INTRODUCTION

HISTORY OF THE STUDY OF THE FLORA

For three hundred years Cambridgeshire has been one of the best known counties, botanically, in the British Isles. The first list of plants made in the county was by Samuel Corbyn (1656), although a few records date from the sixteenth and early seventeenth centuries, made by men like Turner and How, who were beginning to study the flora of the country as a whole. However, the first work of real importance was that of the illustrious John Ray (cf. Raven, 1942), who in 1660 published a 12mo volume of 182 pages entitled *Catalogus Plantarum circa Cantabrigiam nascentium*. This has long been celebrated as the first comprehensive local British Flora. It was the result of nine years' work, and consists of an alphabetical list of plants found in the Cambridge area. It gives localities of plants, which in several cases can still be found there today, for example, *Geranium sanguineum*, 'Found on Newmarket heath in the Devils ditch, also in a wood adjoining to the highway betwixt Stitchworth (Stetchworth) and Chidley (Cheveley)'.

In 1663 Ray published a 13-page appendix to the *Cambridge Catalogue*, and after this in 1685 appeared a second appendix consisting of 30 pages, edited by Peter Dent, a Cambridge apothecary. There was no second edition of the *Cambridge Catalogue*, but in 1670 Ray published his *Catalogus Plantarum Angliae* (ed. 2, 1677), in which all plants occurring in Cambridgeshire were marked with the letter C. This latter work, however, contains very few additions to the county list, which is not surprising as Ray left Cambridge in 1662.

John Martyn, who became the second Professor of Botany at Cambridge in 1733, had published, in 1727, his *Methodus Plantarum circa Cantabrigiam nascentium*. In this he included all the plants of Ray and Dent, but added no new records.

Thomas Martyn, who succeeded his father in the chair of Botany in 1761, produced an 8vo work entitled *Plantae Cantabrigienses* (1763). This was arranged according to the Linnaean system and nomenclature. He published at the same time the *Herbationes Cantabrigienses* which consists of an account of thirteen botanical excursions to localities in the Cambridge area. Some of these, such as Newmarket Heath and Gamlingay, are still visited today. In the same year, but three months later, Israel Lyons published his *Fasciculus Plantarum* in which he lists an

additional 105 species found growing around Cambridge since the time of Ray.

A more thorough knowledge of the flora of our county became available in 1785 with the publication of the first of three editions of Richard Relhan's *Flora Cantabrigiensis*. This work contains the first full account of the Bryophyta, Algae, Lichens and Fungi occurring in the county. Much of our knowledge of the flora of the northern Fenlands dates from this period. This is chiefly due to the work of W. Skrimshire who was a correspondent of Relhan. Details of Skrimshire's activities are contained in a manuscript to be found in the Wisbech Museum labelled *Catalogue of Plants contained in Mr Skrimshire's Hortus Siccus*. This was transcribed by an unknown hand and dated 12 September 1829. Relhan brought out three supplements to his *Flora* dated 1786, 1788 and 1793, while two further editions of the whole work appeared in 1802 and 1820.

The fourth Cambridge Professor of Botany, J. S. Henslow, who was elected in 1825, added much to our knowledge of local plants. He drew up in 1829 *A Catalogue of British Plants* in which he italicized all plants not found in the county. This was followed in 1835 by a second edition in which the letter C was appended to all the Cambridgeshire plants. To Henslow, who was a great lover of field-botany, must go the credit for being the first person to make a comprehensive herbarium collection of the plants of the county. His specimens, which are to be found in the University Herbarium, are still in constant use today.

One of Henslow's pupils, C. C. Babington, was destined to make the most important contribution to the knowledge of the flora of our county. The *Flora of Cambridgeshire*, which was published in 1860, the year before Babington became the fifth Professor of Botany, was the result of his own detailed researches and the work of his many correspondents. Besides including under each species a full list of localities, in which old and new records are distinguished, Babington divided the county into eight botanical regions. These are as follows: 1 and 2 include the main mass of the chalk; 3 the clayey drifts with the Gamlingay Greensand; 4 and 5 contain the country bordering the Fenlands (the Breckland sands were also included in no. 5). The remaining three districts comprise the Fenlands (including the silts). Although this provided a basis for a more even study of our flora, it is clear from a close inspection of the records that the Fenlands still remained under-recorded. For example, *Veronica chamaedrys*, which is now known to occur throughout the county, was omitted from district 7 by Babington.

A number of species are recorded from the county for the first time by

Babington, mainly in the critical genera. This reflects his detailed knowledge of the flora, not only of the British Isles but also that of Europe. He summarized his investigations in an Appendix which deals with *Thalictrum*, *Papaver*, *Viola*, *Arenaria*, *Rubus*, *Bromus* and *Agropyron*.

Finally, Babington gives a list of species which may be found growing at Wicken Fen. Unfortunately, despite the care which has been taken in protecting the Fen, a number of species, including *Viola stagnina*, *Stellaria palustris*, *Potentilla palustris*, *Senecio paludosus* and *Stratiotes aloides*, have disappeared during the last hundred years. Babington also lists sixty-one species which were certainly or probably extinct in the county as a whole. It is, however, pleasant to record that over twenty of these have been subsequently refound, and still occur. They are as follows: *Aristolochia clematitis*, *Asperugo procumbens*, *Geranium rotundifolium*, *Centranthus ruber*, *Lactuca saligna*, *Lathyrus nissolia*, *Lysimachia nemorum*, *Myosurus minimus*, *Myrica gale*, *Oenanthe silaifolia*, *Phleum arenarium*, *Polygonum minus*, *Prunus cerasus*, *Ribes nigrum*, *Salix purpurea*, *Sedum album*, *S. telephium*, *Senecio viscosus*, *Setaria viridis*, *Sorbus torminalis*, *Thlaspi arvense*, *Veronica spicata*.

Babington lived for another thirty-five years after the publication of his *Flora*, remaining in Cambridge all that time. Further records of his exist in an annotated copy of his *Flora*, and in his notebooks and papers. His interest in critical genera seems to have influenced other workers in the county. Of these, the most important was Alfred Fryer. Known to the country as a whole for his work in conjunction with Arthur Bennett on the genus *Potamogeton*, he made a very useful contribution to our knowledge of the botany of the western Fenlands. He lived at Chatteris and was thus able to reach easily a part of the county which had hardly been investigated before. Although he published no general papers on the botany of the fens, many manuscript documents are available, and have been extracted for this *Flora*.

It was fortunate that Bennett, one of the leading amateurs of his day, should have taken so much interest in Cambridgeshire. He was an excellent critical botanist, and the study of a number of difficult groups in the county was begun by him. His main contribution was *Notes on Cambridgeshire Plants* (1899), but many other shorter notes appeared in the *Journal of Botany* from time to time. Other useful contributions were made about this time by R. A. Pryor, the Hertfordshire botanist, in 1874 and by W. West Jnr. in 1898. Pryor provided a list of plants from the Kirtling area, a little-known parish near the Suffolk border. An interesting account of the local flora was provided by A. Wallis (1904).

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The knowledge which accumulated in the last decade of the nineteenth century seemed to demand some outlet. The task fell to A. H. Evans of Clare College, who published *A Short Flora of Cambridgeshire* in 1911. This paper, which must have had a limited circulation, is nevertheless a most helpful one in every respect except for distribution data. Evans disliked Babington's eight regional divisions, preferring to record on which of the six main geological formations the species occur. Evans's 'Short Flora' traces the course of botany and botanists in the county to the beginning of this century, and gives detailed notes on thirty-eight of the rarer species of the county, many of which were already extinct by that time. Finally, the work is notable as, with the exception of a series of papers by G. S. West on the Algae published in the *Journal of Botany* in 1899, it contains the first lists of the lower plants of the county published since Relhan's *Flora*. The Rev. P. G. M. Rhodes prepared the Bryophyta and Lichens, G. S. West was responsible for the Algae, and F. T. Brooks, later to become eighth Professor of Botany, compiled the account of the Fungi.

After the death of Babington in 1895, the chair of botany was no longer occupied by an ardent taxonomist or field botanist. A new approach to the study of the flora, however, developed at this time under the direction of C. E. Moss, the Curator of the Herbarium. Moss was a careful and competent taxonomist whose major work, the *Cambridge British Flora*, unfortunately remained unfinished. He was also one of the pioneer ecologists of this country. Although his most important works on this subject are devoted to Derbyshire and Somerset, his influence in the encouragement of others to follow the 'new science' must have been considerable. Evans recalls that about this time the botanical excursions took on a new lease of life. The swing to ecology was further accentuated by the presence in Cambridge of A. G. Tansley at the same time as C. E. Moss. Tansley edited in the same year as the appearance of the 'Short Flora' his *Types of British Vegetation* which includes some of the first descriptions of the vegetation of the county, for example, the chalk grassland of the Fleam Dyke. 1911 is thus a most important landmark in the history of Cambridgeshire botany. It saw the production of a summary of the traditional study of the flora during the preceding half century, and the beginnings of the study of ecology, a study which was to overshadow and almost eliminate interest in classical taxonomy for the next twenty years. This is reflected in the very few records which were made between 1910 and 1930, and the lack of papers on taxonomy. During this time ecological information about the county began to accumulate, and the greatest attention

was paid to the Fens and to Wicken Fen in particular. This culminated in the publication in 1932 of *The Natural History of Wicken Fen*, a collection of fifty-six papers on all aspects of the subject, including accounts of the flora by A. H. Evans and the vegetation by H. Godwin and A. G. Tansley. The work of Professor Godwin and his colleagues, both here and in other parts of the Fens, has given us a remarkable insight not only into the structure and interrelations of our vegetation of the present day, but a very clear idea of its origin and history.

Brief accounts of the vegetation of the county as a whole were published by Professor Godwin in 1938, first in *A Scientific Survey of the Cambridge District* prepared for the Cambridge meeting of the British Association, and, secondly, in the account of the botany of the county in vol. I of the *Victoria County History*. In each account four main types of vegetation are discussed: the fens, the boulder-clay woods, the acid sands and the chalk grasslands. These four types fit very conveniently into the four lecturing weeks of the University Easter Term, but should not, for this reason, be thought of as the only types of vegetation in the county.

During the 1920's interest in field botany in the county was kept alive mainly by those who had no direct connection with teaching in the Botany School. Foremost among these was Evans, though he was finding it increasingly difficult to get about owing to illness. This short history would be incomplete without mention of A. S. Shrubbs, an assistant in the Botany School from 1870 to 1922, who added much material to the Herbarium and whose delightful personality endeared him to all those who came in contact with him.

At first it seemed difficult to fit into this account of field botany in the county *A Flora of Cambridgeshire* by A. H. Evans published in 1939, but on second thoughts this is not perhaps so surprising. Ray was the pioneer, Relhan the first to include the Fenlands in any detail and record groups other than flowering plants, and Babington the first to turn attention to critical genera. Evans's *Flora* of 1939 came at a time when an interest in species *per se* had been almost dead for a quarter of a century, and before the effect of the revival of interest, which began about 1930, could be fully felt. This *Flora* unfortunately contained very little which was new and a great deal which was erroneous; old records were given without comment though the plants were extinct by that time, and statements on frequency were often misleading.

Though the Apocrypha records that the revival began after T. G. Tutin and J. S. L. Gilmour shared a bed at Foul Anchor, it is certain that these two, in collaboration with W. T. Stearn, and inspired by the

Director of the Botanic Garden, H. Gilbert Carter, began a series of Exsiccatae based on critical material collected in the county. Many of their records were the first to be incorporated in the Cambridge Natural History Society's Card Index which was begun by E. A. George, D. H. Valentine and E. F. Warburg, in about 1938. The basis of this work was a card for each species with a cutting from Babington's *Flora* pasted on the top left-hand corner. The first task was to extract data from all books and papers which had been published since 1860, and to add notes and localities from all the annotated Floras and manuscripts which had accumulated in the library of the Botany School. At the same time part of the county was divided by a grid system, and a small group of workers started to collect records of common species from these areas, and enter them on to the appropriate index cards. The Second World War intervened, and no great progress was made until the latter half of the 1940's. By then it began to be felt that an attempt should be made to collect distribution data as evenly as possible from the whole county. Duplicated sheets were circulated listing about 100 common species to be looked for. From this in 1952 developed the 8 in. × 5 in. field record card listing nearly all the species known to occur in the county. On this card recorders were asked to mark those which they found in a particular locality or kilometre grid square of the National Grid. This type of card has become familiar to botanists throughout the country since the inception of the Botanical Society of the British Isles Distribution Maps Scheme in 1954. The Cambridge Natural History Society can take credit for pioneering this method in this country. At one time it was hoped that lists might be obtained from all the kilometre squares in the county, but the task proved to be too great, and we have had to be content with the 10 kilometre square as the recording unit. Forty of these, many only partly in Cambridgeshire, cover the county, and every effort has been made to investigate each area with equal thoroughness. Of course, with active botanists mainly living in Cambridge, the southern squares have received more attention, and it is still true that the Fenland squares are relatively not so well known. This part of the county has suffered even more than the south from human interference, and the long lists of old records for the Wisbech and Chatteris areas, for example, reflect not only the somewhat inadequate attention these areas have received in recent years, but a real decrease in the variety of habitat and species remaining there today.

Over the last twenty-five years there has also been a re-awakening of interest in the lower plants. P. W. Richards began the card index of Bryophyta and this has since been maintained by M. C. F. Proctor and

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H. L. K. Whitehouse. Proctor used this as a basis for a *Bryophyte Flora of Cambridgeshire* (1956). Since then the bryologists have become 'square-minded' and have collected systematic information on the distribution of the commoner species.

No account of botanical activities in Cambridgeshire would be complete without a reference to the growing concern for nature conservation locally, a concern which led to the inauguration in 1957 of the Cambridgeshire and Isle of Ely Naturalists' Trust. In the Trust biologists and naturalists, professional and amateur, can make a concerted attempt to carry out a reasoned policy for the protection of natural interest and beauty throughout the county. Enormously increased land values, together with revolutionary new techniques in agriculture, are threatening to reduce the countryside to dull uniformity. If we are to have anything left to study and enjoy of the rich heritage of nature which has survived to the present day, urgent conservation action is necessary. The main National Nature Reserves in Britain, such as Wicken Fen, owned by the National Trust, are legally protected; but the many smaller sites throughout the county require local concern to protect them. Public authorities and private owners are usually co-operative if the naturalists' concern is put to them reasonably. The agreement with the Cambridge City Council over Lime Kiln Close, Cherry Hinton, by which this interesting site is preserved as a nature reserve with public access, is an excellent example of such co-operation.

TOPOGRAPHY

Cambridgeshire (including the Isle of Ely) is one of the larger British counties, being about fifty miles in length and about thirty at its greatest breadth. It covers an area of 555,118 acres. No fewer than eight counties touch its borders: Lincs (v.c. 53), Norfolk (v.c. 28), Northants (v.c. 32), Hunts (v.c. 31), Beds (v.c. 30), Suffolk (v.c. 26), Essex (v.c. 19) and Herts (v.c. 20). It approaches to within five miles of the sea north of Wisbech, and the River Nene is tidal for some miles south-west of that town. The northern part of the county, consisting of the former Great Level of the Fens, is monotonously flat. The southern part is occupied by a range of low chalk hills rising to over 130 m. (400 ft.) near Great Chishill. In the west is a wide plateau ending in an outcrop of greensand at Gamlingay where formerly existed some large bogs. The county is watered by the Ouse, the Cam and the Nene. Besides the rivers, we find in the fen country a network of artificial lodes and dykes, discharging into them. The largest of these artificial waterways

are the two 'Bedford Rivers' running from Earith to Denver. There is only one large town, Cambridge, and several smaller ones, Chatteris, Ely, March, Soham, Whittlesey and Wisbech, while the towns of Newmarket, Peterborough and Royston are only just over our borders. Large villages such as Bassingbourn, Burwell, Elm, Gamlingay, Histon, Linton, Sawston and Sutton are a distinguishing feature of the county. The occupation of the people is mainly agriculture and much of the land is under arable cultivation. The main crops are wheat, barley, potatoes, brussels sprouts, beet and oats. Around Cottenham, Histon, Haddenham, Wilburton and Wisbech are large orchards, and the Wisbech area grows many acres of bulb plants such as tulips and daffodils, and also asparagus and tomatoes. Most of the woodland is on the clays, but there are a number of plantations on the chalk.

CLIMATE

The most important feature of the climate of the Cambridge area is its resemblance to that of the main part of continental Europe. This feature is reflected both in temperature and rainfall.

Temperature

The mean monthly temperatures are shown in Table 1, and as in most parts of the British Isles, the lowest mean temperatures occur in January, and the highest in July. The range of mean monthly temperatures (22·4° F.) is about average for south-east England. The most significant feature of the temperature of the region is the low summer minima (Table 1 *b*). These indicate the frequency of frosts. Monthly minima below 32° F. are usual from October to May and quite serious frosts have been recorded at the beginning of June. Winter frosts are often severe and the damage they do is greater than might be expected, for snow gives protection on only a few days in the year. In an average year snow lies in the morning on twelve days only.

Table 1. *Temperatures*

	J.	F.	M.	A.	M.	J.	Jl.	A.	S.	O.	N.	D.	Mean annual	Period
(*a*) Mean monthly and mean annual temperatures (°F.)														
	39·3	39·7	42·3	46·3	53·5	58·0	61·7	61·3	58·9	50·3	42·9	39·9	49·3	1906–35
(*b*) Mean monthly extreme temperatures (°F.)														
Max.	54·0	55·9	63·0	69·1	75·0	81·0	83·8	82·9	78·1	68·0	59·0	55·0	—	1906–35
Min.	19·9	21·0	23·0	26·2	30·0	37·9	43·0	42·1	36·0	28·9	24·1	21·1		

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Rainfall

In the amount of rainfall and its distribution throughout the year the Cambridge climate shows affinities to the continental type. The area has a low annual total varying from 20·6 inches at Upwell to 24·7 inches at Conington. The values for Cambridge are given in Table 2. Only a few areas in Essex have a smaller annual total and, whereas in most parts of the British Isles the rainfall of the winter half of the year is greater than the summer half, in Cambridge only 48 % of the total falls between 1 October and 31 March. This is a continental feature which is shown by only a small area in east and central England; for example, in the East Riding of Yorkshire 49 % falls during this period but in north Dorset the figure is over 55 %.

Table 2. *Mean monthly and mean annual rainfall (inches)*

J.	F.	M.	A.	M.	J.	Jl.	A.	S.	O.	N.	D.	Mean annual	Period
1·92	1·32	1·18	1·64	1·91	1·48	2·32	1·93	1·95	2·04	2·18	1·54	20·72	1921–50

Relative humidity

Compared with other parts of Britain the humidity of the Cambridge area is relatively low. This is particularly marked at the beginning of the growing season in April and May, when values may be as much as 8 % below those for north Dorset to the west and the East Riding of Yorkshire to the north. It is only during these spring months that the mean values fall below 70 % (see Table 3). During the summer, however, these differences from other parts of England are reduced as the average humidity steadily rises, and during the mid-winter period of December and January humidity in Cambridge is at least as high as elsewhere in England.

Table 3. *Mean relative humidity*, 09.00 *hours*

J.	F.	M.	A.	M.	J.	Jl.	A.	S.	O.	N.	D.	Mean annual	Period
90·4	86·0	80·2	69·4	69·5	71·1	73·3	74·7	79·0	82·7	87·7	90·1	77·9	1947–50

Bright sunshine

The Cambridge area is in an intermediate position in the amount of bright sunshine it receives compared with other parts of the British Isles. The average annual total of about 1550 hours is 200 hours less than that

experienced on the south coast, but it is about 200 hours greater than that received by areas in North Scotland and the Outer Hebrides. This results mainly from differences during the summer months; during the period November to January variation throughout the country is negligible. The mean daily hours of sunshine for Cambridge are shown month by month in Table 4.

Table 4. *Mean no. of hours of bright sunshine per day*

J.	F.	M.	A.	M.	J.	Jl.	A.	S.	O.	N.	D.	Mean annual total	Period
1·7	2·5	3·7	5·2	6·6	6·8	6·3	6·0	5·0	3·5	2·1	1·3	1545	1901–30

General considerations

The data discussed above indicate that the climate of the Cambridge area is an extreme one in relation to the British Isles as a whole, and this is particularly marked in the spring months when rainfall and relative humidity are low, and there is a high probability of late frosts. This latter factor perhaps accounts for the absence from Cambridgeshire of a number of oceanic species (e.g. *Ulex gallii* (see map, p. 11), *Oenanthe crocata*, and *Corydalis claviculata*). Drought seems to be a particularly potent factor and must surely explain the paucity of ferns, mosses and particularly liverworts. The present-day fern flora of Cambs contains only thirteen out of a total of forty-eight species in the British Isles, whereas Sussex, a maritime county on the same longitude, has twenty-six species. The only woodland ferns which occur with any frequency are *Dryopteris filix-mas* and *D. dilatata*, and it is probably significant that the latter has increased in recent years as old woodlands have become more densely overgrown. The wall-ferns are almost confined to north aspects and are best looked for on that side of old parish churches, especially if the churchyard is surrounded by trees to give extra shelter. In addition, there is a group of flowering plants which appear to be unable to tolerate this 'dry centre' of Britain and are rare or local in Cambridgeshire. These include *Silene dioica* (see map, p. 12), *Geum rivale*, *Vicia sepium*, *Lysimachia nemorum*, *Veronica montana* and *Stellaria holostea*, to mention only a few of the more conspicuous species. In contrast a number of species appear to be well adapted to these climatic conditions of the Cambridge area and are frequent with us, whereas they are rare or absent elsewhere in Britain except in adjacent counties. This group of species is mainly of continental distribution in