HUGH HAMSHAW THOMAS

1885-1962

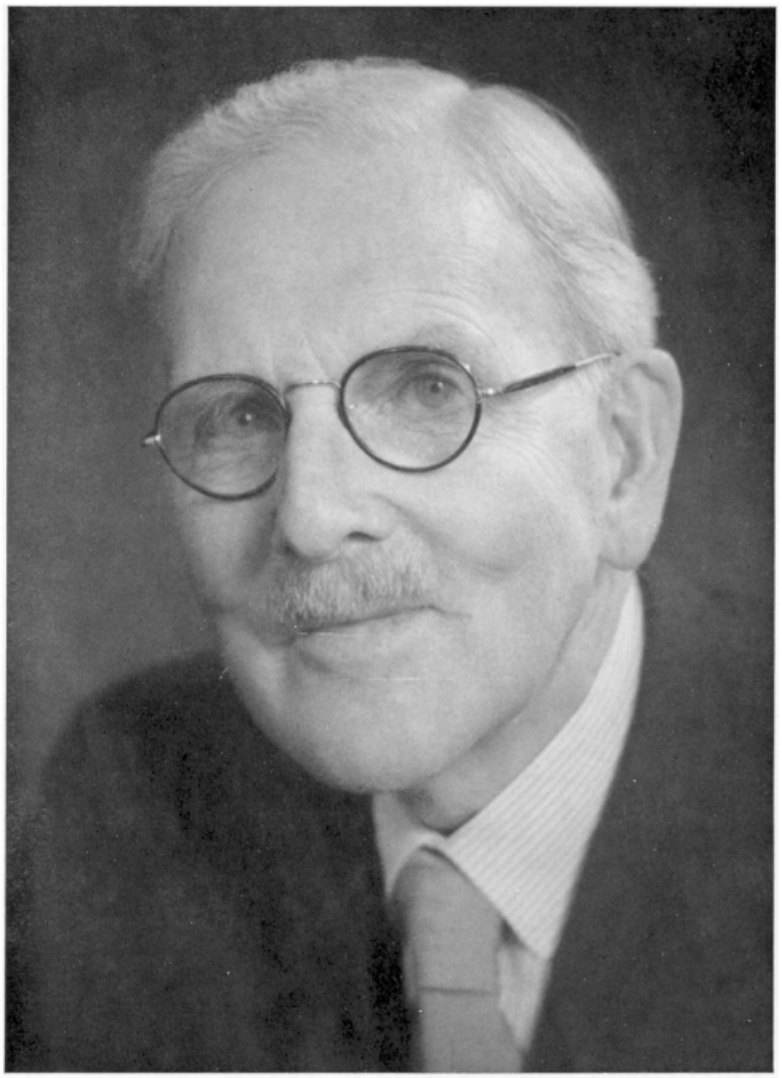
HUGH HAMSHAW THOMAS was born on 29 May 1885 in Wrexham, Denbighshire and died in Cambridge on 30 June 1962.

His home in the little Welsh town was a happy one. He was the second son of William Thomas, whose business was that of men's outfitter. William Thomas was a Congregationalist, a life-long Liberal, a J.P. and a philanthropist. He was of Cornish extraction and was descended on his mother's side from the Leicestershire Hamshaws. He went to Wrexham to do business, settled there and married a Welsh woman, Elizabeth Lloyd, whose family were farmers on the Denbighshire moors. She was a woman of great ability and loved books. Hamshaw Thomas's elder brother was to carry on the business in Wrexham and there was one sister. Hamshaw Thomas was thus half Welsh and brought up in Wales and all his life he had warm feeling for that country.

Hamshaw Thomas was educated at first at a little private school (where he is said to have been soundly grounded in English grammar and in Latin) and then at the school which was presently to become the County School and of which his father was eventually Chairman of the Governors. Here he did very well indeed and by 1904 when he left he was head-boy and had won two gold medals, one awarded by the school and the other by the Central Welsh Board's Examination. He also won an entrance scholarship to Downing College and there he went in 1904.

He chose Cambridge because his sister had gone to Newnham and he chose to study biological science through the influence of Robert Newstead, then Curator at the Chester Museum and later Professor at Liverpool. Newstead coached him in botany, which he needed to supplement his school physics and chemistry. His father's gift of a book called *The museum of science* (which he is said to have bought accidentally at an auction) awoke Hugh's interest in fossils and he made it his hobby to wander round the local coal pits collecting fossil plants.

Downing College was still a small college in 1904, and only 25 freshmen entered in that year. However, the young man rose to the need, playing games hard and working hard. Hugh played soccer and hockey, being awarded his hockey colours. The present Master of Downing told me of an incident only this spring that arose out of his hockey. Hamshaw Thomas became President of the Hockey Club and remained President all his life



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and was dining in Hall on the night when the club had won the Inter-Collegiate Hockey Cup. He called for the butler and told him to fill the Cup with burgundy and to take it to the team who were dining together. They passed it round as a loving cup and then sent it up to High Table with the Captain's compliments.

In his first two years he read botany, physics and chemistry for Part I of the Tripos and was placed in the first class. He was also awarded the class prize for organic chemistry presented by James Dewar. During this undergraduate period he continued to collect fossils and won the Kingsley Memorial prize of the Chester Natural History Society for a collection. At this time A. C. Seward was Professor of Botany and Hamshaw Thomas came under his powerful influence. (Seward was not then at Downing, he went there to be Master in 1915, after Hamshaw Thomas had become a Fellow.) The two men had high esteem for one another, but they were of remarkably different character. Seward had much of the able business executive; dominant, superbly organized; rapid in thought and decision; cheerfully engaged in a fight and when faced by a hard decision cheerfully rejecting the less good and not troubled by what had been rejected. Hamshaw Thomas thought slowly but went on and penetrated very deeply for he was always a philosopher; he was almost too much concerned with people's feelings and avoided hard decisions. Though he was courageous he hated to fight or to cause unhappiness. Fossil plants were by no means the only bond between them, there was also their mutual interest and work in developing Downing College. This brought him in close touch with Mrs Seward, who became a great friend. His marriage reception took place in their home.

It is curious that Hamshaw Thomas never took The Natural Sciences Tripos, Part II in botany, nor did he ever take any formal geology at all. In his third year he read Part II of the History Tripos and was placed in the second class. History was to fit him to enter the Civil Service, his own and his father's intention. However, he took some of the courses of Botany Part II in that year and I suspect he may have given considerable thought to fossil plants too, for his first paper, and it was a bulky one though he was junior author, was presented to the Royal Society for the *Philosophical Transactions* in November of that very year. In the next year he took the Civil Service examination, was placed first in botany, second in chemistry and was offered a post. Fortunately he did not like the post offered and decided to become a man of science. His scholarship had ended when he graduated and it was a brave decision for he was without means and in a small and then impecunious College.

So for the next years he earned his living by hard work, coaching law students for 'Little Go', giving extension lectures, earning every shilling he could. Cambridge may be as liberal now as it was then but it would now be impossible for a young man to work his passage into the right course in that way: then it *was* possible but only by grinding hard labour.

However, these were also most productive years; he played hockey, he

collected fossils on vacation, he wrote numerous papers. He was a founder member of the Marshall Ward Society, one of those little student societies of strictly limited membership and from which you resign on becoming an M.A. It was a society devoted to discussing botany and included a good many who were to become eminent; and though the Society vanished its fame lasted for years. Doubtless the members read papers on the subjects that stirred them most and Hamshaw Thomas read two, one combining fossil plant anatomy with ecology, the other the ecology and anatomy of Recent plants. His interest in the course of evolution arose later from his work on fossils and his interest in morphology later still.

His early papers were written, not from the Botany School, but from the Sedgwick Museum, with Arber or under his influence. He and Arber were great friends. The papers on plants preserved in coal balls were in the fine tradition of D. H. Scott but they did not, in technique at any rate, go beyond that tradition for they were essentially descriptions of what was visible in sections provided by professional section cutters. Methods by which the research worker could secure the sections he needed were not devised until many years later. We do, however, see in these papers an intense interest in the environment in which the plants were growing.

After this early spell in the Sedgwick Museum he came back to the Botany School for good, and he turned to the Jurassic which was to be his life's work. This was clearly at Seward's suggestion for the next two papers are on plants sent to Seward from Russia, and which Seward had not time to describe. The description is careful but I cannot see in it any of the characteristics which become plain in his work on his own Yorkshire fossils. He does deal with a cuticle and with some spores but in a rather lifeless way as though he was just doing what, for some reason, was the proper thing. He mentions the recipe for preparing them but it is incomplete.

I suspect that he took up the Jurassic flora of Yorkshire at Seward's suggestion also. Some Yorkshire naturalists had collected specimens from two or three new spots and, what was more important, some Swedes had done good work on Yorkshire plants beyond what had been done here. The undertaking must have seemed a short job to Seward, for he himself had revised this flora very well only ten years before, and had he undertaken the new work, I am sure the whole thing would have been published and ended in a couple of years.

At this time the disastrous notion prevailed in England that the proper subject of a fossil botanist's study was to be found in a museum; or it was specimens sent in by a geologist who wanted to be told their age. Even Hamshaw Thomas, ardent collector of Coal Measure plants as he was, wrote about other men's specimens in his early papers on the Coal Measures. Then, the admirable work on the coal ball petrifactions had captured thought: a fossil showed structure or else it was trivial. In fact only a tiny proportion of fossils are petrifactions but the great majority are compressions, that is black marks on stones. They were called 'impressions with carbon' as

though they were pencil sketches on a slate and what you could see with a lens was the end, and the specimen once properly cleaned was sacrosanct. To be sure, people had prepared cuticles from such fossils long before, but these were thought idle curiosities of no scientific value. In this atmosphere Thomas began his work and I think his greatest achievement was to change it. I came to the subject fifteen years later and the outlook was entirely different and Seward, though he did not himself alter much, cheerfully came to terms with the new outlook and recognized its value.

In his early years Hamshaw Thomas received two strong influences from outside Cambridge. One was from Robert Kidston with whom he collected in the Scottish coalfields. Kidston, a man of independent means and very independent character insisted that you must never publish till you have studied a very large collection and the evidence is so overwhelming that you are *sure*. This means going back and getting more and studying your collection repeatedly. Then in 1911 Hamshaw spent his summer vacation with A. G. Nathorst in his laboratory in the Stockholm Museum. Nathorst who had worked almost entirely on fossil compressions was bothered about their inferiority to petrifactions and then suddenly in about 1900 realized that the cuticle—which he knew how to prepare—was more than just a curiosity but gave the fossils called 'impressions' new value, for it shows the form of the epidermis of a plant in a way suitable for study at a high magnification. Nathorst's greatest success was with certain fossil flowers, using only moderate magnifications, but people did realize that he had achieved something they could not have done and applauded, though Hamshaw was the first and almost the only man to go to him as a disciple. Nathorst was old when he got this new idea and never carried it very far and it was Thomas who developed it with enthusiasm on the fossils he collected himself in Yorkshire. Then also at Stockholm, Hamshaw met Halle. Halle as an able botanist had known what he wanted when he collected and looked in Yorkshire for specimens of the right kind, reproductive organs rather than handsome leaves. He knew these often made small obscure fossils but when he searched he found what generations of old collectors had missed. So back Hamshaw went and collected very hard from the old localities around Whitby and Scarborough; but he did his collecting on new lines.

The very localities were forgotten, in fact he was told they were worked out. He told me he found the famous Gristhorpe Bed again when he was forlornly collecting a seaweed as a museum specimen. The seaweed was tough, the rock broke and he saw a fossil in the Gristhorpe Bed. It is pleasant to recall that he co-operated with the local naturalists, for only too often the clever young man from the university does nothing of the sort. He must have examined acres of rock surface with a lens. He formed the idea that the Gristhorpe Bed preserved plants almost where they grew, reproductive organs along with leaves, and he searched assiduously for associated parts. He knew he could deal with even the smallest fossils, for a cuticle shows hundreds of cells and small size has no disadvantage for microscopic study.

His collection was large but very discriminating and I can guess the magnitude of his labour by comparing his massive collections from the Gristhorpe Bed with the spoils of a few days' hard work of my own.

As time went on his earnings had become, if not easy at least more satisfactory, for in 1909 he was appointed Curator of the Botany School Museum —the salary, no doubt minute, but the job a part-time one, and in 1912 he became sublector at Trinity having charge of the College botany tutorial teaching and he was gradually able to give up the lowest forms of coaching. All his working life he was devoted to tutorial teaching and I believe his rather slow speech, quiet, thoughtful manner and habit of asking questions instead of telling answers must have made his 'supervisions' extraordinarily good. At any rate a large number of young men who had them have since done very well, and still remember him with affection, admiration and gratitude. In 1914 he was elected to a Fellowship at Downing and financial security began. He gave much to his Museum job and he held it until 1923. In 1909 botanical museums were still highly regarded as teaching assets but even then their value must have been waning. Hamshaw was sure of their value and spent much time in staging special exhibits and also in making up good museum specimens and though this museum was later done away with these last have remained valuable as demonstration specimens. In 1923 he was awarded the Walsingham Medal and three years later the degree of Sc.D.

For many years he gave a great deal of thought to the teaching of biology in schools, as an examiner but also creatively on British Association and other committees. I believe his influence on what came to be taught and examined was very considerable and always for a livelier approach.

In 1913, while collecting in a landslide at Roseberry Topping he found a layer of leathery brown leaves which fell from the rock (and he pasted them on Christmas cards for his friends). He called the leaves 'mummified' and decided that they were more even than a good cuticle round a layer of coal, he believed the interior tissues also were preserved in the coal. Later Walton was to think of the name 'compressions' for such specimens and thus has come into general use but the first idea was Thomas's. Thomas formed the view that in such a fossil every cell is preserved, albeit crushed and altered and if the investigator fails to see every cell it is through his failure of technique or effort. In his *Caytonia* paper he pressed this robust view with all his might.

Already in 1912 Thomas had a large collection which he had studied in a preliminary way according to his principles. He recognized the berry-like *Caytonia* fruit and published its name as a *nomen nudum*. This became rather a habit and was the direct result of holding back till he knew for certain. It was to result in many valuable things never being published at all and his Sedgwick Prize essay written twelve years later contains many of these ideas which he formed early and never published, more is the pity. However, his paper on *Williamsoniella* is of particular importance. In this early period

too he wrote a paper which had a profound effect on other men's work. It was written jointly with Miss Bancroft on 'Recent and fossil cycad cuticles'; she took the Recent ones, he the fossils. At that time anyone trying to make sense of the abundant leaves called 'fossil cycads' became hopelessly confused for they are a hotchpotch of the leaves of known or presumed Bennettitales and leaves of totally unknown affinity. He showed that the cuticles divided them into two groups; the larger agreed with the Bennettitales, the smaller with the Recent cycads. The division is sharp. This continued the work of Nathorst but went much further, for Nathorst merely picked out half a dozen groups leaving the rest alone. This paper was all on Yorkshire fossils and in 1930 he published another paper extending his ideas to plants of other ages, but the work for this second paper was finished in 1914. Others have worked over this and similar material and greater emphasis has been laid on certain of the distinguishing characters that Thomas had noted, but the work remains the first in which the primary classification of a great group was based on cuticles.

He joined the Officers Training Corps at the beginning of the First World War and was in the Royal Artillery in France in 1915. On the eve of the Battle of the Somme he was sent to Egypt where he was given charge of artillery supplies of a sector of the Canal Defence Zone. Then he transferred to the Royal Flying Corps and he was able to do important original work as officer-in-charge of aerial photography, a side of military intelligence then in its infancy. His maps from aerial photographs were the first ever made in that way. The maps made by his team, of Palestine and of the Turkish lines, were of outstanding value and Air Chief Marshall Salmond said later that the success of Allenby's Campaign was 'to a great extent attributable to the work that Captain Thomas did'. He was twice mentioned in dispatches, and was awarded the Order of the Nile and the Military M.B.E. After the armistice he was sent to India to report on the possibility of making a survey by aerial photography and then, on returning to Cambridge, assisted in the direction of research at the Aeronautical Department. He played a large part in founding The University Air Squadron.

He seems to have enjoyed his service, and he was able to return sometimes to biology. He wrote an ecological paper on the flora of the Libyan Desert and collected much material for the study of ecological anatomy which he used later in his teaching. Though this and one other were the only ecological papers he published he was one of the founder members of the British Ecological Society and served on its council and as a Vice-President, and remained in it all his life. His aerial photographic work was sketched in a paper he wrote for the Geographical Society's *Journal* and in *Nature*. He delivered the Cantor lectures to the Royal Society of Arts on the use of aerial photography in survey, particularly of vegetation and forests.

He went back to Cambridge in 1919 and lived in Downing for a few years. In 1920 he was made Dean of Downing, an appointment he held for seven years, and Steward, which he held for seventeen. Both are jobs which can be

infinitely exacting to a conscientious man and can take much of his time. In 1923 he was appointed to a University lectureship and thereafter lectured on many subjects—fossil plants, the morphology of the lower plants, ecological anatomy; the history of botany. In that year too he married Miss Edith Gertrude Torrance, a botany graduate of Cape Town who came to Cambridge to work as a research student in plant physiology with F. F. Blackman. They had two children, both of whom are married; the son took up aircraft engineering.

In the paper on *Caytonia* his exacting and scholarly principles were combined with the happiest results. He collected some hundred specimens, studied them, and sacrificed them in study. He went beyond preparing cuticles and took enormous pains to learn about the uncutinized interiors of the fruits and seeds. There was nothing to guide him. The established technique for isolating the cuticle of a fossil is easy; first oxidize the coaly substance and then dissolve it leaving a cuticle as a flattened sac, but this destroys everything but the cuticle. He had to devise a method to discriminate between a wall that had been cellulose, one that had been lignin, and middle lamella substance. He removed the little fruits, swelled them by boiling them for weeks in alcoholic potash, embedded and sectioned them—and found the sections homogeneous. With continuing faith he tried to etch his sections using mitigated versions of the cuticle technique. He does not mention all the ways he tried but only those which gave some success; three or four variants of the first treatment and even more of the second, and the mortality among his sections was appalling. Now and again he had a good result but he could seldom repeat it. We now know that *Caytonia* seeds preserved side by side vary unpredictably in their preservation, and this fact must have enormously complicated his procedure. However his results, though falling short of what he hoped, were far in advance of what anyone else had achieved.

This *Caytonia* paper (1925) is his greatest. He wrote with enthusiasm, and well he might for he had reason to believe he had solved the age-old problem of fossil botany, the origin of the flowering plants. This class is distinguished by a dozen characters of which the closed ovary is outstanding and it gives them their name angiosperms. Thomas's fossils were closed, berry-like ovaries. This indeed he knew in 1912 but by 1925 he had done much more, for he had recognized both the leaves and the pollen-producing organs of these plants, and this synthesis was an outstanding piece of botanical detective work, comparable with that which gave us the first pteridosperm. His fruits were new, but with the other organs he was hampered by previous work, for the leaves were classified with the ferns and the pollen organs as *Ginkgo* catkins.

He based his synthesis first on careful collecting. In the Gristhorpe Bed, plants are astonishingly local and he noted the frequent association of these three kinds of organ at certain points and their joint absence at others. Then he looked for specific features of agreement. Since all three organs have

petiole-like bases, he compared the epidermal cells of these three (and found them remarkably similar) and he also compared them with petioles of all sorts of other plants in the Gristhorpe Bed and found them different. He was also delighted to find pollen agreeing with that of his pollen organ on the stigma-like mouth of the fruit. I was a student in the Botany School at the time and I remember a ripple of excitement reaching me when he made this discovery.

Most people applauded his paper but it met criticism and some of the criticism was sensible. Thomas had not made as convincing a case for his synthesis as he might have done, and the case was untidy, for there were two kinds of fruits, only one kind of pollen organ, and a very imperfectly divided kind of leaf. I am sure that he could easily have shown that there are two species of leaf and two of pollen organ, as indeed was done later, but he was not interested in that sort of detail. Later workers have noted the same association of organs in other parts of the world.

Many of those who accepted Thomas's reconstruction of the *Caytonia* plant were appalled by his treatment of its 'comparative morphology'; treatment which seemed to them cavalier or even wanton. This indeed was the first time Thomas did open violence to current botanical theory, and as time went on his onslaught on morphology became his main work. The trouble arose over his calling the little berry-like sacs containing the seeds of *Caytonia* 'carpels' and at the same time calling the branched organ bearing them 'sporophylls'. To be sure, he called them 'carpels' in an apologetic way and, if the discussion at the Linnean Society had gone on different lines I think he might have kept more to the path of descriptive fossil botany. As it was he defended his treatment with vigour and was soon to devote his energy to an offensive against the morphological views then current and entrenched.

I suspect that the very striking agreement of what he discovered in the *Caytonia* plant with what we know in flowering plants, together with the natural enthusiasm of a discoverer, led him to hold that *Caytonia* was rather closely akin to them (though he expressly stated he did not believe it ancestral). Then, when he found he could not derive any flowering plant ovary from the fruiting branch of *Caytonia* within the constraints of the carpel theory, so much the worse for the carpel theory.

The paper (1933) on Triassic pteridosperms from South Africa may be less impressive than the one on *Caytonia* but it makes a major contribution to knowledge of a much more important group. While *Caytonia* is an isolated and not very abundant genus, the South African plants were dominant in their day over the whole southern hemisphere. As with *Caytonia*, the leaves were well known and first thought to belong to ferns. Hamshaw Thomas, who went several times to South Africa, visited a fossil locality in Natal which he found phenomenally good. He collected hard and nearly exhausted himself carrying back the spoil to a roadhead (for though fit he was of light build). His collection included new pollen-bearing and also seed-bearing organs (*Pteruchus* and *Umkomaasia*) which he attributed to these leaves, rightly I am

sure. As with *Caytonia*, he had little interest in specific details but he gave his thought to the general organization of the reproductive parts. Both sorts are small and branched, and in discussing them he compared them *at the same time* with leaves and with branch systems. He thus called them both sporophylls and inflorescences, and considered that they shared the nature of a pteridosperm sporophyll and a poplar catkin which everyone had hitherto called a shoot bearing small flowers. This goes far beyond impugning the carpel as he did with *Caytonia*. Many would agree that the carpel is at best an awkward concept, difficult to apply except to diagrams, and would not defend it. His new treatment upset or at any rate questioned the whole basis of comparative morphology. To most botanists, the distinction between 'stem' and 'leaf' had been sacred.

Thus Thomas moved from being a fossil botanist to a botanical philosopher, and the change was not great, for he was concerned, even in his earlier papers, with what was of general interest in his fossils. He wrote about the evolution of the angiosperms, the origin of plant species, and increasingly he wrote on the meaning of plant form and on the history of thought in biological science. Most of this was theoretical, but he also described some flowers and showed that the veins of pod-like fruits have a course which is very unlike that in a leaf. Some of his critics complained that throughout this work he was advertising *Caytonia* and *Umkomaasia*, but this was unfair, though he did frequently recall them.

His several papers on the 'Old morphology' expose its limitations. This was based on the thoughts of Goethe, but modified by passage through many minds and then by the inclusion of a totally foreign idea, evolutionary change. Goethe indeed was more concerned with the concept of leaf than with the thing a botanist can harden in alcohol and section.

Hamshaw Thomas based his new morphology on change by evolution. He took as his ancestral form the early fossil *Rhynia* which also forms the basis of Zimmermann's telome theory and he took up aspects of this theory warmly. To Hamshaw Thomas every organ of a higher plant was comparable with part of the *Rhynia* shoot system, for every organ is a telome or a group of telomes, at first plastic in organization but later stereotyped. Thus a branched leaf of a fern and a branched inflorescence like a poplar catkin are just differently organized telome systems and have no fundamental difference; and accordingly his South African fossil, the seed-bearing organ *Umkomaasia*, can perfectly well be both a fertile leaf and a fertile branch system. With *Caytonia*, there was no confusion in the idea of a branched leaf (the fruiting megasporophyll) bearing fertile leaves, the berry-like organs he called carpels.

A number of people are thinking today on the lines of Hamshaw Thomas's new morphology, though it seems as if they are not following him but pursuing closely parallel paths through the jungle of Recent and fossil plant organs. He did not wish for disciples; he posed questions designed to make a reader think and left him thinking. Philosophers of plant form can with

justice refer to the free imagination of their rivals and after all Goethe, who started it all, was a very great poet.

A result of his absorption in philosophy was that he gave less time to describing fossil plants. His own principles led the same way; for his preliminary, unpublished research had shown him what new things his specimens had to show and not much thrill remains after publication has been delayed for thirty years. He had originally intended to describe everything in his collection but his other interests took all his time. However, I know the feeling that he should have finished his fossils sometimes distressed him. Some men would have taken research students or assistants to do it, but that was not his way. He would have needed to drive himself ruthlessly to have finished describing his collection, but he was not ruthless at all. It is significant that two of his last palaeobotanical papers were acts of kindness, papers in volumes honouring friends abroad.

In his later years he gave much thought and time to the history of science. This indeed was in his mind when I first met him in 1922 and he gave a short course of lectures on it, but it grew. His lecture on the eighteenth-century biologist Richard Bradley made a great impression on his hearers, for not only was Bradley interesting through many original thoughts well ahead of his time but Hamshaw Thomas was roused by the injustice he had suffered, through his successor successfully obfuscating Bradley's memory. Hamshaw Thomas helped to found the British Society for the History of Science in 1947 and served as its President, and many times was re-elected Vice-President. He gave much time and thought to its business, which proved very difficult in its early days, and read several papers besides one on Richard Bradley. The work for this society was the culmination of a series of activities; the first public one of which I know being the exhibition of old scientific instruments in Cambridge in 1936, also he was very active in securing University lectures on the history of science; he had to give this up when he went to serve with the R.A.F. in 1939 but on his return from war service, took it up again and was Chairman of the Committee. When the subject became an option for the Natural Sciences Tripos, success had been achieved.

Like other senior men who are both conscientious and willing he did many responsible jobs for his College, his University and for the Royal Society. Besides these, which I will not enumerate, he helped an astonishing number of organizations, serving on their committees and in due course becoming President. He was founder-member of at least four societies. In his time he was President of the Downing Association; of the Cambridge Natural History Society; of the Eastern Counties branch of the Science Masters Association; of the Yorkshire Naturalists; of the Botany Section of the British Association; of the Linnean Society and of the British Society for the History of Science. He did all he could to assist in the international progress of science; he was a corresponding member of the Botanical Society of America and went to Canada and the U.S.A. to lecture. He was very active

in helping the work of the International Botanical Congresses both at Cambridge and at Stockholm.

When war was declared in 1939, Hamshaw Thomas was in Jamaica on a botanical expedition. He returned immediately to join the R.A.F.V.R. serving first as Station Intelligence Officer at Bomber Command. Later he was posted to Central Interpretation Unit. Probably his major contribution there was the initial organization of the work on scientific lines. When C.I.U. was moved from Wembley to Medmenham Hamshaw Thomas was put in charge of all R.A.F. specialist photographic interpretation and in 1943 this included a very detailed analysis of Peenemunde. At the end of 1943 when he retired for reasons of health, he held the rank of Wing Commander and had again been mentioned in dispatches. Back once more in Cambridge he served as Area Captain in the Fire Guard till the end of the war.

In addition to his service honours and the societies which honoured him by making him President he received the remarkable distinction of being judged, during the Darwin-Wallace Centenary year, 1958, of being among the twenty biologists of the world who had made the most outstanding contribution to our knowledge of evolution, and was presented with a commemorative medal. He received the Linnean Society's gold medal in 1960. His election to the Royal Society took place in 1934.

Honours affected him little for he was a very modest and retiring man. In his youth his main pleasures were music and hockey; later on he went every winter to Grindelwald to ski and skate; his pleasure in neat movements was intense. He continued to be intensely fond of music, though not an instrumentalist. He did a good deal of painting on holidays, always in water colours. During the last year of his life Hamshaw Thomas was looking very frail though he was happy and got about. His last illness was mercifully brief and painless and almost his last expressed words were to ask how the Downing crews had fared in the May races. When one tries to summarize one's impression of Hugh Hamshaw Thomas, outstanding are his thoughtfulness for other people and his gentle kindness; and when one considers his whole work one is amazed at the astonishing width of his labours for the good of other people.

I am deeply grateful to many of his friends in Downing College, and in the Botany School but above all to Mrs Hamshaw Thomas for a great deal of help.

T. M. Harris