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On Saville-Kent's "A Manual of the Infusoria"

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Introduction

William Saville-Kent (1845-1908) had a most remarkable and productive life. He was, successively, an amateur naturalist, an assistant at the British Museum, a curator in a number of public aquariums, the would-be founder of two marine stations, Superintendent of Fisheries in Tasmania in Australia, and finally Commissioner of Fisheries in Queensland in Australia (Harrison 1998). Given his diverse roles, it is perhaps not surprising that his works, published over a nearly 40-year period, covered a wide variety of topics. His first article was on a hydra (i.e., Kent 1868) and his last publication was on color photography (Saville-Kent 1905). A true polymath, holding no diplomas, he authored four major scientific works on very distinct topics. His first book was "*A Manual of the Infusoria: Including a Description of All Known Flagellate, Ciliate, and Tentaculiferous Protozoa, British and Foreign, and an Account of the Organization and the Affinities of the Sponges*", from here on *Manual of Infusoria*, (Saville Kent 1880-1881). His second book was "*Handbook of the Marine and Freshwater Fishes of the British Islands (including an enumeration of every species)*" (Saville Kent, 1883). The third was "*The Great Barrier Reef of Australia; Its Products and Potentialities*" (Saville-Kent 1893), and the last was "*The Naturalist in Australia*" (Saville-Kent 1897). The work on the Great Barrier Reef is no doubt the one for which he is best known. A relatively complete account of the life and work of William Saville-Kent, including summaries of both his troubled adolescence, and his protistological work, can be found in Esteban et al. (2002). Here the focus will be on the story of his major work of interest to protistologists, his *Manual of Infusoria*. Commonly cited as 1880-1881 as the title page indicates (Fig. 1), we will see that it was actually published over a three year period. It has been relatively neglected in histories of protistology. It is cited but not mentioned in the text of Cole's history of protozoology (Cole 1926). Corliss (1978) remarked that it was more or less eclipsed by Bütschli's monographs (Bütschli 1880-1882, 1883-1887). In Leadbeater and McCready's account of the beginnings of protozoology in Britain (Leadbeater and McCready 2000), Saville-Kent is credited with contributing to the debates around the relationship of sponges and protists, but the value of the *Manual of Infusoria* at the time of its publication, or today, received little attention.

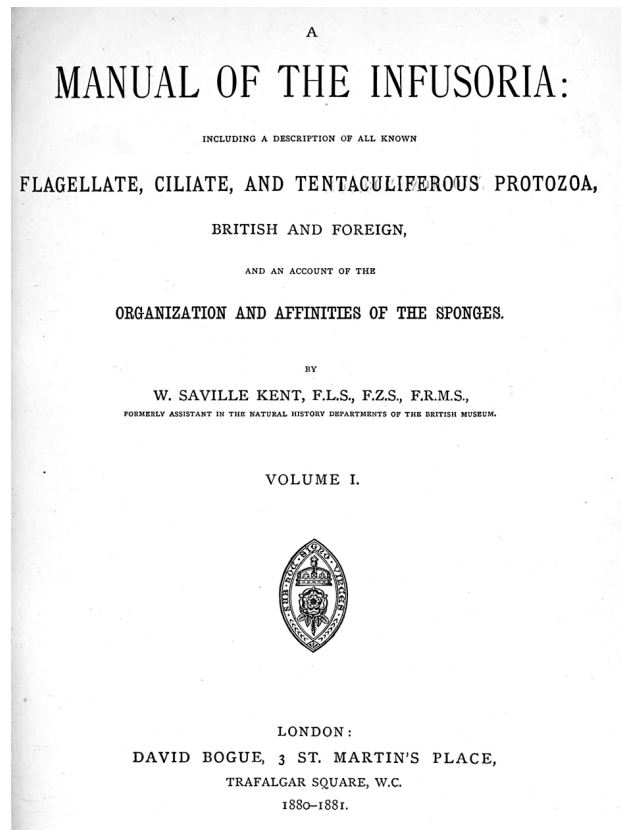


Fig. 1. The title page of Saville-Kent's *Manual of Infusoria*. The publication years given, '1880-1881' are inaccurate. The last part was actually published in 1882, and the preface is dated 'May 1882'. Hence, full references to the work should probably include the note 'published 1880-1882' (as is done here). Original image from the Biodiversity from the Biodiversity Heritage Library : <https://www.biodiversitylibrary.org/item/40541#page/9/>

Saville-Kent's massive three-volume work (913 pages of text in two volumes and a third volume of 51 plates) deserves a close look. It was a most singular and interesting accomplishment. As the complete title reflected, Saville-Kent attempted to describe all known species of 'infusoria'. Infusoria originally were the microscopic forms which appeared in 'infusions' of vegetable matter described by early microscopists such as Leeuwenhoek and Joblot (Dolan 2022a). For Saville-Kent, the infusoria consisted of the largely heterotrophic taxa: flagellates, rhizopods, ciliates and 'tentaculiferous' (suctoria-related). As we will see, he specifically excluded autotrophic taxa such as diatoms and desmids. When he embarked on the very ambitious project, he had little apparent experience, or expertise, with regard to microscopic organisms. It was a landmark work, the first book on protists in English with original content. In reality, there were few authoritative manuals in English at the time.

Before Saville-Kent's *Manual of Infusoria* appeared, the most widely used guide was Pritchard's venerable "*A History of Infusoria*" a constant companion of many early naturalists such as the American Jacob Bailey (Dolan 2022b). It was a replacement for Pritchard's earlier "*The Natural History of Animalcules*" (Pritchard 1834) that was based

on O. F. Müller's "*Animalcules Infusoria Fluviatilia et Marina*" (Müller 1786). Pritchard's '*Infusoria*' book, in its first edition (Pritchard 1841), was largely a translation of Ehrenberg's "*Die Infusionsthierchen*" (Ehrenberg 1838) with his illustrations copied and re-arranged. In the fourth and last edition (Pritchard 1861), the text had been updated to include consideration of the work of Dujardin, Claparède and Lachmann, etc., but the illustrations of flagellates and ciliates were still largely the same as those in the first 1841 edition, taken from Ehrenberg 1838. Thus, Pritchard's *Infusoria* it was quite outdated in Saville-Kent's time and there was a need for a "new" English language manual.

The essay that follows consists of three major parts. The first section will cover the mysterious genesis of Saville-Kent's "*Manual of Infusoria*", the gradual appearance of the work, its reception at the time, and the contents will be briefly described. The second section will provide a consideration of the value of Saville-Kent's manual throughout the years since its publication to the present era in terms of citation data, and discuss the difficulties encountered as variants of Saville-Kent's name have been used. Finally, some misconceptions concerning Saville-Kent's name will be addressed, and suggestions as to how his works should be cited will be given.

The Mysterious Genesis and Gradual Appearance of "A Manual of the Infusoria"

In the first sentence of the preface to "*Manual of Infusoria*" (dated May 1882), Saville-Kent states that ten years had passed since he decided to concentrate his microscopical efforts on studies of the infusoria, but he gave no hints as to why he decided to focus on the 'infusoria'. It appears to be a curious action considering that at that point in time, based on his publication history, he had shown relatively little apparent interest in microscopic organisms. By late 1872, Saville-Kent had published quite extensively on various invertebrate taxa, but particularly on corals and sponges, and he could be credited with a certain expertise on both of the groups. He had published nine papers on sponges, seven papers on corals, and one paper on the relationship between sponges and corals (see the supplementary file for bibliographic details). In contrast, Saville-Kent's work on infusoria consisted of only two papers (Kent 1869, Saville Kent 1871). Indeed, the first sentence of the second paragraph of the preface gives the impression that the project of a new manual on infusoria may have been suggested to him and it provided justification for restricting the manual to flagellate, ciliate, and suctoria-related taxa:

"It was in the first instance suggested that this Manual should be based upon the same lines as the, at the time, only other English treatise devoted to the subject, ' A History of the Infusoria/ by Andrew Pritchard, the fourth and last edition of which was published so long since as the year 1861; that it should include in a similar manner an account of the several distinct groups of microscopical organisms known as the Rotifera, Desmidiaceae, Diatomaceae, and other Protophytes which form, as being a reproduction of Ehrenberg's ' Infusionsthierchen/ so conspicuous a feature of Mr. Pritchard's book. It soon

became apparent, however, that to compass so comprehensive a task with any degree of efficiency would extend the size of this treatise far beyond convenient limits, and that indeed more than sufficient material for a work on the same scale as the one above-named had accumulated in connection with the Infusoria in the most limited and restricted sense as represented by the Flagellate, Ciliate, and Tentaculiferous Protozoa."

In 1872, Saville-Kent held a low salary position in the British Museum as an "assistant", and he had just married (Harrison 1998). If Saville-Kent sought to increase either his reputation or his income or both, authoring a book may well have been his idea. However, given that he had little evident expertise with regard to 'infusoria', the idea of producing a new 'infusoria manual', may have originated not with Saville-Kent, but rather a publisher. In 1872, the first public announcement that a new "*Manual of Infusoria*", was in preparation appeared in the October 31st issue of *Nature*; it was not by Saville-Kent but by the publisher John Van Voorst (Anon. 1872), and it showed that the taxa to be covered in the work had already been defined (Fig. 2). John Van Voorst was a very well regarded publisher of books and journals and long time Fellow of the Linnean Society (Anon. 1898).

NATURE Oct. 31, 1872

IN addition to our announcements of last week, Mr. Van Voorst announces as follows:—Mr. W. Saville Kent, of the British Museum, is engaged upon a new "Manual of the Infusoria;" the treatise will be devoted entirely to the Ciliate, Flagellate, and Suctorial Protozoa, to the exclusion of the Desmids, Diatoms, Rotifers, and other foreign organisms comprised under the above title by Ehrenberg, Pritchard, and other writers; the Rev. Thomas Hincks is preparing for publication "A History of British Polyzoa" with figures of all the species, uniform with his "Hydroid Zoophytes;" "The Birds of the Humber district," by John Cordeaux of Great Cotes, Ulceby, is in the press; a second edition, with new plates and additions, of "Falconry in the British Isles," by Capt. Salvin and Wm. Brodrick, is in preparation.

Fig. 2. The announcement of books in progress by the publisher Van Voorst in October of 1872 (Anon. 1872) included a description of the contents of a new "*Manual of the Infusoria*" by Mr. W. Saville Kent.

Van Voorst did not publish the *Manual of Infusoria*. Exactly why is unknown. One might speculate that he dropped the project early on as it does not appear in any of the listings of 'works in progress' in catalogues included in the end papers of books published by Van Voorst from 1872-1874 that are available in the Biodiversity Heritage Library. The year following Van Voorst's announcement, 1873, was quite eventful for Saville-Kent. His changes in employment were chronicled in the pages of *Nature*. In January of 1873, he left his position at the British Museum to become curator at the Brighton Aquarium (anon. 1873a) but his tenure was short-lived as he resigned in July due to a dispute with directors of the aquarium (Anon 1873b) and he returned to London. By February of 1874, Saville-Kent was said to be moving to New York City to become Superintendent of a new aquarium to be built in Central Park (Anon. 1874a). One can

speculate that, with the changes in jobs and locations, Saville-Kent made little progress on the *Manual of the Infusoria* in 1873, and Van Voorst may have consequently dropped the project.

Regardless of who was to be the publisher, in June of 1874 there appeared evidence that Saville-Kent was actively working on the manual project. A notice was published in the "Microscopy" section of *Hardwicke's Science Gossip*, shown in Fig. 3A (Anon. 1874b). It was a call for information concerning new forms and stated that his treatise was 'to be shortly published', which turned out to be overly optimistic. The eventual publisher, David Bogue, first announced "A Manual of the Infusoria" by 'Mr. W. Saville Kent' in a notice of 'soon to appear' books in 1879 in the October 16th issue of *Nature* (a full seven years after Van Voorst's announcement!). In the notice, it stated that the work would likely be ready by March 1880, and no mention was made that it would actually be published in separate parts, or installments (Anon. 1879). In reality, the first part of the manual did not appear until late 1880. Advance copies of some of the plates destined to be part of the first installment were provided to *Hardwicke's Science Gossip*, and a short but glowing review, presumably by the editor John Taylor, appeared in the September 1880 issue (Anon. 1880a), and is shown in Fig. 3B. With regard to the enthusiasm of the review, and the fact that it was based on receiving advance copies of the plates, it should be noted that by 1880, *Hardwicke's Science Gossip* was published by David Bogue. The review included the first mention that work would be published in installments. Once again, the publication schedule given, parts to appear at monthly intervals, was overly optimistic. However, the price per part was accurate, ten shillings and six pennies. In today's currency each part, which included plates, would sell for about €75. Thus the price of the complete work, sold unbound in 6 parts, and would actually require 3 years to acquire, would run to about €450 in today's currency.

<i>HARDWICKE'S SCIENCE-GOSSIP.</i>	
<p>1874</p> <p>INFUSORIA. — Mr. W. Saville Kent, F.L.S., F.R.M.S., &c., being engaged upon a new treatise on the Infusoria, to be shortly published, invites communications from the Fellows of the Royal, Quekett, or other microscopical societies, and microscopists generally, upon any new and doubtful forms of infusorial life that may come under their notice. A record of phenomena not generally known in association with previously-described varieties will be of value, as also local lists of species. Address, Wentworth House, Stoke Newington, London, N. Postal expenses of specimens defrayed.</p> <p style="text-align: right;">A</p>	<p>1880</p> <p>“MANUAL OF THE INFUSORIA.”—This much wanted and long expected work by Mr. W. Saville Kent, F.L.S., is, we understand, now thoroughly completed. We have been favoured with a sight of some of the plates, which are exquisite examples of engraving, and give us a capital idea of the transparency which characterises the structures of most Protozoa. The work will be issued in 10s. 6d. parts. The first part will be ready in October, and the others will follow in monthly succession. There is nothing before the public on this subject except Pritchard's “History of the Infusoria,” published in 1841, and which now sells at much more than the original published price. Pritchard included desmids and diatoms among the Infusoria! No other living naturalist is so capable of bringing out a work of this kind as Mr. Saville Kent, and there can be no doubt as to the value of the expected manual.</p> <p style="text-align: right;">B</p>

Fig. 3. A public notice that Saville-Kent was soliciting material for his *Manual of the Infusoria* appeared in *Hardwicke's Science Gossip* in the June issue of 1874, (Anon. 1874). He sought information and specimens of new and interesting forms (3A). The first 'review' of Saville-Kent's manual (Anon. 1880a) appeared in *Hardwicke's Science Gossip* in the September issue of 1880, and was based on advance copies of some of the plates (3B).

From 1874, when Saville-Kent asked for information on new infusoria, to 1880 when the first parts of the manual appeared, he was not occupied exclusively with protists. He continued to publish extensively on a variety of topics. For example, he published three papers, and a letter, on observations of giant squids and two papers on sponges (see supplementary file). He published only two papers in which he described new species of protists (Saville Kent 1878, 1880).

The first installment of the *Manual of Infusoria* appeared in 1880. It consisted of the substantial general introductory material of 143 pages with first eight plates. In Britain, it was reviewed quite positively in *Hardwicke's Science Gossip* (Anon. 1880b) and in the *Popular Science Review* (Anon. 1881a), perhaps not surprisingly, as both serials were published by David Bogue. However, very positive reviews also appeared in the foreign press. The first installment was reviewed in *The American Naturalist* (Anon. 1880c), and in the *Annales de la Société Belge de Microscopie* (Deby 1880). While the quality of the plates was praised, oddly, the reviews did not mention the fact that none of the plates were referred to in the text. The first eight plates included illustrations of many new species of choanoflagellates (Fig. 4). No mention was made of plate legends but presumably they were included with the plates. As the work was being sold by subscription, it seems likely that including plates with each 'installment', even if the plates had no relation to the portion of text published, was a means to keep interest in

the work among subscribers. The second and third installments also included eight plates each. They were supposedly published in 1880 but may have actually been available only in early 1881 (Fig. 5).

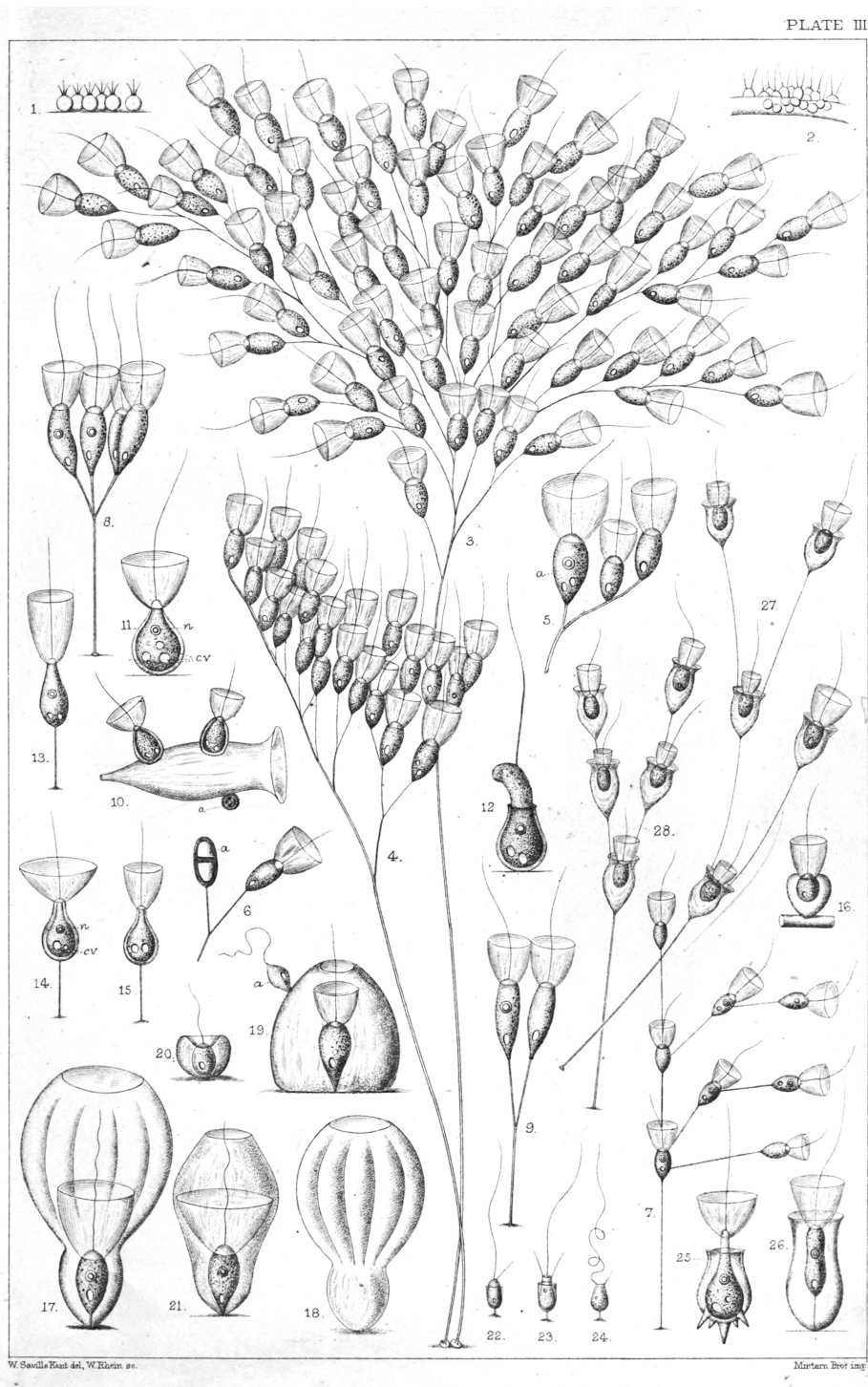


Fig. 4. Plate 3 showing choanoflagellates was part of the first installment published. The actual size of the box enclosing the figures is 22 x 15.4 cm. According to the plate legend, most of species were shown were new: *Codosigma cymosa* (3-7), *Codosigma candelabrum* (8-9), *Salpingoeca minuta* (10-12), *Salpingoeca pyxidium* (16), *Salpingoeca ampulla* (17-21), *Lagenoeca cuspidata* (25), *Salpingoeca petiolata* (26), *Polyoecca dichotoma* (27-28). Original image from the Biodiversity Heritage Library: <https://www.biodiversitylibrary.org/item/40503#page/23>

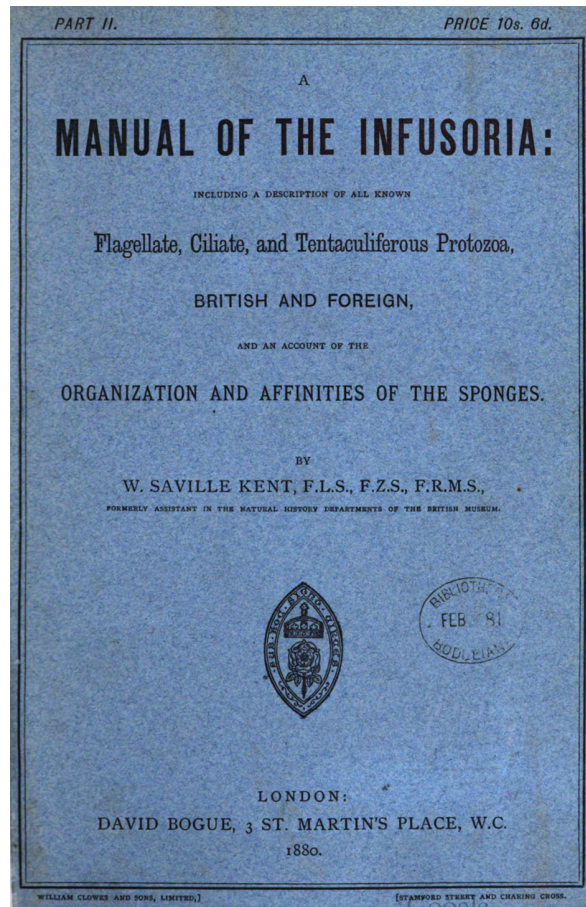


Fig. 5. The cover of the second installment dated as published in 1880. The stamp indicates that it was received by Oxford's Bodleian Library in February of 1881. Based on the library stamp, it appears that the second and third parts were not actually available until early 1881.

The three installments, supposedly all published in 1880, totaled 432 pages with 24 plates. The text of the first three installments covered most of the flagellate groups and the plates included all the flagellate groups except the dinoflagellates. The first three parts together were reviewed again very positively in *Nature* (Anon. 1881b) and in *The American Naturalist* (Anon. 1881c) and the *Annales de la Société Belge de Microscopie* (Deby 1881). The Belgian reviewer however did complain that Saville-Kent neglected to include synonyms, i.e., the original names, of many of the species listed. The manual was noted as work of great value 'now in course of publication' in the *Quarterly Microscopical Journal* (Anon. 1881d).

The fourth installment was not described, but was listed in the 'Books Received' in the July 1881 issue of *Hardwicke's Science Gossip*. It presumably consisted of about 150 pages of text, and plates 25 to 32, covering the last group of flagellates, the dinoflagellates, and the beginning of the sections on ciliates. It appears not to have been reviewed in the journals that carried reviews of the previously published parts.

Part five was reviewed in the November 1881 issue of *Hardwicke's Science Gossip* and described as 'just been published', and stating "*The interesting genus Vorticella is treated at great length*" (Anon. 1881e). The sixth and final part was reviewed in the August 1882 issue of the same journal. The review concluded with the rather odd sentence, given the considerable cost of the complete work, "*It will be but a short time before this book has increased in money value; for, all things considered, it is by far the cheapest and most comprehensive work connected with Microscopy we have ever seen.*" (Anon. 1882). One could speculate that the review was written by the publisher!

The complete work was reviewed by Edwin Ray Lankester, in a three page article published in *Nature* that appeared on April 26th 1883 (Lankester 1883). From the review, it appears that in 1882, Bogue published a complete edition, with the preface dated May 1882, consisting of two volumes of text and a volume of plates with Saville-Kent's famous frontispiece (Fig. 6). Lankester's review likely carried a great deal of weight as he was a very important figure in his time among biologists. He was the editor of the *Quarterly Journal of Microscopical Science*, and had a recognized expertise with regard to protists (e.g., Goodrich 1929). Lankester's review was overall quite positive. It pointed out, at some length, that the work was much more than an accurate review of work up to the time of publication; it incorporated new observations and descriptions of many new species, especially among the flagellates. Lankester however begged to differ with Saville-Kent with regard to the opinions expressed by the latter concerning the phylogenetic relationships of flagellates with sponges and ciliates with worms. However, Lankester also stated that opinions as to possible relationships with metazoan taxa did not detract from the obvious value of Saville-Kent's *Manual of the Infusoria*.

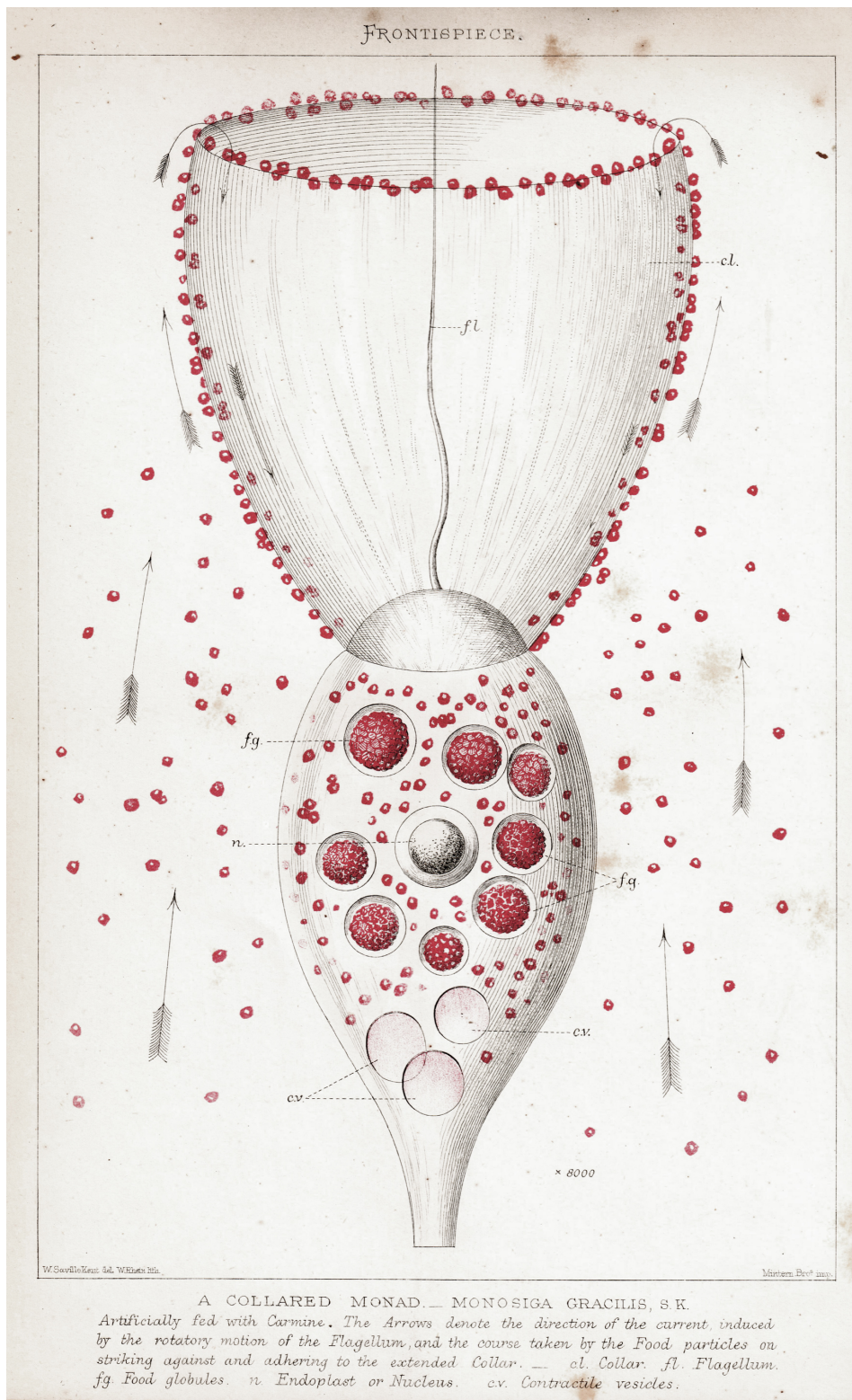


Fig. 6. The famous frontispiece of the volume of plates of Saville-Kent's *Manual of Infusoria*, the only color illustration. It shows a choanoflagellate fed carmine particles. The arrows indicate the direction of the feeding current resulting from the movement of the flagella. The actual size of the box enclosing the figures is 22 x 15.4 cm. The illustration is an enlarged, detailed version of fig. 19 in plate 3 of "A new field for the microscopist" (Saville Kent 1878). The image is a scan of the author's personal copy.

The Value of Saviile-Kent's Manual

Today, for better or for worse, the value of scientific publications is evaluated by using citation data. Setting out to examine the citation history of Saviile-Kent's *Manual of Infusoria*, a problem quickly became evident: it has been cited using a variety of author names: "Kent, W.", "Kent, S.W.", "Kent, Saville W.", "Saville Kent, W.", "Saville-Kent, W." For example among publications published in 2022, the manual is cited as authored by Saville-Kent, W. (Hallegraeff et al. 2022), Saville Kent, W. (Dolan 2022b) and Kent, S.W. (Carr and Leadbeater 2022). To overcome this difficulty, a search was conducted for publications containing the exact phrase "A Manual of the Infusoria" published each year from 1883 to 2023 using 'Google Scholar'. The cumulative number of publications citing Saviile-Kent's manual is shown in Fig. 7. Remarkably, in the 140 years since its publication it has been cited every year with the exception of only 7 years (1917, 1941, 1942, 1945, 1958, 1958, 1962). The overall average number of citations per year is 5.7 ± 4.65 . To date (November 2023), it has been cited over 800 times. Many of the works citing Saviile-Kent's manual are taxonomic works and reference is made to his species descriptions, both of species he described as new, as well as those previously described but whose presence he documented. For many species, occurrence details were noted such as in his text on *Monosiga fusiformis* (page 331): "... found congregated upon the carapace and ovisacs of a species of *Cyclops* obtained from one of the water-fowl ponds in the Zoological Gardens, Regent's Park, in May 1879." Many such details proved valuable. The citation data are undeniable evidence of the enduring value of the manual.

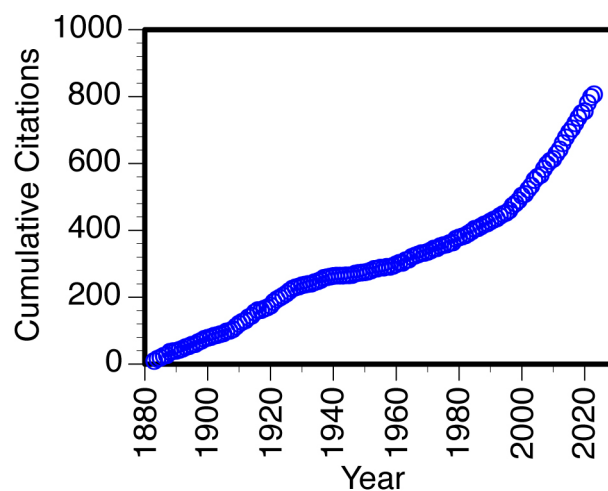


Fig. 7. The cumulative number of publications published, by year, containing the phrase "A Manual of the Infusoria" demonstrating usage of the manual since 1883 to November 2023.

Citing Saviile-Kent's Publications

As stated above, Saviile-Kent's works have been cited in a variety of manners. One could say it is largely his own fault as he used different forms of his name. In the years before 1870 and until mid 1870, he signed his articles "S.W. Kent" or "Wm. S. Kent". He starting

using "W. Saville Kent" in August of 1870 (Saville Kent 1870). In 1885 he began using "W. Saville-Kent " (Saville-Kent 1885), but not consistently. It was only from 1887 onward, that he usually, but not always, signed his works W. Saville-Kent.

Further confusing exactly how his works should be cited is an odd contention that his 'real name' was W. S. Kent (he was born William Saville Kent) and that he started using Saville Kent, and later Saville-Kent, to disassociate himself from the enormous family scandal of the murder of his young half-brother in 1860 (Esteban et al. 2002; Harrison 2006). Saville-Kent's sister, Constance, eventually confessed to the killing, years after the event. The spectacular murder, and Saville-Kent's possible involvement in the crime, has been explored in several books in the year since (i.e., Stapelton 1861; Rhode 1928; Bridges 1954; Taylor 1979; Summerscale 2008; Kyle 2009), and is still today a mystery. However, the murdered child, born Francis Savill Kent, was commonly called 'Francis Savill Kent' in press accounts at the time. So, using Saville Kent or Saville-Kent, as a family name could only call more attention to a possible connection with the family scandal than simply using "Kent". As to why he began using Saville Kent in mid 1870, one can only speculate that when he reached 25 years of age he sought to establish a new professional identity. He remains today an enigmatic character. His only known portrait (Fig. 8) was published in 1897 as the frontispiece in his book "*The Naturalist in Australia*" in which, curiously, infusoria or protozoa are completely absent.

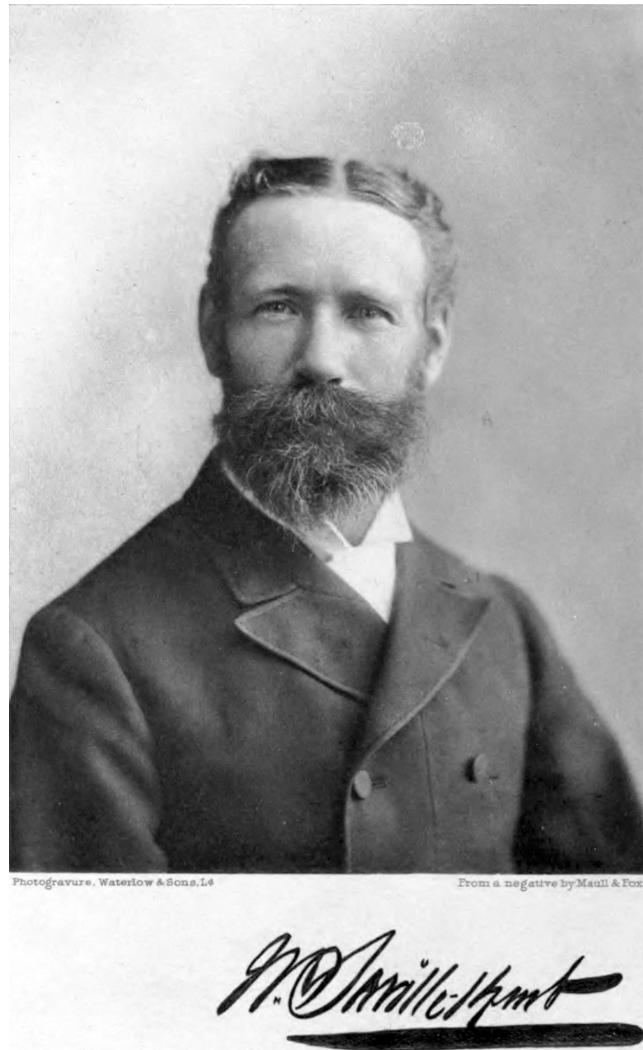


Fig. 8. The only known portrait of William Saville-Kent appeared, with his signature, as the frontispiece of his book *"A Naturalist in Australia"* (Saville-Kent 1897).

Today, it is commonly recognized that one has the right, but not the obligation, to use one's birth name. William Saville-Kent was clearly his ultimate choice as he was buried under the name (Fig. 9). However, when citing a published work, one needs to provide accurate information, including the authorship shown on the publication, to allow the cited work to be located by a reader. While one must respect the right of an author to be called as they desire, actual reference listings should use the authorship as listed on the work cited. The contention put forward here is that William Saville-Kent's works should be cited as they were signed. The early works should be cited in texts as "Kent xxxx" and listed in the reference listed under "Kent, W.S. xxxx" or Kent, "Wm.S. xxxx" as appropriate. Works published after mid-1870 should cited in text as "Saville Kent xxxx" and the reference listed under "Saville Kent, W. xxxx". The works from 1885 onward should be cited in the text cited as "Saville-Kent xxxx", as appropriate, and in the references under "Saville-Kent, W. xxxx". A compromise of sorts has been attempted here as the man is always given as Saville-Kent but in citations in the text to a particular

publication the last name as he used in the publication is used and in the references listings as well.



Fig. 9. The gravestone of William Saville-Kent in the All Saints Churchyard at Milford-on-Sea. Image courtesy of Barry Leadbeater; the added inset is an enlargement showing more clearly that the family name is Saville-Kent.

Acknowledgments

David J. S. Montagnes parted with his copy of Saville-Kent's *Manual of Infusoria* for an improbably small sum, and my possession of his copy inspired this essay. Barry Leadbeater kindly provided the image of the gravestone of Saville-Kent as well as valuable encouragement and aid.

Supplementary Material

To aid in the referencing of works by Saville-Kent, a supplementary file is included with this essay. It lists all the publications by Saville-Kent that I was able to inspect and verify the authorship form he used. The supplementary file is not a complete listing of Saville-Kent's works as some works listed in the bibliographies provided in Harrison (1998) and Esteban et al. (2002) could not be located. However the file contains 88 references

and provides a temporal coverage of his works (1869-1905) greater than those of Harrison (1998) or Esteban et al. (2002). Furthermore, the file is spreadsheet allowing sorting by: authorship form used, year, journal/publication type, and major subject.

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