. A colleague saw him and shouted 'Hallo, D'Arcy, off to Dundee?' 'No', replied D'Arcy, 'Delhi'. He travelled south in freezing weather. The first plane in which the party were to leave London broke down, and the second one was delayed for hours, and in the midst of a severe snowstorm D'Arcy had to drive to and fro from the airport and hang about waiting for the departure. The great changes of climate on the journey from one extreme to another were very trying and even before reaching India he was not well, added

to which he had found the necessary inoculations very trying. Once arrived in Delhi he gave his lecture on the skeletal structure of birds (carrying in a live hen under his arm as an exhibit): he was given an Honorary Degree at the hand of Lord Wavell, the Chancellor of the University; he was garlanded with flowers in the traditional way; but he did not do many of the things he had wanted to do, and was so far from well that he was flown home again with the least possible delay. He had at least seen the Great Pyramid, and 'the Great Pyramid is worth going far, and through much to see', but it had all been too much for him and on his return he was laid up for a couple of months. By the end of March he began to get about again. It happened that the spring of 1947 was one of the most severe for years, and snow lay on the ground even on Easter Day. On a bitterly cold evening D'Arcy insisted on going out to hear Professor Emil Brummer—an old friend—give one of the Gifford Lectures in the University. It was an act of courtesy for which he was not able; he took pneumonia and was seriously ill again.

Shortly after this his second great glossary was published and he was much cheered, for he had waited for it impatiently. *The Glossary of Greek Fishes* was a companion volume to *The Glossary of Greek Birds*, and one reviewer wrote: 'No-one else —except the author of "The Anatomy of Melancholy"—could have written them and no-one else would have wanted to write them.' The delay in publication through the war had been inevitable, but D'Arcy had often feared that he would not see his work in print. His relief at its appearance was tempered with sadness at parting from the friend and companion of a lifetime. The contents are extraordinarily rich and varied, for hundreds of sea-creatures (sponges, star-fishes, cuttle-fish, &c.) are listed with references to Greek authors, where they are found, their description, and identification. Even for those who have no classics the volume is full of stories and (as D'Arcy said) 'unnecessary bits of information'. In his Preface he calls this second Glossary 'a work of love and predilections' (though once he had referred to it as 'a mere thing in book's clothing') and he adds, 'a few more years spent on it would have been

worth the while; but the night cometh when a man can work no more'.

At the same time he had a singular pleasure in the joint dedication by Dr. Charles Singer and C. Rabin of their book *A Prelude to Science* to him and to Sir Charles Sherrington. The conjunction with his old friend doubled his pleasure.

He was well enough to enjoy his eighty-seventh birthday on 2nd May, with a bottle of wine to celebrate it, and good wishes from many friends all over the world, but he was depressed by his weakness, and a week later wrote, 'my long run of good health and great happiness has come to an end'. During the summer he was able to go for short walks and even to have a few weeks away from home in Perthshire, but at the end of August he was again in bed with another attack of pneumonia. Molly had by now come home after demobilization, and this was a comfort to both parents.

The following winter to his great grief D'Arcy could not go out or return to the laboratory, but he kept in touch with the department and the re-equipping of the Gatty Marine Laboratory which was going on at the time, and he discussed the boat that was being built for deep-sea dredging and the outboard motor for the dinghy. The Museum was as close to his heart as ever; one Monday morning he sent for Mr. David R. R. Burt, and showed him a cutting from a Sunday newspaper: 'Wanted, a home for an elephant.' This was the skeleton of an elephant that the Stewartry Museum in Kirkcudbright wished to dispose of. 'Where can we put it?' he asked, and when some suggestion had been made, he said, 'Drop them a line and say we can give it a home', and so some time later the elephant came to St. Andrews. The last letter that he dictated on behalf of the laboratory was one to Dr. J. E. Hamilton in the Falkland Islands, thanking him for the body of a Kelp Pigeon, or Sheath Bill—a rather rare Antarctic bird.

During these months he took the three Honours students of the year, talking and expounding to them from his armchair by the fire in the dining-room. His subject was the history of Natural History, with particular emphasis on the Pre-Linnean

naturalists. He brought out for them the vellum-bound quartos he had collected and loved so much—Belon, Fuchs, Gesner, and many another. One day as he read aloud to them he seemed to be hesitating somewhat, and one of the girls fearing that he was less well said, 'Are you tired Professor, shall we go now?' but he replied, 'My dear child, I am not tired. I happen to be reading you a piece of medieval Italian, and I find the translation a little difficult, hence my hesitation.'

Many friends visited him, and hardly a day passed without visits from colleagues, and from Tom Lockie, his devoted laboratory man. He loved to have letters and to write them. One to an old friend, Miss Mary Cobb of Boston, Mass., was sent back for inclusion in this volume.

St. Andrews. 1948.

. . . As for the Riches of this World, I use no Labour for them, I have no Desire to attain them . . . ; my Riches are my Opportunities to do good, and those Illuminations of my Mind which furnish me for it.

As the months went by he grew gradually weaker, and any exertion sent him back to bed with a recurring fever; his great vitality was gone. As the realization was borne in upon him that the end was approaching he knew great tribulation of mind. He had lived, in his own words, 'as if immortal', and it was as if in a childlike way he believed it, and now he was bewildered by his loss of strength. He had often said how he dreaded the thought of a long drawn-out illness, and that a man who suffered thus was indeed to be pitied: in his last year he knew just such suffering.

Of D'Arcy's religious beliefs it is enough to notice that among his last writings are these significant sentences:

One may believe and dis-believe a thousand things but I know that only the fool hath said in his heart etc. etc.

I believe there are a good many men of our time who begin with simple faith and lose it; and who are trying very hard after they grow old to get something like it back again.

These were words written from the heart. In his early thirties he left the orthodox faith in which he had been brought up, and, like other scientists of his day, was borne on a stream of agnosticism throughout many years of inquiry and speculation. But before the end he returned to the beliefs of his youth, to the faith from which he had grown away, and which he found again to his comfort.

My mother was by this time very frail in body though still strong in spirit, and was almost entirely in bed, but every day when well enough she was carried upstairs to D'Arcy's room. He was upheld and encouraged by her fortitude and simple piety. Every evening they exchanged little notes, D'Arcy's to the end pathetically hopeful of betterment and courageously thinking of her rather than of himself.

His last official act was to compose his report as Regent for the students who were in his charge, and he did it with the care and thought he had always given to the young, though it was written from 'a weary sick-bed'. To the end he thought of others, caring for those he was to leave behind, using what was left of his strength to see that all was in order, thinking of every detail and leaving nothing undone.

One last tribute was yet to come. In April 1948 Dr. Charles Singer, President of the British Society for the History of Science, wrote that D'Arcy, with his friends Sir Charles Sherrington and Dr. George Sarton, had been elected the first honorary members of the Society. In the same month the Athenaeum Club elected him a Life Member. His Life Membership was not for very long.

On the morning of 21st June the end came. His nurse had just left him when his bell rang; by the time she had run upstairs D'Arcy was dead. By his side was his worn old copy of *The Pilgrim's Progress* open at the last page: 'So he passed over, and all the trumpets sounded for him on the other side.'

My mother did not live for long without him. Feeling that her work was done, she put her own affairs in order and seven months later on 6th February 1949, she followed him: in death they were not divided.

EPILOGUE

It is often said that great men combine opposing qualities within themselves; certainly D'Arcy Thompson had this characteristic. He was a conservative, a traditionalist in the fullest sense of the word; he loved the past, its learning, its history, its paintings, its architecture, but he was at the same time a child of the scientific age and he used his knowledge of the past to forward his discoveries in the present.

He was both aristocrat and democrat. His birthright did not mark him out from his fellows, but in his mind there was a quality of distinction that set him apart. Though he held the Greek conception that men are not and cannot be equal, yet he treated the most lowly with courtesy and consideration, for he combined with a certain arrogance a truly humble heart.

The love of freedom was strong within him, freedom to go whither he would, to speak and write what he thought, yet he could admire the Germany of Hitler before 1939 and look with tolerance on the Soviet way of life.

He combined a deep love of his country with outspoken criticism of whatever government was in power and of its conduct of affairs. He could be cynical of the role of the Crown in the twentieth century and yet show deep loyalty to the person of the Sovereign.

He was both a gregarious man and a lover of solitude. He loved to travel and mix with his fellows, yet in his home he wanted only his family around him, and to be uninterrupted in his daily routine.

He once wrote: '(Sir Thomas) Browne's education had made him a cosmopolitan at heart, no common character in England then or now. His lot had cast him in a provincial town.' So it was with D'Arcy. From the town where he was born to that in which he died there are not more than sixty miles; therein he had spent much of his life, yet he too was a cosmopolitan at heart.

And now as I look back over my father's life there come to

mind his own words, said of a man he greatly loved: 'After some years one forgets his great intellectual gifts and only remembers his sterling character, his simplicity, truth and purity of heart.'

POSTSCRIPT: D'ARCY THOMPSON AND *GROWTH AND FORM*

By P. B. MEDAWAR, F.R.S.

D'Arcy Wentworth Thompson was an aristocrat of learning whose intellectual endowments are not likely ever again to be combined within one man. He was a classicist of sufficient distinction to have become President of the Classical Associations of England and Wales and of Scotland; a mathematician good enough to have had an entirely mathematical paper accepted for publication by the Royal Society; and a naturalist who held important chairs for sixty-four years, that is, for all but the length of time into which we must nowadays squeeze the whole of our lives from birth until professional retirement. He was a famous conversationalist and lecturer (the two are often thought to go together, but seldom do), and the author of a work which, considered as literature, is the equal of anything of Pater's or Logan Pearsall Smith's in its complete mastery of the *bel canto* style. Add to all this that he was over six feet tall, with the build and carriage of a Viking and with the pride of bearing that comes from good looks known to be possessed.

D'Arcy Thompson (he was always called that, or D'Arcy) had not merely the makings but the actual accomplishments of three scholars. All three were eminent, even if, judged by the standards which he himself would have applied to them, none could strictly be called great. If the three scholars had merely been added together in D'Arcy Thompson, each working independently of the others, then I think we should find it hard to repudiate the idea that he was an amateur, though a patrician among amateurs; we should say, perhaps, that great as were his accomplishments, he lacked that deep sense of engagement that marks the professional scholar of the present day. But they were not merely added together; they were integrally—Clifford Dobell said chemically—combined. I am trying to say that he was not one of those who have made two or more separate and

somewhat incongruous reputations, like a composer-chemist or politician-novelist, or like the one man who has both ridden in the Grand National and become an F.R.S.; but that he was a man who comprehended many things with an undivided mind. In the range and quality of his learning, the uses to which he put it, and the style in which he made it known, I see not an amateur, but, in the proper sense of that term, a natural philosopher—though one dare not call him so without a hurried qualification, for fear he might be thought to have practised what the Germans call *Naturphilosophie*.

This book has described D'Arcy's life in its daily setting; let me now try to describe the environment in which D'Arcy the scientist lived and worked. When D'Arcy flourished, British zoology, after fifty years, was still almost wholly occupied with problems of phylogeny and comparative anatomy, that is, with the apportioning out of evolutionary priorities and the unravelling of relationships of descent. Comparative anatomy has many brilliant discoveries to its credit; for example, the discovery that the small bones of the middle ear—those which transmit vibrations from the ear drum to the organ of hearing—are cognate with bones which in the remote ancestors of mammals had formed part of the hinges and articulations of the lower jaw; that the limbs of terrestrial vertebrates had evolved along a just discernible pathway from the paired fins of fish; that the muscles which move the eyeballs derive in evolution from the anterior elements of a segmental musculature which at one time occupied the body from end to end. But although later work refined upon them or corrected them here or there, all these discoveries had been made in the nineteenth century. When D'Arcy took his chair, the great theorems of comparative anatomy had already been propounded, and nearly all the great dynasties in the evolutionary history of animals were already known. By 1917, the date of the first edition of D'Arcy's essay *On Growth and Form*, British zoology was far gone in that decline from which a small group of 'comparative physiologists' were to rescue it in the middle twenties—in due course (it has been rudely said) to impose upon it a hegemony of their own.

The work of phylogeny and comparative anatomy is not yet all done. We are still uncertain about the affinities of whales, though we may be quite sure that purely anatomical research will not reveal them; the comparative anatomy of the lymphatic system has hardly been attempted; and there is doubtless much to be done among the parish registers of evolution, in the attempt to trace lines of descent within families of animals, or even within genera. But comparative anatomy is no longer thought of as the central discipline of zoology; D'Arcy Thompson was the first man in this country to challenge its pretensions and to repudiate the idea that zoological learning consisted of so many glosses on an evolutionary text.

In D'Arcy Thompson's earliest writings there is little to suggest that he would one day slough off the coils of evolutionary anatomism, though one of his papers—'On the Nature and Action of certain Ligaments', 1884—is evidence that he was interested in bones for how they worked rather than for what they might have to say about their owners' evolutionary credentials. Later, writing again of ligaments, he said:

> The 'skeleton', as we see it in a Museum, is a poor and even a misleading picture of mechanical efficiency. From the engineer's point of view, it is a diagram showing all the compression-lines, but by no means all of the tension-lines of the construction; . . . it falls to pieces unless we clamp it together, as best we can, in a more or less clumsy and immobilized way. In preparing or 'macerating' a skeleton, the naturalist nowadays carries on the process till nothing is left but the whitened bones. But the old anatomists . . . were wont to macerate by easy stages; and in many of their most instructive preparations, the ligaments were intentionally left in connection with the bones, and as part of the 'skeleton'.

Whitened immobile bones, rearticulated with bits of wire, were indeed symbolic of the evolutionary anatomism which had 'all but filled men's minds during the last couple of generations'.

The treatment of bones and other bodily structures as so many archives of evolution angered D'Arcy for two chief reasons; first, because his contemporaries and immediate predecessors (it is difficult to speak of the contemporaries of a man

who lived so long, but here and elsewhere I centre his life about the year of the publication of *Growth and Form*) had no real curiosity beyond the evolutionary pedigree of an organism or an organ: any inquiry into the action of contemporary physical causes seemed to them to belong to some other science; and secondly because the comparative anatomists, in spite of their devotion to the study of its consequences, were no more than idly curious about the *mechanism* of evolution; they accepted the contemporary and far from adequate form of Darwinism in much the way that nicely brought up people often accept their religion, that is, in a manner that contrives to be both tenacious and perfunctory. D'Arcy's own opinion was that we should look to the action of contemporary and immediately impingent physical causes for the explanation of an animal's growth and form. What causes the spicules of sponges to take their characteristic shapes? D'Arcy sought the answer in the phenomena of crystallization and of adsorption and diffusion, instead of being content with the explanation for which he makes Minchin spokesman, viz. that 'The forms of the spicules are the result of adaptation to the requirements of the sponge as a whole, produced by the action of natural selection upon variation in every direction', and that their regular form is 'a phylogenetic adaptation, which has become fixed and handed on by heredity, appearing in the ontogeny as a prophetic adaptation'. For sponges and spicules one could substitute other organisms and other organs: the formula would accommodate all comers. Then again, D'Arcy tried (very imperfectly to be sure) to envisage how the physical forces acting upon them might have shaped the shells of the Foraminifera, instead of being content to see in their diverse patterns no more than the branches of a hypothetical family tree. In embryology, evolutionary anatomism seemed particularly inexcusable, for real embryos, unlike hypothetical ancestors, are tangible present objects, and amenable therefore to 'causal' investigation in the sense in which the physicist employs that term. Yet Hertwig declared for *post hoc, propter hoc*, holding that the chronological anatomy of embryos provided causes sufficient to explain development, and

Balfour valued embryology mainly for its testimony of descent. Of course, it was not D'Arcy himself, but long before him Roux and His who founded modern analytic embryology by trying to introduce a little dynamics into evolutionary dynastics; but for so long did the spirit of anatomism prevail that even when I was a student at Oxford, the causal analysis of development was separated from descriptive embryology and treated as a thing apart. No wonder D'Arcy was an anti-Darwinian! Believing as he did that present phenomena should be explained by present causes, he saw the appeal to deep historical antecedents as an evasion of responsibility—all the more culpable for being made with the authority of what was, at the time, a most imperfect evolutionary theory.

Here I believe that D'Arcy was as much in error as those whose doctrines he endeavoured to correct. I must make my point at length, because it is the substance of the charge that D'Arcy was somehow 'unbiological' in his way of thinking, and it explains why, although he was surely right to be annoyed with his more austerely anatomical colleagues, they in their turn were not wholly to blame in feeling annoyed with him.

Consider the argument set out in Chapter XVI, 'On Form and mechanical Efficiency', in the essay *On Growth and Form*. Here D'Arcy tells us, amongst other things, of the fitness to their several purposes of bone and bones. The shafts of the humerus and femur are hollow cylinders of a dense compact bone which is thicker in the middle than at either end, for it is sound engineering to have the thickness vary with the bending moments. At each end the shafts widen, and the compact bone thins out, enclosing within it a thick layer of bone of a more open texture—cancellar bone, made of intersecting laminae or trabeculae of bony matter. In a section cut lengthwise through the head of, for example, the human femur, one can see that the bony trabeculae are not arranged haphazardly, but that they form two systems of curves, intersecting roughly at right angles, which are (to a fair approximation) a structural embodiment of the system of stresses to which the bone is exposed in normal life. (It is an old story this, which goes back to Julius

Wolff and Herman Meyer.) The entire arrangement clearly represents an adaptation: what kind of adaptation could it be?

The trabeculae, D'Arcy reminds us, are not permanent structures: they are constantly being broken down and formed anew, and if by mischance a bone should be broken and should reunite in some abnormal fashion, the trabeculae will shape themselves into a new pattern governed by the new and altered system of stresses and strains. This, then, should give us almost direct evidence of what must happen in ordinary development: the trabeculae begin by being 'laid down fortuitously in any direction within the substance of the bone' but end in that functionally apt pattern which seems so clearly to represent the engravery of usage. 'Here, for once, it is safe to say that "heredity" need not and cannot be invoked to account for the configuration and arrangement of the trabeculae: for we can see them, at any time of life, in the making, under the direct action and control of the forces to which the system is exposed.' D'Arcy could have drawn the same conclusion from a study of the forms of joints, for when a long bone is broken and the broken ends fail to reunite, they sometimes become hinged to each other in what is anatomically an almost perfect joint. What better evidence could there be that joints, with all the niceties of their patterns of articulation, are shaped by use?

Yet they are not so. For all their fitness to mechanical purposes, the patterns of bone and bones are not, in the first instance, moulded by the demands of use; the evidence of remodelling and regeneration shows that they *could* be so, and that under special circumstances they are so; but bones will develop in an anatomically almost perfect fashion even when deprived of innervation or transplanted into positions where they can neither move nor be moved. To explain the shapes of bones we must look elsewhere than to the mechanical forces that act in an individual's own lifetime. We need not doubt that D'Arcy's forces acted once upon a time in directing the pathway of evolution, but if that is so, then the problem is just what D'Arcy supposed it not to be: a matter of history. The whole point is that the forces which did at one time shape limbs, or set

the limits within which the shapes of limbs must fall, were translated into those developmental *instructions* about limb-making that now form part of our genetic heritage; the problem of the development of limbs is, first, to break the chemical code which embodies the instructions, and second to find out how the instructions take effect. Here, too, lies the sense of that venerable old antithesis between 'preformation' and 'epigenesis': the instructions are ready-made, but their fulfilment is epigenetic: heredity proposes and development disposes. No one denies the essential truth of what D'Arcy Thompson had to say about the influence of physical and mechanical forces; he simply mistook their context. Perhaps he was aware of having done so when, on a later page, he admits that 'a principle of heredity' may have much to do with the matter. But he never quite realized that he and the comparative anatomists were giving not rival answers to the same question but different answers to two different questions. D'Arcy's answer is to the question: 'What physical agencies formed the basis of natural selection, and so caused one particular set of instructions about limb-formation to prevail?' So construed, all that he has to say is relevant. After all, the elementary forces whose action he contemplated were no different in any yesterday from what they are at present: 'a snow crystal is the same today as when the first snows fell'.

Because he spoke out impatiently against contemporary orthodoxy, D'Arcy Thompson is often thought of as a great innovator; but the angle subtended between an innovator and his contemporaries gets smaller in the more distant view, and at a distance of forty years it no longer seems to us that he stood so far to one side of his anatomical colleagues. Anyone who reads *Growth and Form* attentively will soon discern that D'Arcy was an anatomist himself; the life that appears in his pages is usually still life, and it was product rather than process that usually engaged his attention. I am well aware that his conception of form was essentially dynamical; but though he did indeed declare that any given shape was to be thought of in terms of some orderly array of inequalities of growth-rates, yet in his 'Method of Transformations' (which I shall mention

later) he did in fact compare the final products of two processes of transformation and not the processes themselves.

If D'Arcy was an anatomist, he was the first completely modern anatomist, in that his conception of structure was of molecular as well as of merely visible dimensions, his thought travelling without impediment across the dozen orders of magnitude that separate the two. The advances that have occurred in modern biophysics and structural biochemistry are comprehended within D'Arcy's way of thinking. We all now understand, though the idea was revolutionary in its day, that molecules themselves have shapes as well as sizes: some are long and thin, others broad and flat, some straight, some branched. We also know that crystalline structure is enjoyed by the huge molecules of proteins, nucleic acids, and polysaccharides as well as by the 'crystalloids' of an older terminology, and that the structure of the cell surface and of some of the 'organelles' enclosed by it must be interpreted in molecular terms. D'Arcy would have delighted in the modern X-ray crystallography of 'biological' compounds and in the penetrating insight of the higher powers of the electron microscope; particularly would he have rejoiced in the modern solution of the structure of desoxyribonucleic acid—a brilliant feat of chemical anatomy that provides us for the first time with some physical conception of the 'gene'. Biology, and the chemistry and physics that go with it, have grown more rather than less anatomical in recent years, and the anatomy is indeed Thompsonian, one which recognizes no frontier between biological and chemical form.

This is the right moment to explain D'Arcy's own 'philosophy' of living organisms. He believed (*a*) that the laws of the physical sciences apply to living organisms, and (*b*) that living organisms do nothing to contravene those laws. These propositions are sometimes taken to import that biology is, or soon will be, nothing more than a kind of super physics-and-chemistry. In reality they do nothing of the kind. Biology deals with notions that are contextually peculiar to itself—with heredity, development, and sexuality; with reflex action, memory, and

learning; with resistance to disease and disease itself. These things are no more part of physics and chemistry than is the Bank Rate or the British Constitution. We are mistaking the direction of the flow of thought when we speak of 'analysing' or 'reducing' a biological phenomenon to physics and chemistry. What we endeavour to do is the very opposite: to assemble, integrate, or piece together our conception of the phenomenon from our particular knowledge of its constituent parts. It was D'Arcy's belief, as it is also the belief of almost every reputable modern biologist, that this act of integration is in fact possible. He stopped short of supposing that the act of integration would eventually irrupt upon matters of the spirit: 'Of how it is that the soul informs the body, physical science teaches me nothing: . . . nor do I ask of physics how goodness shines in one man's face, and evil betrays itself in another.' But D'Arcy makes no other mention of these matters, and nor shall we.

The essay *On Growth and Form* (so he described it, though it is nearly 800 pages long) was D'Arcy's magnificent attempt to put his philosophic principles to work. The attempt was successful in so far as it depended upon his geometrical insight, and courageous (though inevitably often faulty) whenever the physicist got the upper hand. The biologist in him, strangely enough, was the weakest member of the team. D'Arcy's treatment of Form, then, is generally illuminating, particularly when he tells us how pervasive are certain elementary forms—the unduloid and catenoid, as well as their simpler relatives the sphere and cylinder; the logarithmic spirals of the horns and shells that grow by accretion while remaining unchanged in shape, the geodetic lines of the thickenings of plant cell walls, the geometric packing adopted by cellular aggregates. When it came to the physicist's turn, and the attempt to explain the shapes of cells or of spicules, or the mechanisms of amoeboid movement or phagocytosis, then indeed his simple armament of surface tension, viscosity, diffusion, and adsorption was not powerful enough by far. We cannot reproach D'Arcy for having failed to solve problems which, most of them, defy us yet; but it is a fair comment that D'Arcy himself made no move

to solve them, whether by doing experiments himself or by suggesting experiments which might have been done by others.

D'Arcy Thompson was sometimes accused of being too much the geometer in his way of thinking, because of his determination to see simple regularity where a literal-minded person would say it did not exist: the spheres he saw were not quite spherical, the polygons not quite regular, the transformations not quite orthogonal, the bony trabeculae an inaccurate representation of stress and strain. It is an old and wearisome story, and in finding this new context for it I believe that D'Arcy's critics were completely wrong. Surely we must always begin by seeking regularities. There is *something* in the fact that the atomic weights of the elements are so very nearly whole numbers; that there is a certain periodicity in the properties of the elements when they are written down in the order of their ascending weights; that hereditary factors tend to be inherited not singly but in groups equal in number to the number of pairs of chromosomes. Unless we see these regularities and strive to account for them, we shall not equip ourselves to understand or even perhaps to recognize the existence of isotopes, the significance of atomic number, or the phenomenon in genetics of 'crossing over'. We act either as D'Arcy does, simplifying and generalizing until the facts confute us, or, like those in whom Bacon saw a chief cause of the retardation of learning, we must betake ourselves to 'complaints upon the subtleties of nature, the secret recesses of truth, the obscurity of things, and the infirmity of man's discerning power'.

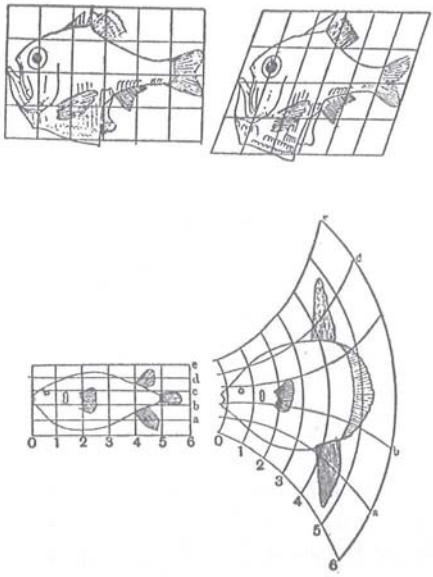
D'Arcy must be acquitted of the charge of striving without just reason for simplicity, but the charge that the biologist in him was strangely unperceptive cannot so easily be dismissed. Here is an example taken from *Growth and Form* in which even a layman should be able to see a certain perversity of reasoning. It comes from Chapter II, 'The Rate of Growth'.

To us nowadays, as fifty years ago to the Bostonian anatomist Minot, it seems obvious that the *norm* of biological growth—the standard to which all actual instances of growth must be referred—is growth by compound interest, sometimes called

logarithmic or exponential growth. A house grows by accretion: the bricks which represent the unit increments of its growth stay put and do not grow themselves. But the central characteristic of biological growth is that that which is formed by growth is itself capable of growing: the interest earned by growth becomes capital and thereupon earns interest on its own behalf. We must therefore plot the growth of organisms not against an ordinary arithmetic scale, equal subdivisions of which represent equal additions of size, but against a logarithmic scale, of which equal subdivisions represent equal *multiples* of size. The simplest case is when the interest earns interest at the same rate as the capital to which it is added; in such a case, the logarithm of size will give a straight line when plotted against age. D'Arcy missed the point of Minot's appeal that this was the form in which curves of biological growth should be represented, just as, later, he was to miss the point of J. S. Huxley's analogous treatment of the phenomenon of differential growth, in which the multiplication-rate of one part of the body is measured against the rate of multiplication of another. D'Arcy preferred to deal with the arithmetical or 'simple interest' type of growth curve, with its first derivative, growth-rate, and its second derivative, acceleration of growth. This treatment not only hid from him much that was important, but led him to attach importance to things of no great weight—for example, the time of life at which the arithmetic growth-rate is at a maximum, seen as the point of inflexion of the integral curve of growth.

The best and most famous chapter of *Growth and Form* is that which embodies D'Arcy Thompson's own most completely original contribution to biology: the Method of Transformations, in the chapter 'On the Comparison of Related Forms'. Consider the shapes of two organisms of related genera. Being closely related, the two shapes will be 'homeomorphic'—that is, roughly speaking, they will be qualitatively the same, so that the one could be changed into the other, as two different faces could be, by some process of plastic remodelling. But although two such shapes may be qualitatively similar, they

will in fact differ in a multitude of particular little ways. The anatomist's method of comparing shapes is to do so piecemeal, feature by feature, with perhaps an occasional measurement of proportion. D'Arcy saw that all these particular little differences



of disposition, angle, length, and ratio might be simply the topical expressions of some one comprehensive and pervasive change of shape. He grasped the transformation *as a whole*. So it might be, for example, with the change of shape produced by distorting a sheet of rubber on which has been drawn a house, or face, or any other figure whatsoever: the shapes of the drawings change in every single particular, but the transformation as a whole might be defined by some quite simple formulae describing the way in which the rubber had been stretched. So also with the transformation that may be produced by tilting a lantern screen away from its normal perpendicular position; whatever is shown on the screen will be transformed in every detail, but in a manner which can be summarily defined by

formulae expressing the direction and the degree of tilt. In all such cases the best way of grasping the transformation is to take, as its subject, some simple and regular figure; for mathematical purposes one takes the ordinary 'Cartesian grid' of graph-paper, an orthogonal system of equally spaced straight lines. This was the way in which D'Arcy expressed the relationship between *Diodon* and *Orthagoriscus* (lower figures) or between *Argyropelecus* and *Sternoptyx* (upper figures), to choose two among the best of a number of good examples. The grids superimposed upon these figures give one instantly the sense and trend of the transformations; we may think, if we like, that *Orthagoriscus* is a *Diodon* living in some quite remarkably non-Euclidian principality of the ocean, or that *Diodon* is an *Orthagoriscus* of ordinary cartesian seas. The lesson to be learnt is that we do not have to seek a hundred different explanations of the hundred particular differences between the one form and the other; *one* system of 'morphogenetic forces' may perhaps account for all the differences between the two.

It is hardly necessary to say that the whole treatment is an over-simplification, and that the transformations figured by D'Arcy could not conceivably have happened in real life. In real life, one adult does not change into another adult, but two related embryos turn into two related adults. However, D'Arcy's somewhat elliptical treatment does not make his one important lesson any the less clear. The reason why D'Arcy's method has been so little used in practice (only I and one or two others have tried to develop it at all) is because it is analytically unwieldy. The methods later developed by J. S. Huxley, though far less comprehensive and ambitious, were much more usable and informative, and they were widely taken up from the moment they were first described. D'Arcy Thompson gave rather perfunctory praise to these developments, believing Huxley's methods of analysis to be implicit in his own. It is in the 'New Edition' of *On Growth and Form*, of 1942, that D'Arcy hints at this opinion; I have been writing all the time of the edition that came out at the corresponding period of the First World War. D'Arcy's reputation as a scientist rests almost

wholly upon this 'Old' edition, and some of D'Arcy's colleagues thought him unwise in his attempt to bring it up to date.

There is one more thing to be said of *Growth and Form*, and perhaps it is the most important thing of all; it relates to an accomplishment in which D'Arcy himself took the utmost pride, and in which he knew in his heart he had no equal. I think that *Growth and Form* is beyond comparison the finest work of literature in all the annals of science that have been recorded in the English tongue. There is a combination here of elegance of style with perfect, absolutely unfailing clarity, that has never to my knowledge been surpassed. To be sure, much of D'Arcy's writing sounds old fashioned—his prose has a longer stride than we can keep up with nowadays—and the scholarly allusions and digressions and the little graces of writing may be somewhat overdone; but this and all the other decorative matter is simply the *fioritura* of the perfectly accomplished singer. *Growth and Form* will remain for ever worth reading as a text in the exacting discipline of putting conceptions accurately into words.

The influence of *Growth and Form* in this country and in America has been very great, but it has been intangible and indirect. It is to be seen in anyone who, having read it, tries to write a little more clearly and with at least an attempt at grace; or who realizes, perhaps for the first time as he turns its pages, that science cannot be divided into what is up to date and what is merely of antiquarian interest, but is to be regarded as the product of a growth of thought. Most clearly of all is it to be seen in the complete matter-of-factness with which we now accept certain beliefs that D'Arcy, as a natural historian, had to fight for: not merely that the physical sciences and mathematics offer us the only pathway that leads to an understanding of animate nature, but also that the true beauty of nature will be revealed only when that understanding has been achieved. To us nowadays it seems obvious that the picture we form in our minds of Nature will be the more beautiful for being brightly lit. To many of D'Arcy's contemporaries it must have seemed strange and even perverse that he should have combined a

physico-mathematical analysis of Nature with, at all times, a most intense consciousness of its wonder and beauty; for at that time there still persisted the superstition that what is beautiful and moving in Nature is its mystery and its unrevealed designs. D'Arcy did away for all time with this neo-romantic nonsense: a clear bright light shines about the pages of *Growth and Form*, a most resolute determination to unmake mysteries.

It is by such diffused and widely pervasive effects as these that we must measure the influence of *Growth and Form* upon biological science. Of direct influence, that can be traced in pedigrees of teaching or research, there is little. In a generation's time there will be no one alive who heard D'Arcy's lectures, and no one to declare from personal knowledge that he knew the animal kingdom inside out. D'Arcy had only one pupil of more than ordinary distinction, and *he* made his name in descriptive zoology of a most un-Thompsonian kind. D'Arcy founded no school, as Sherrington did, so that no lineage of research can be traced back directly to sources in his mind. But then, he did no research in the modern sense; he was, as I said to begin with, a natural philosopher, one who by reflection rather than by intervention or experiment arrived at a certain imperfect but nevertheless whole conception of that science in which God has been slowest to reveal Himself a geometer. It was a conception expressed for the most part in a modern scientific idiom, and with a beauty and clarity of writing that may never be surpassed.

APPENDIX I

LIST OF PRINCIPAL PUBLICATIONS OF D'ARCY WENTWORTH THOMPSON

1883 *The Fertilisation of Flowers.* By H. Müller. Translated and edited by D'Arcy W. Thompson. With a Preface by Charles Darwin. Macmillan.

1885 *A Bibliography of Protozoa, Sponges, Coelenterata, and Worms, including also the Polyzoa, Brachiopoda and Tunicata, for the Years 1861–1883.* Cambridge University Press.

1886 John Ray. Encycl. Britannica, vol. 20.

1895 *A Glossary of Greek Birds.* Clarendon Press.

1909 *The Pycnogonida. Cambridge Natural History*, vol. iv.

1910 *Aristotle: Historia Animalium.* Translated and edited by D'Arcy W. Thompson. (*The Works of Aristotle*: translated under the editorship of J. A. Smith and W. D. Ross; vol. iv.) Clarendon Press.

1911 *Magnalia Naturae; or the Greater Problems of Biology.* Presidential Address to the British Association (Section D), Portsmouth, 1911. *Brit. Ass. Rep. Nature*, 87. Reprinted in *Smithson, Instn. annu. Rep.*; St. Andrews University Memorial Volume, 1911; *Bol. Soc. esp. Hist. nat.*, November 1911.

1913 *On Aristotle as a Biologist; with a Prooemion on Herbert Spencer.* Being the Herbert Spencer Lecture delivered before the University of Oxford, on February 14, 1913. O.U.P.

1915 *Morphology and Mathematics.* Trans. Roy. Soc. Edinb., 50.

1916 *The Greek Fauna.* (*A Companion to Greek Studies.* Edited by L. Whibley. C.U.P.)

1917 *On Growth and Form.* C.U.P.

1921 *Natural Science: Aristotle.* (*The Legacy of Greece*; edited by R. W. Livingstone. Clarendon Press, 1921.)

1934 *Fifty Years Ago, in the Royal Society of Edinburgh.* An Address delivered on 7 May 1934, in Commemoration of the 150th Year of the Society. Proc. Roy. Soc. Edinb., 54.

1936 *A Glossary of Greek Birds.* A new edition (St. Andrews University Publications, No. 39.) O.U.P.

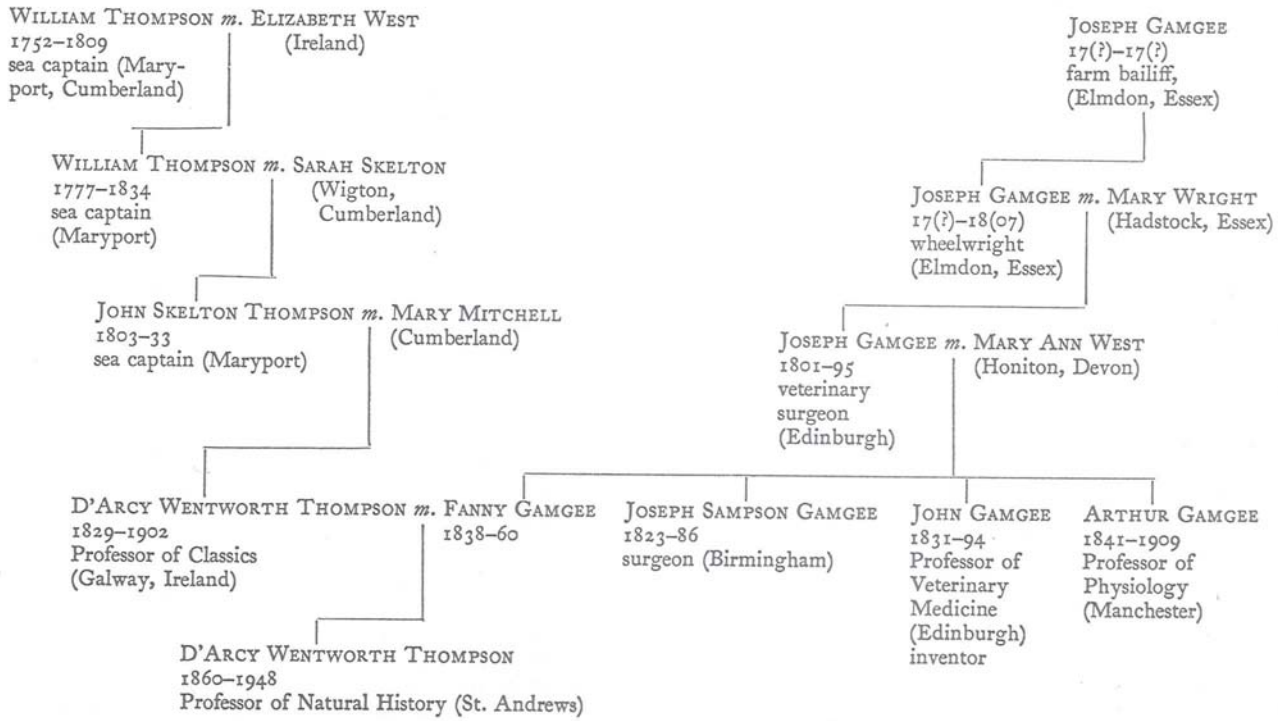
1940 *Science and the Classics.* (St. Andrews University Publications, No. 44.) O.U.P. (Essays and Addresses between 1910 and 1935.)

1942 *On Growth and Form.* A new edition. C.U.P.

1942 *The History of Science in Scotland.* (*Scotland and its People*; No. 5.) St. Andrews University Regional Committee for Adult Education.

1945 *A Glossary of Greek Fishes.* (St. Andrews University Publications.) O.U.P.

GENEALOGICAL TABLE OF THOMPSONS AND GAMGEES



APPENDIX III

ORATION DELIVERED BY THE PUBLIC ORATOR IN A CONVOCATION HELD ON 28 JUNE 1945

Sir D'Arcy Wentworth Thompson, C.B.; F.R.S.; D.Litt. (Camb.), Hon. D.Sc. (Dublin, Witwatersrand), LL.D. (Aberdeen, Edinburgh); Professor of Natural History St. Andrews University, in Dundee, 1884–1917, in St. Andrews since 1917.

Hunc tantum virum, academici, nos omnes qui in litteris versamur Graecis et Latinis pro nostro vindicamus: et quidem optimo iure, cum haud ita pridem nostrae turbae Societatibus uni et alteri praesederit. quid memorem *Glossarium* illud *Avium Graecarum* quod adhuc florente aetate confecit, assiduis postea laboribus retractavit, iam senior argumenti sui amore captus denuo edidit? quid illud referam quod tu, Domine Vice-Cancellarie, grato animo recordaris, ut olim tibi librum illum notissimum de Graecorum monumentis contexenti tractatum hic contulerit brevi spatio praeclara physicorum reperta complexum? cuius in epilogo quali humanitate, quo lepore, qua denique pietate vitam studiis nostris deditam excusat, sic fere pro se locutus:

πατρῷος ὁ βίος φιλοκαλεῖν περὶ ταῦτά μοι.

sed non me fallit, dum haec loquor, tumultuari in subselliis physicos, geographicos clamitare. 'quid', aiunt, 'bipedum impudentissime? nostrum hominem pro vestro vindicas? te, Δῖνε, obtestamur; testamur diversissimas scientiae naturalis laureas quas alii alibi gentium huic nostro detulerunt; testamur denique librum illum palmarem *De Auctu et figuris* conscriptum. natura (ne nescias) sic ab hoc viro investigata est ut nulla eius pars praetermissa sit. quin etiam, plurima necessariis mathematicorum rationibus sic conclusit ut maximam materiam ex rebus per se investigatis ad rerum occultarum cognitionem possit afferre. adde quod piscatoriis navibus vectus irretitarum belluarum genera distinguit, mores scrutatur, caecas vias recludit; haec reputa cum laxas scombris orationes tuae dabunt tunicas.'

hactenus physici, qui tamen inscii totum M. Tulli de Peripateticis

locum in huius laudationem transtulerunt. sed secet, precor, litem is de quo contenditur; quod ut faciat vel ornatior, praesento vobis unicum disciplinae liberalioris exemplar, D'Arcy Wentworth Thompson, Equitem auratum, honoratissimi ordinis de Balneo socium, Societatis Regiae Sodalem, apud Allectenses et Andreanos suos per sexaginta annos Historiae Naturalis Professorem, ut admittatur honoris causa ad gradum Doctoris in Iure Civili.

TRANSLATION OF APPENDIX NO. III

Fellow-scholars, all of us who are concerned with Greek and Latin literature claim this great man as ours: and indeed rightly so, since not so long ago he presided over our two societies.[1] Why should I mention that *Glossary of Greek Birds* which he completed while still a young man, which he afterwards worked at assiduously, and finally, possessed by love of his subject gave to the world anew in advanced age? Why should I recall the fact, which you, Vice-Chancellor, remember gratefully, that once when you were editing that well-known book on *The Legacy of Greece*, he contributed an article dealing concisely with the famous discoveries of the naturalists? In the epilogue to this, he made his excuses for a life devoted to our studies with great learning, great charm and above all great filial devotion, practically saying:

'My father's life led me to cultivate a taste for these things.'

But I am fully aware while I say this that the naturalists are rising in their seats, and that the geographers are protesting. 'What', they say, 'you impudent man? Do you claim our scholar for your side? We invoke you, Heavenly Rotation.[2] We call to witness the many different honours won in Natural Science and bestowed upon our scholar by many different countries in many parts of the world. Finally we invoke that classic that he wrote on *Growth and Form*. Nature (in case you don't know) has been so treated by this man that no branch of it has been omitted. Furthermore he has reached many conclusions by strict mathematical arguments so that he is able to add a great deal, from problems investigated by him, to our knowledge of the hidden laws of Nature. Add the fact that sailing in fishing trawlers he has classified fish caught in the net, investigated their way of life and discovered their migrations. Think of this when your speeches are used to wrap up the fish.'[3]

So much for the scientists who all unwitting have adopted the whole passage of Cicero on the Peripatetics to his praise. But I beg you, let the subject of the dispute settle it. And that he may do so with even greater honour, I present to you the outstanding example of a man of liberal education D'Arcy Wentworth Thompson, Knight, Companion of the Bath, Fellow of the Royal Society, Professor of Natural History for sixty years in Dundee and St. Andrews for admission to the honorary degree of Civil Law.

REFERENCES

[1] The Classical Association of Scotland and that of England and Wales.
[2] Cf. Aristophanes, *Clouds*, verses 380, 825 seq.
[3] Catullus, XCV. 8.

INDEX