

RESEARCH ARTICLE

# A family moss craze: learning, reading and skill development in a botanical and domestic network in early nineteenth-century England and Wales

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## Abstract

Between 1814 and 1826 four members of the family of Jane Talbot and her cousin William Henry Fox Talbot had an active and varied interest in the study of mosses, which included the collecting, drawing and naming of specimens. This article explores the textures of their developing practice of learning natural history, and considers their activities within the framework of the circulation of knowledge, their reading and skill development, and the networks that supported them. Their social status and connections provided access to the expertise of numerous British botanists, including Lewis Weston Dillwyn, William Jackson Hooker, and James Dalton, placing the family as a locus of knowledge (re)production and transmission. This work illustrates the pedagogical practices of an elite group as they engaged with botany in a domestic setting, and makes suggestions as to their motivations and stimulations, as well as the conditions that maintained or diminished their interest. At a time when mosses were little-studied even by professed botanists, it demonstrates how a family group including many young women filled their leisure pursuits with these small plants, and reveals how an extended family with no previous expertise in formal botany could be actors in early nineteenth-century knowledge exchange.

In 1815 the eighteen-year-old Jane Talbot wrote to her younger cousin Henry, ‘What Joy equals mine at this moment – I find Pterogonium Smithii – is it possible! Oh! Joy Oh! Glad! ... I found it in Mr Morton Pitts Garden at Kingston in a Tree[,] I thought it very odd, & unlike any Moss I had ever seen’.<sup>1</sup> Why was a young woman so excited about finding this plant, which belongs to a taxonomic group which was little known or cared-about? Indeed, there were probably no more than a dozen people in the country who could reliably identify it at the time.<sup>2</sup> Furthermore, how might her knowledge of this group of plants have been stimulated, sustained and supported?

<sup>1</sup> Jane Harriott Talbot (hereafter JHT) to William Henry Fox Talbot (hereafter WHFT), 22 June 1815, in Larry J. Schaaf (ed.) *The Correspondence of William Henry Fox Talbot*, 2003–23, no. 650, original underlining, at <http://foxtalbot.dmu.ac.uk> (accessed 15 January 2025) (hereafter TC).

<sup>2</sup> Noticed in 1787 on trees in Italy by James Edward Smith, he happened upon it in Kent later that year. [James Edward Smith], ‘Pterogonium’, in Abraham Rees (ed.), *The Cyclopaedia; or, Universal Dictionary of Arts, Sciences, and Literature*, London: Longman, Hurst, Rees, Orme & Brown, 1802–20, vol. 28, p. 4Y2 v. Specimens of it were circulated

Born in 1796 to the very wealthy Thomas Mansel Talbot of Oxwich, Penrice and Margam in Glamorganshire, and his wife Mary Lucy (née Fox-Strangways), Jane Talbot collected plants, used a microscope, taught herself to etch on copper and stone, owned and studied many books of cryptogamic botany, and received mosses from her aunt to identify. Most of the published letters by or to Jane, or those in which she is mentioned, are part of the correspondence of her cousin William Henry Fox Talbot (1800–77). While they do not give us the perspectives of the other family members and friends with whom she shared her interests, these letters provide a valuable insight into her botanical studies. The correspondence enables us to chart an extensive horticultural and botanical network within the family and beyond, and explore the practice of learning botany in a wealthy, liberal environment in England and Wales in the early nineteenth century.

Botanical activity was a remarkably varied practice two hundred years ago, taking place in a range of social and cultural settings. It was enjoyed by solitary men exploring exciting landscapes, medical students being taken out for field meetings, working-class men talking about plants in the pub, clergymen perambulating their parishes, and women and children discovering the flora of their local area.<sup>3</sup> Families also played their part, and a wide range of household members, including those beyond the family, often contributed to natural enquiry.<sup>4</sup> Furthermore, it is in various family and domestic contexts that natural history is modelled in the books for children and young people by authors such as Priscilla Wakefield, Maria Jacson, Ann Murry, Charlotte Smith and Maria Edgeworth from the late eighteenth century onwards.<sup>5</sup> That there was an audience for these latter works reminds us that many individuals who looked for or read about plants would not have identified as

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in James Dickson's exsiccata *A Collection of Dried Plants*, 1789, and published, as *Hypnum Smithii*, in James Dickson, *Fasciculus Plantarum Cryptogamicarum Britanniae*, 4 vols, London: G. Nicol, 1785–1801. The moss reached a wider audience in English, though without illustration, in William Withering, *An Arrangement of British Plants; According to the Latest Improvements of the Linnaean System*, 3rd edn, 4 vols, London: G.G. and J. Robinson, 1796. Smith subsequently published two accounts, as *Pterogonium Smithii*: James Edward Smith, *Flora Britannica*, 3 vols, London: J. White, 1804, vol. 3, p. 1271; and James Edward Smith and James Sowerby, *English Botany; or, Coloured Figures of British Plants, with Their Essential Characters, Synonyms and Places of Growth*, 36 vols., London: White, 1790–1814, vol. 19, t. 1326. The currently accepted name in Britain and Ireland is *Neckera smithii* (Hedw.) Müll.Hal.; see T.L. Blockeel, N.E. Bell, M.O. Hill, N.G. Hodgetts, D.G. Long, S.L. Pilkington and G.P. Rothero, 'A new checklist of the bryophytes of Britain and Ireland, 2020', *Journal of Bryology* (2021) 43, pp. 1–51.

<sup>3</sup> See D.E. Allen, 'Walking the swards: medical education and the rise and spread of the botanical field class', *Archives of Natural History* (2000) 27, pp. 335–67. On working-class and artisan botany see Anne Secord, 'Science in the pub: artisan botanists in early nineteenth-century Lancashire', *History of Science* (1994) 32, pp. 269–315; Secord, 'Corresponding interests: artisans and gentlemen in nineteenth-century natural history', *BJHS* (1994), 27, pp. 383–408; and Secord, 'Specimens of observation: Edward Hobson's *Musci Britannici*', in Frances Willmoth, Joshua Nall and Liba Taub (eds.), *The Whipple Museum of the History of Science: Objects and Investigations, to Celebrate the 75th Anniversary of R.S. Whipple's Gift to the University of Cambridge*, Cambridge: Cambridge University Press, 2019, pp. 101–18. On clergymen see Brita Brenna, 'Clergymen abiding in the fields: the making of the naturalist observer in eighteenth-century Norwegian natural history', *Science in Context* (2011) 24, pp. 143–66.

<sup>4</sup> Alix Cooper, 'Homes and households', in Katharine Park and Lorraine Daston (eds.), *The Cambridge History of Science: Early Modern Science*, Cambridge: Cambridge University Press, 2006, vol. 3, pp. 224–37; Anna Marie Roos, Martin Lister and His Remarkable Daughters: *The Art of Science in the Seventeenth Century*, Oxford: Bodleian Library, 2018; Alix Cooper, 'Natural history as a family enterprise: kinship and inheritance in eighteenth-century science', *Berichte zur Wissenschaftsgeschichte* (2021) 44, pp. 211–27; and the essays in Donald L. Opitz, Staffan Bergwik and Brigitte van Tiggelen (eds.), *Domesticity in the Making of Modern Science*, Basingstoke: Palgrave Macmillan, 2016; Christoffer Basse Eriksen and Xinyi Wen, 'Colouring flowers: books, art, and experiment in the household of Margery and Henry Power', *BJHS* (2023) 56, pp. 21–43; and Leonie Hannan, *A Culture of Curiosity: Science in the Eighteenth-Century Home*, Manchester: Manchester University Press, 2023.

<sup>5</sup> Bridget Hill, 'Priscilla Wakefield as a writer of children's educational books', *Women's Writing* (1997) 4, pp. 3–14; Elizabeth A. Dolan, 'Collaborative motherhood: maternal teachers and dying mothers in Charlotte Smith's children's books', *Women's Writing* (2009) 16, pp. 109–25; Leanne M. Cane, 'As to the education of youth: the novels of Charlotte Smith and the eighteenth-century and Romantic education debates', PhD dissertation, Northumbria

'professed botanists'; nor would they have gone on to be among that rank. For most people with a casual interest in natural history, or a fascination that lasted just a short time, what stimulated or sustained their interest may be difficult to determine. In respect of women botanists in this period, Ann Shteir has observed that they 'usually belonged to families with natural history enthusiasms, or came into contact with botany and botanists via family networks'.<sup>6</sup> The Talbot correspondence consequently offers an opportunity to explore how several individuals within an extended family engaged individually and collaboratively with knowledge of the natural world, particularly focusing on the practice of 'muscology' in the early nineteenth century.

Despite a broadening cultural interest in botany through the eighteenth century, during this period the study of mosses remained a specialized and limited activity. No doubt this was in part due to their diminutive size, but Dawson Turner acknowledged other challenges with this group, observing 'the difficulties which are universally allowed to surround the class *Cryptogamia*, and to remove which will require much time, unusual trouble, an examination of many *herbaria*, and perhaps an extensive correspondence'.<sup>7</sup> In these early decades of the nineteenth century, mosses were to a large extent the new botanical frontier. The territory had been effectively carved out by Johannes Hedwig in Saxony, who had investigated the reproduction of mosses, and his *Fundamentum Historiae Naturalis Muscorum Frondosorum* appeared in 1782. The English botanist John Sibthorp visited him at this time and subsequently introduced Hedwig's researches to England.<sup>8</sup> Several other works by Hedwig were published over the succeeding two decades, including the *Stirpes Cryptogamicae Novae* (1785), and the posthumous *Species Muscorum* (1801).<sup>9</sup> These were followed by a number of new European studies of mosses.<sup>10</sup> They were largely technical and specialist works, which remained difficult to obtain in Britain; here the third volume of James Edward Smith's *Flora Britannica* gave as comprehensive an account of the country's moss flora (in Latin) as was possible. It was usefully supplemented by the illustrations in his and James Sowerby's multi-volume *English Botany*, especially from 1802, when Smith was working on his *Flora*, though they were far from providing a complete illustrated moss flora. By the turn of the nineteenth century, mosses were at the cutting edge of new and esoteric botany: it was to this area that Jane and Henry Talbot devoted their natural-historical energies.

The Talbot family's concentration on extremely tiny plants is noteworthy. There was a well-attested and popular 'fern craze' in Britain from the 1840s, but such enthusiasm was less often accorded to their cryptogamic cousins, the mosses.<sup>11</sup> To study these small plants required the development of specialist skill, and relatively few people took much notice of them in the first decades of the century. Through the Talbot letters it is possible to reconstruct this developing interest in mosses as it passes from the first kindling of interest and

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University, 2019; Eleanor Anne Peters, 'Observation, experiment or autonomy in the domestic sphere? Women's familiar science writing in Britain, 1790–1830', *Notes and Records* (2017) 71, pp. 71–90.

<sup>6</sup> Ann B. Shteir, 'Botanical dialogues: Maria Jacson and women's popular science writing in England', *Eighteenth-Century Studies* (1990) 23, pp. 301–17; and see also Shteir, *Cultivating Women, Cultivating Science: Flora's Daughters and Botany in England, 1760 to 1860*, 1996, Baltimore: Johns Hopkins University Press.

<sup>7</sup> [Dawson Turner], 'Flora Britannica' [review], *Monthly Review, or, Literary Journal* (1801) 34, pp. 52–60, 52.

<sup>8</sup> An overview and assessment of Hedwig's work at this time is James Edward Smith's anonymous article about him in Rees, op. cit. (2), vol. 17, p. 3X v.

<sup>9</sup> The former was offered to Henry by Hooker for twelve pounds in 1816. William Jackson Hooker (hereafter WJH) to WHFT, 20 August 1816, TC, 712.

<sup>10</sup> Such works included those of Samuel Elisée Bridel-Brideri and the updates to *Species Muscorum* by Christian Friedrich Schwägrichen. See Willem Daniel Margadant, *Early Bryological Literature: A Descriptive Bibliography of Selected Publications Treating Musci during the First Decades of the Nineteenth Century and Especially of the Years 1825, 1826, and 1827*, Pittsburgh: Hunt Botanical Institute, 1968.

<sup>11</sup> David Elliston Allen, *The Victorian Fern Craze: A History of Pteridomania*, London: Hutchinson, 1969; Sarah Whittingham, *Fern Fever: The Story of Pteridomania*, London: Frances Lincoln, 2012.

initial difficulties of identification to collecting, learning, skill development and the critical appraisal of botanical evidence. In doing so, we can gain an insight into a practice of botanical education, the use of books and networks, and the transmission of knowledge in the early nineteenth century.

As such, this article follows Anne Secord's work on Henry Talbot's early botanical interests and the necessity for exactness and precision.<sup>12</sup> It also draws on work from the last two decades dissecting the circulation and transmission of knowledge, along with the material culture of learning.<sup>13</sup> In particular it examines how botanical knowledge was produced (and reproduced) and translated outside formal organizational structures. The work is indebted to critical approaches in book history, especially those of Adrian Johns and Jonathan Topham. As the latter's work on the readerships of the Bridgewater Treatises has shown, the range and variety of actual readers of scientific works of this period was considerable.<sup>14</sup> By investigating the specialist books a group of elite young people read and used, this research demonstrates how a local usage of books, plants and techniques functioned in the dissemination of the practice, culture and dynamics of learning botany. Finally, this article acknowledges the work of Michèle Cohen in recognizing the education of girls and young women as being a site of innovative pedagogic practices, through dialogue and doing.<sup>15</sup> By considering the botanical activities of the Talbot family, I argue that (within elite families, at least) the diverse pedagogical practices within families and domestic spaces motivated and enabled the development of many of the skills required to participate in the production of botanical knowledge, and that the beneficiaries of this included young women as well as young men.

Within the history of botany, the Talbot family may be marginal to the main avenues of scientific development, but the way they used the texts, techniques, objects and networks at their disposal can give us an appreciation of the range of motivations, commitment and constraints to their botanical education. Through such an approach we can explore botanical attainment as cultural practice, and identify the family as one possible vehicle for cohering and supporting study, enquiry, and skill development.

### The Talbot family network

Jane and Henry Talbot were cousins, both being grandchildren of Henry Thomas Fox-Strangways, the second Earl of Ilchester (1747–1802).<sup>16</sup> Jane's mother, Mary Lucy Fox-Strangways (1776–1859), had married Thomas Mansel Talbot (1747–1813) in 1794, and her older sister, Elisabeth Theresa Fox-Strangways (1773–1846) married William Davenport

<sup>12</sup> Anne Secord, 'Talbot's first lens: Botanical vision as an exact science', in Mirjam Brusius, Katrina Dean and Chitra Ramalingam (eds.), *William Henry Fox Talbot: Beyond Photography*, New Haven, CT: Yale Center for British Art, 2013, pp. 41–66.

<sup>13</sup> See especially James A. Secord, 'Knowledge in transit', *Isis* (2004) 95, pp. 654–72; Philipp Sarasin, 'Was ist Wissensgeschichte?', *Internationales Archiv für Sozialgeschichte der Deutschen Literatur* (2011) 36, pp. 159–72; Simone Lässig, 'The history of knowledge and the expansion of the historical research agenda', *Bulletin of the GHI* (2016) 59, pp. 29–58; Lorraine Daston, 'The history of science and the history of knowledge', *KNOW: A Journal on the Formation of Knowledge* (2017) 1, pp. 131–54.

<sup>14</sup> Adrian Johns, 'History, science, and the history of the book: the making of natural philosophy in early modern England', *Publishing History* (1991) 30, pp. 5–30; Jonathan R. Topham 'Beyond the "common context": the production and reading of the Bridgewater Treatises', *Isis* (1998) 89, pp. 233–62; Topham, 'Book history and the sciences', *BJHS* (2000) 33, pp. 155–8.

<sup>15</sup> Michèle Cohen, *Changing Pedagogies for Children in Eighteenth-Century England*, Woodbridge: Boydell & Brewer, 2023; Cohen, 'The pedagogy of conversation in the home: "familiar conversation" as a pedagogical tool in eighteenth- and nineteenth-century England', *Oxford Review of Education* (2015) 41, pp. 447–63.

<sup>16</sup> For brevity and simplicity, Jane Talbot and William Henry Fox Talbot will be referred to as Jane and Henry in this article.

Talbot (b. 1764) two years later. The two Talbot husbands were themselves first cousins, thereby additionally making Jane and Henry second cousins through their fathers.

Jane lived with her family at Penrice, a large estate in south Wales with a neoclassical villa which had been commissioned by her father after he returned from the Grand Tour in the mid-1770s. Thomas Mansel Talbot was a significant collector and patron, and his European travels resulted in a huge collection of paintings, sculpture and antiquities being transported back to Penrice, ensuring that the new house was filled with objects intended for display and appreciation.<sup>17</sup>

William Henry Fox Talbot is now most remembered as a creator of early photographic processes, though that was only part of the very wide range of his interests. Henry's father, William Davenport Talbot, was commissioned in the army, requiring that he and his wife, Lady Elisabeth, move frequently to different postings; Henry was born in February 1800, and his father died five months later leaving debts and liabilities.<sup>18</sup> Later in life, after his time at university in Cambridge, Henry's diverse interests included mathematics, chemistry, antiquarianism, Assyriology and optics.<sup>19</sup>

The two cousins' mothers both remarried after their husbands' early deaths. Highly educated herself, Henry's mother, Elisabeth Feilding, particularly esteemed education, and took considerable interest in that of her son. Mary Cole, Jane's mother, was the person they asked for plant identification, and to whom they relayed plant gossip.<sup>20</sup> The network of family and friends was dispersed around England and Wales, providing diverse places, habitats and gardens to be explored on visits. Among them were those of Henry Stephen Fox-Strangways, third Earl of Ilchester, and his wife Caroline, at Melbury in Dorset. Caroline's sister, Amelina Murray, also developed an interest in mosses, building her own collection, and corresponding with prominent botanists.

### Motivations and catalysts of learning

As children, Jane Talbot and her sisters were already interested in natural history; their mother, Mary Cole, shared rocks and fossils with them that would form the beginnings of their own collections, and she and her daughters routinely recounted their observations, collecting and horticultural activities to Henry.<sup>21</sup> At the time, he was at school in Rottingdean, near Brighton, and had been interested in plants from at least the age of ten, often writing accounts of the flowers he and his schoolmates tended in the garden.<sup>22</sup> In these letters, Henry described their current state, whether they were still in flower, and used the seedsmen's names. Unsurprisingly, the flowers grown by the boys at their school in Sussex were almost entirely easy to grow and reliable hardy annuals available from a variety of seed suppliers.<sup>23</sup> Such engagements

<sup>17</sup> Joanna Martin (ed.), *The Penrice Letters 1768–1795*, Swansea: West Glamorgan County Archive Service, 1993; and Vicky Coltman, *Classical Sculpture and the Culture of Collecting in Britain since 1760*, Oxford: Oxford University Press, 2009.

<sup>18</sup> H.J.P. Arnold, *William Henry Fox Talbot: Pioneer of Photography and Man of Science*, London: Hutchinson Benham, 1977.

<sup>19</sup> Brusius, Dean and Ramalingam, op. cit. (12).

<sup>20</sup> WHFT to EF, 16 April 1812, TC, 564; 18 April 1812, TC, 565.

<sup>21</sup> Ellinore Sybilla Talbot to her cousin WHFT, 8 June 1808, TC, 493; JHT to WHFT, 10 June 1808, TC, 128; Mary Lucy Cole (hereafter MLC) to her nephew WHFT, 8 April 1809, TC, 503.

<sup>22</sup> WHFT to his mother Elisabeth Feilding (hereafter EF), 9 September 1810, TC, 515; EF to WHFT, 12 September 1810, TC, 516; WHFT to EF, 23 September 1810, TC, 517; WHFT to EF, 13 October 1810, TC, 518; EF to WHFT, 23 October 1810, TC, 521; WHFT to EF, 26 April 1811, TC, 534.

<sup>23</sup> Many of the plants Henry mentions in his letters were included in *A Catalogue of Garden, Grass and Flower Seeds, trees, shrubs, herbaceous, green-house and hot-house plants, sold by Russell, Russell, & Willmott, nursery & seedsmen*,

with botany through the cultural practices of horticulture were of course common at this time, and clearly extended to schoolboys. Sarah Easterby-Smith has shown how a practical knowledge of the garden intersected with multiple activities and social relations, uniting (among others) nursery gardeners, elite women and practitioners of polite science.<sup>24</sup>

In the spring of 1812 Henry started at Harrow School. His arrival there coincides with a greater attention in the letters to the wild flora and the phenological changes as different plants emerged in the early months of the year.<sup>25</sup> His letters reveal that he initially described his favourite science as chemistry, and that he sought a *hortus siccus* from his mother.<sup>26</sup> It is not clear whether she bought this for him, but such a collection of dried plants would have provided invaluable reference material to aid his botanical studies. Jane supplied a small microscope to her cousin in 1813, and Henry's mother provided a copy of James Edward Smith's *An Introduction to Physiological and Systematical Botany* (1809), which he consumed with great interest.<sup>27</sup>

As Anne Secord has observed, this expanding interest in botanical topics caused Henry's mother some anxiety, concerned that his studious passions were too narrow and insufficient for her future aspirations for him.<sup>28</sup> Such worries elicited a forceful defence of botany from her son, reiterating that 'Aunt Mary says there is a difference between a philosophical, & a stupid botanist'.<sup>29</sup> The following month he provided an illustration of this 'philosophical' side of botany by describing the morphology of mosses: 'They have a little fringed blossom; the fingers, or teeth as they are called, of which, are always in number 4, 8, 16, 32, or 64: as exact as possible.'<sup>30</sup> Here he paraphrases from the section on Musci in the portion of Smith's book summarizing the Linnaean classes, carefully noting the geometrical progression in the number of peristome teeth that can occur on the capsule of different genera.<sup>31</sup> His classroom studies of classical mathematics and logic would have made him instantly recognize the numerical relationships in this sequence from Book VIII of Euclid's *Elements*, tantalizingly joining together two hitherto distinct and separate parts of his learning.<sup>32</sup>

Already in 1812 Henry had requested his mother to 'send a description of the plants that grow near Malvern', where she was then staying.<sup>33</sup> The summer and autumn of 1814 brought about a deeper engagement with botany, as Henry started recording lists of the wild plants he had observed, sending a list of plants found near Harrow to his aunt Mary, who reciprocated with a list of species she had recently seen for the first time.<sup>34</sup> The Harrow list he extended with his school friend Walter Calverly Trevelyan (1797–1879) over the next year, and he started keeping a notebook listing

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Lewisham, Kent, London: T. Plummer, 1800, and also in the list of annuals given in a series of pieces titled 'The English garden displayed' in the *Lady's Magazine* over the course of 1784.

<sup>24</sup> Sarah Easterby-Smith, *Cultivating Commerce: Cultures of Botany in Britain and France, 1760–1815*, Cambridge: Cambridge University Press, 2017.

<sup>25</sup> WHFT to EF, 27 April 1812, TC, 566.

<sup>26</sup> The *hortus siccus* was one of the lots in an auction: WHFT to EF, 10 March 1814, TC, 599.

<sup>27</sup> EF to WHFT, 4 March 1813, TC, 586; WHFT to EF, 12 September 1812, TC, 576.

<sup>28</sup> Secord, op. cit. (12).

<sup>29</sup> WHFT to EF, 6 September 1814, TC, 610, original underlining.

<sup>30</sup> WHFT to EF, 20 October 1814, TC, 620.

<sup>31</sup> James Edward Smith, *An Introduction to Physiological and Systematical Botany*, 2nd edn, London: Longman, Hurst, Rees, and Orme, 1809, p. 491.

<sup>32</sup> On Henry's mathematical studies see June Barrow-Green, "'Merely a speculation of the mind'? William Henry Fox Talbot and mathematics', in Brusius, Dean and Ramalingam, op. cit. (12), pp. 67–94.

<sup>33</sup> WHFT to EF, 27 April 1812, TC, 566.

<sup>34</sup> MLC to WHFT, 1 October 1814, TC, 617.



the locations of the rarer plants that he encountered as he travelled around the country.<sup>35</sup>

The above-mentioned letter in which Henry defended the study of botany additionally revealed that his more systematic and locally focused approach to botanical observation may have been catalysed by a particular book, even though he did not mention it by name. Lady Elisabeth had collected and dried two *Geranium* species for him while in Westmoreland; in response, Henry noted that 'G. sylvaticum is found in eight of our counties', which he listed.<sup>36</sup> That topographical tally was lifted straight from *The Botanist's Guide through England and Wales* (1805) by Dawson Turner and Lewis Weston Dillwyn. This two-volume work listed the locations and (often) habitats of rarer native British plants, county by county, based on the observations of the authors and their correspondents, and the published literature. Importantly, it added the cryptogams (mosses, liverworts, algae and lichens, but not the fungi) within its scope.

The vascular plant flora of lowland Britain had been well studied by this time, with most of the species of that part of the country described by the early eighteenth century.<sup>37</sup> Montane plants of the north and west were less well known, and the cryptogamic flora had had only limited attention. This meant that there was still opportunity for finding new species, not least in large parts of Wales, as Dawson Turner explained in the introduction to the chapter on Brecknockshire:

No where in our Island, south of the Tweed, does nature present more favorable opportunities for the cultivation, or more extensive fields for the discovery of her treasures, and yet ... no where has less attention been paid to them. This work, therefore, by shewing how little has hitherto been done, we trust will operate as a stimulus to those Botanists who have leisure and opportunity, to turn their minds to these parts of the kingdom.<sup>38</sup>

In respect of their coverage of the class Cryptogamia, Turner lamented it was 'even more faulty and imperfect than we had expected'. The reason for this he ascribed to 'the present imperfect state of our knowledge respecting those plants', the small number of botanists with sufficient knowledge, and especially 'the confusion of the synonymy'.<sup>39</sup> For two of the counties with which Talbot was most familiar at this time this was certainly true. Middlesex, the county including Harrow and London north of the Thames, had eleven mosses and four liverworts listed, mostly old records from Dillenius, and the species for Glamorganshire, where his cousin Jane lived at Penrice, amounted to just six mosses, two liverworts and sixteen seaweeds, reported by Dillwyn and George Sowerby.

Henry's engagement with *The Botanist's Guide* and Smith's *Introduction* illustrates how these texts shaped his response as a reader. Not only does he start to use Linnaean binomials for the first time, but we can see a relation between Dawson Turner's rhetorical exhortation and Henry's subsequent collecting and learning practice, a behaviour that quickly extended to his family, and to his school friend, Trevelyan. At a time when continental Europe was still

<sup>35</sup> William Henry Fox Talbot and Walter Calverly Trevelyan, 'Plants indigenous to Harrow: Flora Haroviensis', 1814–15, was previously at Harrow School Archives; William Henry Fox Talbot, 'Plantarum rariorum stationes à W.H.F.T. annis 1814, 1815, 1816, observatae', Add. MS 88942/1/219, British Library, London.

<sup>36</sup> WHFT to EF, 6 September 1814, TC, 610, original underlining.

<sup>37</sup> David Pearman, *The Discovery of the Native Flora of Britain & Ireland: A Compilation of the First Records for 1670 Species and Aggregates, Covering Great Britain, Ireland, the Channel Isles and the Isle of Man*, Bristol: Botanical Society of Britain and Ireland, 2017.

<sup>38</sup> Dawson Turner and Lewis Weston Dillwyn, *The Botanist's Guide through England and Wales*, 2 vols., London: Phillips and Fardon, 1805, vol. 1, p. 31.

<sup>39</sup> Turner and Dillwyn, op. cit. (38), p. vii.

closed to British travellers due to war, *The Botanist's Guide* turned the young roving botanical mind to the opportunities of the local, mediating the movement of natural-historical knowledge and stimulating the creation of new learning networks.

Conveniently, one of the authors of *The Botanist's Guide*, Lewis Weston Dillwyn (1778–1855), was a near neighbour of Jane Talbot and her mother Mary Cole at Penrice. Dillwyn was a naturalist and author of *British Confervæ* (1809), and various other works. He was a frequent guest at Penrice, and offered help with Henry's botanical pursuits by sending dried specimens of 'several of the rarest British species'. Knowing *The Botanist's Guide*, Henry noted to Dillwyn various species of vascular plants he had found in Glamorganshire; Dillwyn was happy to receive them, and Henry would have been encouraged to read that six of the species he had found were apparently new for the county and would 'all be mentioned in the next Edition'. The older botanist was also willing to look at Henry's Harrow list, and offered additional help, observing,

The Musci are rather a difficult tribe & if you are determined to master them you had better come & shut yourself up for a fortnight in my Library where you will find a tolerably good collection which will materially assist.<sup>40</sup>

Here, a week after Henry had noted to his mother the geometric progression in the numbers of moss peristome teeth, Dillwyn responded to his question about how to start learning about this group, and directed him to James Edward Smith's *Flora Britannica*, one of the few (Latin) works with a treatment of mosses at this time. Within a month of receiving Dillwyn's letter, Henry had acquired a set of the books from his mother, noting that 'the *Flora Britannica* is very useful, & assists my botanical pursuits amazingly'.<sup>41</sup> Leaving no doubt about the intended target of his studies, he wrote to Jane that it is 'a delicious book, without which I am persuaded it is impossible to make out mosses'.<sup>42</sup>

The first two volumes of this important work had been published in 1800, but the third volume did not appear until 1804, probably due to the challenges of differentiating the non-flowering plants which this volume contained.<sup>43</sup> Once the third volume was published, Lockhart Muirhead (1765–1829), Regius Professor of Natural History at Glasgow, writing in the *Monthly Review*, specifically praised Smith's work on the mosses, noting that the Cryptogamia had hitherto been 'one of the most confused and defective divisions of English botany'.<sup>44</sup> Such comments underscore Dillwyn's opinion about how 'difficult' the study of mosses was felt to be, so the Talbot family's focus on them can be seen to be especially noteworthy.

While being portrayed as difficult to master, mosses were nonetheless presented as a suitable group to be studied by women. In his review of *Flora Britannica*, Lockhart Muirhead lamented that it was 'couched in the Latin language'. Acknowledging that this aided European botanists, he remarked that Smith's 'descriptions are so neat and appropriate' that it would be desirable for the work to be available in English,

especially as many of our fair islanders amuse their leisure with the elegant and seducing study of botany. The mosses, in particular, from the gracefulness of their forms, the liveliness of their verdure, and the facility with which they are preserved,

<sup>40</sup> Lewis Weston Dillwyn (hereafter LWD) to WHFT, 28 October 1814, TC, 622.

<sup>41</sup> WHFT to EF, 24 November 1814, TC, 627.

<sup>42</sup> WHFT to JHT, 27 November 1814, TC, 628. One of the reviews observed that Smith had increased the total British moss species to 320: '*Flora Britannica*', *Edinburgh Review* (1805) 6, pp. 79–90.

<sup>43</sup> [Dawson Turner], '*Flora Britannica*', *Monthly Review, or, Literary Journal* (1801) 34, pp. 52–60.

<sup>44</sup> [Lockhart Muirhead], '*Flora Britannica*', *Monthly Review, or, Literary Journal* (1805) 47, pp. 362–8.



are objects peculiarly suited to the delicacy of female observation, and eminently calculated to excite their admiration of omnipotent wisdom.<sup>45</sup>

That Muirhead singled out ‘the delicacy of female observation’ as a compelling rationale for women to devote their time to appreciating mosses might have been because these plants have no obviously visible sexual parts. Authors such as Richard Polwhele (1760–1838) were much concerned about the propriety of the Linnaean system and its focus on one specific and potentially titillating part of vegetal anatomy; Muirhead’s comments instead draw attention to the power of mosses to excite an interest in God, rather than arousing other emotions.<sup>46</sup>

### The difficulty of learning

Jane was already describing ferns in detail to her cousin, and sending him mosses.<sup>47</sup> Over the next ten months the two cousins’ learning and identification of mosses slowly developed, as a result of studying their books, careful examination of specimens, exchanging plants and being out in the field with Dillwyn. Nevertheless, the letters display a gendered vocabulary and style in relation to the cousins’ learning, with Henry frequently adopting a didactic tone inherited from his formal schooling as he displayed the results of his textual studies, and Jane apologizing that her language was ‘not very Botanical’, despite its precision.<sup>48</sup>

Their learning was not straightforward. Henry confessed to Jane that ‘the genus Hypnum is so intensely hard that it discourages me’, and lamented that these small branched bushy plants ‘are so like each other, that it requires experience, to distinguish them’. Their aunt Caroline, Countess of Ilchester, encountered similar challenges, complaining that ‘the Hypnums are most complex’.<sup>49</sup> Dillwyn provided some tentative identifications of some mosses Henry had supplied together with notes on the main divisions in *Hypnum*, despite remarking that the specimens were ‘rather too imperfect to rouse my sleeping recollection of them’.<sup>50</sup> Such early exchanges provided valuable knowledge to help replicate botanical determinations and to support a better practice of specimen collection.

The discernment of difference among these small plants is evident in Henry’s comments on some species Jane had collected from south Wales: ‘The two *Andræa*’s, which you call black things, are two of the most extraordinary or rather curious among the mosses – Are not they unlike other mosses?’ Indeed, these species that grow on wet acidic upland rocks are unique among British mosses, with their peristome of ‘4 incurved teeth, cohering at their tips’.<sup>51</sup> With growing confidence Henry could attempt more accurate determinations and proposed a ‘correcter list of my mosses’ to Jane, comprising ‘*Tortula muralis* (not *subulata*)’, ‘*Funaria hygrometrica*’, ‘*Fontinalis antipyretica* (very beautiful)’.

<sup>45</sup> [Lockhart Muirhead], op. cit. (44), p. 368. The *Annual Review* echoed this, stressing that ‘his fair countrywomen have a claim upon him which, we are persuaded, he has too much gallantry to contemn or to neglect’. ‘*Flora Britannica*’, *Annual Review and History of Literature* (1804) 3, pp. 755–9.

<sup>46</sup> See Shteir, *Cultivating Women*, op. cit. (6); and Sam George, *Botany, Sexuality and Women’s Writing, 1760–1830*, Manchester: Manchester University Press, 2007.

<sup>47</sup> JHT to WHFT, 29 October 1814, TC, 623; WHFT to JHT, 27 November 1814, TC, 628.

<sup>48</sup> JHT to WHFT, 29 October 1814, TC, 623.

<sup>49</sup> WHFT to JHT, 27 November 1814, TC, 628; Caroline Leonora Fox Strangways (hereafter CLFS) to WHFT, 14 February 1815, TC, 636.

<sup>50</sup> LWD to WHFT, 28 November 1814, TC, 629; 21 December 1814, TC, 631.

<sup>51</sup> WHFT to JHT, 27 November 1814, TC, 628; the peristome is clear in the illustration in Smith and Sowerby, op. cit. (2), vol. 18, t. 1277.

and the equally attractive ‘*Gymnostomum truncatulum*’.<sup>52</sup> Captivated by the microscopic, Henry here shares a novel aesthetic sensibility, implicitly encouraging his cousin further to explore this little-known corner of the botanical world. To differentiate between the *Tortula* species, he had had to evaluate the relative shape of the leaves, the length and shape of the capsule, the shape of the capsule lid (operculum), and the habitat, the plants themselves being less than one centimetre tall. Though all common species, it would have required considerable time and evaluative skill to determine these four plants using *Flora Britannica*, starting from its summary of the genera, with its abbreviated forms of the specialized Latin terms for the parts of mosses, and then comparing the characters of each species in the genus.<sup>53</sup>

Despite these successes, other plants were more testing, and illustrated the poverty of the texts available. From Harrow, Henry wrote that he had ‘found one, which I think is very rare, as it is only mentioned to grow in Ireland’.<sup>54</sup> This bristle-moss he identified as *Orthotrichum pumilum*, and described it as ‘the most common of the Mosses now in blow’ (i.e. fruiting), despite the *Flora Britannica* only detailing two places in Ireland in which it had been found:

I was deceived by this, & supposed it was very rare; & so got a friend of mine [Trevelyan], to send it to M<sup>r</sup> Sowerby the botanist; who replied, that the name which we had given it was correct, but that it was ‘not very rare’. These were his words – Does he mean, that it was not very rare; – or, that it was not very rare.<sup>55</sup>

Though Henry was able to tap into other expert opinion, here he shares his linguistic confusion with Jane, and demonstrates how knowledge transfer in the learning process could be a slippery interpretive business.

The winter was no impediment to botanical activities as friends, family and acquaintances met, corresponded and exchanged plants. Writing from the family estate in Northumberland, but without the necessary books to hand, Walter Trevelyan sent Henry some mosses which he ‘could not make out without Smith’ (i.e. *Flora Britannica*), and one of Dillwyn’s friends, John Montgomerie Traherne (1788–1860), introduced himself to supply Henry with some botanical specimens.<sup>56</sup> At the same time, Jane Talbot’s expertise was steadily increasing, as she continued her search for mosses in the relatively unpromising habitats of London, and was clearly familiar with common urban species.<sup>57</sup> Her travels around the country offered many occasions for collecting plants and helping her family to identify them; while at Bath her mother reported that ‘Jane scrapes all the old Walls with great perseverance’, and her aunt Caroline Fox-Strangways was beginning to send her mosses to identify.<sup>58</sup> Caroline had started to study mosses, but at times found Withering’s *An Arrangement of British Plants* (1796) inadequate to the task. She sent a *Hypnum* ‘in seed’

<sup>52</sup> WHFT to JHT, 27 November 1814, TC, 628.

<sup>53</sup> If he had *English Botany* to hand as well, the figures show the subtle differences between the two species, but require some visual skill to tell them apart at first glance: Smith, op. cit. (2), vol. 3, pp. 1255, 1256; and Smith and Sowerby, op. cit. (2), vol. 16, t. 1101, and vol. 29, t. 2033.

<sup>54</sup> WHFT to EF, 21 November 1814, TC, 626.

<sup>55</sup> WHFT to JHT, 27 November 1814, TC, 628, original underlining.

<sup>56</sup> Walter Calverley Trevelyan to his friend WHFT, 13 December 1814, TC, 628; John Montgomerie Traherne to WHFT, 6 January 1815, TC, 632.

<sup>57</sup> ‘There is a gutter in Hyde Park which has Moss in it which (excepting T[ortula] muralis & Bryum argenteum) [is] the only one I have seen’: JHT to WHFT, 2 March 1815, TC, 640.

<sup>58</sup> MLC to WHFT, 28 January 1815, TC, 671; CLFS to WHFT, 3 February 1815, TC, 634.

to Henry, reporting that ‘Jane says it is rarely found in fructification’, which suggests that Jane had access to *English Botany* or *Flora Britannica*, in both of which that detail is noted.<sup>59</sup>

The community of family and friends sustained and extended the fascination with plants. Talbot’s correspondence, with its frequent references to his enjoyment of botanizing at Penrice and its environs, recalls what Dena Goodman has called ‘affective geographies’, those relationships tied to place, and how scientific practice can be enmeshed with family and friendships. I would suggest that the learning of science was also intimately bound with such affective relationships, and that it was not just limited to young men.<sup>60</sup> In 1814, Elisabeth Feilding wrote to her son, ‘Would it not be singular if I were to become a botanist through affection? Whenever I see a plant that seems to me either rare or curious, it immediately brings you to my Mind’.<sup>61</sup> These ties of kinship fostered a familial community of interest and favour.

## Networks

We have seen how the family had natural-historical expertise available through the presence of Dillwyn in their social circle in south Wales, and Henry was able to draw on the skills of artist James Sowerby through his school friend, Trevelyan. Together, they visited Sowerby in December 1814, and the eighteen-year-old Jane was exchanging mosses with Trevelyan.<sup>62</sup> Over the following two years, this largely local and family network rapidly expanded, bringing Jane and Henry into direct and frequent contact with many leading botanists (see the supplementary materials online, which detail the books, people and relationships in this network). Increasingly, their scientific interests shaped the social connections of the family.

In Henry’s case the most significant contact was William Jackson Hooker, at the time managing a brewery in Norfolk, but already an active botanist, author and artist, and fellow of the Royal Society. He was also particularly interested in mosses and liverworts. From October 1815, Henry moved to a new school at Castleford, Yorkshire, for a year, where he received a copy of *Muscologia Hibernica* from its author, Dawson Turner (Hooker’s father-in-law), and was the recipient of many supporting and encouraging letters from Yorkshire botanist James Dalton, another muscologist who had also been introduced via Hooker.<sup>63</sup> Jane was envious of her cousin’s communications with Hooker, but responded with an account of her visit to Sir Joseph Banks’s house in Soho Square, where she met Robert Brown and Henry Holland.<sup>64</sup> Two years later, in 1818, she reported meeting William Buckland, who gave her all the plants from his European tour ‘to arrange and name’.<sup>65</sup> As the following section will make clear, these contacts coincide with and catalyse a deeper and more focused learning about plants, especially mosses.

To facilitate their expanding botanical practice, Jane and Henry developed a range of new skills – physical, visual and textual. During 1816 and 1817 a great many species

<sup>59</sup> CLFS to WHFT, 14 February 1815, TC, 636; CLFS to WHFT, 3 February 1815, TC, 634. This second letter enclosed some ‘*Hypnum proliferum*’; see Smith and Sowerby, op. cit. (2), vol. 21, t. 1494; and Smith, op. cit. (2), vol. 3, p. 1297 (‘*Fruct. fert Martio, Aprili, at rarissime*’).

<sup>60</sup> Dena Goodman, ‘Affective geographies: Family and friendship in the production of scientific knowledge’, *History of Science* (2023) 61(2), pp. 236–65.

<sup>61</sup> EF to WHFT, 21 September 1814, TC, 514, original underlining.

<sup>62</sup> WHFT to EF, 24 November 1814, TC, 627; JHT to WHFT, 22 June 1815, TC, 650.

<sup>63</sup> William Jackson Hooker (hereafter WJH) to WHFT, July 1816, TC, 134; Dawson Turner to WHFT, 21 June 1816, TC, 701; James Dalton (hereafter JD) to WHFT, 29 July 1816, TC, 708.

<sup>64</sup> Henry had already visited Joseph Banks, and Henry Holland subsequently supplied Jane’s sister Mary with many minerals. JHT to WHFT, 23 June 1816, TC, 702.

<sup>65</sup> JHT to WHFT, 20 June 1818, TC, 805.

and books feature in the correspondence. These include new works, specialist titles and difficult-to-source European books, some of which were obtained by the cousins' young uncle William Thomas Horner Fox-Strangways while he was serving as attaché at the British embassy in St Petersburg.<sup>66</sup> Through their social status and wealth, Henry and Jane were further inducted into the wider, international dimensions of knowledge making, and in doing so the scope of their activities extended beyond simply naming plants.

This was paralleled within the family, as additional members started to engage with muscological literature. Foremost among them was Amelina Murray, sister of their aunt Caroline, who had been collecting plants on the Isle of Man and in Dorset, which she had attempted to determine using *Flora Britannica*.<sup>67</sup> People and books were important in this knowledge network, and the next section will examine how the local usage and interpretation of texts alongside other objects and technologies were integral to learning and the dissemination of botanical practice.

### Materials and skills of learning

Learning botany can be hard, and requires considerable application. Relying solely on books easily introduces errors when determining a species, so having access to botanists who could explain difference was essential to Henry and Jane's own skill development. Hooker, Dillwyn and Dalton each played their part in instructing the cousins, with Hooker particularly taking a leading role in managing these new entrants in a new specialism.

Most importantly, the specimens themselves had to be good, meaning that they had to include the parts necessary to enable their determination. Henry learnt this early from Dillwyn, who reported that some of the mosses he had received 'in particular want the Operculum which in determining Hypni [*sic*] is often the most important guide'.<sup>68</sup> But the older botanists also suggested that there could be ambiguity when judging a real-world specimen against a textual description; plants may be young or immature, and others much more variable than the books allowed.<sup>69</sup>

This correspondence implied that hard-won expertise could be a tricky thing to hang on to. Dillwyn wrote to Henry, 'It is so long since I studied the Mosses that you must always doubt my accuracy'. Responding to his protégé's queries he confessed he was 'quite ignorant' about some of the recent taxonomic changes, and was 'rather vexed to find myself becoming more & more a bad modern Botanist'.<sup>70</sup> The diminution of Dalton's skills was echoed by Hooker, who stated that his friend 'was himself once an excellent Muscologist'.<sup>71</sup>

This development and maintenance of botanical skill required a close interplay between observation and the interpretation of texts. Near the start of the period when the family studied mosses we can see a confident faith in the veracity of the texts, which is gradually undermined by the more experienced correspondents, and by the encounter with many specimens. Trying to identify a fern in February, Caroline wrote, 'I can make nothing of it but *Polypodium vulgare*, but Withering does not allow that any one of them are in fructification in this month'.<sup>72</sup> A more nuanced example of the use of the evidence from books can be seen in an exchange between Henry and Trevelyan. The latter had recently visited Cornwall and found a small moss like 'a minute *Dicranum taxifolium*' in a cavern near Penryn which 'had

<sup>66</sup> William Thomas Horner Fox-Strangways (hereafter WTHFS) to WHFT, 1 April 1817, TC, 759.

<sup>67</sup> Amelina Murray (hereafter AM) to WHFT, 28 May 1817, TC, 770.

<sup>68</sup> LWD to WHFT, 28 November 1814, TC, 629.

<sup>69</sup> JD to WHFT, 28 October 1816, TC, 723; JD to WHFT, 21 December 1816, TC, 733.

<sup>70</sup> LWD to WHFT, 28 November 1814, TC, 629; LWD to WHFT, 23 March 1815, TC, 641.

<sup>71</sup> JD to WHFT, 10 September 1816, TC, 718; JD to WHFT, 21 December 1816, TC, 733; WJH to WHFT, 20 August 1816, TC, 712.

<sup>72</sup> CLFS to WHFT, 14 February 1815, TC, 636; Withering, op. cit. (2), p. 773.

a most beautiful Phosphorescent appearance' and quoted a passage from De Luc's *Geological Travels* that contained a similar observation. Henry gave a curt reply asserting that it 'must have been an optical deception' – it was not a feature recorded in his specialist texts.<sup>73</sup>

The more experienced Dalton was less willing to admit what Jonathan Topham has called the 'hermeneutical significance' of books, writing to Henry, 'Notwithstanding the great authority of Hedwig, Dear Sir, I still fancy that *Dicranum rigidulum* will not prove a good species'.<sup>74</sup> And he had great hopes for Hooker's forthcoming *Muscologia Britannica* because its conservative taxonomic approach accorded with his view that 'numberless mosses hitherto allowed as species, will be proved mere varieties'.<sup>75</sup>

These exchanges with the older botanists additionally provided insights into scientific publishing practice and authority. As we have seen, early on, Dillwyn described Smith's *Flora Britannica* as 'the best arrangement of the British mosses' while acknowledging that it was 'far from perfect'.<sup>76</sup> Dalton was much more forthright: 'Smith's muscology is not worth fourpence', and further stressed, 'You must not put the slightest confidence in Smith. Eng[lish] Bot[an]y paid well, & this is all he appears to have cared for', adding that he 'should almost as readily apply to Gerard's Herbal or Ray's Hist[oria] plantarum for satisfaction in any doubtful case that might occur', two texts that were then well over a hundred years old.<sup>77</sup> Henry must have shared such sentiments with other members of his family, since Amelina Murray requested that he not 'find fault with my quoting [Smith.] I must do so while Mr Hooker's work is only in progress'.<sup>78</sup>

The correspondence reveals an evolving use of books, as new titles became available, and a developing awareness of the important (and increasingly specialized) texts. Dalton suggested the use of Hedwig's *Species Muscorum*, not least because of the plates, and Jane was delighted with her copy of Dawson Turner's *Fuci* for her study of the seaweeds of Devon.<sup>79</sup> Hooker kept Henry informed with the progress of the *Muscologia Britannica*, which he was writing with Thomas Taylor, supplying proofs of some of the plates and an outline of the genera to be included, and these updates continued in the early months of Henry's time at Cambridge.<sup>80</sup> Friends and family were keen to know whether the work had been published.<sup>81</sup> In the interim, Hooker shared information from key European texts, copying out generic characters from Weber and Mohr's *Botanisches Taschenbuch*, a volume that Dalton had also recommended even though no booksellers in England stocked it.<sup>82</sup>

Books, specimens and the support of experts were not enough. For plants as small as mosses, a microscope was essential. Both Henry and Jane had started with relatively basic instruments, though quickly realized they were 'not strong enough for small mosses', and others were procured.<sup>83</sup>

<sup>73</sup> WCT to WHFT, 9 February 1817, TC, 745; J.A. de Luc, *Geological Travels: Travels in England*, 3 vols., London: F.C. and J. Rivington, 1811, vol. 3, p. 131; WHFT to WCT, 3 March 1817, TC, 75. Trevelyan had observed the phosphorescent protonema of what is now named *Schistostega pennata*. See Leonard T. Ellis and Michelle J. Price, 'Typification of *Schistostega pennata* (Hedw.) F.Weber & D.Mohr (Schistostegaceae)', *Journal of Bryology* (2012) 34, pp. 17–21.

<sup>74</sup> JD to WHFT, 28 October 1816, TC, 723; Jonathan R. Topham, 'A view from the industrial age', *Isis* (2004) 95, pp. 431–42.

<sup>75</sup> JD to WHFT, not dated (1816 or 1817), TC, 67.

<sup>76</sup> LWD to WHFT, 28 October 1814, TC, 622.

<sup>77</sup> JD to WHFT, 2 October 1816, TC, 720, original underlining; JD to WHFT, 28 October 1816, TC, 723; JD to WHFT, 11 February 1817, TC, 746.

<sup>78</sup> AM to WHFT, 28 May 1817, TC, 770.

<sup>79</sup> JD to WHFT, 21 December 1816, TC, 733; JHT to WHFT, 2 February 1817, TC, 742.

<sup>80</sup> WJH to WHFT, 14 January 1817, TC, 741; WJH to WHFT, 9 February 1817, TC, 1536; WJH to WHFT, 15 December 1816, TC, 732; WJH to WHFT, 24 October 1817, TC, 782.

<sup>81</sup> WCT to WHFT, 24 August 1817, TC, 777.

<sup>82</sup> WJH to WHFT, 20 August 1816, TC, 712; JD to WHFT, 21 December 1816, TC, 733.

<sup>83</sup> JHT to WHFT, 27 November 1814, TC, 628.

For Jane, drawing the plants she observed through the microscope was an integral part of her learning practice. To observe and read about differences between tiny plants was one thing, but having images for reference was invaluable. The act of creating them necessitated very careful observation, and resulted in a personal, visible surrogate for a specimen that could otherwise take some trouble to look at again with the microscope, or which could easily get lost. She also experimented with different techniques to reproduce and replicate her drawings, complaining that ‘the Etching on Copper was so very tedious, & besides being obliged to have a separate Plate for different subjects, (which was expensive) it was liable to so many misfortunes’.<sup>84</sup> Instead, she turned more enthusiastically to lithography, a process only recently described in English.<sup>85</sup> Describing ‘Engraving on Stone’ as a ‘delightful discovery’, Jane explained how ‘one stone serves for my life[.] I have nothing to do but take as many impressions as I like & clean the Stone ready for any thing else’. Focusing her attention on a set of *Phascum* specimens that Henry had sent, Jane first drew them, and then ‘etched’ four before sending the prints to Henry to check. Her plan was ‘to magnify all [the specimens] I possess that are in a good state for shewing the character of the Moss’.<sup>86</sup> These drawings had a clear purpose and were far from being decorative; they were to visualize the defining details of each species according to the latest research.

On receipt of the determinations of these specimens from her cousin, Jane queried, ‘You say the *Phascum*’s you sent me are not Smith’s, who did you name them by?’ demonstrating her understanding of taxonomic authority, and precisely framing her question.<sup>87</sup> Despite gendered differences in their more informal correspondence, these botanical exchanges reveal a normative, technical vocabulary, which is in contrast with her apparent unfamiliarity with terminology just over a year earlier, when she hoped her cousin would ‘excuse stupidity’.<sup>88</sup> Now, in 1816, she was learning about other authorities (in this case Weber and Mohr), whom she was much more willing to challenge, and to express her doubts:

I always thought the distinction between *Bryum bimum*, *ventricosum*, & *turbina-tum*, was so slight as hardly to constitute a separate species ... If Mr H[ooker] thinks the leaves will be sufficient to distinguish Mosses, I wonder how he will make out *B. turbinatum* & *ve[ntricosum]* to be the same, for the leaves are totally different.<sup>89</sup>

Her microscopic observation was acute and critical.

Henry too had developed a much more sophisticated knowledge of these small plants. After sending him Mohr’s generic characters, Hooker suggested, ‘you will not agree with him in having united *Bryum* with *Hypnum*, a change in which I believe no one has followed him’.<sup>90</sup> This may have been an incredibly radical taxonomic proposal, but Henry’s studies had enabled him to understand Hooker’s assertion. Similarly, Hooker readily explained the rationale for some of the decisions he had made in his own work, explaining that he could not keep Hedwig’s genus *Fissidens* separate from *Dicranum* ‘unless the Generic characters are taken from the leaves, which is contrary to a Linnæan maxim that they are to be derived solely from the fructification’.<sup>91</sup> Nevertheless, Henry and Jane would have been well aware how completely different the leaves of those genera are.

<sup>84</sup> JHT to WHFT, 23 June 1816, TC, 702.

<sup>85</sup> Henry Banks, *Lithography; Or, the Art of Making Drawings on Stone, for the Purpose of Being Multiplied by Printing*, Bath, 1813. A second edition followed in 1816.

<sup>86</sup> JHT to WHFT, 23 June 1816, TC, 702.

<sup>87</sup> JHT to WHFT, 20 July 1816, TC, 707.

<sup>88</sup> JHT to WHFT, 2 March 1815, TC, 640.

<sup>89</sup> JHT to WHFT, 23 June 1816, TC, 702.

<sup>90</sup> WJH to WHFT, 28 August 1816, TC, 5271.

<sup>91</sup> WJH to WHFT, 14 January 1817, TC, 741, original underlining.



Henry's visual acuity and familiarity with some of the species of the calcareous habitats in Yorkshire gave him expertise that Hooker valued. After Henry and Jane had worked with their *Phascum* specimens, Henry sent them to Hooker for checking. Though Smith had treated *Phascum rectum* and *P. curvicolium* as separate species in *Flora Britannica* and *English Botany*, Weber and Mohr had synonymized them. Hooker had followed the latter, but had to acknowledge to Henry, 'you have completely set me right' in respect of their being distinct species.<sup>92</sup> The English names given in *Flora Britannica* ('Straight-stalked Earth-moss' and 'Crooked-stalked Earth-moss') suggest the minor differences the cousins had observed between the two sets of specimens.<sup>93</sup> With shoots of the former usually less than one millimetre tall, and the latter only slightly bigger, Henry had supplied specimens to Hooker that were good enough for him to observe the differences himself.

### The diminution of muscology

The dynamics of plant collecting in the family altered in the autumn of 1817 when Henry went to Trinity College, Cambridge. By the following summer, Jane complained that Henry's correspondence had come to a 'dead stop', which she attributed to his 'immoderate love for Euclid' and which had occupied all the time he used to devote to botany.<sup>94</sup> Nevertheless, through that year she still sought new plants from her cousin, and continued collecting mosses.<sup>95</sup> Henry's school friend Trevelyan continued to correspond, eagerly anticipating a visit to study 'Musci & Lichenes'.<sup>96</sup>

The capacity and circumstances for Jane and Henry's moss exchanges were transformed by adulthood. Jane married in 1822, and collected plants as she toured Europe with her copy of *Hortus Kewensis*.<sup>97</sup> If she and Henry exchanged specimens, the letters suggest that they comprised entirely vascular plants. It may well have been only Amelina Murray who actively pursued her muscological interests in this decade.<sup>98</sup> Hooker, not having heard from Henry, enquired whether he was 'still partial to the Mosses' and wished to complete his collection.<sup>99</sup>

General botanical and horticultural interests were maintained in the decades after 1820, even though Henry complained that he had 'almost left off botanizing in England, it is so difficult to find anything new'.<sup>100</sup> Through Hooker he acquired some exsiccatae (published collections of dried specimens), and acquired books and plants on his various European tours for Hooker, supported by introductions to many Italian and German botanists.<sup>101</sup> Henry's familiarity with mosses certainly diminished. In 1836 he observed to Hooker, 'my memory of them wants refreshing very much', and enclosed a specimen from Sidmouth to be named. This, he learnt, was 'Bryum hornum in a young state', a very common species of

<sup>92</sup> WJH to WHFT, 20 August 1816, TC, 712.

<sup>93</sup> Smith, op. cit. (2), vol. 3, p. 1153.

<sup>94</sup> JHT to WHFT, 20 June 1818, TC, 805, original underlining.

<sup>95</sup> JHT to WHFT, 1 November 1818, TC, 829.

<sup>96</sup> WCT to WHFT, 21 June 1818, TC, 806.

<sup>97</sup> JHT to WHFT, 7 October 1822, TC, 1010.

<sup>98</sup> WTHFS to WHFT, 1 August 1823, TC, 1099, in which he observes that 'her mosses &c are in beautiful order'. See also AM to WHFT, 1820, TC, 859; and 21 October 1826, TC, 1494.

<sup>99</sup> WJH to WHFT, 25 November 1823, TC, 1126. Henry's collection was extensive; see Brad Scott, 'Jane Talbot and her family: learning muscology in the early 19th century', *Field Bryology* (2025) 133, pp. 10–17.

<sup>100</sup> WHFT to WCT, 9 September 1830, TC, 2050.

<sup>101</sup> WJH to WHFT, 26 August 1832, TC, 2404. Some of the plants Henry collected were new to Hooker: WJH to WHFT, 24 November 1822, TC, 1021. Among the botanists Hooker suggested he meet were Raddi, Hoppe and Nees von Esenbeck, all of whom specialized in mosses and liverworts. WJH to WHFT, 4 June 1822, TC, 976; 10 June 1822, TC, 980.

woodland banks.<sup>102</sup> Despite forsaking the role of a philosophical botanist, Henry continued to be a valuable supporter and ally to Hooker. If anything, he became a political botanist in the 1830s, lobbying the Chancellor of the Exchequer, and persuading the Linnean Society to petition Parliament 'recommending that Kew Garden be converted into a national Botanic Garden'.<sup>103</sup> Jane continued to collect plants, especially in Europe, and maintained her garden into her seventies.<sup>104</sup>

## Conclusion

This work has explored the transition from childhood education to adult enquiry by examining the experiences of one family and their attention to a particular group of plants. Alongside his formal studies at school, Henry developed his extra-curricular botanical interests in the field, and through correspondence with his family and his friend Trevelyan. In contrast, the letters reveal relatively little about Jane's education other than her self-directed botanical endeavours, but, as Michèle Cohen notes, the skill base on which subjects like botany relied included well-regarded accomplishments for all young people.<sup>105</sup> Among these were the critical reading, evaluation and reasoning that plant determination required, as well as the practical skills of drawing and observing, whether in the field or through the microscope. Furthermore, the ordering of a collection, and maintaining a dialogue through correspondence, developed a managerial systematism and polite sociability. Their muscological learning was also something that the cousins enjoyed, and was neither frivolous nor superficial; it provided a pedagogic space for them to try new things.

The study of nature was an important part of an emerging consumer culture and, as Paula Findlen has observed, natural-history collecting offered elite cultures another means of demonstrating and displaying personal wealth.<sup>106</sup> Even for the younger generation learning about botany, a focus on the challenging, tiny world of mosses asserted their cultural distinctiveness in the second decade of the nineteenth century. Over this period various members of the Talbot family developed the skills necessary to identify a difficult and specialized group of plants and were inducted into the shared practices of professed botanists. These activities were pursued as recreational pastimes at school and within several households. Though much of this paper draws on the network centred on Henry Talbot, the correspondence clearly reveals that many young women were active agents in the collective, shared experiences of practical muscology in the early nineteenth century.

The conditions, motivations, circumstances and practices of learning and knowledge production were varied and totally intermingled. Books catalysed inquiry and cultivated responses from Henry, Jane and other members of the family, especially as the instability of knowledge about mosses became apparent. The interventions of Dillwyn, Dalton and Hooker formed a significant part of the process of universalizing botanical knowledge by explaining it to their 'students'; in this way, wider 'lessons' on taxonomy, authority and publishing practice were packaged around plant collection and identification. Yet the written word was often questioned, for its ambiguity and imprecision, and when compared with the reality of tiny plants. This involved not only microscopic examination, but also field collecting, sometimes alone, but often in larger, sociable groups, facilitated by the Talbots'

<sup>102</sup> WHFT to WJH, 7 May 1836, TC, 3276; WJH to WHFT, 16 May 1836, TC, 3282.

<sup>103</sup> WHFT to WJH, 1 May 1838, TC, 3665.

<sup>104</sup> JHT to WHFT, 7 September 1862, TC, 8598; 12 June 1871, TC, 9785.

<sup>105</sup> Jane's letters suggest that she had some interest in astronomy and learnt French and the Greek alphabet: JHT to WHFT, 17 October 1811, TC, 550; 25 February 1813, TC, 638; 25 June 1813, TC, 587. Cohen, *Changing Pedagogies for Children in Eighteenth-Century England*, op. cit. (15).

<sup>106</sup> Paula Findlen, 'Courting nature', in N. Jardine, J.A. Secord and E.C. Spary (eds.), *Cultures of Natural History*, Cambridge: Cambridge University Press, 1996, pp. 57–74.

domestic and social ties. Together, these elements illustrate how a younger generation explored, created and navigated ways of scientific knowing as they moved into adulthood.

It is this generational focus of learning that emerges from the letters. The Talbot family was not a site for the production of new knowledge (apart from putting Hooker right about *Phascum*), but it was a site of knowledge reproduction and skill development, essential parts of learning and mastery. That many of the group were women is noteworthy; elite young women were increasingly highly educated, and these letters demonstrate the richness of the learning experience of Jane Talbot and her relatives. Many of the texts they read were unlikely to have been written with women as an imagined audience, and though Jane, Henry and others learn ‘facts’ about plant anatomy, classification, habitat and geography, their experience shows how their learning is not limited to normative behaviour and understanding within a particular community. By examining the complex assemblage of learning contexts for individuals who did not go on to become expert botanists, this article has suggested that it is vital to understand the varied processes through which scientific acculturation took place.

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