

DARWIN ONLINE AND THE EVOLUTION OF THE DARWIN INDUSTRY

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Within weeks of Charles Darwin's death in April 1882 accounts of his life began to appear around the world in the form of obituaries. These were followed by numerous biographies over the ensuing years. Most important of these was the three-volume *Life and letters of Charles Darwin* (1887) edited by his son Francis Darwin (1848–1925). This not only made available a large number of letters to and from Darwin but also reproduced most of his privately written autobiography and extracts from other manuscripts as well as many recollections from family, friends and colleagues. This work arguably no longer receives the attention it deserves. Reading it today one is sometimes surprised to see how many recent discoveries and themes were already apparent in this foundational work. It was followed by two volumes of *More letters of Charles Darwin* in 1903. In 1909, the centenary of Darwin's birth and the fiftieth anniversary of the publication of the *Origin of species*, Francis Darwin published transcriptions of Darwin's 1842 and 1844 species theory sketches in *Foundations of the Origin of Species*. These materials, in addition to Darwin's own publications, were the basis for the majority of writings about Darwin until his granddaughter, Nora Barlow (1885–1989), began a remarkable career of publishing additional transcriptions of Darwin manuscripts.¹

In the wake of the 1959 centenary celebrations of the *Origin of species* the next important instalment of Darwin materials occurred with the publication of Darwin's theoretical and transmutation notebooks by Paul Barrett, Gavin de Beer and M. J. Rowlands between 1960 and 1967.² These, combined with the publication in 1960 of the *Handlist of Darwin papers at the University Library Cambridge*,³ triggered interest in the Darwin Archive, deposited at Cambridge University Library after the Second World War. In a sense the modern Darwin industry had begun. By the late 1960s academic historians and philosophers of science began to dominate the field of Darwin studies in place of scientists. Since that time the changing trends of the discipline as a whole have naturally been reflected in Darwin studies. A straight line from his early theorizing to modern evolutionary biology was found to be overly simplistic, and contextual and social studies of science became predominate. Many important and highly sophisticated focused studies opened up ever more novel aspects of Darwin's life and work.⁴

The industry was fully underway by the 1970s when other important unpublished Darwin manuscripts were edited and published in Robert Stauffer's *Natural selection, the second part of Darwin's big species book written from 1856 to 1858*.⁵ Also of great importance were P. Barrett's *Collected papers of Charles Darwin*⁶ and Sandra

Herbert's pioneering edition of Darwin's Red Notebook which revealed some of Darwin's earliest evolutionary speculations.⁷

A quantum leap in terms of scale and sophistication of Darwin studies occurred in the mid-1970s with the establishment of the *Correspondence of Charles Darwin* by Frederick Burckhardt and Sydney Smith, and the publication of its *Calendar of the correspondence of Charles Darwin* with records of c. 14,000 letters in 1985.⁸ A supplement to the *Calendar* in 1994 provided entries for an additional 500 letters. The published volumes of the correspondence itself have been emerging in a steady stream of superbly edited volumes since 1985. The volumes contain not only all known letters to and from Darwin but also abundant scholarly notes and important appendices of additional materials. Darwin's books have been republished in many editions around the world and remain in print.⁹ Also of great importance was the new edition of Darwin's theoretical notebooks, together with additional materials not published by de Beer, by a team of five editors in 1987.¹⁰ This volume revealed the development of Darwin's evolutionary views, and the sources from which he drew information, in unprecedented detail. In the 1980s, concordances to three of Darwin's books and his theoretical notebooks were supervised and published by P. H. Barrett *et al.*¹¹ Following in Nora Barlow's footsteps, Richard Darwin Keynes, Darwin's great-grandson, published important manuscripts between 1979 and 2000.¹² In 1990 Mario Di Gregorio and Nick Gill published the first of three projected volumes of Darwin's marginalia, revealing more about Darwin's reading habits and developing views.¹³

ONLINE SCHOLARLY PUBLICATIONS

If the Darwin industry, the collective scholarship of many historians, biographers and others, has greatly increased our knowledge of Darwin's life, work and the context in which he lived and his works were read and debated, the coal that powers this industry has been the growing awareness and availability of Darwinian primary materials. A second quantum leap is now underway with the publication online of Darwin's publications, manuscripts, correspondence and bibliography. How might *The complete work of Charles Darwin online* (<http://darwin-online.org.uk/>) (hereafter *Darwin Online*) impact the Darwin industry? Before this can be attempted we need to be clear what *Darwin Online* is, since it is very large and diverse and there are various shorthand descriptions circulating in the community which are incorrect and misleading.

Darwin Online began in 2002 as a scholarly online edition of the writings of Charles Darwin (then called *The writings of Charles Darwin on the web*). At that time there seemed to be no versions of Darwin's writings online that could be of much use to historians of science. Firstly the handful of electronic works that were available had no pagination, no reliable indication of which edition or variant had been digitized and in some cases even incorrect dates such as later editions of the *Origin of species* purporting to date to 1859 — the date of the first edition. It seemed an obvious lacuna that needed to be urgently filled. I knew from my first website, *The history of phrenology on the web* (<http://www.historyofphrenology.org.uk/>) begun in 1999, how

useful and welcome an edited scholarly website based on a combination of bibliography linked to primary materials could be. I soon gathered a number of volunteers and began assembling, in the first instance, Darwin's publications and published manuscripts in my spare time. By 2004 a significant proportion of Darwin's published output was available together online. However, with no funding, many editions were hard to procure, and so several interim copies, such as late American editions, were used until first editions could be procured. In 2005, through the unparalleled helpfulness and generosity of Jim Secord and Janet Browne, a Resource Enhancement grant was awarded by the Arts and Humanities Research Council to expand *Darwin Online* to what it has become today. During the three years of the grant, and a following year funded by a private donor, the project was conveniently based at the Centre for Research in the Arts, Social Sciences and Humanities (CRASSH) at Cambridge University. This funding employed two members of staff (one of whom three-quarters time) and enabled a technical consultant to create new infrastructure, search engine, software and important outsourcing work. However, the funding was not sufficient to realize such an ambitious project outright. Many required elements, such as professional web design, had to be delayed until further funding could be obtained.¹⁴ Commercial scanning also proved too expensive, so much was undertaken as volunteer work on evenings and weekends. Other elements had to be done as well as possible, given very limited resources.

Many parties contributed materials in their care, most notably Cambridge University Library which granted a copy of its unpublished manuscript catalogue of the Darwin Archive created by Nick Gill; and The Charles Darwin Trust and Dr Mary Whitear facilitated the reproduction of R. B. Freeman's pioneering *The works of Charles Darwin: An annotated bibliographical handlist* (2nd edn, 1977) and unpublished corrections. These two important bodies of work, manuscript catalogue and bibliography, were joined in a large database that essentially forms the backbone of *Darwin Online*.

Many individuals and institutions lent works in their possession for scanning. Much of the transcription of printed works was done by commercial outsourcing in India while manuscripts were transcribed by the team in Cambridge and volunteers in the U.K. and abroad. Many of the outsourced transcriptions were subsequently corrected by the project and especially by volunteers such as Sue Asscher in Australia.

Over the next three years all of the principal editions of Darwin's books were digitized as both searchable text and full colour facsimiles and the majority, c. 20,000, of his private papers and manuscripts were published online based on the scans of the microfilms produced by Cambridge University Library. In addition, numerous manuscripts have been transcribed and published for the first time on *Darwin Online*. Most of these use an essentially clear text transcription method, which leaves the text largely free of editorial insertions and symbols. This is in contrast to the more editorially intensive methods employed by the *Newton Project* (<http://www.newtonproject.sussex.ac.uk/>) and the *Darwin Correspondence* (<http://www.darwinproject.ac.uk/>). The high standards of these and other projects are well known. However, the method

employed in *Darwin Online* has been shown beyond doubt to be an acceptable alternative. Traditional transcription methods were partly designed to compensate for the reader's lack of access to the original manuscript. However, with online manuscript images placed alongside transcriptions, much editorial intervention can be left out. For example, if a section of text was inserted in the margin, this can be readily seen in the image and need not be textually indicated with editorial apparatus. A consequence of this is the increase in the amount of transcribed text that can be produced with limited resources. This does not in any way deny the value of more intensive editing, or preclude it, indeed it is an essential prerequisite. However, the majority of the scholarly value in a manuscript consists in the words. Rather than withhold this value from scholars and the public for a long period while they are fully edited, an alternative strategy is to make the text itself quickly available online. Several scholarly projects around the world are now following such strategies.¹⁵

Darwin Online contains many newly discovered manuscripts, publications, and new transcriptions such as Darwin's *Beagle* field notebooks, Emma Darwin's diaries (courtesy of Richard Keynes), Darwin's "Edinburgh notebook" (DAR 118), his student bills from Christ's College, Cambridge, an 1871 Darwin cheque that was lost in a picture frame since 1909, a newly discovered manuscript draft sheet for his book *Insectivorous plants* (1875) from the State and University Library in Aarhus, Denmark, Darwin's barnacle slide catalogue from the University Museum of Zoology Cambridge, his "Last will and testament", and Census Returns of England and Wales relating to the Darwin family and much more. In total c. 160 manuscripts of varying length are transcribed and published on the site so far.¹⁶

Darwin Online supersedes all previous editions of Darwin's published papers and shorter publications. Barrett's *Collected papers* (1977) contained 153 items. *Darwin Online* contains a complete collection of all those known to date, c. 507, including around forty items uncovered by the project. The shorter publications are also edited and annotated for the first time, with persons and publications and other features identified and with links to other Darwin publications, works cited by Darwin and relevant manuscripts or proof sheets. This component of *Darwin Online* alone is the largest collection of Darwin's publications ever published in a scholarly edition.¹⁷

Links to works cited by Darwin take readers directly to that work if it is available on *Darwin Online*. If the work is not included then the link takes the reader to the "Bibliography of works cited on *Darwin Online*", which is the first bibliography of all the works cited by Darwin in his shorter publications. The bibliography is therefore a supplement to works read and referred to by Darwin. Combined with the bibliographies of the *Correspondence* (1985–), *Natural selection* (1975) and *Marginalia* (1990–), a complete bibliography of the works cited and used by Darwin is approached.

OBITUARIES AND RECOLLECTIONS

Darwin Online also contains the largest collection of obituaries and recollections (both published and transcribed manuscripts) of Darwin ever published, c. 140 items.

Many of the most interesting stories of Darwin's youth, habits and domestic life are contained in these documents. They are often cited by biographers and now they can be read in their entirety by anyone.

SPECIMEN DESCRIPTIONS

Barrett's *Collected papers* (1977) published a list of *c.* 70 published scientific descriptions of Darwin's specimens, mostly from the voyage of the *Beagle*. *Darwin Online* contains a list of *c.* 120. Furthermore almost all of these items are reproduced in full together for the first time.

CONTEMPORARY REVIEWS

In 1973 David Hull published an important collection of fifteen reviews of the *Origin of species* and *The descent of man* with helpful discussion and additional matter.¹⁸ *Darwin Online* contains more than eighty reviews of several of Darwin's books and *c.* 200 facsimiles of reviews from the microfilm of Darwin's papers in Cambridge University Library. Given future funding, an extension of the project would be to identify all reviews of Darwin's works in all languages and add these to the website alongside the original works.

TRANSLATIONS

Another aim of *Darwin Online*, still in progress, is to include all of the previously published Darwin works in foreign translation. The server statistics of *Darwin Online* show that almost half of its readers come from non-English speaking countries and a large proportion of accesses of the site come through online translation services. To date *Darwin Online* does provide the largest collection of Darwin translations ever published together, currently almost 100 works in Danish, Dutch, French, German, Greek, Italian, Norwegian, Polish, Russian, and Swedish.

SUPPLEMENTARY WORKS

Darwin Online also contains the largest online collection (*c.* 600 items) of supplementary works by other writers relevant to the study of Darwin and his context, works by Lyell, Malthus, Paley, Milton, Herschel, Wallace, Patrick Matthew and many more. The aim is to eventually include copies of all works read and cited by Darwin — so that each reference by Darwin can be linked to the original source, thus reconstructing the web of scientific publications which formed a fundamental part of the context of his work. There is also a growing collection of *c.* 100 secondary works. (Contributions are welcomed.)

THE DATABASE

A large database of *c.* 37,000 entries provides metadata and links to all the content on *Darwin Online* — the electronic texts and images. The database is essentially composed of two halves. One is a bibliographical list, based on R. B. Freeman's,

which continues to be revised, supplemented and corrected. Freeman provided records for *c.* 1805 items. To date the *Darwin Online* database contains records of *c.* 2300. Many corrections have been received from readers of the website, especially to foreign language entries such as Chinese, Dutch, Greek, Polish, Portuguese and Spanish. Thus the bibliographical database has superseded all previous bibliographical lists of Darwin's publications and is the central store where any new discoveries or records should be sent.¹⁹

The other component of the database is the largest union catalogue of Darwin's manuscripts and private papers ever published, currently *c.* 33,000 normalized records covering more than twenty institutions. It is intended to record all Darwin manuscripts in the world.²⁰ At its core is a portion of the unpublished electronic catalogue and Supplement of the Darwin Archive at Cambridge University Library (kindly supplied by Adam Perkins) reproduced with the kind permission of the Syndics of Cambridge University Library. The full original catalogue, which may be consulted in the Cambridge University Library Manuscripts Room, can be downloaded from *Darwin Online* as a searchable PDF file. A marked up ascii text form of the complete catalogue was kindly provided, along with essential and helpful guidance, by its creator Nick Gill. Its content was last updated by the Library in June 2004 and is therefore not as definitive as that kept by the Library itself. However, in the course of naming the scanned microfilm images of the Darwin Archive according to the catalogue, numerous corrections, additions, clarifications or supplementary details have been added. Many abbreviations, necessary on paper, but not in a database, have been expanded to facilitate electronic searching. The full catalogue contains entries for items from the seventeenth century to the present day, circa 35% of which were owned or written by Darwin. The subset provided in the *Darwin Online* manuscript catalogue excludes almost all items dated after 1883; most of the remainder pertains to later generations of the Darwin family. Many non-Darwin items in the catalogue such as correspondence between family members during his lifetime have been retained.

EDITORIAL INTRODUCTIONS

New editorial introductions are being written to help readers understand Darwin's work and context. So far fifty-seven have been published, ranging from Darwin's *Beagle* field notebooks²¹ and several of his books, to the reception of Darwin in Denmark. *Darwin Online* as a whole contains *c.* 3000 new editorial notes to Darwin's publications and manuscripts and a similar number of cross references and over 400 links to the *Correspondence* website.

There is also a revised edition of R. B. Freeman's *Companion* (1978) based on Freeman's unpublished corrections helpfully provided by The Charles Darwin Trust and Dr Mary Whitear.²² Kees Rookmaaker's complete day-by-day "Itinerary of the voyage of the *Beagle*" revises our understanding of Darwin's daily activities during the voyage. And soon to appear is a census of the extant copies of the first edition of the *Origin of species* conducted by Angus Carroll, associate editor of *Darwin Online*,

and Dan Lewis of the Huntington Library, Los Angeles.

Finally there is a section called Audio Darwin which contains Darwin's works as machine-read audio mp3 files for the blind, vision impaired and audio book readers, and a professional BBC "Book of the week" abridged recording of Darwin's *Beagle diary*.

Every text document in *Darwin Online* displays its own hit counter, allowing readers to see how often each has been accessed. It may not be surprising that the homepage receives the most visits and that of all the content the first edition of the *Origin of species* outstrips all others, currently at over half a million visits.

The new edition of the *Cambridge companion to Darwin* (2009) edited by Jon Hodge and Gregory Radick devotes a few lines to *Darwin Online* as a recommended online resource on Darwin, and finds worthy of notice the "Darwin 2009 commemorations" page, which lists several hundred events, publications, films, documentaries and performances occurring in the bicentenary year of 2009; although very far from complete it is perhaps the largest list of worldwide events yet published. (This page has been visited over 50,000 times in the past year.)

In an attempt to make the site more engaging for the general public a number of additional elements were added, including a major works page (far less dense than the lengthy full contents pages which contain hundreds of titles), a biographical sketch of Darwin, a timeline by Janet Browne, and a remarkably popular section: "Darwin's life in pictures".²³ All of these use links to provide additional ways for readers to find their way into the primary documents or to highlight items likely to be of wide interest. Such methods are one way of overcoming one of the major difficulties for a site as large as *Darwin Online*: how can readers ever discover what is present in such a large collection?

THE POWER OF SEARCHING

The search facilities of *Darwin Online* are built on the popular and stable open-source Lucene search engine which is used by numerous institutions around the world, including JSTOR. The search engine has proved extremely useful and powerful, including advanced search options such as Boolean, proximity, and fuzzy searching. When editing Darwin's *Beagle* field notebooks, for example, some words in the original manuscripts eluded us until wildcard searches were used. The letters of the word that could be or were believed to be legible were entered in the search box with wildcard characters, such as "?" for any character, placed where a letter or letters of the word were illegible. On many occasions obscure words were thus identified, including those in other Darwin manuscripts or in works by authors consulted by Darwin during the *Beagle* voyage which are on *Darwin Online*. For example searching for "talc????s" brings up the result "talcaceous". Also of great use, for example in editing Darwin's shorter publications, is *Google Books* (<http://books.google.com/>) which contains seven million books and journals, many of them from the eighteenth and nineteenth centuries. In an 1871 article in *Nature* entitled "Pangenesis"²⁴ Darwin mentions "the repeated loss of colour and its recovery after a few days by the hair,

in the singular case of a neuralgic lady recorded by Mr. Paget” with no citation. A search of *Darwin Online* showed that the same case was cited in the second edition of *Variation* (1875), ii, 374, but again without citation. An advanced search of *Google Books* for works by surgeon James Paget with the terms ‘neuralgic’ or ‘white hair’ identified the source within minutes as Paget’s 1853 *Lectures*, a work Darwin used frequently.²⁵ Similarly, in Sandra Herbert’s edition of the *Red notebook* (1980), 84, an unidentified “Mrs Power” is said not to be “mentioned otherwise in Darwin’s notes”. But a search of *Darwin Online* reveals that Mrs Power was also mentioned in the *Sydney notebook* on p. 79a.

In the future we can expect that more sophisticated types of computer analysis of our historical texts may begin to reveal sources for particular passages of interest. An example is Darwin’s interesting use of the phrase “the gradual death & birth of species” in an 1835 essay written during the *Beagle* voyage.²⁶ It might be tempting to conclude that this refers to an incipient belief in transmutation. Yet a search of *Darwin Online* for “the gradual birth” indicates that the phrase is present in Lyell, who was not discussing transmutation.²⁷

OUTREACH

Although it is an academic research project and website, *Darwin Online* has achieved exceptional public outreach. Several widely reported launches, particularly of the new website in October 2006, generated unparalleled media coverage for an academic publication (online or otherwise) on a single individual from the history of science.²⁸ The launches, via coordinated press releases, were reported on TV, radio, local and national newspapers, science magazines and hundreds of international newspapers, websites, and thousands of blogs around the world. The site launch was the most e-mailed story on the BBC news website and the second most-watched video. Excessive traffic and millions of visitors brought the site briefly to a standstill.²⁹

In April 2008 Darwin’s private papers were launched online. This was the largest ever publication of Darwin papers and manuscripts.³⁰ Millions of visitors again brought the *Darwin Online* website to a standstill. The story was widely reported in the print and broadcast media and online; it was the second most emailed story of the day on the BBC news website. In addition to exploring the new online papers and manuscripts, on the launch day readers from around the world downloaded 14,000 copies of the PDF version of the first edition of *Origin of species*. By the end of the month a total of 68,778 copies of this edition had been downloaded. This is more copies than were sold in the nineteenth century. Similarly widely reported launches were images of Emma Darwin’s diaries (thanks to their owner Richard Keynes) and Darwin’s newly discovered student bills from and courtesy of Christ’s College, Cambridge. A large amount of correspondence has been received from around the world from historians, scientists, teachers and especially members of the public, expressing gratitude and excitement over free access to an integrated collection of primary documents. One reader even described breaking into tears over access to a first edition of *Origin of species*.

It is difficult to gauge the specific impact or influence of *Darwin Online*, given that it is not by any means the only new resource on Darwin and the history of nineteenth-century science to become available online in recent years. Nevertheless some key differences can be seen on Wikipedia, for example. A few years ago the Wikipedia page on Darwin was essentially a gloss on one or two popular biographies of Darwin. The references at the end referred to little else. In fact the entry read very strongly like the tone of one of the biographies. Today, by contrast, the page is far more sophisticated and balanced, and cites a wide range of Darwin's publications, manuscripts and correspondence. Here one can see members of the public making good use of the original materials provided by historians of science and no longer relying solely on popular secondary works nor blindly believing the interpretations of particular writers. *Darwin Online* is also used in schools, by scientists, by religious groups, poets, literary scholars, artists, film makers, publishers, advertisers and so forth. Such an engagement with the history of science is a good omen for the future.

All of this exposure, use and notoriety might seem to be an entirely good thing for a history of science project. However this attention has another important consequence — which is that it unfortunately generates a great deal of envy, rivalry and hostility. It may seem inappropriate to mention this, but it is a significant part of the events and anyone interested in pursuing a similar course should be aware of the facts. It is also still widely believed that online scholarly publications are not as serious or respectable as those in print. In a sense this is to be expected, given the greater antiquity and established authority of print media. We can no doubt expect a degree of snobbery to continue for a considerable time. Yet this does not explain or excuse some of the unflattering characterizations of *Darwin Online* that circulate such as “it is just a scanning project”: a very misleading shorthand indeed, given that about 1% of the work on *Darwin Online* has been scanning. Nor does it excuse point-scoring using trivial mistakes found on the website, or persuading an institution not to cooperate with the project. If a mistake is found and is worth mentioning, then it is worth emailing *Darwin Online* so that it can be rectified. To date all factual or formatting errors reported to *Darwin Online* have been corrected within 48 hours.

SCHOLARLY USE

I have heard from many historians of science and scholars in other fields that they find *Darwin Online* indispensable for research on Darwin. Some have reported that they often prefer to use the online version of a Darwin book to an original copy sitting on a nearby bookshelf. The online edition is, given wireless networks and portable devices, virtually an omnipresent edition of the primary corpus. This means that a first edition of the *Origin of species*, and hundreds of Darwin's other writings, are available on every desk in the world. This is profoundly different to what we knew before when one had to have a reader's ticket to a substantial research library. Scholars are no longer as dependent on a single edition, since all editions are equally available. This access is seen in the large amount of Darwin literature to appear around the 2009 anniversaries. Many of these works reveal a substantial increase in references

to first and other rare editions, rather than non-standard late editions. This is clearly a consequence of the use of *Darwin Online* even when it is not cited *per se* (or never referred to at all). One can only imagine what will be possible when we have transcribed and made searchable the whole archive. *Darwin Online* is frequently referred to or assigned to students, and as many have noted there is a widespread tendency for students to prefer what is available online.

IMAGERY

Darwin Online and other online publications have also made possible a much greater dissemination of illustrations and imagery from original documents, replacing those from secondary works (or commercial image repositories with often inadequate or inaccurate provenance details). I experienced this when working with Carlton publishing on my book *Darwin* (2008).³¹ The publisher's "image researcher" used only online resources for image acquisition and refused to even visit the British Library! Many proposed images found by the researcher were taken from commercial image services from an illustrated work from the 1970s, and attributed the origin of the image no further back than the 1970s. A few minutes research on *Darwin Online* shows the illustrations in the original context of the works in which they first appeared, allowing not only for a higher quality reproduction but more accurate attributions.

Before *Darwin Online* there was a paucity of primary Darwin illustrations circulating on the internet. There was of course the tree diagram from *Origin of species*, his Notebook B tree sketch, and some of his book engravings and woodcuts. Now all of the illustrations in Darwin's publications are available and can be readily seen by anyone in a few minutes browsing. These, such as the beautiful lithographs in *Zoology of the voyage of the Beagle* (1838–43), are now known to almost anyone remotely curious, and this has meant a great visual enrichment of the publications on Darwin appearing in 2009. *Darwin Online* provided hundreds of high-resolution images for exhibitions, publication and broadcast. This provided the project's only additional source of income to enable further outsourcing work and research expenses.

CITING ONLINE SCHOLARSHIP

Many scholars are unsure how to cite online publications. This seems to be the reason why many use *Darwin Online* yet do not list it in their bibliographies. In a small number of cases manuscript transcriptions first published on *Darwin Online* have even been reproduced in a recent book and articles. The citations claim that the original manuscript was consulted. But in these particular cases only an online transcription is available, without a facsimile image. This is apparent not only from the verbatim quotations (and in one case a transcription error) but also from the citation of the unique abbreviations of archival numbers (adopted for technical reasons which required that no spaces or colons be used, such as "EH1.3" for English Heritage 1.3 as conventionally cited, e.g. in Herbert's *Charles Darwin, geologist*, 394),³² editorially assigned page numbers, such as "4a" not present on the original manuscript, or

dates assigned by the editors. Similarly shorthand names first published on *Darwin Online*, such as “*Beagle* field notebook” or “Personal ‘Journal’” (adopted to make the item’s content clearer to a general audience) indicate which transcription was consulted. The works on *Darwin Online* all carry a citation record as the first line on the page. These, or some version of these combined with the revision history, a line indicating who has worked on a particular transcription, ought to be used in any proper scholarly citation.

Other potential downsides to using online materials is the danger of forgetting what the real primary documents look and feel like, and hence what they were like historically in their original contexts. Scholars might be in danger of losing their archival or library research skills and relying too heavily on the more readily accessible online materials. But this is no different in kind from the previous shortcoming of relying overly heavily on published as opposed to unpublished sources, and this is part of the reason why archival research is so highly praised and valued, and rightly so.

The views of an unnamed Darwin scholar were reported in a British Council “Darwin Now” podcast (2009) (after a description of *Darwin Online*), that with access to so much of the primary material the public might conclude they are qualified to think of themselves as “Darwin scholars”, and hence the need for an expert scholar would be overlooked or undervalued. I suspect few historians would share this concern. Yet it raises a significant point. In the past only a handful of experts knew the Darwin Archive and much of the other primary material — this, in effect, gave them power *vis-à-vis* all others ‘not-in-the-know’. But now that non-experts are able to access and search through these materials, some of that power is lost. Hence one can understand that for some more senior scholars the online revolution means a loss, or at least a perceived loss, of authority. This seems to me part of what Peter Kjærgaard has identified as the change from the Darwin industry to the Darwin Enterprise. So perhaps what we will see in the future is a great democratization from the online availability of historical materials and editions. Wikipedia is a case in point, for now, instead of just relying on the interpretations of biographers, the editors of Wikipedia are able to go to the primary resources themselves. This does not mean that suddenly members of the public can magically inhale all of the expert understanding and sophistication of historians of science, but it does mean a greater engagement with and interest in our field than ever before. And this is surely, indeed manifestly, better and to be welcomed by historians of science.

We live in a new age and environment, of which *Darwin Online* is only a part. Online catalogues are a huge step forward, but even better than a catalogue is a catalogue that links to the material it records. *Darwin Online* does this with its bibliography and manuscript catalogue and the *Correspondence* does so with its calendar and online transcriptions. Many other online scholarly websites are breaking new ground, such as the *Newton Project*, *Livingstone Online* (<http://www.livingstoneonline.ucl.ac.uk/>), *Einstein Archives Online* (<http://www.alberteinstein.info/>), *Jean-Baptiste Lamarck: works and heritage* (<http://www.lamarck.cnrs.fr/?lang=en>), and the *Alfred Russel Wallace page* (<http://www.wku.edu/~smithch/index1.htm>).

CONCLUSION

So in addition to the content outlined above, *Darwin Online* is, by several orders of magnitude, the largest publication on Darwin to date. It is the largest editorial project of Darwin's published writings ever undertaken and the second largest, after the *Correspondence*, of his manuscripts. At the time of writing, *Darwin Online* contains over 85,000 pages of searchable text, illustrated with over 2000 colour plates, 200,000 electronic page images, and c. 500 downloadable PDF files. The site contains at least one exemplar of all known Darwin publications, reproduced to the highest scholarly standards, both as searchable text and electronic images of the originals. The website has distributed more copies of Darwin's works than all publishers combined. The entire site together has had over 100 million hits since October 2006. Almost all of the historiographical items outlined above are included in *Darwin Online* (except where reproduction permission could not be obtained). Its search engine supersedes the concordances.

How may we think of Darwin differently as historians? How might we write of him differently in light of this? It is definitely too early to tell with any certainty. But some indications are already apparent. We are in the midst of a revolution. This is still sinking in, and historians' thinking and research practices will need time to adjust to this new and as yet rapidly changing environment. We can probably expect that further traditional historiographical certainties will be overturned like Darwin's delay,³³ for example, whether Darwin was the naturalist or the captain's companion on the *Beagle*, whether or not he feared that marrying his first cousin affected the health of his children, whether or not the death of his daughter Annie contributed to his loss of faith or occurred after his loss of faith, which national or international schools of thought most influenced him, and so forth.

An online project on a recognized subject of research can also become the central storehouse where discoveries, new information, identified mistakes in the literature and so forth can be centrally gathered together to allow anyone one researching the topic to readily discover what is already known. In this way we can more effectively build on the cumulative work of scholars over many years into more integrated and informed networks. There is so much important work in so many fields of the history of science. If each of these is gathered together in a central place such as a website, with scholarship of different kinds integrated, and if these websites are willing to cooperate and consult with each, rather each being created in isolation as if the others did not exist, then we can imagine the ultimate culmination of the online revolution. Compare with the traditional methods of identifying a mistaken transcription, translation or identification in the historiography. It might be pointed out in the author's later work, or a later edition, or in the work of another scholar. Most likely this would be a year or several years after the error had been discovered. And it would remain in print to confuse later researchers who may not find their way to the correction. Yet with co-operative, freely available online scholarly projects, we can rectify this and other shortcomings rapidly and visibly. So we can expect an increasing acceleration of our research and an expansion of our power over the primary and the secondary

materials and our understanding of the history of science as a whole.

As historians we have a great advantage over previous generations, with the ability to search archives and libraries across the globe from our desktops, to the power to search through millions of pages in seconds, to the electronic availability of primary and secondary literature online. Almost gone are the days of writing down a reference and having to wait until a copy or photocopy can be procured from a library or archive. But as Darwin wrote in the *Origin of species*, “In the distant future I see open fields for far more important researches”. We are actually a tragic generation, able to find and access so much more than our predecessors and doomed to imagine but not enjoy our successors electronic access to and power over everything ever printed or even everything ever written. There is a lot more change to come with “no prospect of an end”.

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- published his German translation of the *Origin* he used the expression ‘*natürliche Zuchtun*g’ on the title page. By the third edition this had become ‘*natürliche Zuchtun*g,’ but in the online version it remains in its original form through the 1882 edition, when the online version no longer lists the title in German.” Kohler and Kohler somehow miss the fact that complete facsimiles of the first, second, third and sixth German editions are available on *Darwin Online*. Hence readers can see the original works. The bibliographical database records are updated for all items that have been seen, including the third German edition whose title is given correctly. Like Freeman we do not assign exact titles to works that we have not seen. (There have been occasional mistakes of course and we would be grateful to be informed of any errors so they can be corrected.) M. Kohler and C. Kohler, “The *Origin of Species* as a book”, chap. 18 in M. Ruse and R. Richards (eds), *The Cambridge companion to the Origin of Species* (Cambridge, 2009), 350.
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