



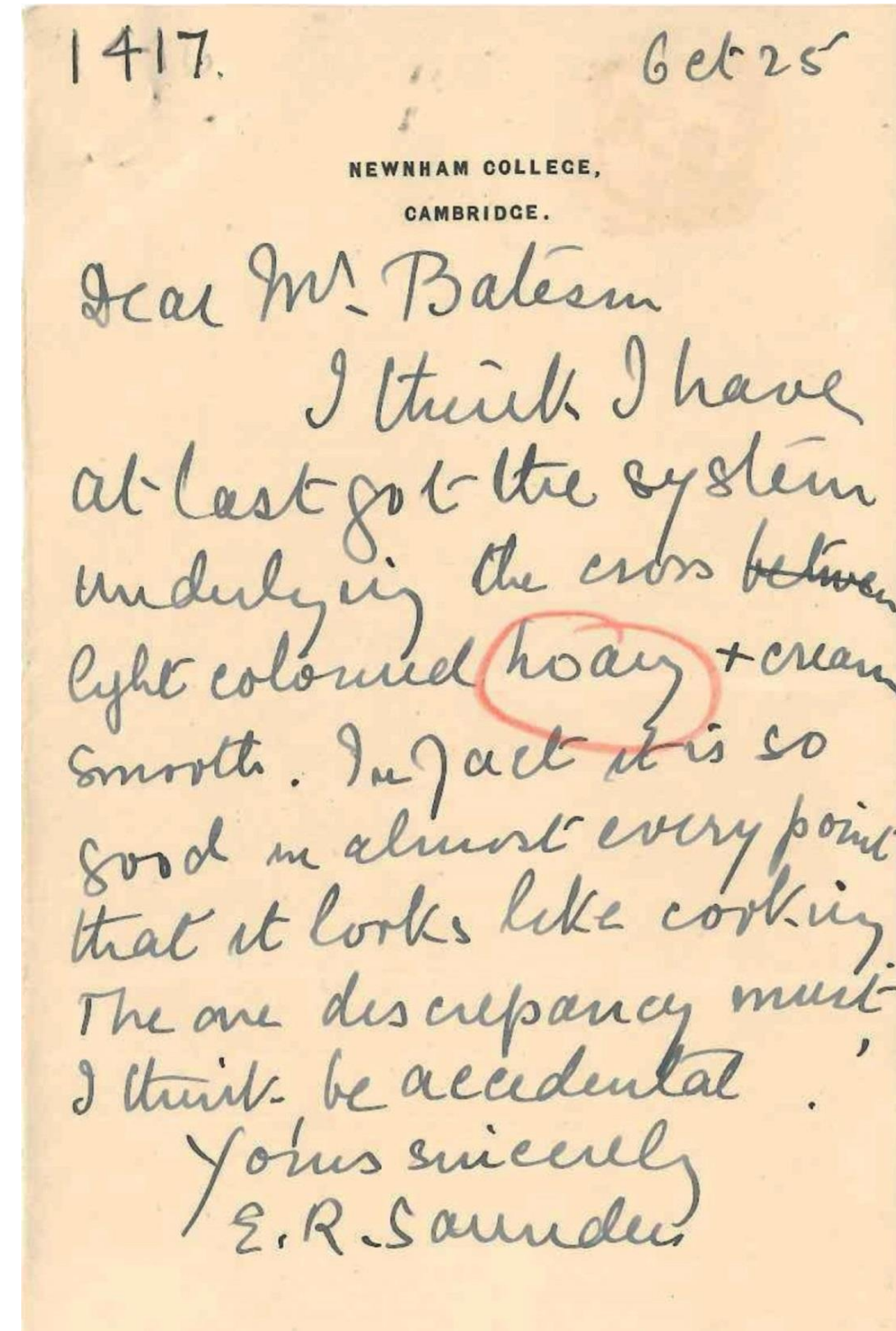
'The Mother of British Plant Genetics'

Edith Saunders died on 6 June 1945, and a report of her death appeared in the *Times* on 8 June. It is unattributed but was most likely written by Sir Harry Godwin, who said:

'She was one of the first women to take a distinguished place in the scientific world after the opening of university education to women'

She had for many years been identified as a botanist, and none of her early contemporaries were still living. Most of those asked to contribute to the few obituaries in the scientific press were perhaps unaware of her complete background. The first appeared in *Nature* on 18 Aug, and discussed only her work in floral morphology and her teaching. J B S Haldane felt sufficiently exercised over the omission of her work in Genetics, which he considered was of the 'first importance', that he added his own tribute in an additional obituary published 29 Sept, in which he stated:

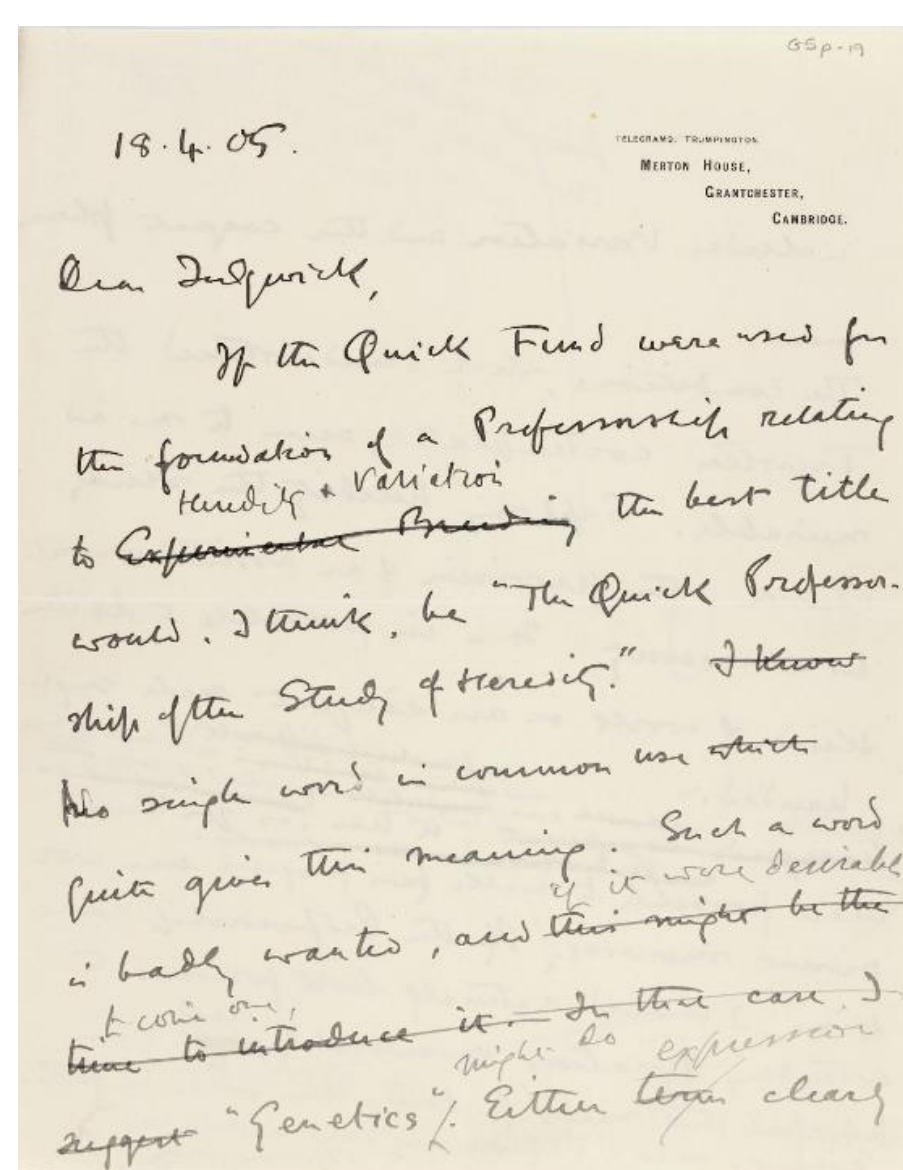
'It is clear that she and Bateson had independently discovered some at least of Mendel's laws before his work was known to them. She must in fact be regarded as the 'mother' of British plant genetics'.



Saunders writes to Bateson in 1905 to tell him she has a theory 'cooking'

When the Department of Genetics celebrated its centenary in 2012, Edith Saunders was given special attention, though she was relatively unknown and never a member of the department. Dr Don MacDonald wrote:

'Edith Rebecca Saunders ... was highly influential, and her contribution to plant genetics has not been fully acknowledged by posterity. Edith Saunders had her own independent line of research in plant genetics using *Matthiola* (night-scented stocks). ... Edith Saunders carried out many of the early experiments on sweet peas in collaboration with Bateson, and brought to these experiments not only her expertise in crossing plants, but a rigorous and systematic approach to the analysis of the results. She was probably the first to observe in her *Matthiola* crosses those deviations from Mendelian behaviour which we now recognise as complementation and genetic linkage. For technical reasons, the results of this became more clearly obvious in some sweet pea crosses, and the sweet pea examples have passed into the literature and into the history books. However, it is clear from their publications that Edith Saunders was certainly the first to notice these exceptions, and together with Bateson, to come up with an explanation which fitted the facts.'



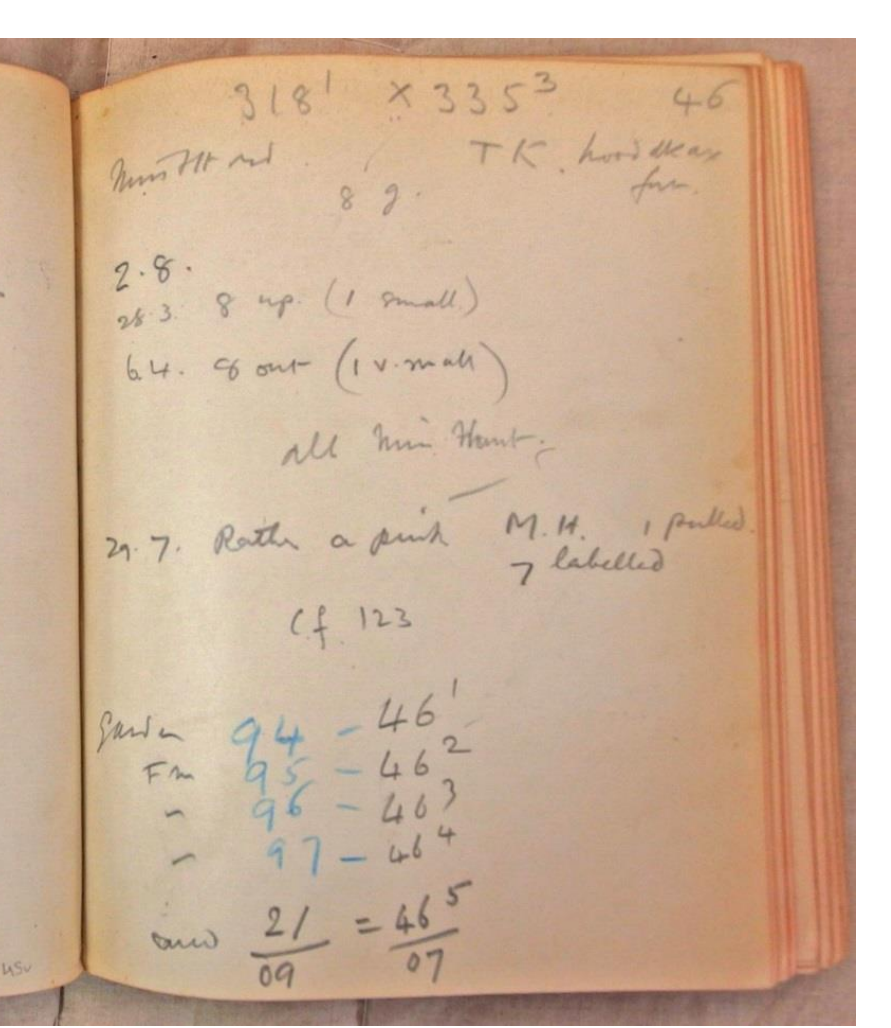
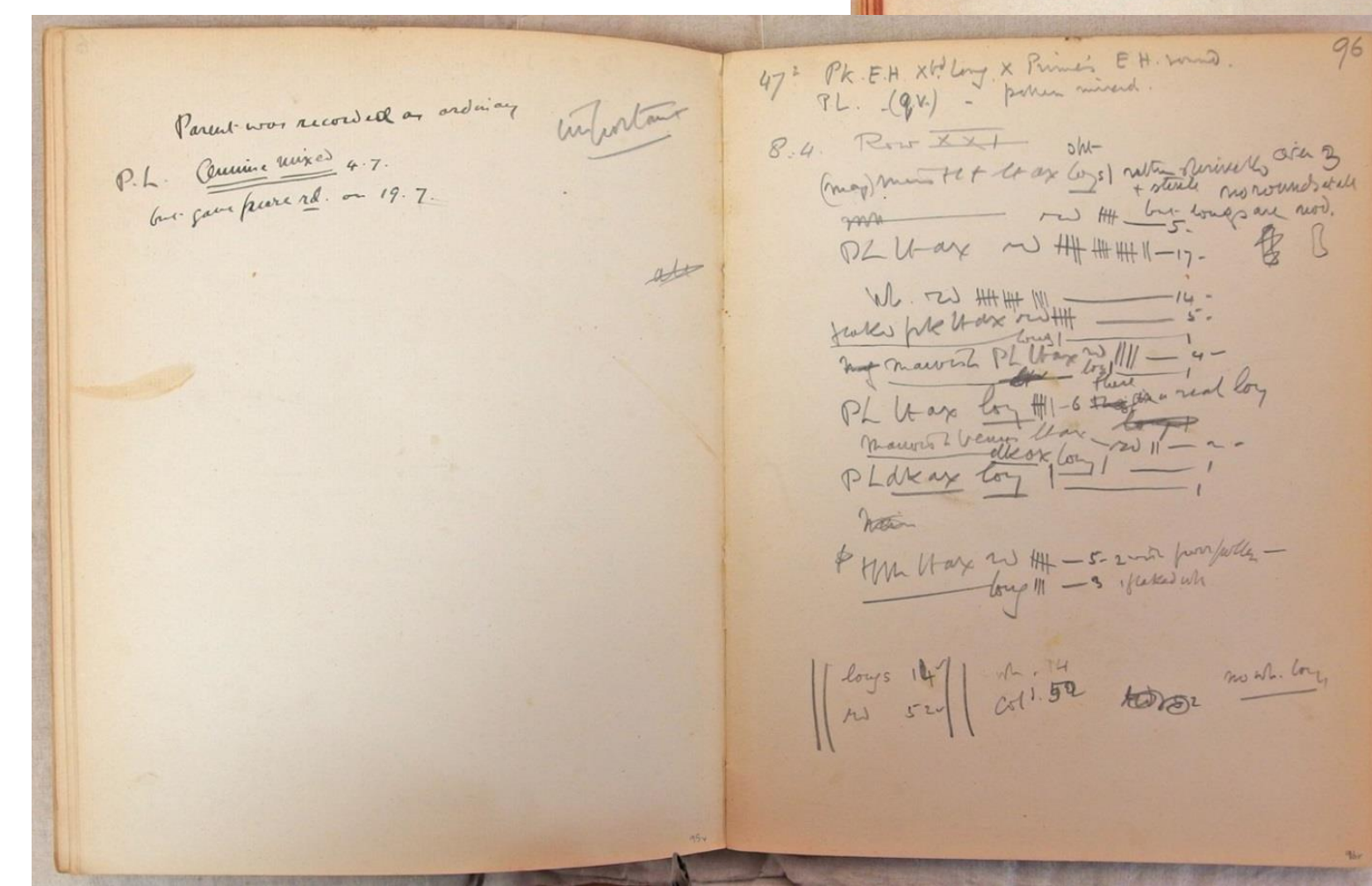
Bateson first suggested 'Genetics' as a title for a new professorship [which he desperately wanted]. The term became 'official' when he used it in his speech to the 1906 RHS Conference on Hybridisation - as a consequence renamed the 3rd International Conference on Genetics

Edith Saunders was Bateson's earliest collaborator, from summer 1895 at the latest. They had thus been research partners for 5 years prior to his rediscovery of Mendel, and for 10 years before he named the new science 'Genetics'. The better-known Reginald Punnett was recruited - for 'menial operations' - in 1904. Bateson 'cultivated' his other early collaborator, Charles C Hurst ['Bateson's Bulldog'], after hearing him speak about his orchid hybrids at an RHS meeting in 1899.

Once Bateson had conveyed to Saunders his early ideas on discontinuous variation in 1895, she immediately understood and supported them, designing a series of plant crosses to validate them. Bateson had found a scientific soulmate who was also able to design and carry out experiments on plants unsupervised and completely trusted, leaving him to focus on animals. She was the first person to present her results with his at meetings. She continued to work with him intermittently until he died in 1926, making her his longest-serving colleague.

Cambridge University Library holds 16 note books with meticulous records of sweet pea crosses, Saunders' specialism.

Below: It is probably Bateson who wrote 'Important' next to this record, whilst the note about the parent appears to be in Edith Saunders' hand



Above: Bateson & Punnett often waged bets on the outcome of plant and poultry breeding experiments, so the results were not predictable. Interestingly, it was Bateson who tended to lose, but he always seems to have paid up

'Wonderfully exact and clear teaching'

Haldane's description of Edith Saunders might equally apply to the role she adopted with her students. She was a Lecturer at Newnham College 1892-1925, and Director of Studies for the Natural Sciences at both Newnham [1918-1925] and Girton [1904-1914]. For over 20 years, she was almost single-handedly responsible for organising Botany Practicals for women. Although her subject was nominally Botany, she also taught general Biology, bringing in her expertise in Physiology and Genetics. Obituaries and other [rare] accounts of Edith Saunders all attest to her importance as a teacher ... whilst conveying some indication of her exacting standards:

'Not the least valuable part of her services was the organisation and training of many generations of science students at Girton and Newnham Colleges She always set before her pupils a high standard, and much excellent work was carried out by them. Even after many University Professors and lecturers opened their lectures to women, all the practical work of Part 1 of the Tripos was still carried out by her ... There must be many women employed in scientific work in universities, schools and other places all over the world who ... owe their present position and success to the stimulus of Miss Saunders' teaching, and the high quality of the work on which she insisted' [Ethel Shakespear and G L Elles : obituary]

'She seemed the embodiment of dedicated search for scientific truth. ... In the old Balfour Lab we rejoiced in her wonderfully exact and clear teaching, and the orderly marshalling of the facts by which she led us to understand and delight in the ways of plants ... Those were the days when Mendelism was the latest big idea, and though as a Botany student I only attended the more general lectures I did share in a delightful afternoon at Grantchester, when Professor Bateson led us on a Sunday afternoon round of his own farmyard, garden and poultry runs.' [M D Ball, Newnham student 1908-1911]

'... No one more convincingly proved [the value of examining fresh material] than the formidable 'Becky' Saunders, who gathered all the Newnham and Girton students under her care and made certain that they saw for themselves every last bit of evidence the fresh material might yield: the rest of my demonstrators toiled far behind her in assiduity and skill.' [Harold Godwin, *Cambridge and Clare*]

'The large contingent of women in Part I were shepherded by the draconian Becky Saunders, a very able scientist (or shepherd)' [HG = Harold Godwin, *Part II in '22* [typescript]]

Mother of 'the Pack'

Saunders not only inspired many women students as a teacher herself, she introduced some of them to Genetics by bringing them to Bateson's lectures. When Bateson was made Assistant to the Professor of Zoology in 1899, he was given no proper working space, but at least had the opportunity to deliver his 'Practical studies of evolution' lectures, and thus disseminate his ideas. In 1902 he started his twice-weekly 'Bible Class' in his rooms in St John's College. Notes on them made by Nora Darwin are held in the University Library. She said: 'My first introduction to the whole subject ... was when William Bateson was giving what we called his bible class, in a remote lecture room, in the back of one of the colleges. It was outside the ordinary curriculum. It was a 5 or 6 o'clock lecture. And there he introduced a small set of people into the elements of the new Genetics. Mendelism was just coming in. ... He was a brilliant lecturer and, of course, he had an entirely new view of ordinary heredity. ... It was very inspiring indeed!'

Even more significantly, by bringing women into Bateson's circle, Saunders was able to help a few of them to embark on a research career, which at the time was almost impossible under any other scientist. A collective unlike any other was formed, of unpaid [at least by Bateson] women researchers, and students of both sexes. Bateson knew a wide range of results must be produced for his theories to gain acceptance, for which he required assistance - yet he had no funds. In a failed 1906 request to the Royal Society for financial support for a 'School of Genetics', he mentioned he already had 12 researchers working on Mendelian experiments. He also needed space for breeding experiments - but had no land or laboratory. Thus the 'group' worked in many locations. In Cambridge alone, research was conducted in the Botanic Garden, St John's College kitchen gardens, College farms, the garden of Newnham College and the fields behind it, Bateson's own extensive garden in Grantchester, butterfly cages in the Dept of Morphology, mice cages in an attic on the [New] Museums Site and the Balfour Lab for Women.

The comradeship between members of the 'group' was also due in part to an initial lack of acceptance by those in the more established fields of science. Sturtevant lists the central members of Bateson's coterie as: Edith Saunders, Florence Durham [Bateson's sister-in-law], Dorothea Marryatt and Muriel Wheldale [both Newnham students recruited by Saunders], R C Punnett, and R P Gregory [initially a Botany student]. Later additions also recruited by Saunders included Hilda Killby and Igera Sollas. As the most established woman in the group, Edith Saunders fell into the role of mother to Bateson's paterfamilias, and she continued to assist others after the 'group' disbanded. When the polarising Bateson and his followers descended on meetings, those who were not wholehearted admirers called them 'The Pack'.

Rona Hurst, wife of C C Hurst, apprehended the major contribution Saunders made in the early years: **'She was shy and reserved behind all her apparent composure, but when one got to know her she was a woman of great charm and culture, allied to the magnificent brain which had backed up Bateson quite selflessly and unassumingly from the beginning. Her careful and well-designed experiments had always formed a steady and solid background to the general genetic story. Hurst had a great respect and admiration for her, regarding her as a wonderful stabilising influence in the earliest and most difficult years of the research in heredity.'**

Although Edith Saunders' publications after 1920 increasingly categorised her as a botanist, her research in floral morphology stemmed from a persistent compulsion to solve genetics problems. Her 'leaf-skin theory' and 'theory of carpal polymorphism' came under considerable fire at the time, but her tenacity, her rigorous methodology and precise presentation of results were never in question.