

INTRODUCTION

The year 1876 started out sedately enough with Darwin working on the first draft of his book on the cross- and self-fertilisation of plants, and the regularity of life in Down House measured by the ongoing tally of his and Emma's backgammon games. 'I have won, hurrah, hurrah, 2795 games', Darwin boasted; 'my wife ... poor creature, has won only 2490 games' (letter to Asa Gray, 28 January 1876). Francis Darwin, happily established in Down Lodge with his wife, Amy, had settled in as his father's botanical assistant, and their close working relationship is evident in their correspondence whenever one or the other was away from Down. The usual rhythm of visits with family and friends took place against the constant backdrop of advice and cossetting regarding the ailments that were so much a feature of Darwin family life. But the calm was not to last, and the second half of 1876 was marked by anxiety and deep grief. In May, William Darwin suffered a serious concussion from a riding accident, and George Darwin's ill-health grew worse, echoing Darwin's own chronic condition. But it was in September, when Darwin was finishing work on the second edition of *Orchids* and checking the page-proofs of *Cross and self fertilisation*, that the family suffered a devastating loss. The Darwins must have spent much of the year anticipating the birth of the first member of the next generation of the family, with Francis and Amy's child expected in September. Their joy at the safe delivery of a healthy boy was soon replaced by anguish when Amy died four days later. 'I cannot bear to think of the future', Darwin confessed to William on 11 September just hours after Amy's death. For once, the labour of checking proofs proved a blessing, as Darwin sought solace for the loss of his beloved daughter-in-law and relief from his anxiety about Francis. By the end of the year there was a different order at Down House with Francis and his baby son Bernard now part of the household, and Darwin recasting his work on dimorphic and trimorphic plants in new ways.

Darwin began the year by making a resolution. He would in future revise his published books only once and never touch them again, so as to use the 'small quantity of work' left in him for 'new matter' (letter to Asa Gray, 28 January 1876). The preparation of the second edition of *Variation* had involved much time and effort the previous year, and Darwin clearly wanted to focus his attention on testing his views on hybridity and species, and furthering his evolutionary arguments through new research. In February, he corrected the sixth edition of *Origin* for the very last time, and made minor changes to a reprint of the second edition of *Climbing plants* (letter from R. F. Cooke, 23 February 1876). When Smith, Elder and Company proposed

reissuing two of Darwin's three volumes of the geology of the *Beagle* voyage, *Volcanic islands* and *South America*, in a new single-volume edition titled *Geological observations*, Darwin resisted making any revisions at all. His resolve held even when Julius Victor Carus, who intended to translate the texts into German, pointed out several errors in the companion volume, *Coral reefs*, already in its second edition. Darwin was nevertheless 'firmly resolved not even to look at a single proof'. Perhaps Carus's meticulous correction of errors in the German editions made Darwin less anxious about correcting the English ones. 'You are the most wonderful man for accuracy, & I for blundering', he cheerfully observed to Carus. (Letter to J. V. Carus, 24 April 1876.)

Darwin focused instead on the second edition of *Orchids*, and he devoted much effort between May and September to gathering information from correspondents, carrying out experiments, and revising the text. *Orchids*, which concentrated on the 'means of crossing', was seen by Darwin as the companion to *Cross and self fertilisation*, which provided evidence for the 'advantages of crossing' (letter to Asa Gray, 28 January 1876). Revising *Orchids* was less a return to old work than part of the future work outlined by Darwin in his 'little Autobiography' ('Journal' (Appendix II)). During a two-week holiday after finishing *Cross and self fertilisation*, Darwin took up the suggestion made by a correspondent the previous year to write about his life (*Correspondence* vol. 23, letter from Ernst von Hesse-Wartegg, 20 September 1875). He began to compile an account of the development of his mind and character, although this was a private document intended in the first instance for his family only. Writing for an hour every afternoon, Darwin finished his account on 3 August with his new research in mind: 'During this autumn of 1876 I shall publish on the "Effects of Cross & Self Fertilisation in the Vegetable Kingdom". ... I hope also to republish a revised edition of my book on Orchids, & hereafter my papers on dimorphic & trimorphic plants, together with some additional observations on allied points which I never have had time to arrange. My strength will then probably be exhausted, & I shall be ready to exclaim "nunc dimittis."' ('Recollections', pp. 418–19).

Darwin remained firm in his resolution to concentrate only on new material despite the influx of information on other topics that he continued to receive. His botanical research effectively allowed him to consolidate his evolutionary framework, while avoiding the more contentious questions that his earlier books raised. On 22 April, he told his old Shropshire friend Thomas Eyton, who had evidently mentioned the discovery of possible human fossil bones in Canada, 'I am now at work on plants and do not suppose that I shall ever return to the consideration of man.' In particular, Darwin seemed eager to avoid issues that touched on moral or religious questions. These topics, however, continued to be raised in various ways. On 10 January, Charles O'Shaughnessy, an Irish Catholic farmer and self-proclaimed discoverer of remedies for potato blight, lunacy, epilepsy, rheumatism, consumption, and 'etceteras', wrote with the good news that he could restore Darwin to a religious life. This transformation would be effected by his forthcoming pamphlet, *Darwin confounded* (C. O'Shaughnessy 1876), which, he informed Darwin, 'completely confuted' the

arguments presented in *Descent of man*. ‘I will leave no doubt in any mans mind’, O’Shaughnessy continued, ‘but that your work is the most absurd production I ever had the pain of reading’. One ‘Nemo’ also argued for the essential role of God in the process of evolution because natural selection was not a ‘sufficient agency’ for the generation of consciousness. The manifestation of consciousness occurred through a process that used to be called transmigration, Nemo pointed out to Darwin, adding, ‘the term nowadays is *evolution* and it is the correct one’ (letter from Nemo, [1876?]).

Views such as these were easy enough for Darwin to dismiss, but it was more difficult for him to ignore the accusation made by the comparative anatomist St George Jackson Mivart in his *Lessons from nature* that Darwin had ‘at first studiously disguised his views as to the bestiality of man’ (Mivart 1876, p. 144). Not only was the comment unjust, but it was also the latest attack by the one man who Darwin felt had treated him ‘basely’ and who had succeeded in giving him pain (letter to A. R. Wallace, 17 June 1876). Although Mivart had long been a severe critic, relations between the two men had not broken down completely until Mivart made a slanderous attack on George Darwin in late 1874 in an anonymous article, which impugned not only George’s but also Darwin’s respectability (see *Correspondence* vol. 22, Appendix V). Eighteen months later, Darwin remained fearful that Mivart still had the capacity to damage George’s reputation. ‘I care little about myself but Mr Mivart in an article ... accused my son George of encouraging profligacy, & this without the least foundation’, Darwin told Alfred Russel Wallace on 17 June. It was the still raw memory of this incident that underlay Darwin’s heartfelt thanks to Wallace for his critical review of Mivart’s *Lessons from nature*.

Despite being busy drafting *Cross and self fertilisation*, Darwin did not forget the causes that had occupied him at the end of the previous year. He had been incensed in December 1875 when the zoologist Edwin Ray Lankester was blackballed at the Linnean Society of London because of internal squabbles, and had immediately begun to canvass fellows of the society to support Lankester at a second election (*Correspondence* vol. 23). With the voting scheduled for 3 February, Darwin reassured his close friend Joseph Hooker that he and Francis would attend the meeting. Darwin hoped not only to remove any stain on Lankester’s scientific reputation, but also to save the Linnean Society from the ‘utter disgrace’ of blackballing so distinguished a zoologist (letter to J. D. Hooker, 29 January 1876). Both aims were achieved, and in Darwin’s view, the five votes against Lankester must have been cast by the ‘poorest curs in London’ (letter to W. T. Thiselton-Dyer, [4 February 1876]).

The fight for legislation to allow vivisection for scientific purposes did not have so satisfactory a conclusion. The controversial issue had occupied Darwin for much of 1875. In January 1876, a Royal Commission report was published outlining the conditions under which experiments for physiological research and teaching should be permitted on living animals. The legislation subsequently proposed, however, was far more restrictive. Vivisection would be permitted only if it promised new, medically beneficial, discoveries, and would be banned completely on cats and dogs.

‘What a monstrous perversion of the Vivisection Commissions recommendation this bill is’, George Darwin declared to his father on 31 May. The physiologist Michael Foster, according to George, feared that if the bill passed into law it would threaten the existence of the physiological school at Cambridge University. The Physiological Society, which had been founded in March 1876 by the London physiologist John Scott Burdon Sanderson to discuss how best to respond to the impending legislation, considered what action to take. Burdon Sanderson was keen for the society’s secretary, George Romanes, to write articles for the *Fortnightly Review*, a highbrow periodical aimed at a general readership. Romanes, however, was reluctant to do so, as he confessed to Darwin on 1 June: ‘the heat of battle is not the time for us to expect fanatics to listen to ‘sense’.’ Darwin agreed. ‘I am inclined to think that writing against the bigots about vivisection is as hopeless as stemming a torrent with a reed’, he told Romanes on 4 June, but added, ‘Frank ... who sputters with indignation on subject takes an opposite line’. Although he conceded that Francis had the best of an argument with him on the subject, this did not affect Darwin’s pragmatic summing up of the situation: ‘It seems to me that physiologists are now in the position of a persecuted religious sect, & they must grin & bear the persecution, however cruel & unjust, as well as they can.—’

Throughout 1876, Darwin continued to receive responses to *Insectivorous plants*, which was published in July 1875, with a US edition published later that year and a German translation in 1876. ‘What is more to be wondered at—Nature in all her contrivances,—or man’s mind, able to investigate them to such extent?’ enthused Hermann Hoffmann on 10 January, while on 23 June, Auguste Forel mentioned the ‘intense pleasure’ the book gave him: ‘the quantity of new observations, profound and meticulous, that it contains is truly amazing.’ On 15 May, Mary Treat admitted to being so fascinated by the book that she sat up nearly all night before she could lay it down. Some correspondents wanted more information. Sophie Bledsoe Herrick, an American scientific author, found the ‘positive testimony’ conclusive, but wondered whether Darwin had investigated the ability of insectivorous plants to sustain life, as other vegetation did, on inorganic matter alone; she requested a reply (which Darwin duly sent) unless her questions were ‘too silly to deserve an answer’ (letter from S. B. Herrick, 12 February 1876). Others questioned whether insects provided nutrients that were absorbed through the leaves of insectivorous plants. An American horticulturist, Peter Henderson, began experiments on *Dionaea* ‘to test the insect eating theory’ (letter from Peter Henderson, 15 November 1876). William Dallinger from Liverpool, who planned to investigate the mechanism of plant digestion further, had already reported on 10 January that he had confirmed the ‘more salient points’ relating to *Drosera* in a ‘remarkable manner’ by replicating Darwin’s experiments. In contrast, the German physiologist Moritz Schiff was so struck that his research on animal digestion had been used by Darwin to draw analogies with plant digestion, that he repeated his own experiments, sending Darwin small amendments to his results (letter from Moritz Schiff, 8 May 1876).

The young zoologist George Romanes was also carrying out experiments, but in his case in the hope of confirming Darwin’s views on heredity as expressed in

the pangenesis hypothesis, first published in 1868 (*Variation* 2: 357–404). Others had attempted but failed to support the hypothesis through experiment, and pangenesis was not widely accepted. When the second edition of *Variation* was published in February 1876 (despite bearing a publication date of 1875), Darwin must have been gratified by Romanes's response to the heavily revised chapter on pangenesis. Not only did Romanes think the chapter 'admirable', but it made him 'more anxious than ever to get positive results in this year's experiments' (letter from G. J. Romanes, [c. 19 March 1876]). A less welcome reaction came from an ardent supporter of Darwin, the German zoologist Ernst Haeckel. Opposing Darwin's views for the first time, Haeckel had developed and published a rival theory of heredity named perigenesis, which he sent to Darwin on 9 May. Haeckel argued that the character of cells depended upon the wave-like movements of molecules of protoplasm that he called plastidules, and that adaptations were the result of changes in the wave pattern passed on to newly formed plastidules. Darwin thought Haeckel's essay 'clever & striking', but wondered how perigenesis explained reversion to a remote ancestor. Hoping that Romanes would one day convert the 'airy nothing' of pangenesis into a 'substantial theory', Darwin forwarded Haeckel's essay to him on 29 May. If pangenesis was 'airy', Romanes retorted on 1 June, perigenesis must be 'almost vacuous'. In September, Erasmus Alvey Darwin reported that Darwin's hypothesis had been criticised from quite a different angle when James Clerk Maxwell discussed the limits of the dimensions of organic molecules in relation to pangenesis in his article on the atom published in the *Encyclopaedia Britannica* the previous year (letter to G. H. Darwin, [after 4 September 1876]).

Darwin continued to encourage research by experts and amateurs alike and to promote work he admired. He was so interested in a letter from Fritz Müller in Brazil describing the contrivance whereby the *Cecropia* (the embauba or trumpet tree) ensured a beneficial relationship with the ants that inhabited the trunk that he sent the letter to *Nature* for publication. 'It seemed to me a shame to keep such interesting facts to myself', Darwin later told Müller (letter to Fritz Müller, [9 February 1876]). Likewise, when Johann von Fischer sent observations confirming Darwin's suggestion in *Descent* that the brightly coloured rumps of monkeys were an example of sexual selection, Darwin communicated this information in an article in *Nature* (letter from Johann von Fischer, [before 15 September 1876]). Hubert Airy's latest paper on leaf-arrangement or phyllotaxy was sent to the Royal Society of London by Darwin because he believed that Airy was 'on the right course in explaining phyllotaxis by the mutual pressure of very young buds' (letter to J. D. Hooker, 21 June [1876]). Darwin recognised scientific skill in all levels of society. He not only offered to propose the young rising star of Cambridge morphology, Francis Maitland Balfour, for fellowship of the Royal Society, but also signed a petition for a civil-list pension for the impoverished Scottish shoemaker and ardent naturalist Thomas Edward (letter from F. M. Balfour, 11 December 1876; letter to Samuel Smiles, 16 December 1876).

Darwin was well aware of his privileged position as an independent researcher, and sympathised with his close friends Joseph Hooker and Asa Gray, whose situations

often reflected the discontents of professionalisation. ‘Hooker seems to be absorbed in all sorts of routine work, and I fancy that you suffer largely in the same way’, Darwin wrote to Gray on 28 January. On 14 November, Hooker himself acknowledged he was ‘over head & ears in work, & in despair altogether’. Darwin’s wealth and privilege also distinguished him from his valued correspondent Mary Treat, who published her work on the yellow pitcher-plant, *Sarracenia variolaris*, in *Harper’s New Monthly Magazine* despite an invitation to publish it in *American Naturalist*: ‘you may wonder at my selecting a literary Magazine rather than a scientific one,’ she told Darwin on 15 May, ‘but I am wholly dependent upon my own exertions, and must go where they *pay best*’.

Darwin’s generosity in promoting the work of others sometimes had unintended consequences. He had no idea that his cautious answer to the question of what constituted an individual would, when received by the Belfast merchant James Torbitt, become a weapon in a campaign to eradicate potato blight. Torbitt had argued that this disease (caused by the water mould *Peronospora infestans*) was the result of propagating potatoes by cuttings rather than by seed, because new individuals could be produced only from sexual generation and not from self-division. Advertising Darwin’s support of this view would promote the success of the potato-seed business Torbitt was trying to establish and thus, he claimed, hasten the eradication of disease. ‘The **peronospora** does not know that we are pressing on its life,’ Torbitt enthused, ‘nor that every word addressed to you and approved of by you, turns, as it drops from my pen, into a live **blood-hound** which shall hunt it to the death’ (letter from James Torbitt, 19 April 1876). Darwin beat an angry retreat. He thought the use of his name in an advertisement distasteful, and pointed out that advertising a remedy for blight before a disease-free variety of potato had been produced by crossing the most pest-free varieties would damage the cause by leading the public to consider Torbitt an untrustworthy fanatic (letter to James Torbitt, 21 April 1876).

Darwin also had cause to regret his generosity to Lawson Tait, a Birmingham gynaecologist. The decision by the Royal Society of London to reject a paper by Tait on the digestive powers of *Nepenthes* left Darwin, who had communicated the paper to the society in 1875 at Tait’s request, with the ‘awful job’ of informing the author (letter to G. G. Stokes, 21 April [1876]). Darwin could not have been surprised by the society’s decision. He already knew that Joseph Hooker, president of the Royal Society, who was also researching *Nepenthes*, considered the morphological part of Tait’s work to be ‘trash’ and thought the paper was ‘not worthy of being read ever’ (letter from J. D. Hooker, 28 January 1876). Darwin himself had harboured doubts and was quick to acknowledge his misjudgement. ‘It is a good lesson which will last for my life’, he told George Stokes, secretary of the society, on 21 April, confessing, ‘as I knew nothing about *Nepenthes* & did not feel sure that his paper was rubbish ... I thought that I was not justified in refusing to send it to the Royal Soc, but it is now too clear that I sh^d. have been fully justified.’ Tait apologised on 25 April for placing Darwin in ‘so objectionable a position, as to be sponsor for a rejected paper’, but persisted in asking for the physiological objections to the paper so that

he could discuss its shortcomings with the referee. Darwin gave in, admitting to William Thiselton-Dyer on 26 April that Tait's letter about his 'accursed paper' had quite melted his heart, Tait took the affair 'so humbly'. Although Darwin would not breach scientific etiquette to disclose the identity of the referee (whom he knew to be the Cambridge physiologist Michael Foster), he requested an abstract of the report. On 5 May, Darwin had the unenviable task of passing on the crushing verdict that Tait's experimental methods were 'useless', of 'no diagnostic value', 'unimportant', 'valueless', and 'defective'.

Although correspondence was an indispensable research tool for Darwin, he struggled to cope with the onslaught of letters in response to his published work. 'I am so overwhelmed with letters on many days that I am often *forced* to be very brief in my answers, & I may appear ungrateful when this is not my frame of mind', he told the botanist and entomologist Henry Edwards on 1 March, before going on to confuse him with another entomologist, William Henry Edwards. The promise in *The Times* of 25 April that writing could be done more quickly and carbon copies easily made by means of a 'highly ingenious apparatus' may have persuaded Darwin to purchase one of the earliest available commercial models of typewriter. Francis Darwin and his wife, Amy, carefully prepared for its arrival. Amy made mock keyboards, Francis told his father on 1 May, '& we have races on them (in which I win). I find one learns very quick where to dab down ones fingers I am pining for the real machine.' It was the mechanically minded Horace, however, who was the first to type a letter, telling George on 1 May (in the only script the machine was capable of), 'FATHER HAS GOT A TYPEWRITER & A VERY NICE TOY IT IS.' After describing how you 'PLAY ON KEYS', Horace pointed out that in less than a day he could type no more than '2 OR 3 TIMES AS SLOWLY AS WRITING' (DAR 258: 860). He thought typing would be a boon to anyone who wrote a lot, but the novelty soon wore off and in 1878 the machine was given away.

Just days after the arrival of the typewriter, Darwin finished the first draft of his book on cross- and self-fertilisation and began work on the second edition of *Orchids*. Despite noting in his 'Journal' (Appendix II) that this involved 'much labour', Darwin never took to the machine. He continued to write in pen and ink, and to employ the former Down schoolmaster Ebenezer Norman to make copies of his work. On 18 May, Norman wrote to say that he had copied three hundred pages of the draft of *Cross and self fertilisation*, and, unlike a typewriter, he was able to point out possible mistakes in Darwin's calculations. To demonstrate the advantages of crossing, Darwin presented the results of experiments carried out over eleven years to show that in the majority of cases cross-fertilised plants were taller and more vigorous than self-fertilised ones. His conclusion was based on strict controls on the conditions of existence, and a statistical analysis of the total number of results from a variety of plants over several generations. Mathematics had never been Darwin's strong point, and he was reliant on his son George and cousin Francis Galton for the calculations. 'I have no idea how it could be done', Darwin confessed to George on 8 January, while Galton's statistical analysis (later published in *Cross and self fertilisation*) was a

revelation. ‘I am astonished that the common rough way of taking a mean differs so much from your refined methods’, Darwin told Galton on 13 January. His inability to comprehend how it was done, and his reluctance to employ a ‘professional calculator’, led him to admit to Galton, ‘This whole subject of variability of height is so much beyond my scope, that without you can give me a sentence, I will pass it over’.

The correspondence in 1876 shows that Darwin, as well as relying on help from his sons, took a keen interest in their research. He revelled in the praise heaped on Francis by George Henry Lewes for an article on the snail’s heart and a letter to *Nature* on the use of the chemical pycrotoxine in vivisection experiments (letter to Francis Darwin, [1 May 1876]). Darwin, however, was well aware of both the highs and the lows of scientific work. George was cautioned not to be too downhearted if his paper on the influence of geological changes on the earth’s axis of rotation did not stand up to scrutiny, although Darwin would himself be ‘so dreadfully disappointed’ if it all broke down. ‘As for yourself’, he told his son, ‘all I can say is do not commit suicide’ (letter to G. H. Darwin, [4 June 1876]). By midsummer, Darwin rejoiced to hear that the Cambridge astronomer John Couch Adams not only approved of George’s work but intended to present it to the Royal Society. He was pleased that Horace was off to Birmingham to lecture to the Institution of Mechanical Engineers on the dead-weight rotary dynamometer he had designed. Finally, he remarked, ‘Frank is getting on very well with *Dipsacus*, & has now made experiments which convince me that the matter which comes out of the glands is real live protoplasm, about which I was beginning to feel horrid doubts.’ ‘Oh Lord what a set of sons I have, all doing wonders.’ (Letter to G. H. Darwin, 13 July [1876].)

Darwin’s pride in his sons’ achievements was intertwined with anxiety about their health. He feared that too much excitement from scientific research was dangerous, and approved when George, who had worrying symptoms of stomach disorder and eczema, was able to rest his mind (letter to G. H. Darwin, 2 May [1876]). Darwin even cautioned the otherwise healthy Francis, ‘Take care and do not overwork and kill the goose that lays the golden eggs’ (letter to Francis Darwin, [1 June 1876]). Serious illness was never far away in the Darwin family. In April, while Emma was suffering from a feverish cold, Darwin’s London consultant Andrew Clark was called out to see Darwin’s daughter Henrietta Litchfield, who had fallen ill on a visit to Down. In the same month, Darwin heard that his sister Caroline Wedgwood continued to languish in Felixstowe, unable to get home because of a ‘long and terrible illness’ (letter to C. S. Wedgwood, 20 April 1876). By the time the Darwins were organising a special train carriage to get Caroline home, they had experienced a further calamity. On 10 May, William suffered serious concussion after falling off his horse. Darwin sought the best medical care. On 30 May, the surgeon James Paget advised complete rest for three months, but when William developed symptoms of rheumatism and poor digestion, Darwin wrote to his own doctor. ‘We find it extremely difficult to judge how far to avoid any excitement on the one hand, and yet not to make his life too monotonous,’ he explained to Andrew Clark, who travelled to Down to give William ‘the very devil of an examination ... so as to prove his

brain sound' (letter to Andrew Clark, [late June 1876]; letter to G. H. Darwin, 13 July [1876]). The irony was probably not lost on Darwin when an unknown German correspondent wrote in November to suggest that he write a book on 'The variations & sicknesses of men in state of domestication' showing how to bring about 'the return of the sick body to the natural laws' (letter from Fritz Hoddick, 23 November 1876). In late May, Darwin could only exclaim, 'What a deal of illness & misery there is in the world' (letter to W. D. Fox, 26 May [1876]).

There was much worse to come, however, and all the more shocking because associated with a happy event. On 7 September, Charles and Emma became grandparents for the first time to a large and healthy boy, the son of Amy and Francis. Just four days later, Darwin had the hard task of telling Leonard that Amy, after seeming to recover well from the birth, had suffered eighteen hours of convulsions and died that morning. 'God knows what will become of Frank— his life will be a mere wreck', Darwin lamented. Amy had been loved by the whole family and their grief was acute. Darwin's letter to his younger son offered comfort, not by hiding the pain of the situation, but by reminding Leonard of how much his friendship had been valued by Amy. In contrast, Darwin's letter to his oldest son William sought comfort. He expressed his anxiety that Francis was too young to care for the baby, and his hope that both would live at Down House away from reminders of Amy. 'It is the most dreadful thing which has ever happened', Darwin wrote in despair, 'worse than poor Annie's death, though not so grievous to me'. Darwin very rarely mentioned his oldest daughter Annie, who died at the age of 10 in 1851, but William, who was 11 years old at the time of her death, would have had clear memories of his sister and the devastating impact of her loss on his parents. Darwin's affection for and reliance on William was clear as he ended his letter in a rush of sentiment: 'No Father ever had better children than we have & you are one of the best of all' (letter to W. E. Darwin, 11 September [1876]).

Emma and Charles exhibited a practical stoicism in the face of death, and it was Francis's mother-in-law, Mary Anne Ruck, who provided emotional support. Amy's mother had come to Down at the end of August to be with her daughter at the time of the birth, and Emma was unimpressed by her. 'The more I see of Mrs Ruck the less I can take interest in a single word she says', she confided to Henrietta (letter from Emma Darwin to H. E. Litchfield, [31 August 1876] (DAR 219.9: 138)). But Mary Anne Ruck's ability to console Francis after Amy's death gained Emma's respect. 'She is always able to speak', Emma told William, before acknowledging, 'I shall always love Mrs Ruck She forgets herself & is so tender' (letter from Emma Darwin to W. E. Darwin, [13 September 1876] (DAR 210.6: 144)). Darwin, too, expressed his gratitude, stating that he had never seen Mary Anne Ruck's equal 'for goodness & kindness of heart' (letter to Francis Darwin, 16 September [1876]). However, Darwin was adamant that the only way to overcome grief was through work, and Francis was first tasked with making a fair copy of Darwin's recently completed autobiography (letter from Emma Darwin to W. E. Darwin, [13 September 1876] (DAR 210.6: 144)). Darwin knew that something more intellectually absorbing would soon be required, but feared that Francis would be

unable to resume his botanical research (letter to Francis Darwin, 20 September [1876]). Amy had ‘helped & encouraged’ Francis in his scientific work, ‘& whether he will ever have heart to go on again or what he will do I cannot conceive’, Darwin wrote anxiously to Hooker on 11 September.

By the time Darwin received Hooker’s condolences on 13 September, Francis had left Down. Amy was buried in Wales near her family home, and Francis stayed with the Ruck family until late October. His absence gave the household at Down time to recompose itself, now with a newborn baby in its midst. A nurse was hired, plans were set in motion to extend the house to accommodate Francis, and Darwin continued his own work by sending Francis proofs of *Cross and self fertilisation* to check and suggesting that he translate Fischer’s paper on monkeys’ rumps. By late September, the Darwins were able to host lunches for eminent German visitors, first Haeckel on the 26 September, and then Ferdinand Cohn, his wife Pauline, and Ferdinand Römer two days later. Darwin hoped that the Cohns would not come, complaining, ‘it kills me,—not but what I withstood poor dear Häckels bellowing at us yesterday very well’ (letter to Francis Darwin, 27 [September 1876]). Haeckel’s bellowing out his ‘bad English’, however, was as nothing compared to noise generated when ‘Professor Cohn (quite deaf) & his wife (very pleasing) & a Prof. Römer came to lunch’, Emma Darwin reported to Leonard Darwin on 29 September (DAR 239.23: 151). By the time Francis returned to Down in late October, Emma and Darwin had made a trip to Southampton to visit William, who was still recuperating, and, Darwin, to his relief, had made the final corrections to the proofs of *Cross and self fertilisation*. ‘I am so sick of correcting the press & licking my horrid bad style into intelligible English’, he told Asa Gray on 28 October.

Darwin could not advise his publisher how many copies of *Cross and self fertilisation* should be printed. The work, though of ‘some permanent value’, was ‘extremely dry’, he informed Robert Cooke on 16 September. Darwin was apologetic about the analysis of the experimental results, fearing perhaps that botanists would struggle as he did to comprehend the methods of calculation. ‘Please observe that the 6 first chapters are not readable, & the 6 last very dull’, he warned Asa Gray on 28 October, when sending him the page-proofs for review. ‘The dullness you deprecate I may find in the details of experiments and statistical matter—never lively reading for one so poor at figures as I am’, Gray conceded on 12 November, although he could reassure Darwin that the introduction was far from dull. Otto Zacharias, a young German journalist eager to review *Cross and self fertilisation*, was also told that the book was dull (letter to Otto Zacharias, 5 October [1876]). Darwin repeated the same warning to Julius Carus, his German translator. ‘You will have to decide whether it is worth translating’, he told Carus on 27 September, although he emphasised that the results were ‘remarkable & well established’. Darwin need not have worried. The reception of the book was positive, and nowhere more than in Germany.

The physiological researches of German botanists had helped shape Darwin’s approach, and his publications, in turn, were welcomed in Germany as contributions to an ongoing botanical conversation. Francis’s ability to read German had