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Nineteenth-Century Popular Science Magazines, Narrative, and the Problem of Historical Materiality

> This is precisely the vindication of the popular lecture as an educative and instructive agency. So many of us are like children; we like to be "told a story", and the telling of the story excites in us a desire to know more. (Wilson, 1898, p. 95)

In his *Reminiscences of a Lecturer*, Andrew Wilson emphasizes the importance of narrative to popular science lecturing. Although Wilson promotes the teaching of science as useful knowledge in its own right, he also recognizes that the way science is taught can encourage audiences to take the subject up and read further on their own. Form, according to Wilson, should not be divorced from scientific content and lecturers should ensure that not only is their science accurate, but that it is presented in a way that will provoke curiousity and stimulate interest. In this paper I discuss the influence of narrative in structuring scientific objects and phenomena, and consider the consequences of such presentations for historical research. As scientific journalism necessarily weaves both its intended audience and the objects under discussion into its accounts, these texts, I argue, demand that we recognize their nature as social relationships inscribed in historical objects.

* * *

Andrew Wilson's emphasis on form is important because, like many late nineteenth-century scientists, he depended upon the press for a large portion of his income. Although there was money to be made writing for the diffuse scientific community in nineteenth-century Britain, science was acknowledged as an important component of wider culture and so something that should be reported within non-scientific titles. Consequently, writers like Wilson had to bear in mind both the scientific literacy of their intended audiences, and the wider concerns of the title to which they submitted content. Wilson himself contributed a weekly column to the *Illustrated London News* called "Science Jottings." Although the *Illustrated London News* was ostensibly a newspaper, its weekly periodicity positioned it somewhere between the newspaper and the magazine. This was reflected in its content: although news

occupied the first few pages of each number, many of its columns were devoted to regular features, literary pieces, and social commentary. Wilson's "Science Jottings" are part of this magazine-type content: they rarely address the scientific news stories of the day; instead, each takes a single scientific subject and relates it in a conversational manner that leads from the specific and everday to the technical and abstract. This genre of journalism, therefore, is similar to the popular lecture and Wilson, like many of his colleagues, combined his literary production with his lecturing, publishing lectures as articles, and memorializing both as books (Wilson, 1887).

There was a political component to such journalism in the late nineteenth century. H.G. Wells began his career as an author by contributing articles on science to a wide range of periodicals (Hughes and Philmus 1973). In an article published in *Nature* in 1894, Wells discusses the importance of such writing to science:

> The fact remains that in an age when the endowment of research is rapidly passing out of the hands of private or quasi-private organizations into the hands of the State, the maintenance of an intelligent exterior interest in recent investigation becomes of almost vital importance to continued progress (Wells 1894, p. 300; Lancashire 1988).

The state endowment of scientific research was controversial in late nineteenth-century Britain as many argued that it would compromise disinterested research. However, the editor of *Nature*, Joseph Norman Lockyer, was a vocal supporter of state-endowment, and he used the journal to campaign for increased funding for science. In "Popularising Science", Wells insists that the professional model sought by the elite scientists clustered around *Nature* could only be maintained if the profession was recognized and approved by the wider public beyond its readers. This role, he suggests, should be undertaken by those best qualified to do so – specifically scientifically trained writers such as himself. Railing against current publications for their want of what he calls "philosophical quality" and their often miscellaneous subject matter, Wells offers advice to the aspirant scientific writer in an attempt to ensure only the "right" science would be communicated (Wells 1894, p. 300). His article, therefore, is part of a wider imperialist attempt to dictate the actual nature of things through a discourse which derives from, whilst simultaneously re-affirming, an institutionalized, professionalizing elite. However,

as science becomes more specialized, it necessarily becomes more difficult for those outside its codes to understand: Wells therefore must provide a model for science communication that accommodates such discursive boundaries, while ensuring that his audience are not alienated from the subject matter they exist to define.

Scientific objects and phenomena are notoriously hard to detect and, paradoxically, often become more mediated as scientists attempt to get closer to them. The whole panoply of laboratory, equipment, and experiment is designed to provide a stage upon which as yet unknown things can happen in a quantifiable and repeatable manner. Because viruses, radioactivity, chemical reactions, and many other now familiar phenomena are not immediately self-evident, at one stage in their histories they simply did not exist in the human world. Of course the actions of these various things did exist, but the objects which are now claimed as their causes did not. Bruno Latour, following the things from the lab to the page, claims that science draws its power and constructs its objectivity through a rhetoric that leads the reader back to these objects (Latour 1987; 1999). Suspected objects become more solid as scientists mobilize evidence that points to their existence beyond the text; should a reader want to dispute what is recounted, then they would have to mobilize evidence from a laboratory of their own. As Lorraine Daston writes, "[s]cientific objects may not be invented, but they grow more richly real as they become entangled in webs of cultural significance, material practices, and theoretical derivations" (Daston 2000, p. 13). It is only through an increasing dependency upon the human world that objects are acknowledged as independent entities within it.

This is problematic for popular science as it is often the mediating aspects of scientific practice that make it inaccessible for non-expert readers. Wells's solution is to re-present the object in a way that can appeal to these readers while not over-simplifying the science. He calls this "inductive reading", and interestingly notes that it already exists in another domain of literature:

> The taste for inductive reading is very widely diffused; there is a keen pleasure in seeing a previously unexpected generalization skilfully developed. The interest should begin at its opening words, and should rise steadily to its conclusion. The fundamental principles of construction that underlie such stories as Poe's "Murders in the Rue Morgue" or Conan

> Doyle's "Sherlock Holmes" series, are precisely those that should guide a scientific writer. These stories show that the public delights in the ingenious unravelling of evidence, and Conan Doyle need never stoop to jesting. First the problem, then the gradual piecing together of the solution. They cannot get enough of such matter (Wells 1894, p. 301).

By recasting the scientific description of an object or phenomena as the solution to a mystery, the popular science writer can move from the familiar to the scientific in a way that maintains the reader's interest while replacing the former with the latter as the "real" explanation.

Although Wells presents inductive reading as new, it is actually quite a common narrative strategy in the popular science magazines of the period. By recommending it to the elite scientific readers of *Nature*, Wells is endorsing this model of science communication over the others that featured in the popular science press. What distinguishes inductive reading is its emphasis on structure over rhetorical style. Wells, echoing Karl Pearson in the *Grammar of Science*, insists that a scientific paper for popular reading "may and should have an orderly progression and development" (Wells, 1894, p. 301; Pearson 1892). This is in contrast to what Wells characterizes as "Badgers and Bats" articles:

> He writes first of all about Badger A. "We now come", he says, "to Badger B"; "then another interesting species is Badger C"; paragraphs on Badger D follow, and so the pavement is completed. "Let us now turn to the Bats", he says. It would not matter a bit if you cut any section of his book or paper out, or shuffled the sections, or destroyed most or all of them (Wells 1894, p. 301).

The narrative strategy espoused by Wells grants the author teleological control over any content, and should provide enough narrative suspense to sustain the interest of the reader without the need for further rhetorical flourishes. He argues that "scientific exponents who wish to be taken seriously should not only be precise and explicit, but absolutely serious in style" (Wells 1894, p. 301). This seriousness ensures that science writing is a proper employment for the scientist while criticizing many of those who traditionally contribute popular science to the periodicals. In attacking "Badgers and Bats" articles, Wells suggests that this sort of subject matter,

chosen only for its alliteration, is unscientific and therefore not proper matter for scientists to discuss.

These two types of writing are often present in the same title. *Hardwicke's Science-Gossip* was established by Mordecai Cubbitt Cooke and Robert Hardwicke in 1865 as a fourpenny monthly. In 1872 John E Taylor, a popular and prolific scientific author and lecturer assumed the editorship and proprietorship of the title from Cooke, editing it until ill-health and declining sales forced him to give it up in 1893. The title was resurrected in January 1894 by two entomologists, John T Carrington and Edward Step, who raised the price to sixpence. *Science-Gossip* was closely associated with the widespread natural history communities and the spectacular cover gestures towards this heritage (figure 1). The dramatic Darwinian struggle for existence in the centre is surrounded by symbols of amateur practice: at the top microscopes and telescopes point at both the small-but-close and far-but-large objects of natural history and astronomy respectively; the elaborate border combines animals from each major taxonomical group with the seasons that dictate the rhythm of the natural world; and of course the advertisement for Epps's Cocoa reminds us of the commercial concerns of the journal. When Carrington and Step took over they sought to alter the content of the magazine by encouraging more contributions from professional science writers. This failed as they could not afford to pay the big names and *Science-Gossip* continued to rely mostly on the amateur community and the free copy they provided.


MONTHLY FOURPENCE.
By Post, Fivepence.
Nos. 1 to 228 (with few exceptions) may be had, 8d. each.—Nos. 229 to date, 4d. each: excepting Nos. for Feb. & Mar. 1884, Feb. 1885, Jan. 1888, Jan. 1890 (out of print).
No. 328.—April, 1892.
Hardwicke's
Science-Gossip:
Monthly Medium of Interchange and Gossip
FOR STUDENTS AND
LOVERS OF NATURE.
EDITED BY J. E. TAYLOR, F.L.S., &c.
Contents.
A Few Remarks on Our Commonest Spiders.—Illustrated.
Somersetshire Sand-Pits: their Geological History.—With Map.
Contributions Towards a List of the Mollusca of Herefordshire.
Notes on New Books.
Notes on the Infusoria. II. Flagellate Infusoria.—Illust.
British Poisonous Plants.—Illustrated.
Secreting Glands in the Feet of Flies.—Illustrated.
Science-Gossip.
Zoology.
Microscopy.—Illustrated.
Botany.
Geology.
Notes and Queries.
Notices to Correspondents.
SPRING
SUMMER
AUTUMN
WINTER
CHATTO AND WINDUS,
PICCADILLY, LONDON, W.
[All Rights Reserved.]
EPPS'S (GRATEFUL COMFORTING) COCOA.

Figure 1.

These two types of writing – that popular with the amateur naturalists and the popular form promoted by Wells – were often side-by-side in *Science-Gossip*. In November 1892, Jason Saunders's "Woodland Wanderers or the Mycetozoa" presents a typical amateur naturalist piece that revolves about a personal account of a particular type of natural object, the mycetozoa. From its opening paragraph onwards it lacks the clarity and seriousness demanded by Wells:

> Not that our woods and shady coppices are the only haunts of the strange creatures designated above [i.e. the "Woodland Wanderers" of the title], but these are their homes *par excellence*. Wherever there are shade and moisture, associated with decaying vegetation, there will these curious and interesting organisms almost certainly exist (Saunders 1892, p. 250).

Whereas Wells demands scientific precision and accuracy, Saunders prefers to enthuse in his own terms. He dismisses taxnomical concerns as a "rage" which "may possibly be carried to an absurd length" and then doubts "if there be any truth in the assumption that all the creatures that inhabit the earth, have descended from some few primordial forms of life" (Saunders 1892, p. 250). Although evolutionary theory remained controversial in wider society, it was by this time scientific orthodoxy and in rejecting it along with taxonomy Saunders signals his marginality within the scientific community. From such a position Saunders can disregard this impersonal body of knowledge, and instead assert his own experiential knowledge in its place.

This assertion of individual knowledge radically alters the status of the object being described. The combination of the playful tone of lines like "[t]he *we* is not editorial, but covers two personalities, a juvenile enthusiast still in his teens and the writer, the latter often finding material assistance from the sharp vision of more youthful coadjutor" with more literary evocations of the environment firmly link the mycetozoa with both the contingent moment of its discovery and the narrative of the author (Saunders 1892, 250). By writing himself (and his partner) into the account, Saunders ensures that the reader can only encounter the object through the prism of the authorial persona. As such, the narrative represents a single observation, of an uncertain objectivity, and cannot claim, but equally does not aspire to, the status of impersonal and definitive knowledge. Instead it is accepted as an inductive account, linked to a time and space. Saunders's article is a contribution from a member of a

community, a fellow-worker in amateur science, and is one of the many which fills the pages of the magazine. In this way the natural objects that lie outside the text prompt further contributions, comparisons and comments and so become the points around which the social network of readers coheres.

The following article in the November 1892 number of *Science-Gossip* is Edward A Martin's "On the Underground Geology of London". This third person narrative immediately sets out the objects of the paper while simultaneously distancing the reader from the subject matter. For example the opening paragraph:

> There are few subjects of geological interest which have a greater fascination for the theorising student, than the subject of the position which the various geological strata have, and the directions which they take, under our great metropolis.

reveals the scientific object even while retaining it as the subject of authorial discourse (Martin 1892, 251). From here the narrative is carefully structured, just as Wells recommends, allowing Martin to slowly develop it according to his own terms. The citations at the end of the third paragraph introduce the names of eminent geologists such as De La Bêche and Prestwich, building upon their work while locating the text within a larger narrative of geological research. The numerical figures, introduced at the opening of the second paragraph in the second column are what Bruno Latour calls inscriptions – textual components that can be traced directly to the object being described. As these figures are validated by the earth itself, they are incontestable unless readers have the resources to gather their own evidence. As the reader of *Science-Gossip* is not figured as an expert geologist, Martin can build confidently upon them to recreate the strata beneath London upon the page of the magazine in a series of diagrams. Instead of linking the object with the narrative of personal discovery, Martin's account posits it as an essential entity outside the text which confers authority onto his textual recreation. This is a tautological, highly regulated piece of writing which, through a myth of distance, seeks to create an object which can be appreciated by the reader but remains under the control of the author. Instead of a single, contingent observation narrated by an observer, we have a panoptic vision, presenting the information as objective fact which we are privileged to share.

It is this form of knowledge, in which an object is elucidated through the careful revealing of evidence, that Wells supports as successful popular science. Rather than the rambling accounts of the amateur naturalists, full of incident and enjoyment that could bind them together in a common pursuit, Wells's serious popular science seeks pleasure in its own careful representation of scientific objects. Slavoj Žižek, in *Looking Awry*, claims the detective story is inherently self-reflexive:

> It is a story of the detective's effort to tell the story, i.e. to reconstitute what "really happened" around and before the murder, and the novel is finished not when we get the answer to "Whodunnit?" but when the detective is finally able to tell "the real story" in the form of a linear narrative (Žižek 1991, p. 49).

Equally, the allocation of pleasure is strictly controlled in popular science: readers are not encouraged to wonder at the marvels of the object or phenomena beyond the text, but rather how the expositor writes it into his or her text. For instance Martin's piece concludes with a reminder that the actual strata are not reducible to the diagrams:

> In referring to the accompanying diagrams it must not of course, be overlooked that the scale used is one which exaggerates tremendously the depth of the strata, in proportion to the extent of the surface shown. A true representation would be secured were the horizontal distance multiplied about fifty-three times, but this is obviously impossible in the case of a simple diagram (Martin 1892, p. 254).

Although this does allude to the size of the area covered by his diagrams – and so hints at the scale of the object under discussion – the reader's attention is returned to the patterns that they reveal on the page. It is the author's handling of this material that provides access to the object: rather than wonder at the sublimity of natural phenomena beyond the text, the reader instead wonders at the version within it.

Just as Martin alludes to the impressive scale of his research, so detective fiction necessarily involves an element of voyeurism in the contemplation of the crime scene that is subsequently legitimated by restoration of order by the detective. Consequently, there is always an element of spectacle in popular science writing, and this is often acknowledged within the textual account. *Knowledge* was also a six penny popular scientific monthly and so was in direct competition to *Science-*

Gossip from 1894. Its first editor and proprietor Richard Anthony Proctor founded it as a cheap weekly rival to *Nature* in 1881 however, unable to draw upon the high-profile contributors that were attracted by *Nature*, he was forced to raise the price and reduce the periodicity in 1885. Proctor, like Lockyer, was an astronomer, but he was a vocal opponent of the endowment of research and was involved in several disputes with leading astronomers including the Astronomer Royal George Biddell Airy. Although well-regarded as both an author and an astronomer, Proctor could not rely on his own copy to make *Knowledge* pay and he had to depend on a number of popular science articles to sustain a readership and circulate the magazine. Upon his sudden death in 1888 another astronomer, Arthur Cowper Ranyard, took over the editorship and proprietorship and retained the increasingly divergent mix of research and popular articles. The magazine lasted until 1917 and, reflecting the wider trend in scientific culture, absorbed the more amateur-oriented *Science-Gossip* in 1902.

The cover of *Knowledge* signals its history and readership (figure 2). The sub-title "Simply Worded – Exactly Described" pre-empts Wells's description of popular science writing, while the curved title "Knowledge" above the "an Illustrated Magazine of Science" alludes to the cover of *Nature*, echoing its "A Weekly Illustrated Journal of Science" (Lightman 2004). Each number of *Knowledge* was contained within a substantial advertising wrapper for a range of scientific instruments and publishing lists. The instruments tended to be aimed at reasonably well-off amateurs – especially astronomers – but the publications were a mix of scientific and nonscientific titles, indicating a fairly leisured, book-buying readership. After Ranyard assumed control of the title, it quickly gained a reputation for its visual material. Ranyard was one of the first to regularly employ photographic reproduction in his magazine, and these images allowed his readers unprecedented access to photographs which previously had to be rendered in another reproductive code (such as engraving or lithography) prior to inclusion. These collotypes were usually reserved by Ranyard for the discussion of astronomy, allowing his readers to see photographs that would otherwise remain beyond the text and usually in the possession of a few individuals or learned societies. However, he also used them as a lure to encourage contributions from other writers. E.A. Butler was a regular contributor of serial articles on insects and nearly every number of *Knowledge* between 1889 and 1894 contains an article by him. In 1890 Ranyard

permits Butler to reproduce a magic lantern slide (figure 3) to illustrate his serial 'The Common Flea'. The image confronts the reader with an object that is both familiar and slightly strange. It is too transparent, too flat, and yet its overwhelming reality is both revolting and compelling. Isobel Armstrong describes the voyeuristic pleasures that the miscroscope afforded the nineteenth-century viewer: the mediating instrument is elided as the viewer is propelled into strange proximity to these uncannily still objects (Armstrong 2002, 30-36). Yet this position is carefully regulated when the microscope is replaced by a photographic reproduction and enlargement. By subsituting the page for the mediating action of the instrument, the viewer is fixed at a single scopic site, reallocating pleasure from the manipulable object beyond the text to the one that has been combined with it.

PRICE SIXPENCE.

KNOWLEDGE

AN ILLUSTRATED

Magazine of Science

SIMPLY WORDED—EXACTLY DESCRIBED.

EDITED BY A. COWPER RANYARD.

Vol. XIV. [All rights reserved.] DECEMBER, 1891. No. 74.—New Series.

LONDON: WITHERBY & CO., 326, High Holborn, W.C.

Figure 2.

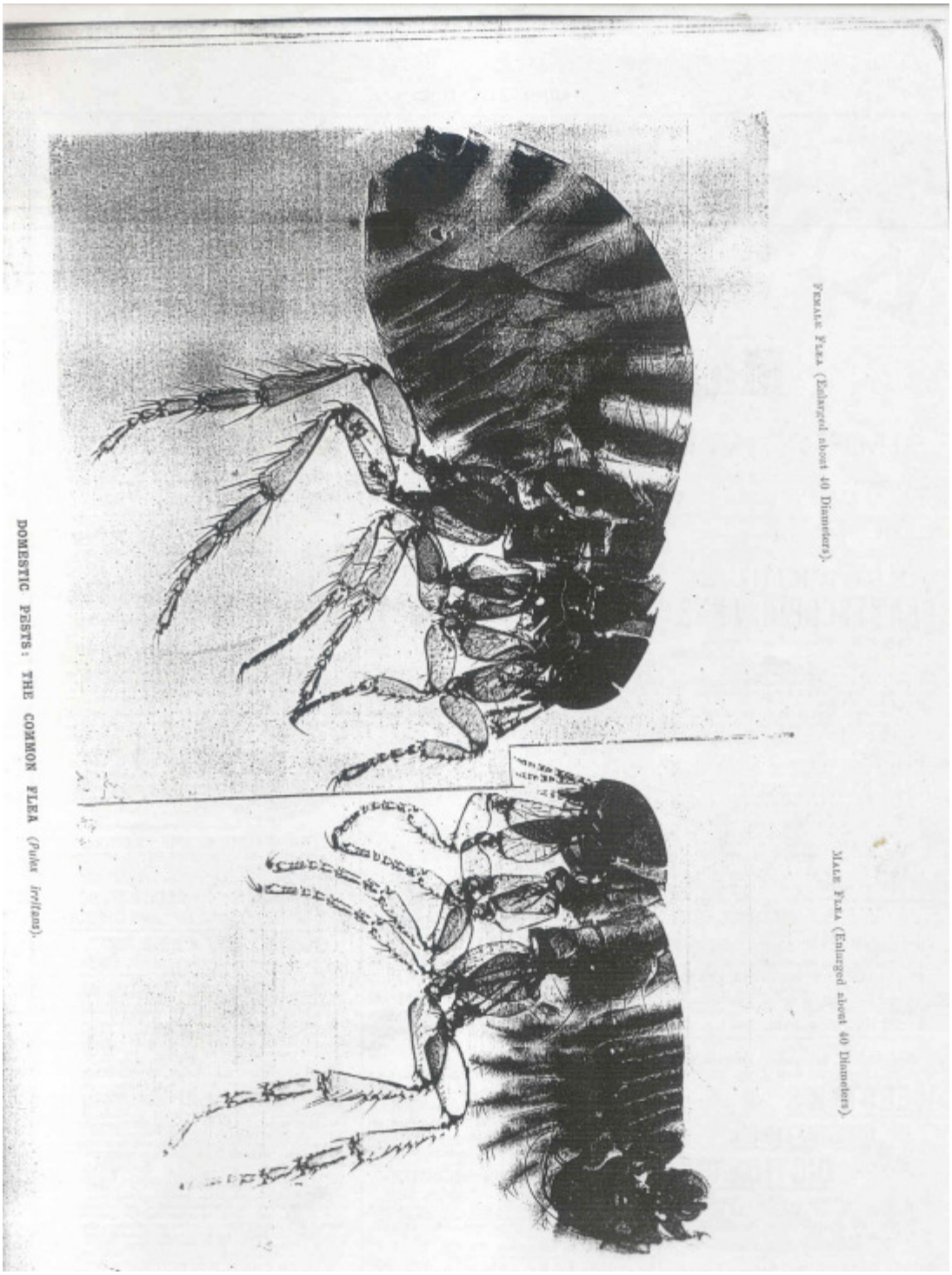

Figure 3.

The letterpress accompanying the image is peculiarly overwritten. Beginning in *media res* (it is a serial article after all) it opens with a discussion of the digestive system of the flea that combines a detailed physiological account and diagram with gory details of function. The oesophagus, we read, is "a rather short and narrow tube leading into a thick-walled gizzard, which, again, opens by its broader end into

a capacious bag, the stomach, big enough to hold a large draught of blood, such as the insect is only too eager to suck in whenever it can get the opportunity." Its alimentary canal "when gorged with blood, can be rapidly emptied by the insect, and its contents ejected with considerable force, when a new and good supply of food presents itself before the last meal is disposed of." These abstract details, which can only be imagined, are related to the everyday:

> The dark stains on linen, that indicate where fleas have been, consist of their dried excrement, and are composed of the undigested remains of the blood corpuscules contained in the food. Judging from the fact that rooms that have been long unoccupied are sometimes found to be swarming with fleas, it would seem that the perfect insects can subsist for a time without their customary food, although they are rapacious and insatiable enough when it is available (Butler 1890, p. 41).

Such shifts from the abstract to the familiar mirror the politics and erotics of the reproduced photograph. Butler explains why his images look like they do (the sample has been flattened, and parts of its internal anatomy have been dissolved out to render it transparent), thus accounting for the difference between everyday experience and the magnified image of the flea. The grotesque details and the reproduced image thus serve the same purpose: they make the familiar strange in order that his narrative can account for this difference.

As Butler revels in the grotesque, his narrative tends to deviate from Wells's insistence on seriousness. However, the pleasure in these details aids the process of substituting the textual account of the flea, including the images, for the flea that exists beyond the text. Just as the cost of indulging in the spectacle of the crime scene is assent to the detective's restoration of order in detective fiction, so in Butler's article enjoyment of the grotesque is subject to his rendering of the object. Drawing on Lacan, Žižek claims that objects in detective fiction are like those in dream interpretation, with the detective as the analyst. He writes that dreams, like the scene of the crime, are doubly inscribed. On the manifest level they seem to possess an organic unity, but the detective must read through this "imaginary unity", and reveal the encoded level beneath (Žižek 1991, pp. 51-3). Butler, like Martin in *Science-Gossip*, unravels the unity represented by the everyday object and makes it strange in order to reveal its true accounts through their narrative. The popularizer

here is both the murderer and the detective, the dreamer and the analyst, and this symmetry allows them to speak completely for the object, appropriating its materiality as material for the telling.

It is in the restoration of order that popular science subtly rearticulates its objects as objects of desire. In the accounts of the amateur naturalists it is the whole experience, which the author narrates in order to emphasize its commonality, that allows the object act as a focal point for a community of readers. Like a Sherlock Holmes case, the popular science of Wilson, Wells, Martin and Butler renders the familiar world strange, bewildering the reader before explaining the strangeness of the 'case' with a Holmesian dénouement. In neither form of science writing can we gain unmediated access to the objects of the past. These objects have been translated, brought within the text, and then socialized within a historical and cultural context. Rather than conceive of popular science journalism as accounts of objects that exist beyond the text, whether in the past or in the present, we should instead consider how the objects are related within the text. Andrew Wilson suggests that all readers are left unfulfilled by a successful narrative, and are eager to learn more. However, this pleasure is predicated on the historically contingent transformations of the material world that underpins both the preparation of scientific objects and the processes of publishing. Although Wilson hopes his readers will go on to develop an interest in science, he also hopes they will go on to buy more of his books. It is only by linking the words and images on the page to the materials from which they are derived that we can understand the otherwise muted cultural histories of things, whether scientific objects or the various things that make up the subjects of print journalism.

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Illustrations

Figure 1: title page of *Hardwicke's Science-Gossip*, ed. J.E. Taylor, 28, November 1892. Shelfmark: PP.1979

Figure 2: Title page of *Knowledge*, ed. A. Cowper Ranyard, 14, December 1891. Shelfmark: PP.1447.BB

Figure 3: 'Domestic Pests: the Common Flea (*pulex irritanis*)', from an original by the Direct Photo Eng. Co. Ltd, in *Knowledge*, 13, January 1890, facing 41. Shelfmark: PP.1447.BB

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