

Miss Ethel Sargent, F.L.S.

ETHEL SARGANT was born in 1863, and was the third daughter of Henry Sargent, barrister-at-law. She was educated at the North London Collegiate School, under Miss Buss, and at Girton College, Cambridge, where she took Parts I and II of the Natural Science Tripos in 1884 and 1886.¹ She came to Kew in October, 1892, and it was here that her career as a botanical investigator began. From 1893 until the death of her mother in 1912 she lived at home, and for some years was able to give most of her time to research work in her own laboratory. Later, her devotion to an invalid sister and to her mother left her little opportunity for continuous work. In 1912 she took the Old Rectory at Girton, where she spent the last years of her life in surroundings which were especially congenial to her. She died at Sidmouth, after a short illness, on January 16, 1918.

By her premature decease, English botany loses one of its ablest and most devoted students, who had accomplished much, and would doubtless have accomplished still more, if life had been prolonged.

When Miss Sargent came to the Jodrell Laboratory in 1892 her exceptional ability in research work at once showed itself. Her first published paper (1893) was a joint one with the present writer, on the pitchers of *Dischidia Rafflesiana*, chiefly concerned with the physiological anatomy of these organs.

But while at Kew a more characteristic line of work was started—the investigation of the nucleus. For some time, both at Kew and afterwards in the very efficient laboratory which she had built at her home, Miss Sargent engaged with great perseverance in the search for centrosomes; their presence in the higher plants was then one of the burning questions of cytology. Like other observers, she was unable to confirm Guignard's conclusions. Her publications on cytological subjects relate to the formation of the nuclei concerned in reproduction. Her chief results are embodied in two papers in the 'Annals of Botany' on the formation of the sexual nuclei in *Lilium Martagon*—the first on oogenesis, the second on spermatogenesis. She was one of those who contributed to the proof of the striking agreement in these fundamental processes between animals and plants.

Incidentally to her own researches Miss Sargent was able to confirm the important discovery, by the Russian botanist Nawaschin, of double

¹ The writer is indebted to Miss Sargent's brother, Mr. W. L. Sargent, for many particulars of her life.

fertilization in Angiosperms. Preparations showing the twofold nuclear fusions were demonstrated by her to the Royal Society in May, 1899. Her position in this matter may be compared to that of Guignard, whose work, though somewhat earlier in date, was also essentially a confirmation of Nawaschin's results. An interesting résumé of the subject of Double Fertilization was given by Miss Sargent in the 'Annals of Botany' a year later.

Miss Sargent's main lifework falls under two periods, which somewhat overlap. The first, already touched on, was cytological; the second, which occupied the remainder of her scientific career, was anatomical, her subject being the comparative anatomy of seedlings and the conclusions to which it led. The latter period was perhaps the more fertile of the two. This work also was started at Kew, where she began to accumulate her seedling material. The first publication on the subject was a joint paper, with Mrs. D. H. Scott, on the development of *Arum maculatum* from the seed (1898).

Her comparative researches were widely extended and soon led to conclusions of far-reaching importance. A new type of transition from stem to root in *Anemarrhena* (Liliaceae) was described in 1900, and this was followed up, two years later, by a preliminary paper on the origin of the seed-leaf in Monocotyledons, the first statement of her important theory. The following year, 1903, saw the publication of her great memoir on this subject, one of the most valuable of her contributions which have appeared in the 'Annals'. It is illustrated by seven plates, drawn partly by herself and partly by her friend Miss Agnes Robertson, now Mrs. Arber. While agreeing with Prof. G. Henslow and some other writers in deriving Monocotyledons from Dicotyledons, contrary to the views of the majority of botanists up to that time, Miss Sargent was led to quite an original interpretation of the relations between the two classes. Her comparison of the seedling-structure of certain Liliaceae with that of Dicotyledons, which are exceptional in having a single seed-leaf, indicated that in the former, as well as in the latter, the one cotyledon represents a fused pair. The anatomical facts supporting this conclusion are worked out in the fullest detail. This point then, the origin of the single cotyledon by fusion, is the first essential of the theory. Secondly, while Prof. Henslow had traced the Monocotyledons to an aquatic ancestry, Miss Sargent explained their peculiarities of structure by the hypothesis that they were essentially *geophilous* plants, originally possessing underground stems, such as bulbs, corms, or rhizomes, as so many of them still do.

Thus the Monocotyledons are regarded as having sprung from some early and simple race of Dicotyledons, by adopting, in the first instance, a geophilous habit. Our author was able to offer, on these lines, a satisfactory explanation of all the leading characters of Monocotyledons—the single

seed-leaf, the scattered vascular bundles, the usual absence of secondary growth, and the sheathing leaf-base. In all these points her position is supported by a careful comparison with Dicotyledons of similar habit.

The full memoir appeals, as is natural, to the specialist; for the more general reader there is an admirable summary of the theory in an article on the Evolution of Monocotyledons, published in the '*Botanical Gazette*' for 1904. Some years later an elaborate discussion of the whole theoretical position appeared in the '*Annals*' (1908) under the title '*The Reconstruction of a Race of Primitive Angiosperms*'. Her conclusion is: 'It is probable, therefore, that the Primitive Angiosperms resembled Dicotyledons much more nearly than Monocotyledons in their general features, as well as in stem anatomy and the possession of two cotyledons' (p. 183).

Whether Miss Sargent's theory be ultimately accepted or not, there is no doubt that it has exercised a considerable influence on contemporary botanical opinion. The details are worked out so fully and precisely as to give a solid basis to the hypothesis of the origin of Monocotyledons from a Dicotyledonous stock. At present the weakness of the theory lies in the absence of any palaeontological evidence in its support. The early history of Angiosperms is still unknown, but so far as they have been traced back, Dicotyledons and Monocotyledons appear to be of equal antiquity and to show no signs of convergence. At the same time it would be unfair to lay too much stress on facts which may prove no more than our admitted ignorance of the first stages of Angiospermous evolution. On purely morphological grounds Miss Sargent's theory holds a strong position.

In connexion with her general work on seedlings Miss Sargent paid special attention to the difficult subject of the anatomy and morphology of the Grass embryo; two papers, in conjunction with Mrs. Arber, are devoted to this special investigation (1905 and 1915). An admirable discussion of the position of vegetable embryology was given by Miss Sargent in her able address to the Botanical Section of the British Association in 1913.

We have now run rapidly through Miss Sargent's more important original contributions to science. She gave in addition a few popular addresses, but her serious teaching was limited to a course of lectures at the University of London in 1907 on the Ancestry of Angiosperms; her '*Reconstruction*' paper, referred to above, is an abstract of these lectures. Her taste and enthusiasm were all for research, and she was unwilling to allow herself to be distracted from it by teaching. She published two essays of a general character—on '*Women and Original Research*' (1900), and on '*The Inheritance of a University*' (1901). Two passages from the latter may be quoted: 'The great inheritance, then, of the Universities is the tradition of learning for learning's sake' (p. 7). 'Frenchmen, Scotchmen, Americans have a respect for learning: the Englishman alone asks of what

use it is. The subscription to a new laboratory is wrung from his pockets only by demonstrating that research pays in Germany' (p. 6).

Miss Sargant possessed the gift of style; the clearness and vigour of her exposition were no less characteristic than the accuracy of her observation. This was no doubt due in a large degree to her literary tastes; her brother writes: 'Always a great reader, her retentive memory gave her a wide and accurate knowledge of English Literature.' The writer remembers her saying that a love of books was the first thing necessary for a student—a true view, in his opinion, though one not popular among the modern apostles of science.

Miss Sargant was elected a Fellow of the Linnean Society in December, 1904; she was the first woman to serve on the Council. She was also the first of her sex to preside over a Section of the British Association, and proved herself a most capable and business-like President. At Cambridge she was elected an Honorary Fellow of Girton College in 1913 and also succeeded Mrs. Sidgwick as President of the Federation of University Women; towards the close of her life she devoted much time and labour to compiling the Register of University Women for War Work.

Personally Miss Sargant was a woman of a generous nature, who will be long remembered for her many acts of kindness. Her masculine vigour of intellect was associated with a truly feminine character of the highest type.

D. H. S.

LIST OF MISS SARGANT'S PAPERS.

- Some Details of the First Nuclear Division in the Pollen Mother-cells of *Lilium Martagon*, L. Journ. R. Micr. Soc., 1895, pp. 283-7.
- Direct Nuclear Division in the Embryo-sac of *Lilium Martagon*. Ann. of Bot., vol. x, 1896, pp. 107-8.
- The Formation of the Sexual Nuclei in *Lilium Martagon*. I. Oogenesis. Ann. of Bot., vol. x, 1896, pp. 445-77.
- Ditto. II. Spermatogenesis. Ann. of Bot., vol. xi, 1897, pp. 187-224.
- On the Presence of two Vermiform Nuclei in the Fertilised Embryo-sac of *Lilium Martagon*. Proc. Roy. Soc., vol. lxxv, 1899, pp. 163-5.
- A New Type of Transition from Stem to Root in the Vascular System of Seedlings. Ann. of Bot., vol. xiv, 1900, pp. 633-8.
- Recent Work on the Results of Fertilization in Angiosperms. Ann. of Bot., vol. xiv, 1900, pp. 689-712.
- Women and Original Research. Frances Mary Buss Schools Jubilee Magazine, November, 1900, pp. 1-8.

- The Inheritance of a University. The Girton Review, Lent Term, 1901, pp. 1-15.
 The Adaptation of Seedlings to their Surroundings. Trans. S. E. Union of Scientific Societies, 1901, 4 pp.
 The Origin of the Seed-leaf in Monocotyledons. New Phytologist, vol. i, 1902, pp. 107-13.
 A Theory of the Origin of Monocotyledons founded on the Structure of their Seedlings. Ann. of Bot., vol. xvii, 1903, pp. 1-92.
 The Seedlings of Geophytes. Trans. S. E. Union of Scientific Societies, 1903, 5 pp.
 The Evolution of Monocotyledons. Bot. Gazette, vol. xxxvii, 1904, pp. 325-45.
 The Early History of Angiosperms. Bot. Gazette, vol. xxxviii, 1905, pp. 420-3.
 The Family Tree of Flowering Plants. Proc. Holmesdale Natural Hist. Club, 1906 (for 1902-5), 12 pp.
 The Reconstruction of a Race of Primitive Angiosperms. Ann. of Bot., vol. xxii, 1908, pp. 121-86.
 Address to Botanical Section of British Association, Birmingham, 1913, pp. 1-14.

Joint Papers.

- D. H. Scott and E. Sargent: On the Pitchers of *Dischidia Rafflesiana* (Wall.). Ann. of Bot., vol. vii, 1893, pp. 243-69.
 Rina Scott and E. Sargent: On the Development of *Arum maculatum* from the Seed. Ann. of Bot., vol. xii, 1898, pp. 399-414.
 E. Sargent and Agnes Robertson (Mrs. Arber): The Anatomy of the Scutellum in *Zea Mais*. Ann. of Bot., vol. xix, 1905, pp. 115-23.
 E. Sargent and Agnes Arber: The Comparative Morphology of the Embryo and Seedling in the Gramineae. Ann. of Bot., vol. xxix, 1915, pp. 161-222.

In completing the above list of Miss Sargent's works the writer has had the kind assistance of Mrs. A. Arber, F.L.S.



1918. "Miss Ethel Sargent, F.L.S. [Obituary]." *Annals of botany* 32, i-v.

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