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**PLANTS AND THEIR PALAEOECOLOGY:
EXAMPLES FROM THE LAST 80 MILLION YEARS**

MARJORIE E.J. CHANDLER MEMORIAL VOLUME

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"So is illustrated the fact that the present grows out of the past and all work owes its existence to those who have gone before".
M.E.J. Chandler, 1964.

CONTENTS

Marjorie E.J. Chandler in her garden at Powerstock, Dorset, England; June 1973. Photograph courtesy of Henry Andrews.

Tertiary Res.	9(1-4)	1-6		Leiden 1988

Marjorie E.J. Chandler

K.I.M. CHESTERS

Marjorie Elizabeth Jane Chandler was the daughter of a Leamington Spa (Warwickshire) jeweller. In later years when she cultivated a large and productive garden she recalled that she came of market gardening stock. Being the eldest of seven children her memories of her mother in her growing years were of being most preoccupied in bearing the next child, and she always gave much credit to Gertie, the little maid of all work, who largely brought her and her next sister up. Her father was very musical and she grew up to a background of musical evenings and herself played the violin to a high standard. She joined the University orchestra in Cambridge and played chamber music with members of the Darwin family. Characteristically when later there was no longer opportunity to practise to her satisfaction, she stopped playing.

Left largely to themselves the children made their own amusements and long walks along the canal banks and occasional expeditions into the country led to an interest in wild flowers and nature generally. Like many botanists her copy of Bentham and Hooker was hand coloured and copiously annotated.

Her membership of the Church of England was nurtured from an early age by the wife of the vicar of a local church. In the course of her life she owned many prayer books but 'Auntie' Susan Cartwright's was the most used and treasured. This was characteristic of her remembrance and appreciation of those who encouraged her, and they, in their turn, evidently found in her something worth encouraging.

Her formal education started at a Dame School. She later moved to a newly founded Girls' High School where the Science mistress gave up precious free time to give her extra help. The school was not then sufficiently well equipped to teach science to scholarship standard and she had to gain an arts scholarship in order to reach university to read the geology she so much desired. She achieved the necessary entry in English, remaining in touch with her English teacher all her life, and changed to science on entering Newnham College, Cambridge. There her supervisor was the formidable Gertrude Elles, who even managed to teach her to knit on a field trip to Wales; no mean achievement this. She much appreciated and made the most of her Cambridge days, circumscribed by the first world war. Just as her school days were marked by a shelf of prize books, so was her subsequent career by scholarships, starting with the Sedgwick prize at Cambridge. These scholarships enabled her to live a frugal, hand to mouth existence, never quite knowing where the next would come from, but thus managing to do what she wanted. She was adept at this.

Due to the war she was unable to attempt a double first, having gained first class in part 1 of the tripos. As she was the only candidate for part 2 the authorities declined to set a paper. She regretted this, for it was felt she would have gained it. However, when Cambridge finally granted degrees to women she had to be persuaded into applying for her M.A., and only agreed when it was put to her that it might be helpful in seeking financial support for her researches. In the event she never used it, and in clearing up after her death I found her M.A. certificate folded in the newspaper lining of a drawer.

At Cambridge she studied under the 'Great Men' of her day. Professor John Marr was at the end of his long reign at the Sedgwick and A.C. Seward in the Botany School. It was Seward who recommended her to Mrs E.M. Reid, and thus founded a very fruitful and productive partnership.

Mrs Reid, a mathematics teacher, married Clement Reid F.R.S., a member of the Geological Survey, at a fairly late age. She started to help him with his work on fossil fruits and seeds and by the time he died in 1916 had become the more important partner in their research. She regarded it as her duty to carry on his work, and Seward, who greatly admired her, sent her a graduate student in botany as an assistant. It was a difficult household to join. Mrs Reid, although she had a resident housekeeper (a widow with children) lived on very little and led a very spartan existence in which work and christianity played the most important parts. Milford on Sea was then a small village, and life proved altogether too monastic for someone fresh from Cambridge. Miss Chandler, on the other hand, was more able to adapt and to throw herself into the work—the sacred trust to Clement Reid. So began a partnership that was to result in the Bembridge Flora (1926) and, seven years later, the London Clay Flora (1933).

''Pinewood'', Mrs Reid's house purchased after Clement's death because it was cheaper than ''One Acre'' to which they had retired, was an unusual house. It was said to have been erected by the son of a local builder out of scrap in the builders yard, and its appearance bore this out. A variety of windows, lean-to kitchen, awkward stairs, odd-shaped rooms with an attic at the top of the house known as the ''Work-room''. Being under the roof it was very hot in summer and freezing cold in winter, with the windows solid sheets of ice. Not that this was a great handicap to the ladies. If it was cold you wore a coat, hat, and perhaps a scarf. There was no heating and only in her later years did Miss Chandler bring work down to the dining table—always feeling the critical ghost of Mrs Reid hovering behind her. In the Work-room were the library of books and separates, cabinets of Recent herbarium material, Clement Reid's desk and chair, a lesser table, microscopes and camera. Apart from a low magnification dissecting microscope, that used for the work was an upright brass with good lenses, to which one stood to use. All the microscope work was done in natural daylight, and when not in use the instrument was kept under a Victorian glass dome. Yet with this equipment Miss Chandler could decipher cell-structure others found difficult with far more sophisticated equipment. An illustration of this was a long series of letters which passed between her and W.N. Croft at the B.M.(N.H.) on cells in the fossil fern *Anemia*, until at last he, a perfectionist, gave her best.

The camera, constructed by Clement Reid from gas pipes, a bellows and good lenses was another primitive piece of equipment from which she produced excellent results. All the photographs in the Bembridge and London Clay Floras, and her own publications were almost entirely her own work. Plates were taken and developed and printed in the bathroom. For certain magnifications it was necessary to climb on to a rickety old kitchen chair and the unusual magnifications in the London Clay Flora are due to this fact. The line drawings were hers also.

To study fossil material it was first necessary to become familiar with Recent fruits and seeds, more especially with the cellular nature of the various layers and coats which might be found fossil, but which were not normally seen by Recent botanists. Clement and Eleanor Reid had begun to acquire such a knowledge and collection of Recent fruits and seeds. There were packets of these from the great Botanic Gardens (e.g. La Mortella) and collectors (e.g. Forrest) of the world, and items gathered from their own and friends' gardens. To the end of her life Miss Chandler would pick up partially decayed fruits and seeds, placing them in some old box (tea) labelled with provenance and a query as to whether they might help in the elucidation of some specific fossil. Studying more tropical floras than the Reids had hitherto entailed a massive expansion of this knowledge and one way of achieving this was to spend long and intensive periods at Kew herbarium making pages and books of notes and drawings and acquiring herbarium material for dissection. This was financed by letting Pinewood to summer visitors, the rents paying for modest accommodation at Kew where work continued into the evenings long after the herbarium was closed. The only distractions were Miss Chandler's occasional escape to Saturday afternoon tea in a nearby café, and of course, church on Sunday. Their collection of herbarium material was greatly assisted by the then practise of shaking herbarium sheets and tipping loose material from drawers on to the floor to be swept up at the end of the day. It was Miss Chandler's duty to keep a vigilant eye open for, and to save, these treasures. Later W.B. Turrill, then a young assistant and later Keeper of the Herbarium, started a separate carpological collection to help them and subsequent workers.

After a short holiday themselves they returned to Milford to continue their studies. The fruits and seeds from Kew would be macerated and dissected. The maceration was by the simple expedient of boiling with caustic soda in a saucepan on the kitchen stove. Dissection took place initially in a ''winkle'' (small china) saucer of water using a hand lens, the results later mounted on glass or cardboard slides. The saucers were acquired for nothing: watchglasses would have cost money.

The London Clay Flora was their classic work. Miss Chandler had a vivid memory of being taken by Dr Bather, Keeper of Geology in the B.M.(N.H.), down into the basement of his Department, to be shown shelves of glass jars of a putrid mixture of London Clay fossils in the paraffin then considered necessary to ensure the survival of pyritised specimens. Over the years the liquid had discoloured, so that it was impossible to see what the jars contained. Had Bather had a free hand his wish was to dump it all in the River Thames. Instead they were brought up into the light of day, transferred to glycerine and moved to Milford on Sea for the long period of study which W.N. Edwards (palaeobotanist) likened to Jacob waiting for Rachel. The Departmental memory of Miss Chandler at that time was of a shy young woman in a straw hat decorated with cherries.

The London Clay Flora was a joint study, but the bulk of the work fell on the junior author altough she had too much respect for Mrs Reid to admit this.

After its completion Mrs Reid, by then elderly and tired, ceased active work and Miss Chandler continued on her own. To enable her to continue as Clement Reid's heir Mrs Reid had "adopted" her as a "daughter", making it clear that in return for the work she would leave her the house and contents (save for the best items which had to be returned to members of Clement and Eleanors' families), and such money as she had. On Miss Chandler's part she became the "daughter at home", continuing her research for which the B.M.(N.H.) paid her less than a shop Assistant would then earn per hour. This as an associate, renewable (or withdrawable) annually. Also running the house (as in the days and to the standard of a resident housekeeper, but with very little help), and caring for an increasingly frail but very determined old lady. These conditions continued through the war years and after, and she was always grateful to W.N. Edwards (then Keeper of Geology: also to his successor Dr E.I. White, Keeper of Palaeontology), for continuing support during this difficult time.

During the war one major difficulty was a lack of paper for writing on. The MS for the Supplement to the London Clay Flora (1961) was written on a miscellaneous collection of all shapes, sizes and colours: backs of old school reports from a local prep. school, ecclesiastical documents from the church, bills and receipts from local tradesmen. The Supplement was based largely on fresh collections by A.G. Davis, G.F. Elliott, A. Wrigley and others. Unfortunately in the rush to return much of this material to the B.M.(N.H.) for "safe keeping" at the beginning of the war it was stored without glycerine, and was found decayed when it eventually became possible to publish in 1961.

Meanwhile she herself was collecting floras more locally in Hampshire, of different preservations, but not always more stable. She would cycle miles on an old-fashioned "sit up and beg" bicycle to investigate any temporary exposure, carrying back as much material as she could, to pick over and study. Most of the exposures were coastal and out of bounds to civilians during the war, but as soon as she was able she was on the cycle again and continuing her work.

The writer well remembers accompanying her to Lake for the first time. Now Rockley Sands Holiday Camp, it was then a bleak foresaken stretch of shore on the outskirts of Poole, Dorset. We went by train so that between us we might carry back a greater weight of material. It was in February, cliff fall being then more prevalent and fresh material more likely after winter storms. The method of collection was to fill sieves with loose material and to wade into the sea to reduce the bulk by sieving. The crudely washed matrix was then carried home in household buckets. Being a subtropical flora it was possible later to eliminate any suspect contaminates. Another trip was across the water from Lake to Arne, now a nature reserve: it was then a military range with the possibility of unexploded ammunition.

At home the muddy bucketfulls were subjected to finer and finer sieving, using sieves handmade for the purpose by Clement Reid. The much reduced residue was picked over under water in the winkle saucers, the water helping to keep the carbonaceous fruits and seeds from drying out and cracking. This was done with a water-colour paint brush reduced to a few fine hairs, and a hand lens. Likely fragments were then transferred to glass tubes of water, and corked to await more detailed expert examination under the microscope. Unlikely looking irregular black or brown fragments might under magnification reveal a characteristic cell-pattern or suture line which would tie up with, and provide a necessary clue to the determination of a more complete specimen. These hours and hours of work were fitted in around the necessary household tasks of cooking, washing, cleaning, gardening, of Secretary to the Church council, Sunday School teacher, sacristan and keeping in touch with an ever-increasing number of friends and relatives. When Mrs Reid died, W.N. Edwards suggested that Miss Chandler should join the Geological Department staff in the Museum, but she preferred to continue her adopted way of life. Like all paid members of staff then she was required to keep a diary of hours and work accomplished. Her account was more accurate than most listing many more hours of intensive research than she would ever have achieved with all the benefits of the Museum's facilities. She was most grateful that the Museum had enabled her to continue as she had, and bitterly upset when her age was given as the reason to discontinue her Associateship. This made it impossible for her to continue her scientific work and thus the last few years which she could have given to palaeobotany were lost to us. She was most grateful to Margaret Collinson who retrieved her last MS, prepared as final volumes of the Lower Tertiary Floras of Southern England and saw as much as possible into print.

Her remaining years were passed gardening and on church affairs, although she continued to receive letters and visits from overseas palaeobotanists. Preferring to stay at home and work she was not a familiar figure here, and, not unusually, was held in greater esteem abroad than at home, having many faithful correspondents and admirers from Russia to the Americas.

She was delighted that Margaret Collinson and others would continue to develop the study of fossil fruits and seeds, as she and the Reids had done. Their work was all important to her, and the thought that it would be continued was some comfort in the rather bleak close to her life and work. She would have approved of this volume as enabling work to be published, rather than as a memorial to herself.

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